Rural Electrification Policy and Off Grid Solar: Sector Engagement Strategies in India and Beyond

Victoria Anne Plutshack

Peterhouse

Cambridge Centre for Environment, Energy and Natural Resource Governance

Department of Land Economy

University of Cambridge

This dissertation is submitted for the degree of Doctor of Philosophy

December 2018

DECLARATION

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text.

It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text

In accordance with the Department of Land Economy guidelines, this thesis is does not exceed 80,000 words.

Signed:____

Date:____

Victoria Anne Plutshack

University of Cambridge

Rural Electrification Policy and Off Grid Solar: Sector Engagement Strategies in India and Beyond

Victoria Anne Plutshack

Summary

1.1 billion people currently live without access to electricity. Sustainable Development Goal #7 advocates for clean, affordable energy for all by 2030, but most of the work of electrification is spurred by national electrification efforts. How rural electrification policies attempt to engage market actors, and the impact that these policies have on enterprises, is crucial to understanding what makes policies effective. This thesis begins by creating a typology of rural electrification policies in order to improve comparison and contextualisation of individual policies. Within this typology, the research explores the relationship between programmatic policies and market actors (enterprises). Given India's history of rural electrification programmes and its well-developed off grid solar market, the thesis then takes India as a case study and explores on two of its off grid solar programmes: the Decentralized Distributed Generation Scheme and the off grid component of the Jawaharlal Nehru National Solar Mission.

In depth interviews explore how enterprises' business models respond to policy change, their political strategy and how end users are selected. Findings suggest that enterprises respond quickly to changes in their policy environment, and a single change can have large knock-on effects within the business model. Political strategies are impacted by a number of factors both exogenous and endogenous to the enterprise, which can limit engagement with programmes. Finally, the target populations for rural electrification programmes are not necessarily the ideal customers for enterprises, even for those selling off grid products. While the interviews focus exclusively on India, these findings more generally suggest that governments must support the market that their policies require.

Preface

The conceptual framework developed in Chapter 5: Factors influencing the Political Strategy of Enterprises was developed from work done in collaboration with Dr Subhanjan Sengupta. The data and analysis is completely my own, with Dr Sengupta offering feedback. Section 5.3 offers further information. All words are my own.

Dedicated to those in the dark

ACKNOWLEDGEMENTS

While it is impossible to mention all those who contributed to this work of scholarship, there are some who cannot go unmentioned. Firstly, I would like to express my gratitude to the Department of Land Economy for funding my studies, and for the resources and support for my fieldwork. My gratitude also goes out to my supervisor, Dr Jorge Viñuales, who has offered feedback and enthusiastic support throughout the process. I would also like to acknowledge my colleagues in the Cambridge Centre for Environment, Energy and Natural Resource Governance for their camaraderie and insights over the years. Special thanks must go out to Tibisay Morgandi and Martina Kunz: two wise women, good office mates, and great friends.

Much of this thesis relied on fieldwork undertaken in India in the spring of 2016. This work could not have been done without the sponsorship of the Centre for Energy, Environment and Water, and the great support of Abhishek Jain. I would like to extend my thanks also to each of the individuals that were interviewed in the course of this work. Every minute generously given to this research is greatly appreciated, and it is my greatest hope that they were minutes well spent. I would also like to extend my gratitude to Dr Subhanjan Sengupta, from a bumpy car ride in Uttar Pradesh to co-authors and friends, thank you for all your support and feedback. A special mention must also be made of the wonderful weeks spent in Bihar with the Ahmad family, without such incredible company, generous support and amazing food, much of this work would not have been possible.

Finally, a few words must be said for the communities that supported me through these challenging years. My thanks go out to the fine college of Peterhouse, who offered friendship and funding. A special thanks to those Petreans who helped through some of my most stressful moments: Alice Rose, Joanne Usher, Laura Thesing, Livvy Elder, Philipp Jacob, Erik Pickering, Nathaniel Zetter, Fiona Hughes, and Simone Hanebaum. External gratitude belongs to Agniya Dremach, a friend among friends, for her effortless support. Of course, no acknowledgements would ever be complete without thanking Michelle Quay, my second self, without whom this thesis simply would not exist. Last thanks are reserved for my family: Alex, Anne and Lee Plutshack. With your love and support, anything is possible, including, perhaps, this thesis.

CONTENTS

List of Tables

List of Figures

List of Abbreviations and Acronyms

CEA	Central Electricity Authority
CSR	Corporate Social Responsibility
DDUGJY	Deendayal Upadhyaya Grameen Jyoti Yojana
DDG	Decentralised Distributed Generation
DISCOM	Distribution Company
ESCO	Energy Service Company
ESMAP	Energy Sector Management Assistance Programme
GoI	Government of India
IEA	International Energy Agency
JNNSM	Jawaharlal Nehru National Solar Mission
LMIC	Low- and Middle-Income Country
MFI	Microfinance Institution
MNRE	Ministry of New and Renewable Energy
MoP	Ministry of Power
NABARD	National Bank for Agriculture and Rural Development
NAMA	Nationally Appropriate Mitigation Actions
NBFC	Non-Banking Financial Companies
NPM	New Public Management
PPP	Public-Private Partnership
RE	Rural Electrification
REC	Rural Electrification Corporation
REP	Rural Electrification Policy
RGGVY	Rajiv Gandhi Grameen Vidyutikaran Yojana
RVEP	Remote Village Electrification Programme
SE	Social Enterprise

SHG	Self Help Group
SHS	Solar Home System
SME	Small and Medium Size Enterprise
WB	World Bank

List of Appendices

1 INTRODUCTION

1.1 Introduction

It was a sunny February morning in New Delhi, and I was perched on a plush chair in a small conference room. It was my first week in India and the first interview of my fieldwork. Next to me, animatedly answering my questions, was the founder of a solar social enterprise. The business had started out providing a range of technologies to address rural challenges – clean drinking water, pest control, basic lighting. He was explaining how the company had landed on their current business model:

> "I realised that the real challenge in India was distribution, and setting up the last mile, and as a person also I found I was more excited to work with people than with that. So we pivoted the model and we started solar home systems, which is more customers"

Or it should have been, but despite the reasonable price, no one was buying "off the shelf". That is when the company found financing for their customers through the National Bank for Agriculture and Rural Development (NABARD) and business picked up. Political changes put an end to that approach:

> "Then in 2014 the government again changed - the Modi Government, the right-wing Government came in. And they decided to remove all the subsidies, all the bank financing for home systems, which kind of hit us hard again"

So what did they do?

> "So the model didn't work anymore, so our sales are falling, which is when we entered micro grids."

When I spoke to this company last – ENT11, in my coding – they still had a few areas where they were supporting their old solar home system customers or providing solar home systems for community and public lighting projects. Now, they do not even mention solar home systems on their website. It is microgrids or nothing. As the conversation unfolded, the change in technology had shifted their customers. They had moved their geographic focus to a different state. Their financial arrangement with the consumer had changed, impacting whom they could reach. They added more grid-connected projects to finance the off grid work. All this because the Jawaharlal Nehru National Solar Mission (JNNSM) had cancelled its subsidy and financing.

This might seem surprising. ENT11 had been taking advantage of the JNNSM's Off Grid Scheme as it was intended. The Government of India had prioritised electrifying rural areas and had identified off grid solar systems as one way to do it (MNRE, 2012a). How did the government want these types of enterprises to help them reach their goal? How were these policies intended to engage enterprise, and what impact were they actually having on the market? It was not simply a matter of losing customers: some enterprises were leaving the market; some were shrinking or scaling up; some enterprises were metamorphosing into completely different companies altogether. All of this was likely to impact the end user. To quote my interlocutor:

> "So [we] realised that we have to take it in our own hands, and otherwise, poor people get shafted all the time in this country - actually, everywhere in the world."

1.2 SDG #7, Off Grid and the Private Sector

1.2.1 Global policy support for off grid

Energy access is a cornerstone of the United Nations' 17 Sustainable Development Goals. SDG #7 aims to ensure access to affordable, reliable, sustainable and modern energy for all by meeting five 2030 targets:

> "By 2030, ensure universal access to affordable, reliable and modern energy services
> "By 2030, increase substantially the share of renewable energy in the global energy mix
> "By 2030, double the global rate of improvement in energy efficiency
> "By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology
> "By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support" (United Nations, 2015)

This thesis focuses on addressing the first and second targets of SDG 7 by exploring rural electrification policies (energy access) that promote solar energy (increasing renewables). These are primarily off grid solutions, which include solar home systems (sometimes called standalone solar), micogrids and minigrids. Solar home systems provide power for a single households, whereas solar microgrids and minigrids power multiple households, as well as other buildings. Within this thesis, I define microgrids as having between 1-10kW capacity and minigrids as having 10kW of capacity or greater, which is the definition according the GoI's draft minigrid/microgrid policy (MNRE, 2016). It should be noted that since "microgrid" is the common vernacular for any decentralised grid solution, most enterprises occasionally referred to their products as "microgrids". However, this thesis will continue to use the capacity-based definitions outside of direct quotations.

If we are to meet SDG #7's goal of energy for all by 2030, nearly three quarters of additional connections must come through decentralised systems, 24% through standalone off grid and 30% through minigrids (IEA 2017, p 53, 89). This gives some idea of the importance of off grid technologies to global energy access in the next decade. Indeed:

"Sub-Saharan Africa in particular has seen significant growth in the role that decentralised systems play in providing access in rural areas over the last few years, and by 2030, off-grid and mini-grid systems generate the majority of the electricity used to bring access to rural areas. In developing Asia, which is home to countries like Indonesia and the Philippines with thousands of islands, two-thirds of electricity related to expanding access in rural areas comes from decentralised systems in 2030" (IEA 2017, p 50-51).

However, even in this new policy scenario, universal access will not be reached, and it assumes "strengthened policies, effective infrastructure planning and higher levels of strategic investment to keep pace with growing demand from strong population growth, particularly in rural areas" (IEA 2017, p 90).

One aspect of infrastructure planning that has changed over time is the relationship between grid and off grid solutions. Grid expansion has long been considered the primary approach to electrification, even in scenarios where distributed generation has had a large part to play, such as China's access expansion through microhydro power in the 1980s (Niez, 2010; Palit and Bandyopadhyay, 2017). However, as the scale of the challenge has come into focus, policies have incorporated off grid solutions, at first to reach those that are unable to get grid connected in the short term, and increasingly as a longer term complement to grid extension (Haanyika, 2006; Palit and Chaurey, 2011).

The move from grid-only approaches to off grid is also reflected in a move from assumptions of public financing to leveraging the private sector. In great part, this is because public resources are scarce in many low- and middle-income countries, and the private sector is viewed as a possible solution to tight budgets (Williams *et al.*, 2015). These changes have also taken place in the context of power sector reforms across Asia and sub-Saharan Africa, which have diminished incentives for utilities to connect additional customers (Haanyika 2006). Instead, governments have both invited private financing for off grid projects and created rural electrification agencies to prioritise new connections (Haanyika, 2006; Baldwin *et al.*, 2015).

1.2.2 Global investment trends in off grid market

Sure enough, global investment in the off grid market has increased, despite mixed views of government intervention in the sector. Increasing investments in pay-as-you-go solar companies suggest that private players anticipate profits, with the latest figures from 2018 showing an additional $511 million investments in solar home system companies (Bloomberg NEF, 2017). Solar home system and PAYG business models are receiving 81% and 91% of investments, respectively (Wood Mackenzie, 2019). Financing also predominantly goes to the SHS players in the field that have already achieved scale, such as Zola Electric, MKPOA and d.light (Wood Mackenzie, 2019). The majority of investments is flowing into East Africa where mobile money makes additional financing attractive (Wood Mackenzie, 2019).

Financing in the has come from multilaterals, bilaterals, governments and private investors, whose focus can influence how money is spent (Gujba *et al.*, 2012). Many of these multilaterals are development banks, such as the World Bank, the Asian Development Bank and the African Development Bank, which in the past have favoured large, grid-based projects (Subhes C Bhattacharyya, 2013).

Even smaller off grid projects, like minigrids, can provide a positive return on investment, but government policy still needs to help support private investment through prioritizing off grid, reforming subsidy regimes that favour fossil fuels, and implementing technology standards (Schmidt, Blum and Wakeling, 2013). Solar PV minigrid projects should be slightly less expensive than diesel-based projects, however, in high risk environments, PV projects require 95% more financing, becoming much more expensive than diesel-based projects (UNDP, 2018). UNDP identifies policy programmes and legislation as the primary approach to reducing risk for minigrid investment (UNDP, 2018). Meanwhile some have cited India's public off grid programmes as limiting the role of private investment in the sector, suggesting that the way in which governments design off grid policies influences the buy in from the private sector (Wood Mackenzie, 2019).

1.2.3 Evidence for the efficacy of policies

The literature that explores the design and success of off grid solar electrification policies falls into three categories: case studies of individual programmes, broader explorations of specific themes (ie role of financing), or a few limited comparative studies. Case studies of individual programmes attempt to assess the determinants for success or failure of rural electrification policies, but are still fairly few and far between. Some examples include an analysis of India's National Solar Mission, Bangladesh's solar home system programme, rural electrification in Zambia, and a rural energy service company programme in Fiji (Haanyika, 2008; Dornan, 2011; Harish and Raghavan, 2011; Urmee and Harries, 2011). Broader thematic explorations focus mainly on the challenges or barriers to off grid energy expansion, which can include regulatory or policy barriers, but just as often focus on financing, infrastructure, corruption, willingness to pay, technological and human capacity, training and skills development (Sovacool, D'Agostino and Jain Bambawale, 2011; Glemarec, 2012; Ahlborg and Hammar, 2014; Yaqoot, Diwan and Kandpal, 2016).

Finally, studies that attempt to compare rural electrification policies are scattered and casuistic in that individual countries are selected and some assumption of comparability is inherent in the design of the research. Comparisons commonly take place between four main countries: India, China, Brazil and South Africa (Liming, 2009; Niez, 2010). Liming compares the financing available for rural renewables in India and China, finding that India and China share a common emphasis on financing for the sector but that India has a more developed system of subsidies, financing and institutional support for rural renewables, as well as greater domestic, as opposed to international, investment (Liming 2009). Niez is more ambitious is comparing these four large countries and outlining the relevant policies for each, making an assessment of general success and drawing broader conclusions about the design of REPs (Niez 2010).

Some comparative studies are more ambitious. Sovacool uses extensive interviews (441) and secondary literature to draw conclusions about the success and failure of renewable energy access programs in Bangladesh, China, Laos, Mongolia, Nepal, Sri Lanka, India, Indonesia, Malaysia, and Papua New Guinea (Sovacool 2013). Javadi et al select approximately 40 countries and give cursory descriptions of their rural electrification policies, doing little to disentangle the different technologies and types of support available for each (Javadi et al. 2013). Examples also come from countries in very different bands of electrification rates (ie. Norway and India). However, an interesting feature of Javadi's analysis is the focus on the relationship between the public and private sectors:

"In this case [of rural electrification policy in Peru] the relationship between the private sector and the state, involve the private firms to rural electrification, and the role of local community in the decision-making process have to be considered. One of the main problems of electrification is the total government budget. […] Despite of separation of private and public sectors in electrification programs, based on government strategy, private sector involves with government policy." (Javadi et al. 2013)

To articulate that sentiment another way, despite electrification being considered the purview of the government, policies often have expectations for how the private sector or other market actors might be involved. Especially given the three requirements identified by the IEA – policy, infrastructure and investment – the relationship between rural electrification policy and market actors is perhaps particularly important (IEA, 2017).

If there is one takeaway from the comparisons above, it is that REPs take varying approaches to delivering off grid electrification, and little literature has explored how these approaches affect individual market actors. This is important because the characteristics of the off grid solar market are likely to impact the diffusion of these technologies, and the market is comprised of market actors. Therefore, an exploration of the way in which off grid programmes and legislation shape the market actors enable us to see the ways in which they shape the market.

LMICs across the world have taken similar steps to reaching unelectrified populations, although these policies have taken different approaches to engaging non-government actors, such as NGOs, social enterprises and the private sector. Does the arrangement of these actors within a policy impact its outcomes? In order to take the first steps to addressing that question, we must understand what are the arrangements being set up? How do the non-government actors function within that arrangement? And what are the possible impacts of that arrangement on the rural poor?

1.3 India as Case Study

1.3.1 Unelectrified population

India is an ideal case study for this topic for a number of reasons. First, as recently as 2016 over 240 million people in the country did not have access to electricity, which is nearly a quarter of the global population without access (IEA, 2017). India is made of 29 states and seven union territories, and infrastructure development varies by state. Electricity access is worse in Northern states, which have the lowest electricity access rates (IIPS, 2015). Figure 1.1 gives the official survey numbers from 2015, which is when this research began. Because of the lower electricity rates in these regions, I have focused my research on companies that work in these areas. The majority of my sample work across multiple states, but there significant overlap in Rajasthan, Bihar and Uttar Pradesh. Figure 1.1 illustrates the coverage of the sample. The darkest blue shows states represented by over five enterprises in the sample, the medium blue shows states represented by between two to five enterprises in the sample, and the lightest blue shows states represented by only one enterprise in the sample.

The country has made great strides in electrifying the population especially given its enormous size and geography. Between 1990 and 2016, the electrification rate increased from 45% to 85% (World Bank, 2017a). The political will for expanding electricity access culminated in the January 2019 announcement that all Indian households now had access to electricity (Dsouza, 2019). While in reality, there are still many households without electricity, the government's narrative of total access is in tension with the interviews in this thesis, which were collected fewer than two years before (Urpelainen, 2019).

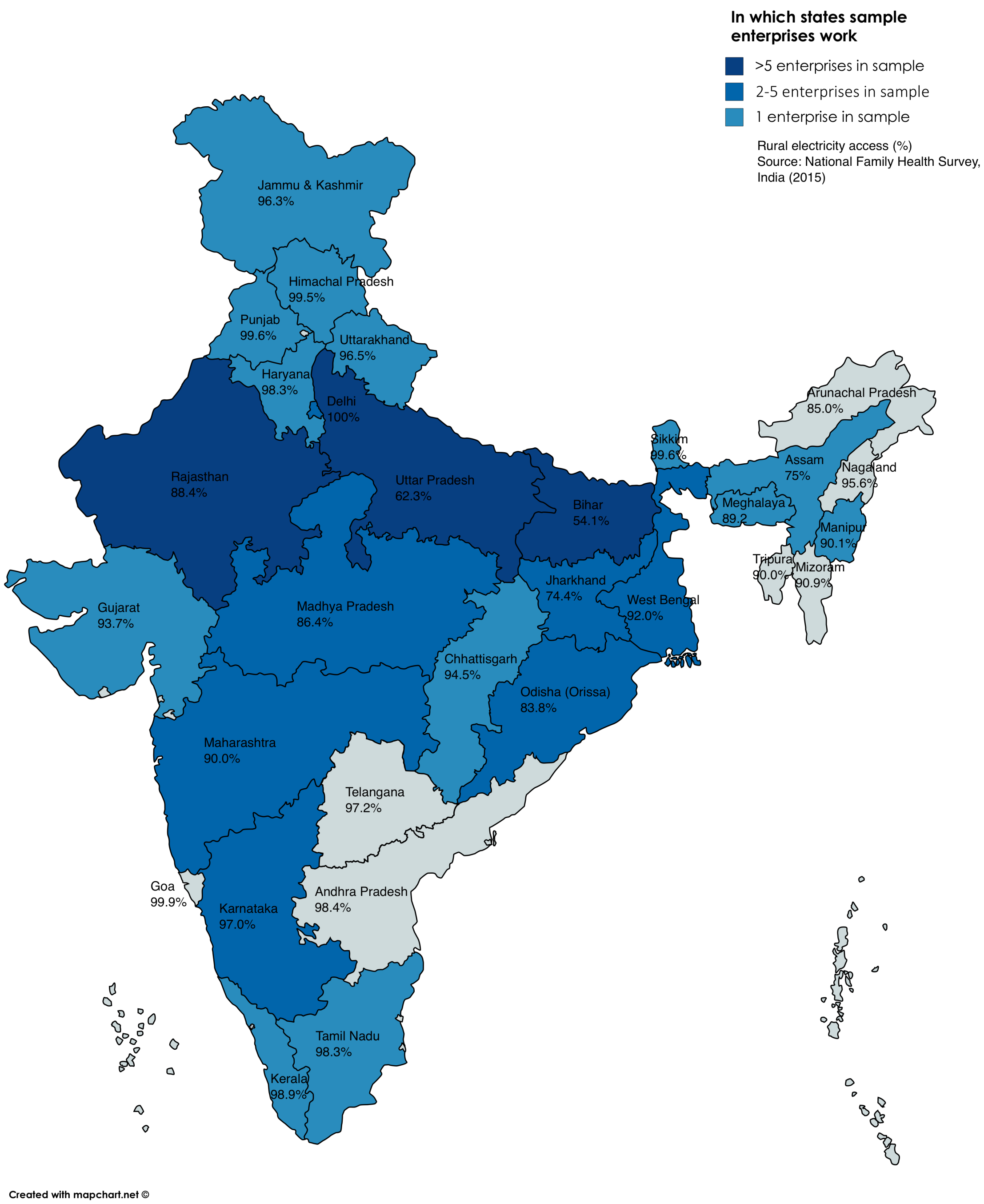

Figure 1.1: Coverage of enterprise sample and rural electrification rates (Source: IIPS 2015)

1.3.2 Solar Market

Finally, India has a history of supporting domestic solar energy production and distribution, which has led to a burgeoning solar industry. India currently has 345 GW of installed capacity, with approximately 20.5% of that capacity derived from renewable sources (MoP, 2018). However, as a nation with a growing appetite for electricity, there are concerns that demand is outstripping supply, and that this demand could increase significantly from 1130 TWh to 5528 TWh within 30 years (Hairat and Ghosh, 2017; CEA, 2018).

In addressing this demand issue, India has turned to solar energy. Studies suggest that, in addition to good general solar radiation conditions, 58% of the India's geographical areas is considered a 'solar hot spot' (Ramachandra, Jain and Krishnadas, 2011). Solar installations are booming and India has already reached many of its 2022 targets (BT, 2018). Even in the off grid space, there is a lot of growth. There are approximately 45-60 formal players in the market, with the smallest providing only a few hundred panels and the largest serving millions of customers (Singh, 2016a). Nevertheless, the market faces challenges.

1.3.2.1 Kerosene undermines off grid solar economics

The low rate of electrification in rural regions goes some way to explaining the political and social phenomenon of kerosene usage. India accounts for 15% of kerosene usage worldwide (Garg *et al.*, 2017). Kerosene and firewood are the primary fuels used in rural lighting and cooking respectively, and they are often used also as a supplement to other energy sources like liquefied petroleum gas (LPG) or electricity (Gangopadhyay, Ramaswami and Wadhwa, 2005; Rao, 2012; Lam *et al.*, 2016b). However, kerosene is relatively dangerous, both for causing fires and for damaging air quality, which can lead to respiratory infection (Rehman *et al.*, 2005). There is widespread dissatisfaction with kerosene, which can also be a challenge to access, but this has not been enough to cause a shift in demand for cleaner solar systems for lighting (Urpleinen, 2018).

Kerosene is subsidised by the government (as seen in Table 1.1), and these subsidies are supposed to target the poor and act as a redistributive policy (Rao, 2012). Subsidised kerosene is sold through the public delivery system (PDS) but private (and non-subsidised) actors entered the market in 1993 (Gangopadhyay, Ramaswami and Wadhwa, 2005; Rehman *et al.*, 2005). Kerosene is also bought on the black market for higher prices (Aklin *et al.*, 2017a). However, since the subsidised rations are based on cooking usage, but used for lighting in rural areas, it is not very effective in rural areas (Rao, 2012). Due to inefficiencies and health concerns, for years there has been discussion about limiting both kerosene subsidies, and the current government seems committed to ending the subsidies entirely (Gangopadhyay, Ramaswami and Wadhwa, 2005; Choudhary, 2017).

Year	Kerosene Subsidy	PDS Kerosene (Rs./Litre)
2002-03	2.45	8.98
2003-04	1.65	9.00
2004-05	0.82	9.01
2005-06	0.82	9.07
2006-07	0.82	9.09
2007-08	0.82	9.13
2008-09	0.82	9.19
2009-10	0.82	9.26
2010-11	0.82	11.90
2011-12	0.82	13.78
2012-13	0.82	14.86
2013-14	0.82	14.96
2014-15	0.82	14.96
2015-16	0.82	15.24
2016-17	0.82	16.69

Table 1.1:Kerosene Subsidies and Price (PPAC 2018)

Evidence suggests that solar systems, including lanterns, may be a less expensive, healthier and safer alternative, however, uptake of these new technologies remains low, perhaps because of low trust (Yaqoot, Diwan and Kandpal, 2015; Urpelainen, 2016). Concerns are that high kerosene subsidies undermine the market for solar systems (Garg *et al.*, 2017; Mills, 2017). That being said, as electrification spreads, so the use of kerosene has been decreasing, and this trend is expected to continue (Rehman *et al.*, 2005).

1.3.2.2 Discom disincentives

It is important to note, that every state in India has its own political and economic factors that influence energy access, but there are some general trends that have limited historical electricity access (Chatterjee, 2018; Sareen, 2018). The high costs of moving into rural areas, mixed with low revenues from poorer customers, disincentivises discoms' expansion into rural spaces. While high costs are certainly a by-product of moving into areas with poor infrastructure, it is also the case that the discoms have artificially high costs due to inefficiencies within the organisations (Palit and Bandyopadhyay, 2017). The fact that they cannot recoup all their costs from rural customers is also partially political; relief aid to farmers often comes in the form of amnesty from electricity payments and politicians run on offering subsidised electricity.

While these losses should be provided in a lump sum to the discom, as in many other Indian subsidies, this subsidy is often late or hard to access (Palit and Bandyopadhyay, 2017). All this makes discoms hesitant to expand electricity access. The discom challenge extends to the off grid space, as central grid expansion undercuts minigrid and microgrid development, since discoms are required to provide subsidised electricity rates to rural customers (Comello *et al.*, 2017).

1.3.2.3 Access to financing

Scholars cite financing as one of the greatest barriers to the uptake of off grid technologies (Hermes and Lensink, 2011; Agnihotri, 2013; Reeves and Sabharwal, 2013). Although the World Bank had financed a $10 million loan to the Government of India in 1994 for the development of a solar market, there were challenges pushing the subsequent credit programme into rural areas (Miller and Hope, 2000). Moving forward, greater emphasis was placed on tapping into India's extensive network of rural banks as a means to reach rural customers with financing (Liming, 2009). Nevertheless, there are still customers without access to formal banking, and that is where microfinance steps in.

In India microfinance institutions (MFIs) and informal savings collectives such as self help groups (SHGs) attempt to improve the penetration of financing deeper into rural areas. Microfinance offers small loans to those without access to traditional forms of banking, and in India it typically takes the form of MFIs, which can be NGOs or non-bank financial companies (NBFCs), or SHGs that are linked to banks (Bansal, 2003; Singh, 2009; Priyadarshee and Ghalib, 2011). While SHGs and MFIs operate separately, they work together as part of the same financial ecosystem. SHGs, which were created initially in the 1980s and developed in the 1990s, organise the rural poor into groups. Although SHGs may be constituted of men or women, part of their success is considered to be the support and financial assistance to women (Kalpana, 2016).

In 1992, NABARD created a means by which SHGs could be linked to banks in order to allow SHGs to access loans, in addition to their current savings and group lending activities (Priyadarshee and Ghalib, 2011). In being linked to SHGs, financial institutions (banks or NBFCs) can avoid unnecessary transaction costs from organising the poor (Priyadarshee and Ghalib, 2011). SHGs are considered to be informal savings groups, and therefore, are predominantly unregulated (Reserve Bank of India, 2013).

However, in the past, self-regulation schemes have been trialed in an effort to standardise SHGs (Seibel, 2012).

MFIs can take the form of NGOs, which was initially the most common MFI configuration, or more recently as for-profit NBFCs (Priyadarshee and Ghalib, 2011). This shift was partially due to a World Bank microfinance programme in India in the 1990s (Taylor, 2011). While MFIs were initially hailed as a panacea to many development challenges, a crisis in the MFI system in Andhra Pradesh in 2010 undermined the momentum that the system had developed. Since the 1980s, SHGs had proliferated across the country unevenly, with nearly 20% of SHGs active in Andhra Pradesh (Priyadarshee and Ghalib, 2011). This meant that MFIs quickly moved into the state, hoping to capitalise on the success of the SHGs. In turn, oversupply of lending led to over borrowing, and defaults on payments drove poor people into the arms of usurious moneylenders and famously accounted for a number of suicides in the state (Priyadarshee and Ghalib, 2011).

At this stage, the Government of India stepped in to analyse the practices of MFIs. The Malegam Committee, set up by the Reserve Bank of India, proposed caps on outstanding loans and an upper limit to interest rates (Reserve Bank of India, 2011). More recently, the Reserve Bank of India has categorised MFIs as a form of NBFC and outlined further guidelines, most importantly for the conduct of debt collectors (Reserve Bank of India, 2017). The aim in both regulations is to protect the rural poor, especially as MFIs increasingly move from non-profit to for-profit models, which can become exploitative. Although microfinance and SHGs offer opportunity, the reality is that the penetration into rural regions is still small and both types of financing leave out the poorest constituents (Priyadarshee and Ghalib, 2011). Nevertheless, they are seen by off grid solar enterprises as a crucial part of the off grid ecosystem, allowing their products to reach a lower social strata.

1.3.3 Off grid policies

Indian also has a long history of trying to address this issue. In the early 2000s, off grid solar was identified as a potential solution for rural electrification, and so programmes that aimed to improve energy access also supported the industry, such as the Rural Village Electrification Programme and the Village Energy Security Programme. In 2003, the Government of India passed the Electricity Act of 2003, which created notified rural regions (GoI, 2003). These were areas that were officially ‘rural’ in which private enterprises could provide power at an unregulated price, opening up rural electrification to third parties. It was soon followed by the Rural Electricity Policy of 2006, which announced the aim to provide electricity access to all as well as outlining the definition of what constitutes an electrified village (MoP, 2006a).

Name	Region	Start Date	Summary	Target
RVEP	National	2001	Uses renewables to provide electricity to remote villages	Villages without grid access
RGGVY - DDG	National	2005	Uses distributed generation sources to provide electricity to remote villages, providing free connections to those below the poverty line	Villages without grid access
DDUGJY – DDG Scheme	National	2015	Uses distributed generation sources (primarily renewables) to provide electricity to remote villages, providing free connections to those below the poverty line	Villages without grid access
JNNSM – Off Grid Component	National	2010	Provides financing for solar products in the form of end user subsidies (SHS) or capital grants (microgrids/minigrids)	Off grid technologies
Draft National Microgrid/ Minigrid Policy	National	NA	Establishes tariff regulations for distributed power plants along with potential for capital grants	Microgrid/ Minigrid tech
Saubhagya	National	2017	Aims to provide electricity to all households by December 2018, providing free connections to those below the poverty line	Households without access
Rajasthan Solar Policy	State	2014	Broadly supports uses of solar energy for remote lighting and productive end uses	Solar Technologies
Uttar Pradesh Minigrid Policy	State	2016	Establishes tariff regulations for distributed power plants along with potential for capital grants	Microgrid/ Minigrid tech
Bihar Draft Minigrid Policy	State	NA	Establishes tariff regulations for distributed power plants along with potential for capital grants	Microgrid/ Minigrid tech
Uttar Pradesh Solar Policy	State	2017	In addition to the Minigrid Policy, allows for state subsidies to promote solar for rural electrification	Solar technologies

Table 1.2: Primary rural electrification programmes applicable to solar technologies, since 2000)

In 2006 a new tariff policy also required the state energy regulatory commissions (SERCs) to set a renewable portfolio obligation for distribution companies, further incentivising the adoption of solar (Amrutha, Balachandra and Mathirajan, 2017).

Individual states, including Uttar Pradesh and Rajasthan, have also been at the forefront of creating state solar policies (Government of Rajasthan, 2014; Government of Uttar Pradesh, 2017).

For a decade, the main rural electrification scheme was the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), which was initiated in 2005. It was replaced in 2015 by the Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY). Both schemes focus on grid expansion as the primary form of electrification, but include a Decentralised Distributed Generation (DDG) Scheme. Both RGGVY and DDUGJY use census records to identify villages that would not be reached by the grid within 3-5 years, at which point they fall under the DDG Scheme. The DDG Scheme is implemented through state governments, which tender off grid projects to supply power to those villages, providing a subsidy that is met jointly by the national and state governments (MoP, 2009). Table 1.3 compares the number of villages electrified through grid and off grid. We can see that off grid electrification accounted for 15% of the villages covered under the programme. This number was originally planned to be higher, but 820 villages were moved from the off grid to the grid extension programme in 2017/2018.

In 2008, the Government of India launched the Jawaharlal Nehru National Solar Mission (JNNSM), which includes a provision for the support of off grid electrification. Specifically, the JNNSM includes both targets and subsidies for off grid solar energy, which is funneled directly to the system integrator (in the case of micro/minigrids) or through the National Bank for Agriculture and Rural Development (NABARD) for end users purchasing solar home systems (MNRE, 2012a). The JNNSM-NABARD subsidy has been cancelled twice since its inception – first in 2015 and again in 2017 (MNRE, 2017b). Its future is uncertain. The JNNSM off grid policy stands alongside the DDG Scheme as the two key policies that support off grid electrification via solar energy.

In 2017, both the national and state governments were looking to better support microgrids and minigrids. In 2016 Uttar Pradesh released a microgrid/minigrid policy, and Bihar had a plan in development (Government of Uttar Pradesh, 2016). In 2016, MNRE also asked for comments on a draft national microgrid/minigrid policy (MNRE, 2016).

	Villages Electrified under DDUGJY		
State	Off Grid	Grid	Percentage Off Grid
Arunchal Pradesh	555	1483	37%
Assam	394	2732	14%
Bihar	207	2906	7%
Chhattisgarh	473	1078	44%
Himachal Pradesh	0	28	0%
Jammu & Kashmir	54	129	42%
Jharkhand	248	2583	10%
Karnataka	27	29	93%
Madhya Pradesh	33	422	8%
Maharashtra	43	80	54%
Manipur	99	366	27%
Meghalaya	82	1051	8%
Odisha	399	3281	12%
Mizoram	0	54	0%
Nagaland	0	78	0%
Rajasthan	93	427	22%
Tripura	0	26	0%
Uttar Pradesh	31	1498	2%
Uttarakhand	24	91	26%
West Bengal	0	22	0%
TOTAL	2762	18364	15%

Table 1.3: Villages electrified under DDUGJY, July 2018 (REC, 2018b)

It is important to note that the definition of village electrification is that at least 10% of households have an electricity connection, and therefore 100% village electrification is not 100% household electrification. In late 2017, the Government of India announced a new programme, Saubhagya, that aims to electrify 100% of households by the end of 2018 (ET Bureau, 2017). There are fears that this strong centralised push toward total electrification will impact the future of the off grid sector in India (Mishra, 2017). This research focuses primarily on the period of 2010-2017, and will not include an assessment of the Saubhagya programme. Most enterprises entered the market after 2010, although a few enterprises have a much longer history. As the interview data was collected in Feb-April 2017 that is the end date for the study.

1.4 Literature Review

1.4.1 Conceptual frameworks: What is the arrangement?

Several literatures have offered up conceptual frameworks for articulating the arrangement of the private sector, non-government actors and government in delivering public services. Each offers a different focus: political economy, innovation studies, socio-technical transitions theory, entrepreneurship literature, public administration, and modes of governance. In the end, Archibugi et al describe a triangular arrangement, which captures all three major elements of service delivery: government, implementing actor and citizen/user (2003).

1.4.1.1 Political Economy

Political economy suggests that these actors are part of a larger system in which economic theories and political experience merge, and where institutions and organizations shape one another. The field is interested in the intersection of politics and economics, but it is a wide-ranging discipline, which has evolved since its inception (Smith, 1817; Marx, 1859). To complicate things further, political economy can refer to either this area of studies or a methodological approach that borrows from economics or sociology, usually an institutional approach (Weingast and Wittman, 2008). Therefore this section will focus on the most relevant aspects of the current literature, primarily institutional approaches focusing on government and public services. This institutional approach, which is most relevant to this study, ranges the gamut from looking at the efficacy of institutions, to comparing them across countries, to understanding why and how they come to take their current forms (Weingast and Wittman, 2008). Political economy stresses the co-evolution of politics, society and the economy (Weingast and Wittman, 2008). However, the vastness of those interrelations necessarily causes studies to focus on particular intersecting phenomena (eg Banerjee et al. 2005).

Work on the political economy of India has turned its eye to elections and government cycles, government responsiveness, development, policy targets, and economic liberalisation (Kohli, 1989; Sen, 1992; Bardhan and Pranab, 1999; Besley and Burgess, 2002; Khemani, 2004). Relevant to our interests, a political economy perspective has been used to delve into issues of the procurement of public services under a centralised democratic government in India (Banerjee, Iyer and Somanathan, 2005, 2007; Banerjee and Somanathan, 2007). Findings suggest that despite calls for universal access to basic services, a region's socio-economic history plays a big role in actual access, but that public mobilization allows some communities to get comparatively greater access (Banerjee and Somanathan, 2007). These works explore how socio-economic differences play into access to public services, but do little to explore the way in which the procurement of those services exacerbates these inequalities – focusing on the correlation, not the causation (Banerjee, Iyer and Somanathan, 2005).

On a high level, much ink has been spilled trying to interpret the extent to which government has the ability to impact demand and supply within the market (Wren, 2008). It has been pointed out that in a liberalised market, the market itself is likely to undersupply public services, suggesting the need for public procurement (Romer, 1994; Barro, 1997). From an institutional perspective, institutions and the market shape and are shaped by one another. Therefore, the relationship between governments and non-state actors in the delivery of public services should fall under the purview of the field. Indeed, scholars have examined how governments – particularly in less-stable countries – may see service delivery as a mechanism for state legitimacy, how politics influences public service delivery, and how NGOs are also employed in service delivery (Batley and Mcloughlin, 2010; McLoughlin, 2011; Batley, McCourt and Mcloughlin, 2012). However, focus remains on the factors affecting these relationships, rather than on the organisation of the relationships themselves (McLoughlin, 2011).

1.4.1.2 Innovation

While the previous literatures have suggested that institutions and organizations shape one another, both have focused an a higher level institutional perspective. Innovaiton studies can also be asked, how does government intervene in markets, and what does that say about the role that enterprise is supposed to play? In this context, innovation is "understood as the introduction of new solutions in response to problems, challenges, or opportunities that arise in the social and/or economic environment" (Edler and Fagerberg, 2017). Therefore, even the application of a mature technology in a new market may qualify as innovation. With this definition, this section will look at the literature on innovation systems.

Innovation systems literature focuses on how technologies develop and diffuse through systems of innovation (Mondal, Kamp and Pachova, 2010; Quitzow, 2015). These systems consist of the technology or knowledge of new innovations, the various actors and institutional aspects (Malerba, 2005). Essentially, "the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge" (Lundvall, 1992). These systems grow and change in response to each other, and to systems in other countries, which enables a truly international perspective on innovation (Quitzow, 2015). While much research in the field focuses on developed economies, it can apply to developing countries where research focuses on 'catching up' technologies (Jacobsson and Bergek, 2006; Blum, Bening and Schmidt, 2015). Innovation systems are an analytical construct, rather than a description of coordinated actions and actors, and as such are used as a way of identifying how the world works in practice (Bergek *et al.*, 2008).

Generally the innovation literature rejects the traditional concept of market failures, in favour of system failures as the crucial impetus for intervention (Foxon *et al.*, 2005; Bergek *et al.*, 2008; Edler and Fagerberg, 2017). These ideas are operationalized in technological innovation systems (TIS) analysis, which uses the concepts to notice weaknesses in the system and offer policy recommendations (Bergek *et al.*, 2008). TIS analysis often focuses on the seven system functions: Entrepreneurial activities, knowledge development (learning), knowledge diffusion, guidance of the search, market formulation, resource mobilization, and the creation of legitimacy. In the adjacent literature, innovation economics believes that economic policy exists to encourage growth through innovation, and that there is, therefore, a role for government intervention in the market. The general tenets of innovation economics could be summarised thus: innovation has agglomeration tendencies (physical spaces of innovation often further innovation and activities within those spaces) as well as spillover (the benefits of innovation are captured by more than just the innovating actor) (Rennings, 2000). Because the positive externalities of spillover are not being fully captured by the innovator, there is under-investment in innovation, leaving room for government intervention to correct this imbalance (Schumpeter, 1939; Freeman, 1982; Rennings, 2000).

If we step back and look at innovation policy as a whole, there is a social dimension to innovation policy: "innovation policy may contribute to solutions for urgent societal challenges" (Edler and Fagerberg, 2017). In order to do that, policymakers must determine how innovation will solve the challenge. This is the basis of Edler & Fagerberg's innovation policy typology in which policies may be mission-oriented, invention-oriented or system-oriented (Edler and Fagerberg, 2017). Taking a more traditional approach, the S-curve of technological development can also be used as a guide to which policies are appropriate at each stage of development, starting with R&D financing and moving towards a well-regulated market (Foxon *et al.*, 2005). Or else addressing function or system failures can be a guide for intervention (Metcalfe, 2005; Hekkert *et al.*, 2007). In all cases, the government supports innovation as a way of supporting either growth, or a particular end goal. In this way, the innovation literature is relatively flexible, although it is notable that, with a few exceptions, there is less emphasis on diffusion than on the earlier stages of innovation (Freeman and Soete, 1997).

1.4.1.3 Socio-technical Innovation Systems

In more recent years, innovation systems has been rolled into the burgeoning field of socio-technical transitions. Where innovation systems approaches focus on an ecosystem perspective of technological change, socio-technical transitions expand the range of actors that impact those changes (Ockwell and Byrne, 2017). The combination, the socio-technical innovation systems approach, therefore allows a more holistic vision of how these changes take place, and how governments can support or guide them (Ockwell and Byrne, 2017). Socio-technical transitions encapsulate the shift in technology use within a society, and are embedded within the socio-technical landscape of deep, structural trends within that society (Geels, 2002). In the commonly cited multi-level perspective, that landscape is composed of overlapping technical regimes, who change over time as innovation from niches are incorporated into them (Smith, Voß and Grin, 2010; Geels *et al.*, 2017). Innovation alone does not lead naturally to technological change, but social structures, behaviours and attitudes must coevolve with technology (Geels *et al.*, 2017).

These niches, also described in the Strategy Niche Management framework, serve to protect innovations as they are developed through experimentation (Schot and Geels, 2008; Raven *et al.*, 2016). New socio-technical innovations will not initially be robust enough to compete with incumbent technologies, and therefore need spaces in which financial, and other, pressures are lowered in order to develop that robustness (Nill and Kemp, 2009). It is worth noting that innovation in this context does not have to be an entirely new piece of technology, but can be a new application of existing technology. In that regard, even though solar energy, in many contexts, has become a part of the dominant technical regime, its off grid application is still struggling to move out of its niche. The socio-technical innovation systems approach to technology transitions emphasizes the system-wide support that novel technologies require to move from their niche into the dominant technical regime (Ockwell and Byrne, 2017).

India's solar industry has made great strides through that type of eco-system approach, offering R&D support, having public sector companies move technologies from labs into markets, and continuing to support training efforts in the sector (Kapoor *et al.*, 2014). In 1981, the government initiated the Commission for Additional Sources of Energy (CASE), and the 1980s broadly saw an increase in R&D support for the industry. R&D funding for solar increased significantly in the Eleventh Five Year Plan (2007-2012), which proposed an additional Rs 53 billion (around 758 million USD) to be specifically focused on silicon production and light emitted diodes (Sahoo, 2016). The Department of Science and Technology, Department of Industrial Research and MNRE fund R&D activities. MNRE in particular has funded Rs 3016.4 million (approximately 42 million USD) worth of on-going solar R&D projects (Kar, Sharma and Roy, 2016). Currently, the Jawaharlal Nehru National Solar Mission is the programme that supports this aggressive R&D (Sahoo, 2016).

Innovation was often spurred by large, state-owned energy enterprises, such as when Central Electronics Limited (CEL) started the National Solar Photovoltaic Energy Demonstration Program to lower the cost per Wp by improving efficiency (Kapoor *et al.*, 2014). In fact, companies like CEL have a remit specifically to bring to "commercially exploit" technologies developed by national labs and R&D institutions (CEL, 2019). The Government of India has also recognised the need for more solar skills development, and in 2015 it launched the Sector Skill Council for Green Jobs (SSCGI), which is a not-for-profit, autonomous, industry-led society, which aims to promote training for renewable energy technologies, among others (GoI, 2015). On the NGO side, Barefoot College is one of the few institutions that tries to train rural workers – especially women – as solar engineers, with the expectation that they will take their skills with them back to their home villages (Roy and Hartigan, 2008).

However, this systems approach does not appear to extend to off grid solar, with which India has taken a more top-down approach. Instead, India follows the approaches that Ockwell and Byrne describe as "hardware financing" and "private sector entrepreneurship" (2017). Hardware financing refers to the approach wherein the barrier to greater dissemination is the inability for the benefits of the technology for society to be reflected in the price, and so additional support is employed to make up the difference. Private sector entrepreneurship approaches assume that innovation will solve society's problems in an extreme form of techno-optimism, and so support should go to capital for private sector innovation (Ockwell and Byrne, 2017, pg 142). Arguably, the direct contracting approach of the DDG scheme takes this hardware financing approach, and the JNNSM's capital subsidy for microgrid/minigrid enterprises could be seen as taking either approach, depending on whether you view a microgrid development as a completed project or an innovation experiment.

It is possible that the government's view of off grid solar as something temporary or marginal that limits its interest in building up the off-grid sector in the same holistic manner. Another possibility is that India's contracting approach to rural development became the guiding posts for off grid solar. Going from a niche to a regime (this is the niche ontology) involves the coevolution of government regulations with technology, which fit and integrate with existing practices (Ockwell and Byrne, 2017). Direct contracting for rural development may have been that 'existing practice' (Monga, Mehta and Ranjan, 2012). As it stands, solar home systems may be ready to be integrated into the dominant regime, but minigrid businesses are still looking for the innovation that will allow them to break even. India provides an interesting case study where this particular form of innovation (off grid solar) had a great opportunity to grow in its niches (projects, companies) but in the scaling up support has neglected the whole system in favour of financing to get systems in the hands of the poorest.

1.4.1.4 Public Administration

The literature on public administration suggests that as our conception of public administration has changed, so has the relationship between government and non-state actors. Sindane describes public administration as "the organisation, mobilization and management of human and material resources to achieve the purposes of government" and the art and science of that management (Sindane, 2004). The literature on public administration covers many of the topics that also fall under political science, such as the process of policy design and public participation, but there is a heavier emphasis on implementation. Common topics include bureaucracy (Farmer, 1995; Goodsell, 2003), public participation (Hart, 1984; Vigoda, 2000, 2002), and engagement with the private and non-profit sectors (Hood, 1995; Hughes, 2012).

In traditional conceptions of public administration, governments organised themselves in bureaucracies, which focus on the administration of policy determined by politicians, which made the bureaucrat a true public servant. This also entailed bureaucratic delivery, namely "[o]nce a government had involved itself in a policy area, it also became the direct provider of goods and services through the bureaucracy" (Hughes 2012, p 5). This firm delineation between public and private sector is a partial over simplification, but stands in stark contrast to the newer forms of administration discussed below (Hood, 1991). In the traditional public administration template, the role of the private sector is kept outside of the delivery of public services, which become the province of the state.

Since the 1980s, there had been a belief that we are moving from public administration to new public management (Hood, 1991, 1995; Hoggett, 1996). While this definition, too, is vague, scholars see a changing conception of the roles of government and non-state actors. In the initial conception of public administration the government did the work of implementation, whereas in public management, the government controls or manages that implementation (Hughes, 2012). New public management (NPM) is characterised by a more private sector ethos:

> "The basis of NPM lay in reversing the two cardinal doctrines of PPA; that is, lessening or removing differences between the public and the private sector and shifting the emphasis from process accountability towards a greater element of accountability in terms of results." (Hood, 1995)

Since then, there are continued changes in the relationship between government and the private and non-profit sectors. Characteristics of these changes include: a focus on efficiency, decentralisation and public service in the mode of the private sector, including a move to contractualism (Lane, 2002; Christensen and Lægreid, 2016). By this, Lane is referring to an increase in contracting out public services to the private sector, although this could also include contracting out to any non-governmental organisation (Lane, 2002; Lecy and Van Slyke, 2013). It should be noted that contracting out has been in use for centuries, but its rise in popularity under NPM is notable. As with the general mixing of public and private sector in public management, contracting out is intended to improve efficiency, although there is still an administrative need to ensure compliance with the contract (Hughes 2012, p 153). Although NPM is has moved out of academic favour, replaced partially by the concept of 'governance', its applicability and success in developing economies is unclear (Manning, 2001).

Perceptions of the role of NPM in LMICs is mixed, with some scholars believing that NPM has had little impact outside of the OECD whereas others see output-based (results-based) contracting in the developing world as an extension of this phenomenon (Manning, 2001; Kilby, 2004; Common, 2017). The difference seems to come from a disagreement about what the key characteristic of NPM is: reduced public sector size or contractualism. While the two logically go hand in hand, LMICs may display an increase in contractualism as private sector (or at least non-government actors) supposedly improve efficiency, while maintaining their bureaucracies to manage these new contracts (Kilby, 2004; Alonso, Clifton and Díaz-Fuentes, 2015).

1.4.1.5 The Triangular Arrangement

The triangular relationship of service delivery developed by Archibugi et al takes these actors and concepts and develops a simple framework that is easily used to conceptualise the organisation of the state, non-state service delivery actors and the end user (see Fig 1.2) (Archibugi *et al.*, 2003). The inclusion of the state in service provider–consumer interactions acknowledges the government's role in public services, and the division of the end user and citizen acknowledges the overlapping but differing populations of users and taxpayers.

The triangular relationship is simple, but effective for the focus of this research, which is interested in how the state organises these actors in the provision of public services. This framework allows us to conceptualise how the state attempts to create efficiency and service quality, often through competition, and to balance the needs of the citizens and users. Within this framework "different combinations of tariff coverage and general taxation may present themselves, with weights depending above all on distributive concerns" (Archibugi *et al.*, 2003). This conceptual framework offers a way of viewing the process of service delivery, which will later be employed to describe the programmatic modes developed in the typology in Chapter 2.

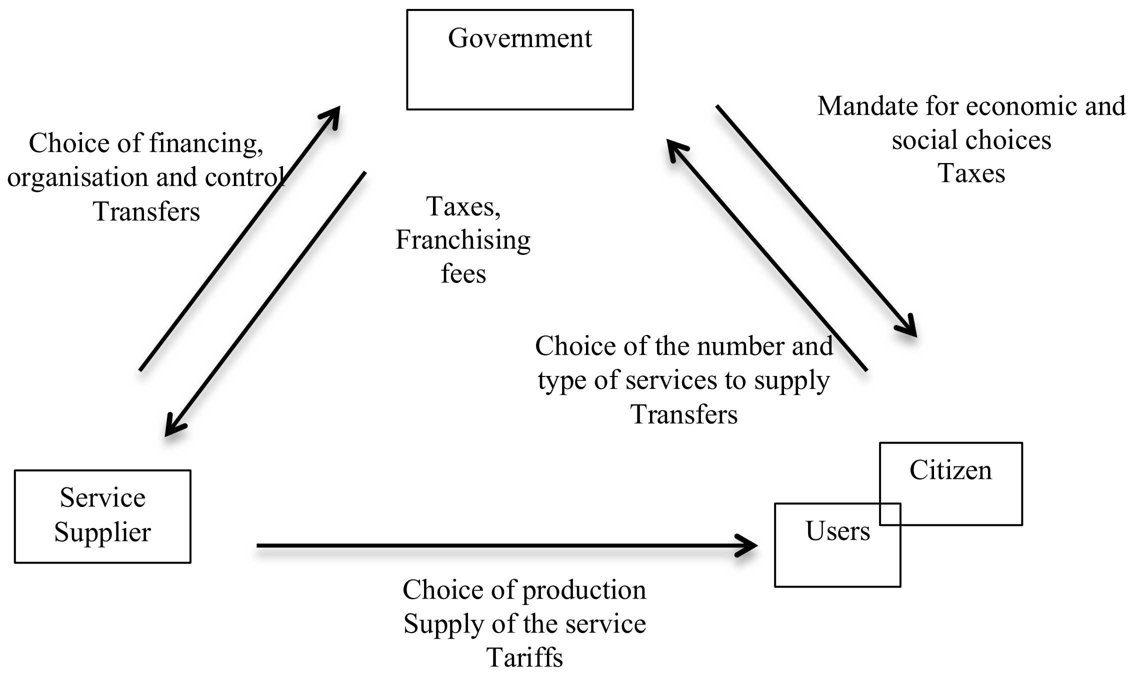

Figure 1.2: Triangular Arrangement developed by Archibugi et al 2003

So what is the arrangement between government, non-government implementing actors and end users in rural electrification policies? These strands of the literature, taken together, suggest that such an arrangement should account for prominence of government institutions in shaping the market, while also acknowledging the role of the end user/citizen. It should also be acknowledged that these arrangements will not be the same from policy to policy, and the popularity of specific arrangements will likely change over time. While Archibugi's framework offers a good articulation of these features, an examination of real world rural electrification policies will be needed to determine the common arrangements of these actors.

1.4.2 Enterprises: What are the impacts on non-government actors within the arrangement?

1.4.2.1 Private and non-governmental sectors in rural electrification

After identifying the common arrangements of rural electrification policies, this thesis asks how implementing actors are influenced by policy at the enterprise-level. Over the last 30 years, the private sector has been invited to participate in rural electrification in developing countries (Cabraal, Cosgrove-Davies and Schaeffer, 1996; Haanyika, 2006; Yadoo and Cruickshank, 2010). Because rural electricity – whether grid-based or standalone systems – partially shares aspects of private goods, there is the assumption that the private sector could be engaged to provide these services. More specifically, depending on the technology, electricity can be measurable, consumers can be charged relative to the amount consumed, and can be excluded if payment is not made (Ostrom and Ostrom, 2014).

However, the motivations of the private sector and the public sector are often at odds, and there is a concern that privatisation will mean the sidelining of rural electrification (Haanyika, 2006). In some cases, private investment has been poor in the rural space, due to a perceived lack of profits to be made, heavy subsides for government grid power, and lack of access to credit (Ahlborg and Hammar, 2014; Yaqoot, Diwan and Kandpal, 2016). Additionally, there is evidence that relying on the private sector has slowed electrification efforts (Cook, 2011). Nevertheless, there is still a great deal of support for the concept of non-state enterprises, particularly SMEs, social enterprises, and NGOs, getting involved in the off grid space (Yadoo and Cruickshank, 2010; Lemaire, 2011; Jolly, Raven and Romijn, 2012; Yaqoot, Diwan and Kandpal, 2016).

There are some further criticisms of this approach. The aim of engaging the private sector in delivering public services is to save the public money on those services through competition (Entwistle and Martin, 2005). Contracting out public services has been seen as a way of capturing private sector benefits and reducing taxpayer costs without selling state assets (Domberger and Jensen, 1997). Contracting private enterprises assumes that this competition is present, but that is not always the case (Amir Hefetz and Warner, 2012; Girth *et al.*, 2012). Additionally, engaging private enterprise is considered to be at its weakest in situations where there is not a customer "with the resources to provide a profit to the organisation that performs it," as is often the case in rural contexts (Cohen, 2001).

The World Bank, among others, has suggested public-private partnerships as a way to mitigate risk for private sector coming in to a new market with low margins (Reiche, Covarrubias and Martinot, 2000). These partnerships are usually supported because they purport to reduce government inefficiency and lessen the burden on the taxpayer (Linder, 1999). However, the degree of decentralisation and extant redistributive policies impact the true equity of these partnerships and the benefit they provide to the poor (Miraftab, 2004).

Other non-private sector options exist also. NGOs can have very different relationships to government, but increasingly low-income countries find themselves with NGOs that focus on providing basic services (Coston, 1998; Rahman, 2006). This is at least partially because NGOs are being encouraged as market actors who can provide services at lower cost and higher quality than the government (Hearn, 1998). Local cooperatives have also emerged in some regions in response to the failure of the public sector to deliver these services (Yadoo and Cruickshank, 2012).

Crucially, the private and nonprofit sectors are also bolstered by government in an attempt to both create and to take advantage of competition and capacity within these sectors. Recent literature has suggested, for instance, that where the US government supports nonprofits, they are more prevalent, which lends credence to the theory that nonprofits are engaged by governments to assist with public services, rather than that they step in where government has failed (Lecy and Van Slyke, 2013). Even in the private sector, governments use strategies to support private markets when competition is low, essentially using their own resources to build competition in order to then improve public service delivery (Girth *et al.*, 2012). Understanding this symbiosis paints a richer, more accurate picture of how policy interventions impact electrification efforts.

1.4.2.2 Enterprise-level perspective

That understanding can be best improved by focusing on the enterprise-level perspective. Empirically, taking the enterprise as the subject through which to view the impact of policies enables the researcher to identify the causal mechanisms at play, and so it is a good level at which to articulate and examine whether a policy's theory of change functions in context. Conceptually, it offers greater granularity to a system that is routinely overlooked. Many fields treat the firm as a black box, most notably policy evaluation, whose impact evaluation studies the outputs and outcomes of an intervention and neglects the implementing agent to a great extent (Chaurey and Kandpal, 2010; Millinger, Mårlind and Ahlgren, 2012). Even in the literature cited above, especially political economy, public administration, and modes of governance, the enterprise is conceptualised primarily as part of a market, and not as a system in its own right (Howlett, 2011; McLoughlin, 2011; Quitzow, 2015). By focusing on the enterprise-level perspective here, we have an opportunity to improve the granularity of the system that moves from policy intervention through implementation to outputs. In terms of implementation science, this approach aims to explain what influences implementation outcomes (Nilsen, 2015).

Despite the conceptual and empirical value that can come from a firm-level analysis, few studies on off grid enterprises focus on the policy dimensions of their experience. Exploring off grid energy through energy service companies usually focuses on case studies, but there are some prime examples of research on the state of the market (Zerriffi, 2007b; Harish *et al.*, 2013; Gabriel and Kirkwood, 2016; Singh, 2016a). All of these works aim to inform policy, but they take very different approaches to incorporating past interventions into their research. Zerriffi focuses on small scale off grid technology in the context of Brazil, not limited to solar power, and explores how business models and institutions play a role in success and failure of enterprises. Policy is an integral part of that project, and the author breaks down the policy priorities and focus to show the link between policy interventions and the repercussions for rural electrification, using the fiscal consequences of policy as the pressure point for impact (Zerriffi, 2007b). While Gabriel & Kirkwood focus more broadly on renewable energy entrepreneurs in 28 developing countries, they also take policy as a key independent variable. In their paper, the number of renewable energy policies and the strength of government interest in those policies are two key axes for anticipating the types of businesses present in a country (Gabriel and Kirkwood, 2016).

Similar literature in the Indian context exclusively focuses on the off grid solar market. A great recent example is Kartikeya Singh's work on the state of the market and relationship between technology options and scalability. Singh does ask whether enterprises take a government subsidy but primarily uses feedback about government programmes as a context for providing policy recommendations (Singh, 2016a). Harish et al. (2013) examine Karnataka's off grid solar market in order to disentangle the dynamics of technology adoption. While they cite the solar loan programme as a catalysing factor and note that sales dropped after the announcement of JNNSM, the focus is very much on the dynamics between enterprises, their offerings and end users.

Singh 2016	Harish et al 2013	Zerriffi 2007	Osterwalder 2004 (Gabriel & Kirkwood 2016)
Types of products sold	Type	Independent Variables:	Product:
Number of products sold/distributed	Year of Establishment	Organisational Form	Value Propositions
Geography of distribution	Primary Product	Technology Choice	Infrastructure Management:
Primary reasons customers purchase the products	Volume of Sales	Target Customers	Key Partners
Information regarding warranty	Geographical Presence	Financial Structure	Key Activities
Availability of financing to purchase products		Dependent Variables:	Customer Interface:
Participation in government subsidy market		Electricity Access	Customer Segments
Research & development budget		Sufficiency	Channels
Marketing		Quality	Customer Relationships
After sales maintenance and servicing		Sustainability	Financial Aspects:
Perceived barriers to market entry and scaling		Replicability	Cost Structures
			Revenue Streams

Table 1.4: Business Model Components

There are two key shortcomings to the approaches described above. Firstly, there is a lack of comparability across authors, since each use a different set of components to break down and compare business models, as seen in Table 1.4. Singh uses a survey according to a set of pre-determined metrics such as types of products, marketing, and participation in government subsidy market. Likewise, Harish et al use a similar approach with a narrower band of metrics. Zerriffi goes in a different direction by breaking down characteristics into independent and dependent variables. Finally, Gabriel & Kirkwood rely on the business model canvas first developed by Osterwalder (Osterwalder, 2004; Osterwalder and Pigneur, 2010). Although 'types of products sold', 'primary product', 'technology choice', and 'value proposition' could all be describing the same component, their differences make comparison challenging. Only Gabriel & Kirkwood choose to use a set of components that have been developed by previous enterprise literature.

Taking a step back, the second shortcoming is that most of these papers represent a snapshot of the enterprise landscape at one moment in time. Singh and Harish are particularly notable for using survey data, which are particularly good for making statistical generalisation, but weak when considering changes in the landscape. Zerriffi's focus on the relationship between policy impact places a greater emphasis on the transformative power of policy, but only Gabriel & Kirkwood talk about enterprises as they change over time (see discussion of a life-cycle progression). As policy interventions are time-bound phenomena, snapshots of business models are inadequate to fully grasp their impact.

Exploring changes to an enterprise's business model over time addresses the shortcomings of these studies, while also making a novel empirical and conceptual contribution. By comparing multiple narratives of change over time, this research enables us to make broader statements about the factors that influence these changes, and begin to answer questions about how the shape of the market is impacted by specific interventions.

1.4.2.3 Political Strategy

In Osterwalder's conceptual framework, one level up from the business model level is the 'strategic level' (2004). Although changes to business models may give an indication of how the market has been changed by an intervention, understanding how enterprises try to negotiate their relationship with government offers additional insights into how enterprises function within these policy arrangements. Enterprises take different strategies in engaging with government and policy based on their competencies, knowledge, and resources (Dahan, 2005; Vining, Shapiro and Borges, 2005). Research into strategies of political engagement fall under political strategy or corporate political action and focus solely on non-market strategies (Hillman and Hitt, 1999; Lawton, Mcguire and Rajwani, 2013; Mellahi *et al.*, 2016).

Baron describes nonmarket strategy as a "concerted pattern of actions taken in the nonmarket environment to create value by improving its overall performance" as opposed to market strategies that "create value by improving economic performance" (Baron, 1995; Lux, Crook and Woehr, 2011). Nonmarket strategies aim to shape the environment in which enterprises function, and therefore Baron proposes that they are more important in contexts with few market opportunities (Baron, 1995; Aggarwal, 2001). Within the literature on nonmarket strategies, we find research on corporate political action and corporate social responsibility, the former focusing on political relationships and the latter focusing on appearing to align corporate and political interests (Mellahi *et al.*, 2016).

The literature on corporate political action (CPA) covers the factors that influence it (e.g. Dahan 2005; Vining et al. 2005), typologies of strategies and approaches (e.g. Hillman et al. 2004; Getz 2002; Lawton, Mcguire, et al. 2013; Oliver 1991), as well as burgeoning evidence on the efficacy of CPA (e.g. Hillman & Hitt 1999; Shaffer et al. 2000; Oliver & Holzinger 2008; Lawton, Mcguire, et al. 2013). The broad topics covered are outlined in Table 5.1, borrowed from Hillman et al 2004.

Antecedents	Types of CPA	Outcomes	Organising to Implement
Firm	Proactive/Reactive	Public Policy	Integration with market strategies
Industry	Approach	Firm Performance	Integration of multiple political actors
Issue	Participation Level		
Institutional	Strategy Types		

Table 1.5: Summary of Political Strategy Literature (Source: Hillman et al 2004)

This thesis is interested in the secondary strand of approach: the types of strategies that enterprises employ. In this way, it aligns itself primarily with the taxonomic approach that has characterised the literature. Examples include Hillman & Hitt's taxonomy of political strategies: information strategy, financial incentive strategy, and constituency building strategy (Hillman and Hitt, 1999). Mathur and Singh attempted to integrate CPA and corporate management literature, creating a two-stranded taxonomy based on political contributions and corporate lobbying (Mathur and Singh, 2011). Previous to that, Weidenbaum outlined business responses to policy: passive reactive, positive anticipation and public policy shaping (Weidenbaum, 1980). Meznar & Nigh identified broader strategies of buffering or bridging (Meznar and Nigh, 1995). Using a smaller microscope, Cook and others explored the political actions of smaller firms, from letter writing and association participation to personal contact, coalition building, publicity and hiring consultants, and personal involvement in campaigns (Cook and Barry, 1993, 1995; Cook and Fox, 2000).

There are a number of blind spots within the literature described. Firstly, the types of firms that are explored are almost exclusively large corporations and often multinational firms (Wry, Cobb and Aldrich, 2013; Hadani, Munshi and Clark, 2017). It is specifically in considering the political strategy of multinationals that emerging markets are considered, rather than exploring the expression of CPA within a single emerging market (Khanna and Palepu, 1997, 1999; Aggarwal, 2001; Peng, Wang and Jiang, 2008). This is a significant gap, in that emerging markets may have weaker institutions, or institutional voids, or else have greater government control over relevant, regulated markets (Khanna, Palepu and Bullock, 2008; Tian, Hafsi and Wu, 2009). There are a few notable exceptions to each trend, namely Cook's work on political action within small firms, and a few examples of political strategy within a single emerging market (Cook and Barry, 1993, 1995; Cook, 1996; Cook and Fox, 2000; Tian, Hafsi and Wu, 2009). More recent works on corporate social responsibility highlight the various national and international institutions that shape its expression in developing countries (Ali, Frynas and Mahmood, 2017; Jamali and Karam, 2018; Frynas and Yamahaki, 2019). This thesis hopes to address both shortcomings by exploring the political strategy of the off grid solar sector in India, which is comprised predominantly of small- to medium-sized enterprises (Singh 2016).

An enterprise's choice of political strategy can also be informed by a number of theoretical explanations. Political strategy literature often straddles a variety of social science theories, which inform the assumptions that the study makes and the aspects of the study that are explored. Potential theoretical approaches include agency theory, transaction cost theory, stakeholder theory, game theory, interest group theory and collective action theory, resource dependence theory and institutional theory among others (Getz, 2002; Mellahi *et al.*, 2016).

Resource dependence theory (RDT) and institutional theory (IT) are two of the most prominent within the literature (Birnbaum, 1985; Meznar and Nigh, 1995; Blumentritt, 2003). Resource dependence theory has particular relevance in nascent industries that have grown – like solar – with the support of government. Pfeffer and Salancik developed resource dependence theory in their seminal work *The External Control of Organizations: A Resource Dependence Perspective*, in which they proposed that organisations are dependent upon the resources of one another, and that firms will seek to reduce the risks associated with that dependence (Pfeffer and Salancik, 1978). This proposition has often been interpreted as suggesting that firms seek greater autonomy and to lessen dependence, but is an equally useful perspective to consider how uncertainty is mitigated in the context of resource dependence (Hillman, Withers and Collins, 2009; Drees and Heugens, 2013). The latter perspective is the primary focus of research on RDT in the context of political action, although government is ignored by most RDT literature (Nienhüser, 2008; Hillman, Withers and Collins, 2009; Drees and Heugens, 2013). RDT addresses political strategy directly in Pfeffer and

Salancik's *Ch 8: The Created Environment: Controlling Interdependence Through Law and Social Sanction* (Pfeffer and Salancik, 1978). As Getz puts it:

> "Political activity does not enable a firm to reduce its dependence on government. Rather, it allows the firm to reduce uncertainties related to the dependence, and thereby to reduce the likelihood that dependence will have negative effects on the firm." (Getz 2002, p 313)

The core assumption is that firms rely on the resources of external parties, and so the desire to reduce uncertainty in the policy environment is related to political risk (Mellahi *et al.*, 2016). Enterprises may attempt to reduce that uncertainty by either aligning their incentives with government or by creating a favourable political environment (Mellahi *et al.*, 2016). There is empirical evidence that the greater the dependence of a firm on its political environment, the greater its commitment to political action, and that firms in similar environmental positions will take similar political strategies (Mullery, Brenner and Perrin, 1995; Blumentritt and Nigh, 2002). It should be noted that, outside of policy, a universe of diverse actors with different interests and objects affect the firm's environment (Wry, Cobb and Aldrich, 2013). These organizations may coalesce around specific issues, and RDT then becomes a useful perspective through which to disentangle the complexity of such an environment (Wry, Cobb and Aldrich, 2013, pg 467-468).

Of course, the institutional context within which a firm is conducting business will impact the political strategy it pursues. Within the literature on CPA, an institutional perspective is prominent, whether it is defining the political strategies of multinational corporations, Chinese firms in the domestic market, or more broadly focusing on the context-specific nature of political strategy (Aggarwal, 2001; Wilts, 2006; Kolk and Pinkse, 2007; Tian, Hafsi and Wu, 2009). Institutional theory becomes even more relevant within the literature in cases on emerging or developing markets, where the strength and competencies of institutions vary significantly from the Western contexts of most literature (Aggarwal, 2001; Tian, Hafsi and Wu, 2009).

Institutional theory sees institutions in an economic framework or a sociological one: respectively either focusing on economic regulation or legitimacy (Hotho and Pedersen, 2012). The latter approach suggests that firms require legitimacy to access institutional resources, and that internal political resources are required in order to gain political access and legitimacy. This is done primarily by adapting to institutional contexts, norms and laws, but enterprises have a range of potential responses to institutional pressures (Oliver, 1991a; Mellahi *et al.*, 2016). Institutions, which include government actors but are not limited to them, provide the environment of rules and requirements within which a firm must function (Bluedorn *et al.*, 1994). In the context of political strategy, Getz explains:

> "Political activity is a way by which a firm obtains formal and informal institutional resources, among which are laws, favorable public opinion and legitimacy." (Getz 2002, p 314)

However, the process by which policy is made can also confer legitimacy on the governing institution, suggesting that legitimacy is not owned by one actor alone, but is instead creating and endowed through an iterative process (Malesky and Taussig, 2017).

This section began by asking, 'what are the impacts of policy on non-governmental implementing agents in the arrangement?' As we have explored the firm-level studies already existing on off grid enterprises and the literature on political strategy, it is clear that both the changes that occur within the business model and the attitude to government that underpin a business' strategy will be relevant to that question.

1.4.3 End Users: What is the impact of the arrangement?

In the end, the firm-level changes that take place in response to policy interventions are most important to the customer. Who is targeted and by which types of organizations matter. At a higher level, policymakers must decide who or what should be the target of policy interventions. In REPs, targets can be those without grid access, those without the means to purchase energy systems, or even the technology itself. It should be noted that Indian fuel subsidies are, at their core, a rural energy policy. In the case of fuel subsidies, it is the poor who are the target. Targeting the poor is a feature of both government programmes, aid agencies and microfinance organisations (Skoufias, Davis and de la Vega, 2001; Rai, 2002). Even in the case of government services, where fees are required, government targets low-income populations or high-risk populations for exemptions and additional support (Gilson, Russell and Buse, 1995).

Selection can take place at a range of levels. Oftentimes household level selection takes place, focusing on household consumption or other wealth indicators (Skoufias, Davis and de la Vega, 2001). In some cases, household level selection is approximately as effective as geographical based selection, suggesting a strong correlation between geography and wealth demographics (Skoufias, Davis and de la Vega, 2001). Indeed, targeting the poor often requires a proxy for wealth, as this data may be hard to come by (Alatas *et al.*, 2012). Many studies focus on measuring the success of these proxies, but the truth is that proxies are often context-dependent (Wodon, 1997; van de Walle, 1998; Rai, 2002; Ravallion, 2009). In rural areas, for instance, land ownership is a better indicator of wealth than education, whereas the trend it reversed in urban areas (Wodon, 1997).

In truth, targeting the poor – as with any population – is a multifaceted problem with unintended consequences. Being aware of programmes changes people's actions to either try to be included or to avoid inclusion, depending on the social dimensions of the programme (Sen, 1992). While it is important to successfully target those populations in need, the reality is that the costs required in targeting provide a trade off for more granular targeting (van de Walle, 1998; Ravallion, 2009). An additional challenge is making sure that the programme is identifying the right subset of people as in India's Targeted Public Distribution System for targeting food subsidies, which conflated poverty with food insecurity (Mane, 2006; Suryanarayana and Silva, 2007).

Targeting the poor in low- to middle-income countries may be less effective because a high rate of poverty increases the costs of targeting (Ravallion, 1999). In the context of rural electrification, it may be argued that offering subsidised off grid systems bypasses this difficulty. Those who would purchase off grid systems are by definition those in need of greater electricity access, and therefore the target population for REPs.

Market actors - be they commercial companies, non-governmental organisations or social enterprises –also target their activities towards certain customers. In the case of off grid solar solutions, the target customer is predominantly rural, without grid access, and with little cash or credit history, although there are exceptions in each case. Despite these challenges companies have seen opportunities for making profits even at the bottom of the pyramid, often with the help of microfinance institutions (Prahalad and Hart, 1999; Reeves and Sabharwal, 2013). Studies on the success of microfinance only address a challenge to targeting the poor, but do little to circumscribe the types of customers that different organizations target. In great part this is because studies on electrification have avoided the firm-level perspective, as discussed above. Better describing the target populations for policymakers and enterprises can give insights into whether policies are likely to attract the interest of enterprises and help better understand the off grid market.

So, given that rural electrification policies assume some enterprise involvement, how do these policies impact the off grid solar sector? Taking a step back, we are left with a number of questions. A tour through the most relevant fields of literature suggests that to unpack the arrangement of actors within these policies, we need a conceptual framework that includes government, the market and the user/citizen, with the understanding that institutions shape the market and visa versa, and that the arrangement of actors may change. Archibugi's triangular relationship gets us as close as possible, but we are left to ask, what are the most common arrangements of these actors within REPs?

Shifting to the enterprises that make up the market, we asked what the impacts were on the actors within the arrangement? Past studies have suggested that a firm-level perspective is the correct one to use to answer the question, and have also demonstrated the challenge of using different conceptual frameworks when discussing business models. For that reason, Osterwalder's business model canvas will be used. The literature on political strategy also offered up a way of asking 'why' enterprises act. By combining both 'how' and 'why' enterprises respond to policy interventions, we can present a more robust picture of these interactions in order to improve policy design.

Finally, what is the impact on the end user? Although the firm-level perspective is not the most intuitive one from which to answer this question, it offers some insights into the interplay between policy and the market. Specifically, it can help to answer whether REPs and enterprises are targeting the same customers, and it can give an indication of what types of companies are truly targeting the bottom of the pyramid.

1.5 Research Questions

This thesis takes up the challenge of exploring national rural electrification policies (REPs) through the lens of off grid solar enterprises. Policymakers, researchers, donors and international aid organisations all have a vested interest in understanding what works when it comes to policy interventions (Bardhan and Mookherjee, 2005; World Bank, 2008; Bennett *et al.*, 2011; Rogge and Reichardt, 2016). Policy evaluation currently focuses on impact evaluation and ex-post interviews with stakeholders, enabling high level statements about the overall success or failure of the programms (Aklin *et al.*, 2017a; Akoijam and Krishna, 2017; GOGLA, 2018). The outputs of these policies are determined by the success of market actors within the framework set out by government, and yet studies of businesses focus on innovative business models, local governance and economic viability (Jolly, Raven and Romijn, 2012; Krithika and Palit, 2013; Bhattacharyya, 2014; Ramchandran, Pai and Parihar, 2016; Singh, 2016b). The lack of scholarly connection between off grid enterprises and policy is surprising, since rural electrification efforts have almost universally been instigated (and financed) by government (Haanyika, 2006; Liming, 2009; Niez, 2010). In reality, policy interventions and enterprises work within an interlocking system of incentives and disincentives, and this thesis is an attempt to treat it that way by exploring policy change from the perspective of off grid solar enterprises. The value of this approach is a better view of India's main off rural electrification programmes, JNNSM and DDUGJY, which can go beyond evaluating success or failure and address aspects of policy design as well as broader concerns of embedding energy justice into rural electrification policy (Sovacool and Dworkin, 2015; Fuller and McCauley, 2016).

In doing so, we see how policy does more than encourage outputs, it changes the very shape of the market. It is impossible to engage the market without changing it. Commercial companies, NGOs, state-funded organisations and social enterprises all seek to provide electricity access to the world's rural poor. They do so with their own goals, aims and means. REPs require a certain amount of engagement from these enterprises because they form key actors in reaching electrification targets. The extent to which REPs support, engage and require enterprise action is variable, and so this thesis aims to answer a big question – how do REPs impact off grid enterprises – by breaking down the topic into a series of smaller, more manageable questions:

- Ch 2: How can we categorise rural electrification policies in order to better contextualise and compare them?
- Ch 3: How do India's rural electrification policies fit into this typology?
- Ch 4: How have off grid solar enterprises in India changed their business models over time in response to policy change?
- Ch 5: What political strategies do these enterprises employ, and what enterprise factors influence political strategy?
- Ch 6: Who are the target populations of rural electrification policies and off grid solar enterprises, and what factors influence which populations are targeted?

Chapter Two opens up the thesis by asking, how can we categorise REPs so as to better contextualise and compare them? This question arose in response to the lack of comparability across and within studies of rural electrification policies. Without a strong breakdown of the nature of policies, which regularly consist of multiple instruments, it is impossible to determine the external generalizability of findings (Niez, 2010; Javadi *et al.*, 2013; Sovacool, 2013). Attempting to apply a modes of governance framework onto these policies does more to obscure their comparability, because applying a term like 'corporatist' or 'network-based' belies the fact that most governments cut across approaches in addressing energy access (Howlett, 2011; Mukherjee and Howlett, 2016). Instead, the chapter takes a sample of 56 policies from countries with a less than 80% rural electrification rate and breaks down these REPs by type and components, offering up a new typology of rural electrification policies that focuses on the mechanism by which enterprises implement the policy.

In order to further explore that intersection, India is selected as a case study for the thesis due to its ample solar potential, history of off grid policies, and relatively large off grid solar market. While there are a few evaluations of the Jawaharlal Nehru National Solar Mission and the earlier Village Energy Security Programme, there is a dearth of evaluations of the on-going DDUGJY and its DDG component (Harish and Raghavan, 2011; Palit *et al.*, 2013; Akoijam and Krishna, 2017). Chapter Three is an application of the rural electrification policy typology against India's extant REPs, which helps to define which types of interventions the thesis tackles and ways in which my findings are applicable to other contexts.

From this point on, the research moves to an embedded case study approach, focusing on off grid solar enterprises in India and relying on interview data from 15 enterprises, three government organisations and a handful of experts in the field. As described above, policy evaluations of rural electrification programmes ignore the business perspective, despite the fact that the each policies makes assumptions about the market's characteristics and its behaviour (Entwistle and Martin, 2005; Andrews and Entwistle, 2010). Is that theory of change of the policy intervention correct? And are there other changes that occur that aren't accounted for in that theory of change? If it is not, then policies will be less effective. If there are unexpected consequences of change, then those may have unintended impacts on the target population.

While some literature on business model change explores how the stage of the market and strength of government interventions shapes the characteristics of enterprises, none conducts policy analysis through exploring change over time (Gabriel and Kirkwood, 2016). Change over time is crucial to making claims about causality, and hence linking policy to its impacts on the market. Chapter Four interrogates the interviews to determine how off grid solar enterprises have changed their business models over time in response to changes in the JNNSM and DDG scheme.

In Chapter Five, I ask what political strategies enterprises employ and what enterprise factors may influence political strategy. Although there is a large field of literature that explores political strategy, these literatures were developed in the context of large corporations in the late 20th century, in the USA and Europe (Pfeffer and Salancik, 1978; Schuler, 1996; Getz, 2002; Hillman, Keim and Schuler, 2004). Some efforts have been made to re-approach these concepts from a small company's perspectives, but as they stand, they are ill-suited for the context of small companies in a highly politicised sector that focuses on optional incentives instead of regulation (Cook and Barry, 1993, 1995; Cook and Fox, 2000). By asking what strategies enterprises employ, we can re-focus the concept of political strategy so that it is more relevant for these enterprises. By considering then what factors influence an enterprise's political strategy, policymakers can proactively consider the likelihood of their policies being appropriate for enterprises of different characteristics (size, type, philosophical orientation, etc).

Finally, Chapter Six brings the research back to what really matters: people. In the off grid space, many actors focus on the 'bottom of the pyramid,' the poorest members of the community (Prahalad and Hart, 1999, 2001; Prahalad and Hammond, 2002). The original concept suggested that capitalism could extract profits from even the poorest people on the planet, but evidence a decade later suggests that none have successfully tapped this market (Pitta, Guesalaga and Marshall, 2008; Agnihotri, 2013; Kolk, Rivera-Santos and Rufín, 2014). Given that electricity access is often considered a proxy for poverty, it seems unlikely that enterprises that require a degree of cost recovery and rural electrification targets would overlap. So who are the target populations for REPs and enterprises, and what factors influence these target populations? Answering this question will also determine the degree of overlap between these populations, which is likely to impact the size of the enterprise population interested in engaging with the National Solar Mission of the DDG Scheme.

In total, the thesis seeks to understand the means by which policies for the improvement of energy access through off grid technologies engage enterprises, and what the impact is on end users. In order to do that, it creates a typology for comparing policies before looking at the case of India in order to explore how business models change in response to policy change, how they seek to mitigate the risk and seek benefits associated with change, and what impacts these changes have on target populations. Figure 1.3 diagrams the focus of each chapter.

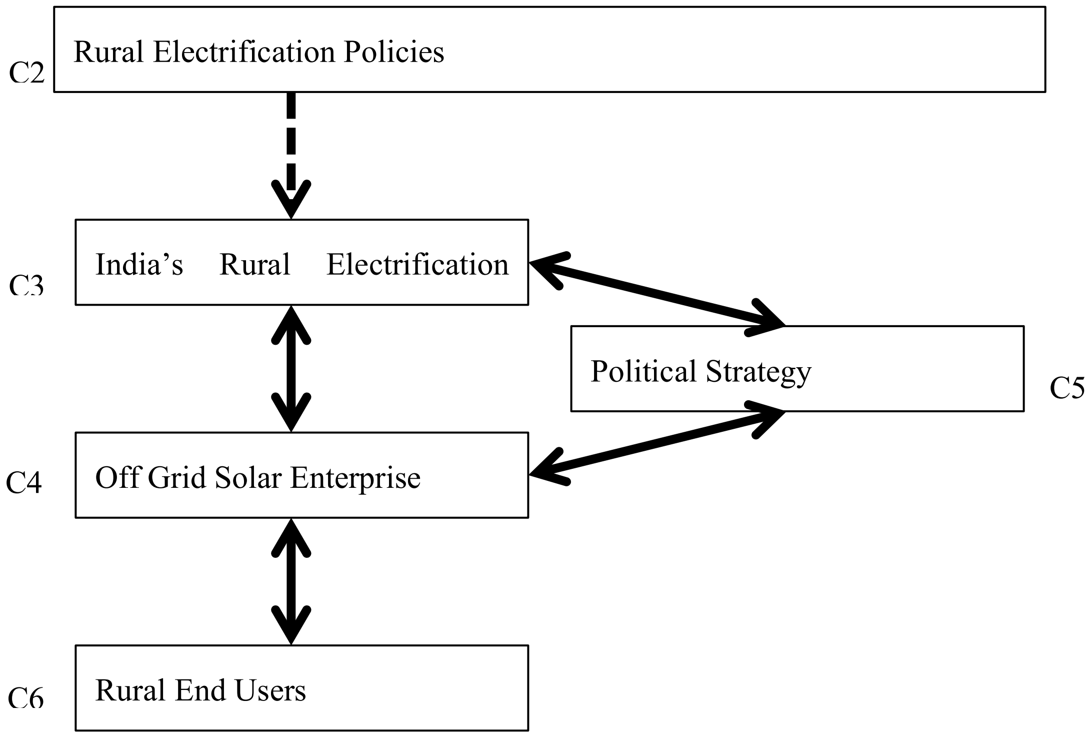

Figure 1.3: Conceptual Framework for Chapters (Source: Author, 2018)

1.6 Methodology

In order to answer questions about the interplay between policy design and enterprise, this thesis follows a number of qualitative methods. This section will outline the literature on each approach, namely, typologies, embedded case study analysis, and grounded theory. First, this section will cover the epistemological and ontological assumptions of the thesis before moving on to expand on the qualitative research methodologies. The research question for each chapter will be linked to the data and methods employed to answer it, making this the primary reference section for each chapter's methodology.

As an interdisciplinary research project, the relevant literature at times takes competing epistemological and ontological positions. Ontology refers to what degree there is a concept of reality, and epistemology refers to what degree that position of reality can be known and the ways in which that knowing is constructed or discovered. It is important to understand the assumptions inherent in the literature cited before outlining the position that this thesis takes. Research on international business and organisational studies has been trapped between positivist and anti-positivist approaches, depending on the topic of their study (Wicks and Freeman, 1998). Specifically, studies of management and international business often take a positivist approach that assumes research is able to make objective statements about the world around us (Martin, 1990; Astley and Zammuto, 1992). Whereas studies that explore the more intangible aspects of organisations, such as strategy, ethics or culture take an anti-positivist approach wherein the researcher is unable to make claims to objectivity, but instead describes one vision of reality that is inherently limited in its generalisability (Astley, 1985). This same 'generalisability' challenge appears in the struggle between context-laden and context-free international business research (Welch *et al.*, 2011). The concern is that:

> "while all qualitative research is commonly assumed to be context sensitive, a strong trend towards decontextualisation has in fact prevailed in much case research. The rich context that is the essence of a case study is ultimately regarded as a hindrance to theorising. Since to theorise is to generalise away from context, "explaining" and "contextualising" are regarded as being fundamentally opposed." (Welch et al. 2011, 743)

However, each epistemological approach takes some balance of the two. Summarising the common approaches of qualitative methodologies, inductive theory building takes a positivist approach that searches for generalities (ie Eisenhardt), natural experiments also take a positivist approach but focus on searching for causes (Yin), and interpretive sensemaking uses an interpretivist or constructivist approach to search for meaning, as is commonly used in grounded theory (Glaser and Strauss, 1967; Welch *et al.*, 2011).

This study finds itself between a number of philosophical stances, likely in what Welch et al would describe as 'contextualized explanation' (Welch et al. 2011, 745). Epistemologically it shares the social constructionist belief that artifacts are socially constructed through language, narrative and interaction, and that an organisation can represent such a society (Berger and Luckmann, 1991; Burr, 1995; Charmaz, 2006). However, it follows the interpretivist approach that the models we create are interpretations of reality and that the researcher is not an unbiased observer

(Lin, 1998; Williams, 2000). Ontologically, the research follows more in the vein of critical realism, taking an ontological realism stance, married with epistemological constructionism (Maxwell and Mittapallo, 2010). In that regard, the research imagines that the interviews are social constructions that reveal a single perception of an objective reality, and the models of interaction that the research proposes are interpretations of what that reality might be. In that regard, truth is provisional, and multiple interpretations may exist which are better or worse representations of reality.

Qualitative research has become increasingly popular in both solar policy evaluation and business studies, although with different focuses. Policy evaluation that uses qualitative methodology predominantly looks into how solar home systems impact users' lives through interviews and is most commonly paired with some kind of quantitative method (Azimoh *et al.*, 2015; Holtorf *et al.*, 2016; Barman *et al.*, 2017; Den Heeten *et al.*, 2017). Business research has more whole-heartedly embraced qualitative methods in the past decade (Hair *et al.*, 2007; Eriksson and Kovalainen, 2008; Welch and Piekkari, 2017). A qualitative research approach was ideal for exploring enterprises decision making since decisions about business models, political strategy and target customers or beneficiaries take place within the 'black box' of the organisation. Interviews with government officials and enterprises allows the researcher to see factors involved in such decisions. Qualitative research is also well-suited for hypothesis and theory building because of a focus on mechanisms and causal relationships (Yin, 1981; Eisenhardt, 1989; Corbin and Strauss, 2008; Ridder, Hoon and McCandless Baluch, 2014). Because of these benefits there is a growing trend towards qualitative research in business and strategy research (Carson and Coviello, 1996; Hair *et al.*, 2007; Eriksson and Kovalainen, 2008).

Criticisms of qualitative methodologies focus on the nature of interpretation and the generalisability of such findings. While it is true that qualitative methodologies rely on authorial selection and interpretation, such claims can also be levelled at quantitative research (Eisenhardt, 1989). All research requires the researcher to make determinations about what questions, sources and interpretations are relevant and valid (Lin, 1998; Williams, 2000). The measure of good qualitative research is the transparency with which these decisions are made (Eisenhardt, 1989). Likewise, issues of generalisability emerge also in quantitative studies (Mahoney and Goertz, 2006). In qualitative research, it is not the material findings that are generalisable but the mechanisms and relationships through which they come about. This is analytical generalisation (Yin, 2014). Following this logic, the thesis offers up a way of viewing the relationships between rural electrification policies, the actors that they work through, and the end user that may be applicable to other low- and middle-income countries.

As its core the thesis explores the experiences of 15 enterprises in order to glean knowledge that may apply in other circumstances, the methodologies employed try to offer a pathway to generalizability while also appreciating the context of that experience. The first two main chapters create and apply a typology of rural electrification policies in order to determine the universe of policies to which India's case study may apply. In that way, the thesis moves from asking 'what are the possible approaches that government take to engaging enterprise to provide off grid energy?' to asking 'what are the approaches used in this case study?'.

The latter three chapters then employ a mix of grounded theory and case study analysis, wherein grounded theory allows the researcher to define the studied phenomenon (ie. political strategy or target population) according to the conception of the enterprise, and the case study analysis uses that contextual construct to compare the experiences of enterprises to tease out factors that influence their behaviour. So the latter half of the thesis asks 'how do enterprises respond to these approaches?', 'why do they respond that way?' and 'what is the impact on the end user?'.

1.6.1 Typology

Chapter two asks, how can we categorise rural electrification policies in order to better contextualise and compare them? In order to answer this question, the chapter develops a typology of relevant policies. The purpose of this chapter is to suggest where governments take similar approaches to engaging enterprises, and thus improve the comparability of this study to others. An alternative approach may have been to expand this thesis to another country case study or two, and to compare India's approach and experience to another country. However, this would have been extremely onerous, given the time constraints. Perhaps more importantly, by creating a typology of policies, I create a framework that is applicable outside of one or two case studies, and also enables other comparative policy studies to be better contextualised.

The Rural Electrification Policy Typology would be best described as a qualitatively derived theory, in that it was created inductively through comparing a set of qualitative data and that it offers up not just concepts but the relationship between them (Morse, 2004). There are two common arguments about the validity of typologies, which offer a parsimonious summary of the research subject: either typologies achieve parsimony through "glossing over" complexity or else they do not reach the level of theory, and are merely a classification system (Doty & Glick 1994, 230). In order to address each of these criticisms it is crucial to understand how typologies are derived in qualitative research and what is meant by theory.

First, qualitative derived typologies are created through an inductive process that can be described in three steps. The researcher builds categories (concepts) from comparing the data, names them, then creates definitions, boundaries and attributes of the concept (Morse, 2004). I would argue that at this stage, the researcher also outlines relationships between the concepts. While the skill and transparency of the researcher will determine the extent to which these concepts describe the world's complexity, Morse also offers three tests of the concept. Each concept should be 1) saturated, as in, fully described, 2) linked to data, and 3) abstract enough to be "used independently from the context" in which it was created (Morse 2004, 1390).

Second, theory is described not just as rich description of the concept itself, but theory also sets out the falsifiable relationships between concepts (Bacharach, 1989; Whetten, 1989). Concepts, as described above, are not just categories but the "building blocks of theory" (Morse, 2004). They need not be unconnected to other concepts, but indeed, should be connected. Finding common attributes between concepts and connecting them is the next step to describing relationships between concepts (Morse and Penrod, 1999). Indeed, Chapter Four borrows a typology in the form of Osterwalder's business model framework, which explicitly describes the relationships between the concepts therein (Osterwalder, 2004). Finally, Doty & Glick explain how falsifiability is needed and how can be done between ideal type and real world organisations, which is a possible way of determining the fit of the REP typology against real world rural electrification policies (Doty and Glick, 1994). That falsifiability is evident in Morse's criteria for evaluation: clarity, structure, coherence, scope, generalisability, and pragmatic utility (Morse *et al.*, 2002). It should be noted that falsifiability applies to the creation of typologies, as in chapter 2, but not to the creation of constructs in grounded theory (Doty & Glick, 1994). Typologies must be coherent in order to meet the criteria for theory. This criterion, along with the five others, represents a good rubric by which to determine the validity of the typologies within the thesis.

1.6.1.1 Typology Data

My approach was first to identify those 62 countries that have a rural electrification rate of under 80% (World Bank, 2017a). Rural electrification policies that were included must meet the following criteria:

1. The aim of the policy must be to improve rural energy access
2. At least one policy instrument must be relevant to the provision of off grid solar technologies
3. The primary source must be available in full (or else a proxy, i.e. the World Bank project report)
4. Salient portions of the primary source must be available in English

The definition of policy incorporates legislation, as well as any projects, programmes or notices about the strategy or implementation of rural electrification. The survey includes World Bank projects. These projects were included if they were the only record of a government policy that was financed by the World Bank as a way to access policies whose primary sources are not in English. World Bank projects are also included if they include policy instruments beyond pilot projects, i.e. they represent a programme for expanding access. The survey also includes Nationally Appropriate Mitigation Actions (NAMAs), which are national strategies for reducing the carbon emissions in developing countries and are created by the national government pursuant to the Bali Action Plan from COP 18 in Doha (UNFCCC, 2018). Relevant REPs were identified through:

1. Policy databases such as IRENA
2. Rural Electrification Agency websites
3. The World Bank database
4. Additional online searches to identify documents

The final result is a survey of 56 REPs across 30 countries with rural access rates below 80% (see Appendix 1). The vast majority of these policies (54) were initiated after the year 2000 and almost all (49) are still in effect. No specific time period was used in surveying these policies, focusing instead on those that were most commonly identified in primary literature (ie. background information available in rural electrification strategies). The loose restriction on time period was due to the focus on collecting a large sample. It is possible to attribute the large skew in the sample towards post-2000 policies as reflecting the impact of the Millennium Development Goals on socially oriented policies, but it is also likely due to the ease of accessing more recently developed, written and uploaded documents.

Therefore, what this survey includes is recent rural electrification policies that support off grid solar energy in countries with low rural electrification rates. Due to the need for English language documentation, there is bias towards countries that have previously been colonies of the British Empire. Therefore, there are fewer examples from South America and more examples from Africa and South East Asia. As the focus is on categorising the types of policies, it is unlikely that this bias has any strong impact on the categories present, but incorporating Spanish and French language policies could address the gap. As it stands, additional foreign language research was outside the scope of this research. This research often includes multiple policies from a single country, but is not a complete record of all relevant policies, and is not a country case study. Instead, it is a collection of relevant policies from which to draw broader categories and approaches.

1.6.1.2 Typology Method

Once collected, each policy was broken down into a summary of its constituent parts, with particular emphasis on how the private or non-state sector was involved in dissemination and on aspects of the policy relevant to off grid solar products. At that stage, policies were further broken down by policy instrument. Almost all policies contained multiple policy instruments. Based on the summaries and policy instruments, policies first were grouped into categories. These categories were then named, based on the nature of their constituent policy instruments and the arrangement of actors, and then these categories were defined (as outlined in section 2.5). The relationships between these categories were also defined as a part of that exercise. The final typology can be seen in Figure 2.1.

As the following chapters shift to focus on India, chapter three asks, how do India's rural electrification policies fit into this typology? By answering this question the chapter suggests the universe to which experiences based on a particular policy may be generalised. For instance, experiences describing the bidding process of the DDG Scheme will be more comparable to another country's experience with direct contracting, as opposed to another country's policy that takes a government as distributer approach.

In order to do this, chapter three uses primary source material (legislation, policy guidelines, etc.), augmented by expert interviews with nine government officials, to break down the two main rural electrification policies – DDUGJY and JNNSM – by programmatic mode. Within these policies, I focus solely on the off grid components; namely, the DDG Scheme of DDUGJY and the Off Grid Component for the JNNSM. Although the grid expansion (DDUGJY) and the grid-connected solar (JNNSM) components also shape the industry, this research has focused on the off grid space because it is understudied, and these are the policies most commonly referenced by the respondents (Brass *et al.*, 2012). By that same logic, I have also applied the typology from chapter two to other important policies for the rural electrification sector, as the respondents commonly discussed them. Their inclusion also illuminates the approach of the Government of India to the sector as a whole, as policies have layered over time (Howlett and Rayner, 2007).

1.6.2 Case Study Analysis

Chapters four through six rely on case studies of off grid solar organizations in India. This thesis utilises an embedded case study approach where the experiences of 15 enterprises are considered to be separate case studies within the single case study of India (Yin, 2014). Case studies are ideal for asking questions about why or how phenomena take place in a context that does not require control over behavioural events and where the phenomena studied take place in the present (Yin 2014, 8). Chapter four is interested in how off grid solar enterprises have changed their business models in response to policy change. In addition to the changes in the enterprises (how), the rich interview data also allows an analysis of the factors influencing these changes (why), making case study research ideal for this project. Chapters five and six are specifically interested is the factors that influence political strategy and target populations. It should be noted that chapters five and six are also interested in what political strategies and target populations exist, and these questions are addressed by grounded theory (see 1.5.3).

While some of this information could be collected through surveys, which may have offered greater comparability if subjects were to be given multiple choice questions, narratives from chapter 4 would have been difficult to collect in such a manner. Likewise, factors that influence political strategy or target populations would be difficult to untangle from survey-based research, as it requires the context available in these rich interviews.

Case studies are commonly used in the field of political science, and their use as a qualitative research method has been codified, with particular attention to generalising their findings (George and Bennett, 2005; Gerring, 2005; Yin, 2014). Within-case and cross-case methods develop and test hypotheses that are both case specific and generalised (Brady, 2002; Mahoney, 2007). Generalisation takes two forms – theoretical (analytical) and empirical. Theoretical generalisation occurs when a process or mechanism is extracted from a case study that may also apply in other cases. Empirical generalisation occurs when characteristics of a sample can be extrapolated to the whole population (Tsang, 2014). Case studies are particularly appropriate for theoretical generalisation, since they are able to determine causal mechanisms in a way that quantitative correlation alone cannot (Flyvbjerg, 2006). However, empirical generalisation is possible for portions of a case study when comparing similar analytical structures (Tsang, 2014).

There are four ways to assess the strength of a case study: construct validity, internal validity, external validity and reliability (Yin, 1981). Construct validity assesses the quality of data collection, which can be done by using multiple sources of evidence, having an established chain of evidence and having informants review draft reports. Establishing a chain of evidence links the case study questions to the case study protocol to citations in the report to evidence in the database (Yin, 2014). The intention here is that later researchers can dig into how certain claims were made, so that they are falsifiable. All these steps have been taken in this thesis. Internal validity is described as "seeking to establish a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships" (Yin, 2014). This is done through explanation building, pattern matching and addressing rival explanations. Within the thesis, I look for patterns across cases, use direct quotes to build the logical mechanisms behind these patterns and use literature to uncover and counter rival explanations.

External validity, on the other hand, is a matter of "designing the domain to which a study's findings can be generalized" (Yin, 2014). In single case studies, as in the overarching case study of REPs in India, theory should be used to expand on the generalisability of this study. In the work on embedded cases (ie individual enterprises), replication logic is used to prove that the same logic is applicable to other cases. Finally, reliability is concerned with "demonstrating that the operations of a study – such as the data collection procedures – can be repeated, with the same results" (Yin, 2014). In order to achieve this, I prepared a case study protocol (Appendices 1-2) and a case study database, which can be seen upon request. These files include the details on case how case studies were done, questions asked, all raw interview data, and the full word tables for each chapter.

1.6.2.1 Case Study Data

This primary data for these chapters are 29 in-depth, semi-structured interviews, across a range of enterprises, government agencies and research institutes. 17 interviews were with high-level executives or managers of 15 enterprises that provided off grid solar technologies, broken down in Table 1.6. Two were primarily commercial enterprises, seven social enterprises, four non-governmental organisations, one public sector enterprise and one governmental organisation. Several enterprises had additional products, but this research focused solely on off grid solar products for domestic lighting.

Interview Type	Organisation Type	Total Organisations	Total Interviews
Enterprises		15	17
Government Officials	Government of India	2	6
	State Governments	2	3
Experts		3	3
Totals		22	29

Table 1.6: Interviews Summary

Interviews lasted between 25-75 minutes, with the majority of interviews taking approximately one hour. The respondents were primarily the CEOs of small to medium scale enterprises, or else the senior manager of the off grid division of larger enterprises. Questions focused on initial descriptions of the business model in use, reasons behind the use of this business model, how the business model had changed over time, interaction with government and the impact of policy changes on the enterprise.

Code	Off Grid Product Type (Past & Present)	Primary Enterprise Type	Est.	States	Scale of Off Grid Component
ENT11	Microgrid, SHS	Social	2010	Rajasthan, Uttar Pradesh	Medium - 5000-50,000 HHs
ENT12	SHS	Commercial	2013	Rajasthan	Small - 500-5000 HHs
ENT13	Microgrid, Minigrid, SHS	Commercial	2013	Rajasthan, Uttar Pradesh, Others	N/A - Panel Manufacturer
ENT14	Microgrid, Minigrid, SHS	Social	2014	Bihar, Rajasthan, Uttar Pradesh	Medium - 5000-50,000 HHs
ENT21	Minigrid	NGO	2015	Bihar, Uttar Pradesh	Medium - 5000-50,000 HHs
ENT22	SHS	NGO	2009	Bihar, Rajasthan, Uttar Pradesh, Others	Very Large - 100,000-250,000 HHs
ENT23	Minigrid, SHS	Public Sector	1974	Bihar, Others	Large - 50,000-100,000 HHs
ENT24	Minigrid	Social	2007	Bihar, Uttar Pradesh	Medium - 5000-50,000 HHs
ENT25	SHS	Social	2013	Bihar, Others	Pilot - 0-500 HHs
ENT26	SHS	Social	1995	Bihar, Rajasthan, Others	Very Large - 100,000-250,000 HHs
ENT27	SHS	NGO	2013	Bihar	Small - 500-5000 HHs
ENT28	Microgrid, SHS	NGO	2008	Bihar	Very Large - 100,000-250,000 HHs
ENT29	Minigrid, SHS	Government	2012	Bihar	Small - 500-5000 HHs
ENT31	Minigrid	Social	2014	Haryana	Small - 500-5000 HHs
ENT32	Microgrid, Minigrid	Social	2011	West Bengal, Jharkhand	Small - 500-5000 HHs

Table 1.7: Enterprises Interviewed

The enterprises selected give a fairly good overview of the market across India. Estimates vary, but recent research suggests that there are 45-60 key formal players within the off grid solar sector in the country (Singh, 2016a). An informal market of local dealers and distributers also exists within the country, representing a few hundred companies, but collecting data on these enterprises is challenging given their disparate locations and limited footprint outside of their local area (Singh, 2016a). The true extent of the market is not clear, but the CEEW suggests there are approximately 250 formal and informal businesses nationwide (CEEW, 2013).

Within the sector, there are a number of large private actors (e.g. TATA BP) and large public sector organisations (eg. REIL), as well as a growing number of small and medium-scale organisations that represent NGOs, social enterprises and smaller commercial enterprises. It should be noted that the line between each category can be blurry, as there are a number of organisations that fall within a range of public to private ownership, NGOs may have branches of their organisation that are run as a commercial enterprise, and India has no legal definition of social enterprise (Perry *et al.*, 1988; Sengupta and Sahay, 2017).

The commonality between all these actors is that they are a part of the supply chain (manufacturing, developing, distributing) off grid solar technologies. There the commonalities end. Some are financed by international development banks (i.e. World Bank), foundations (i.e. Shell Foundation), and aid agencies (i.e. DFID). Others are funded directly or indirectly by state governments (i.e. Government of Bihar). Still others have partnerships across business, government and international organisations, which are summarised in Figure 1.4. Lines represent partnerships, which need not be for funding, but may also be supply chain related, for local capacity, for training, among other purposes.

For stylistic purposes – and brevity – these actors are described in the collective as 'enterprises,' alluding to a combination of the term's meanings of 'business' and 'undertaking.' The term is not used to denote an organisation's philosophy regarding profit-making (Sengupta, Sahay and Croce, 2018). Where relevant, analysis will specify the type of actor, but Table 1.7 can also be used as a reference throughout.

Within these organisations, there is a wide range of engagement with the off grid sector. That is, some organisations work solely with off grid products, even in grid connected areas, whereas others spend most of their energies on grid connected products. Only three of the enterprises regularly engage in grid connected projects (ENT11, ENT13, ENT23). All grid connected products are outside the scope of this study. However, off grid products used in grid connected areas are within my scope. Description of the enterprises and their work will focus entirely on their off grid products, except where explicitly discussed.

Finally, the study focused on enterprises that were active in Bihar, Uttar Pradesh and Rajasthan. Those states were chosen because their high solar potential and lower rates of rural electrification have led to a rise in enterprises working in these areas. However, most enterprises worked in multiple states (as seen in Figure 1.1), including those from outside the study area, without changing their business model across states. Because the focus on these areas was primarily to increase the number of enterprises that might be interviewed, this study also includes enterprises that were available for interviews from outside these states. As the policies studied are national level interventions, they apply equally to enterprises working in different states.

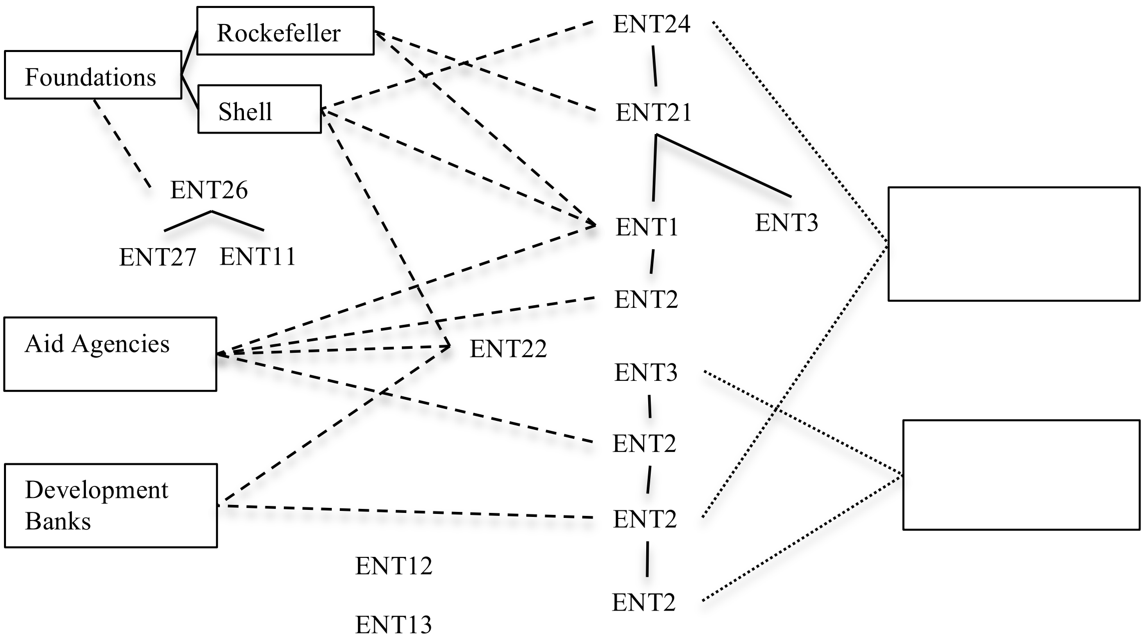

Figure 1.4: Interconnections between organisations

Interviews were conducted using a mixture of snowballing sampling from multiple entry points and theoretical (or stratified) sampling. Three enterprises served as discrete entry points, reaching out to them independently, and thereafter reaching most of the interviews by introductions from other enterprises. Many small to medium enterprises are members of networks such as the Clean Energy Access Network (CLEAN). To avoid this bias, I also purposefully sought out larger enterprises, public sector enterprises, and governmental organisations that may not have been in these networks. The theoretical saturation point was reached when all key enterprise types (NGO, public sector, commecial, and social) were represented within that sample (O'Reilly and Parker, 2013). Arguably, a thematic saturation point was also reached within the interviews, in that narratives of change, while different, followed similar logic and represented common experiences (Eisenhardt, 1989; Guest, Bunce and Johnson, 2006; Corbin and Strauss, 2008). However, there is still scope for further research, particularly into those categories for which there are few respondents, notably public sector organisations.

The sample represents approximately 650,000 households who have received an off grid solar product through one of these 15 enterprises. Most of this population received their products through one of the three very large enterprises represented. However, it is important to note that the interview selection is biased towards smaller enterprises, because they are more responsive to interview requests, are often members of industry organisations and were more likely to connect me with additional interviews.

Since larger organisations are more likely to be eligible to engage with current rural electrification programmes, there is a potential bias against working with the government in this sample. In order to mitigate this, I purposefully sought out larger organisations, state-owned enterprises, and governmental organisations in order to get a fuller picture of possible government interactions. There is also a selection bias for successful enterprises. Unsuccessful enterprises are difficult to identify and reach out to, and so I only contacted enterprises that were currently in business. This does not significantly negatively impact my results, as they are representative of enterprises currently functioning in the space, but it must be acknowledged that one potential impact of policy change is the loss of particular businesses.

Interviews with government officials covered two fundamental national-level organisations: the Ministry of New and Renewable Energy (MNRE) and the Rural Electrification Corporation (REC). Additionally, interviews included members of the REC in Rajasthan, as well as the Rajasthan Renewable Energy Corporation Ltd (RRECL), which is the state nodal agency for the current rural electrification programme Deendayal Upadhyaya Grameen Jyoti Yojana (DDUGJY). Efforts were made to contact other relevant state nodal agencies, but were unsuccessful.

Finally, three experts were interviewed to provide richer context on the policy and enterprise landscapes. Experts were primarily academics or practitioners. Some contact was made with a researcher from the World Bank and members of self help groups (a form of MFI), however, in the analysis the importance of financing became clear. Future research would do well to expand this research to the role of selection in donor organisations, development banks and microfinance institutions.

1.6.2.2 Case Study Method

Each chapter begins by articulating the phenomenon that is being studied. In chapter four, that is the components of the business model. In chapter five that is the components of political strategy, and in chapter six that is the aspects of target populations. Chapters fix and six articulate these phenomena through grounded theory (1.5.3), but chapter four borrows its ontology from Osterwalder's business model canvas (Osterwalder and Pigneur, 2010). The reason for borrowing the ontology, rather than recreating one, is that the interviews did not focus on full descriptions of the each aspect of a enterprise, but only record business model components that arise within the course of questioning. Therefore, the data was not robust enough to create my own ontology, and so I have borrowed one.

Once the phenomenon has been articulated, each chapter applies a case study approach, comparing the response of each organization and identifying overall trends and possible factors that influence diverging responses. In chapter four, general trends in change over time are noted, as well as building logical relationships that contribute to causal mechanisms within the system that is the enterprise. In chapter five, each tactic of political strategy is explored one by one, noting the characteristics of the enterprises that employ such a tactic in order to pull out the key factors that influence political strategy. Finally, chapter six uses the construct of the target population to breakdown how the main programmes articulate their target population, as opposed to trends within descriptions of the target population by technology, enabling us to see where programmes and enterprises are targeting the same populations, where they are not, and hypothesising about the potential impact of these overlaps (or lack thereof) on end users. Further articulation of each chapter's methods is incorporated in the individual chapter.

1.6.3 Grounded Theory

Chapters five and six also rely on a methodology influenced by grounded theory to derive the frameworks used to analyse political strategy and end user selection (Glaser and Strauss, 1967; Corbin and Strauss, 2008). By blending grounded theory with case study analysis, the thesis attempts to overcome the limitations of previous business research, whose frameworks have been developed in a very different context, while still attempting to move towards generalizability. Grounded theory enables chapters five and six to describe the phenomena as it is experienced in context, rather than transplanting a multinational corporation-based, western-centric ontology onto it. In that way, grounded theory is being used to expand upon and challenge the current literature in these fields, as well as answering the questions about 'what' is being studied. At the same time, it offers a starting point for comparative analysis across enterprises with the aim of identifying influencing factors that have the potential to be applied across contexts.

Grounded Theory was originally developed by Glaser and Strauss to develop theory through the coding and analysis of qualitative data (Glaser and Strauss, 1967). In its original conception, grounded theory takes an objectivist approach, assuming that the researcher is able to take a detached stance and view reality through this analysis (Glaser and Strauss, 1967; Corbin and Strauss, 2008). However, later iterations of the method take a constructivist view that the researcher cannot be separate, and instead the 'reality' that is viewed through analysis is social constructed (Charmaz, 2006). Given the constructionist stance of this thesis, I take this form of grounded theory as my guide through chapters five and six.

Grounded theory in these chapters helps to conceptualise *how* enterprises and governments conceive of and describe political strategies and their target populations. In that way, these concepts are not universal truths but an approximation of the reality that the researcher and the subject share (Charmaz, 2006). These concepts are then applied to the embedded case studies to determine the factors that influence them and the implications for the real world actions of enterprises. As will be explored in the next section, keeping the analysis close to the interview data, rather than imposing theory from above, is integral to addressing the role of the researcher in our postcolonial development narratives.

As I have alluded, I do not follow a strict grounded theory methodology, but instead borrow heavily from its approach. In addition to sharing the assumptions of Charmaz's constructivist grounded theory, I develop my conceptual frameworks through three-step coding. Primary coding is done freely by associating sections of interview data with the guiding question of the chapter. Secondary coding consolidates and builds on the primary codes. Finally, tertiary codes compare secondary codes to derive higher-level categories (Charmaz, 2006). Further details on coding are available in chapters five and six. Where I deviate from the approach is in my strict allegiance to the research question (not necessary, or even desired in Glaser's conception), and I allowed myself to be familiar with related literature (as opposed to coming in blind). These changes make the research a little more focused, but necessarily block off particular paths of inquiry that I might have taken. Nevertheless, given the limited scope of time available for a doctoral thesis, I believe this compromise allows for the best of both worlds, allowing the research subjects centre stage while also being specific in what I asked of the data, which were the same interviews as Table 1.7.

1.7 Reflexivity and Positionality

Given the many dimensions of identity, authority and representation within this subject, it is crucial to reflect on the positionality of both the author and the research within this thesis. What role does the researcher play in the research, and how do the characteristics of the researcher impact that role? What role does the researcher have in representing the realities of the research subjects? Are these designations of "researcher" and "research subject" overly simplistic and problematic? How can reflecting upon these questions improve our fieldwork research? These are the questions that predominantly play out in geography and education research that take a closer look at gender, race and postcolonialism (Katz, 1994; Kobayashi, 1994; Mullings, 1999; Nagar and Ali, 2003).

Reflexivity refers to the concept of reflecting upon these questions with the aim of improving our understanding of how knowledge is constructed, or at least acknowledging the limitation of that construct. Sultana describes it as "being attentive to the politics of knowledge production" (Sultana, 2007). The belief in the value of such reflection relies heavily on postmodernist concepts of the plurality of truth, and it questions our ability as a single point of observation to see and know alternative realities, which are situated, incomplete and ever shifting (Pillow, 2003). In such an environment, what is it that we mean by positionality? A researcher's position is the combination of a range of visible and invisible factors that contribute to the negotiated identity of the researcher in the research context. In other words, "a researcher situates both herself and her research subjects in the same landscape of power, which is the context of the research project in question" (Rose, 1997). This can simply take the form of an exploration of the way that race, gender, education, class or other markers of identity influenced the interactions between researcher and research subject (Sultana, 2007). However, some scholars, Rose most prominently, disagree that "transparent positionality" – that is, explaining how your position and how it affects the research – is even possible. In Rose's conception, the postmodernist position is ever changing and multi-faceted, experienced differently by each party, and therefore is unknowable (Rose, 1997). This is a position increasingly shared by feminist geographers (Nagar and Ali, 2003; Pillow, 2003).

Given the unknowability of our positionality, what is the purpose of reflexivity? Scholars have questioned the ability of self-reflection to move beyond narcissistic naval-gazing (Patai, 1994; Nagar and Ali, 2003; Pillow, 2003). Perhaps more insidiously, there is the concern that the simple act of reflection will be deemed sufficient to consider the work of justice and equality done, and relations between researcher and subject will return to a previous dynamic with the mistaken belief that inequalities of representation have been solved (Sultana, 2007; Spivak, 2010). One approach that seeks to prevent such surface-level reflexivity is to write "with" and not "about" one's subjects (Nagar and Ali, 2003). This prevents the silent assertion that the academic distance a researcher maintains imbues them with a god-like objectivity. However, this can begin to blur the lines between academic research and journalism, as the subject is given greater sway over the narrative. Either way, the most strident criticism of reflexivity is that this is academic discourse that ignores the very real-world needs of people and that we are not asking the most pressing questions in our fog of semantics (Patai, 1994; Nagar and Ali, 2003). These criticisms are even more pointed in the context of work with the rural poor.

Within this thesis reflexivity holds three purposes, which aim to acknowledge the postmodernist conception of unknowable positionality while forging ahead in the knowledge that inevitable simplifications in representation must take place to address the real, pressing needs of those without electricity access. Therefore, reflection is key for 1) considering the limitations of this research, 2) ensuring the representation of counter-narratives within the research (especially crucial in Chapters Four through Six, which rely on interview data), and 3) acknowledging the position of this research in broader, systemic inequalities of postcolonial research in the hope that we might, as a field, find ways to address these (Nagar and Ali, 2003; Jack and Westwood, 2006; Milner, 2007; Spivak, 2010).

Despite the initial differences between myself and the majority of my research subjects, I actually occupied a dual insider-outsider status (Mullings, 1999; Merriam *et al.*, 2001; Sultana, 2007). As a young, white woman with an American accent, coming from a top British university, I was often diametrically opposed on all these visible counts of identity from my interview subjects, most of whom were middle-aged, Indian men in government or business in India. From this perspective, I was a clear outsider, and when I attempted to show insider status (wearing a *shalwar kameez*, for instance) it was commented upon. These comments were always friendly, but served to further draw attention to differences between myself and my subjects. However, despite initial impressions, there were important similarities between most of the interview subjects from off grid businesses and myself. Many of the CEOs, COOs, managers and cofounders that I spoke to had been to business school, some in India, some in European institutions. As I undertook my masters at the Judge Business School of the University of Cambridge, these interviews often illuminated how a shared educational background can be as powerful as visible markers of similarity (Mullings, 1999).

Whether these similarities or differences helped or hindered in the course of my research is difficult to address. It is certainly possible that the difficulties I faced in getting some government interviews, or the dismissiveness of some government interview subjects, related to my gender, but equally, it is likely that my gender and age contributed to some of my more cordial, longer and more helpful interviews (Sultana, 2007). It also likely assisted in the few interviews that were with women, who often were working specifically in a women's empowerment context. It is certainly the case that a shared business school background helped in many of the business interviews, in great part because the participants spoke the same "language," making their narratives – and my questions - more instantly understandable to each party.

Despite these similarities, my research still falls under the category of international business research (IBR) and comes with the larger-scale, systemic post-colonial baggage that that entails. Although many of my interview subjects came from the same, Euro-American educational background, the subject of my research was truly the businesses that these subjects represented. The fact of the matter is that IBR is predominantly developed, undertaken, and published by either Western scholars or within the framework of Western, Anglophone scholarship. This can drown out competing voices from elsewhere in the world (Jack and Westwood, 2006). Likewise, the very questions and assumptions that scholarship makes is determined not by the individuals whose lives are studied, but by scholars from a different continent, speaking a different language (Nagar and Ali, 2003). Even where interviewing elites (as I was), the power of interpretation and choice of frameworks still remains with the author (Mullings, 1999). To attempt to redress this issue, Jack and Westwood suggest that "at a minimum, local self-representations should be taken account of and ideally become the prime resource driving conceptualizations and practice" (Jack and Westwood, 2006). Borrowing from grounded theory in first constructing and then applying new frameworks, I have attempted to put the interview narratives front and center in my interpretation. However, there are still some frameworks (ie Osterwalder's business canvas) that are applied retroactively onto the data.

Exploring the role that this researcher and research has in broader trends cross-boundary research aims to qualify the authorial objectivity that academic research takes (Nagar and Ali, 2003). More concretely, it is the basis by which counter-narratives are included within the interview data. Doing so is more than naval-gazing, but acknowledging that real world data can be messy and contradictory, and improving representations of the research subject despite that.

1.8 Conclusions

This introduction has gone some way to exploring the context in which the research is situated. India is a large, complex country with its own history of power sector development. When electricity was introduced in the late 1800s, it was primarily owned by private developers and very limited in geographical scope. Since then, publicly owned companies took over as the grid was expanded throughout urban and periurban spaces. However, large swathes of the rural population were still without power, and policies and companies that are the subject of this research emerged in the 1990s-2000s with the privatisation and unbundling of the power sector (Palit and Bandyopadhyay, 2017). Given the political interest in electricity access, as rural populations make up large portions of many constituencies, Indian policies vacillate between strong state interest in customer protection and an emphasis on allowing market forces to bear on rural development.

Given that, this thesis asks how rural electrification policies impact the enterprises that are enlisted (or expected) to provide off grid solar systems in areas with little to no electricity access. Using an embedded case study method, the bulk of the research uses interviews and secondary literature to piece together the complicated answer to such a question. In doing so, I break this question further into smaller questions about enterprise change over time, political strategy and target customers. The findings suggest that enterprises of all sizes are agile, quickly respond to policy, and try to balance minimising political risk with taking advantage of potential benefits. The tension between market-based approaches and social equity create difficulties in scaling up enterprises that focus on those with the least, and microfinance organisations can actually reinforce inequality.

While the case studies focus entirely on India, the rich interviews that underlie this study offer up logical relationships between social, economic and political factors that allow for theoretical generalisation. That is to say, while the particulars of each enterprise are idiosyncratic, the mechanisms by which they make decisions are potentially universal. This is the greatest offering that this research can make to our energy access problem. India is unique among low- to middle-income countries in its decades of grid and off grid expansion programmes that have been supplied by impressive central investments. Prime Minister Modi believes that all households will be electrified by the time that this thesis is completed (ET Bureau, 2017). While it seems likely that energy intensification programmes and efforts to improve quality will be ongoing, the future of off grid expansion is primarily in Africa (IEA, 2017). While India might be unique in the history and breadth of its off grid programmes, it is hardly the only country to recognise its potential. Increasingly, low- and middle-income countries are supporting non-state enterprises in expanding the use of solar home systems, microgrids and minigrids (Sovacool, 2013; IEA, 2017). To determine where the comparison of India's REPs is most apt, we begin by exploring these new policies around the globe.

India-specific findings suggest that solar enterprises respond to changes in ways that are potentially predictable, given the logical relationships between aspects of the business model, but which may be counterproductive for the development of a healthy off grid solar sector and for filling tenders. The extent to which enterprises are reliant on, and therefore responsive to, enterprise change is determined by their political strategy, which relies on enterprise characteristics such as size, past experience, and technology. Finally, the end users targeted by policy and enterprises are only partially aligned, suggesting that changes in market-based policy may negatively impact the direct contracting policies in place. Taking a step back, the study suggests that policy changes do not just increase or decrease sales, but change the very shape of the market that they hope to tap into. Increased emphasis on leveraging the private sector by governments around the world suggests that these findings may have relevance for other policies that try to use market actors for public service delivery, particularly in a development context.

2 RURAL ELECTRIFICATION TYPOLOGIES

2.1 Introduction

Sustainable Development Goal 7 supports access for affordable, reliable, sustainable and modern energy for all by 2030 (United Nations, 2015). In the pursuit of that goal, governments all over the world have sought to bring power to the 1.1 billion people without electricity (IEA, 2017). The expectation is that increased energy access will improve other development indicators, such as air quality, health, education and gender equality (Azimoh *et al.*, 2015; Barman *et al.*, 2017). While the relationship between these factors is still up for debate, international organisations broadly agree that energy is a cornerstone of development, without which many other quality of life improvements cannot exist (Muir, Areikat and VandenBroek, 2014; Acheampong *et al.*, 2017; Mccollum *et al.*, 2017). This is the primary reason that governments all over the world are trying to improve and expand energy access. In countries with large underdeveloped areas, these attempts at improvement take the form of rural electrification policies (REPs). REPs typically focus on expanding the national grid and planning increases in supply in order to support new demand. However, with SDG #7 increasing the pressure to provide access, even where grid expansion is uneconomical, many countries are acknowledging the importance of providing energy through off grid solutions. Off grid solutions include minigrids, microgrids and standalone systems of all capacities and energy sources. The IEA estimates that 50% amount of new connections will be achieved through off grid (IEA, 2017). Although both fossil fuels and renewables are likely to play a part in the expansion of off grid systems, renewables are anticipated to account for 60% amount of new connections (IEA, 2017). Among renewables, solar has been the heavy hitter, accounting for a large proportion of connections as manufacturing costs for PV decrease globally (IEA 2017, p 13). Nevertheless, as energy access is broadly considered the responsibility of central governments, newer REPs have gone out of their way to support solar off grid.

These REPs require a degree of engagement with market actors. It is anticipated that $786 billion of investment will be required to secure energy access for each person on the planet by that deadline, with the majority of that money needed for the expansion of electricity access (IEA 2017, p 104). That represents approximately 3.4% of the global energy sector investment. Given that the majority of the population without access lives in low- to medium-income countries, governments have looked to the private sector and other non-state actors to secure the funding and expertise necessary. Rural electrification policies utilise a range of approaches to encouraging off grid technology and engaging non-state actors in their delivery. This thesis focuses specifically on those REPs that engage market actors in the service of expanding access through off grid solar technologies.

As it stands, the literature on such policies is casuistic and sparse. Occasionally scholars have sought a comparative approach to REPs (Liming, 2009; Niez, 2010; Javadi *et al.*, 2013; Sovacool, 2013), but the majority of studies take a single case study approach (Chakrabarti and Chakrabarti, 2002; Haanyika, 2008; Lemaire, 2011; Mawhood and Gross, 2014; Quitzow, 2015; Mollik *et al.*, 2016). One reason for this is the complexity of the field, which intersects previous power sector policies, electrification programmes, market development and renewable energy support. This can also lead to policy layering (Rogge, Kern and Howlett, 2017). This makes comparing them a challenge and prevents attempts at more generally assessing their operation, as there is not necessarily a shared vocabulary between the studies. In order to improve comparison and contextualise single case studies and expand the conclusions of this thesis, this chapter surveys a selection of off grid solar REPs to develop a rural electrification policy typology. Building a typology from the data, rather than fitting the data to a previous framework, is important in part because of the uniqueness of the sector, which features the provision of new technology in low- and middle-income countries to deliver public services typically through private and non-state actors.

In order to do that, this chapter first explores the relevant literature on rural electrification policies and public service delivery, and then surveys the rural electrification policies that utilise off grid solar energy that are available in English. Solar energy is expected to be the largest source of off grid electricity, especially in sub-Saharan Africa (IEA 2017, p 13). The policies surveyed focus on those countries that currently have lower than an 80% rural electrification rate. This is not a claim that these are all the relevant policies in existence, but merely a large sample of such policies, given the constraints outlined the in methodology section. Breaking down these policies into their constituent relevant instruments, this chapter proposes a new typology of REPs focusing on three policy types: institutional, regulatory, and programmatic. Within the programmatic policies, there are five modes of engagement with market actors in public service delivery: market-based, energy service companies, public-private partnerships, direct contracting, and government as distributer.

The rural electrification policy typology that is developed here offers a toolbox for comparing off grid solar policies across countries and contexts. Given its focus on off grid energy products, it is likely applicable to other forms of off grid electricity technology, such as micro hydro or biomass plants, or else to other off grid energy products, such as clean cook stoves. Most importantly, defining and delineating these categories offers a way to improve our comparative analysis of REPs, to ensure that comparisons are able to accurately determine the key similarities and differences between policies.

This chapter will first expand on the current literature on off grid solar policy in section two. Section three will review how three strands of the relevant literature approach the engagement of private and non-state actors in the provision of public services, namely, the literature on political economy, innovation studies and public administration. Section four will then outline the method by which this chapter collected rural electrification policies, their definition, and their analysis. Section five sets out a new typology of REPs and section six goes into detail on programmatic modes, which specifically describe the engagement of private and non-state actors, pulling back in our conceptual framework. Finally, section seven will discuss the implication and use of this typology in its concluding remarks.

2.2 Methodology

Using the typology methodology described in 1.5.1, I collected 56 rural electrification policies to develop the REP typology below. The majority of the rest of chapter defines the categories and their relationships, as well as offering a survey of policies that fit within these categories.

2.3 Rural Electrification Policy Typology

2.3.1 Development of an REP typology

Two studies are notable for taking steps towards a typology of global rural electrification policies. The first is a study of policies from all over the world that aim to expand electricity access, which broadly break down into grid expansion and off grid. From there, off grid policies can be broken down by technology. However, the 'typology' of each policy is a very short summary (Javadi *et al.*, 2013). Sovacool takes a more methodical approach to collecting and categorising rural electrification programmes, but the focus is on lessons learned in achieving its outputs (Sovacool, 2013). Notably, Sovacool only looks at programmes, not all policies, and so policies that do not explicitly set up a service delivery arrangement are not included. In considering the programmes together, the article outlines three paradigms of renewable energy development: donor gift paradigm (1970s-1990s), the market creation paradigm (1990s and 2000s), and the new "sustainable program paradigm (mid 2000s-present) (Sovacool, 2013). While this typology is helpful in conceptualising how these policies have changed over time, they act more as a historical summary rather than a tool for deconstruction, which is necessary for comparison.

The REP typology presented here categorises the policies that have been included in this survey. Findings suggest that policies are primarily institutional, regulatory or programmatic. However, it is possible for policies to be in more than one category. Thus, the relationships between the categories could be described as this: rural electrification policies can be institutional *and/or* regulatory *and/or* programmatic in nature; programmatic policies deliver rural energy *through* a programmatic mode *using* incentives to align the actors within the mode.

Categories can be defined by the challenge that they aim to address. That is, institutional policies address limitations to the current institutional capacity. Regulatory policies address needs to manage a market that is not naturally supporting energy access. Finally, programmatic policies specifically focus on how to reach end users with the specified technology. The latter is usually what is referred to as rural electrification policy, but other policies, such as those that create funds for improving energy access, are also important parts of the rural electrification puzzle. By incorporating all of these types of policies and delineating their aims and methods, this typology improves our discussion around these policies by making it more precise, systematic and comparable.

Up until this point, the chapter has referred to a range of non-state actors: private companies, NGOs, semi-public organisations and social enterprises. From this point forward, all non-state actors will be referred to as ‘enterprises’ regardless of their business model. This is partially due to the fact that in the off grid sector the line between private, social and non-governmental organisations can blur due to the heavy emphasis on poorer customers. Given this, REPs often invite any non-state organisation to apply. Last but not least, for stylistic purposes, it is easier to give this diverse group a single moniker. Clarifications will be made when discussing specific REPs, but general discussion of engagement with non-state actors will refer to them as enterprises.

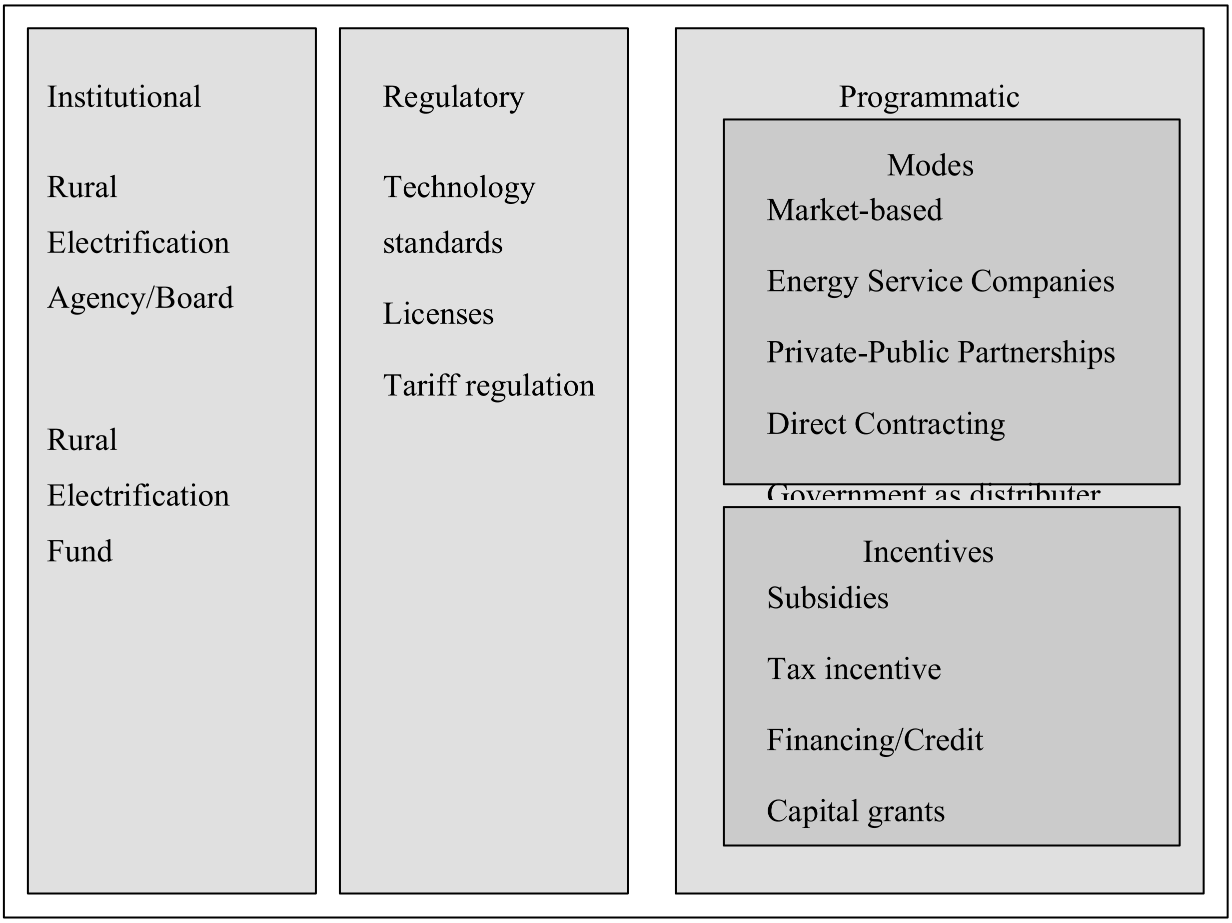

Figure 2.1: Rural Electrification Policy Typology

2.3.2 Institutional Policies

In 1977, the Government of Bangladesh ratified Ordinance No. LI of 1977. This ordinance set up a rural electrification fund to be managed by a rural electrification agency. At that time, the rural electrification rate in the country was under 5%. Today it is 68.85% (World Bank, 2017a). Ordinance No. LI of 1977 is the oldest REP in this dataset, although it should be noted that the policy was updated in 2013. It represents a subset of the REPs that are institutional policies; that is, they are policies that aim to create an institutional framework within the government that enables the expansion of energy access. For the most part, these policies focus exclusively on the creation of a rural electrification agency or a rural electrification fund. A rural electrification agency may be a separate entity or a subdivision of the ministry or department of energy or renewable energy. Rural electrification funds are usually under the sole control of the rural electrification agency, where one exists.

Within the sample, nine policies create a rural electrification fund and eight policies create a rural electrification agency or rural electrification board. In the creation of a rural electrification fund, these policies outline the role of the fund, how money shall be allocated to the fund, who is in control of the fund, and the manner in which the money in the fund should be dispersed. The aim of these funds is to expand and improve rural electricity access, but the creation of a fund also aims to do so by ring-fencing funding for this particular purpose. Legislation setting up rural electrification agencies follow a similar approach in concentrating institutional capacity and attention through a devoted board of members. Policies that set up these agencies outline the agency or board's purpose, membership, functions, responsibilities and reporting and auditing rules.

As in all these categories, some policies may fall under more than one category. Although typically these policies stand on their own or else include provisions for both a rural electrification agency and fund, in some policies, the creation of an agency or fund is one instrument among many. There is no obvious trend in which policies may overlap with this category; that is, some policies include regulatory and institutional components and some include programmatic and institutional components.

2.3.3 Regulatory Policies

Regulatory policies do not offer financial benefits, although they may be favourable to a sector, but instead set out the rules of the playing field. They are broadly considered to be a restrictive policy – limiting the actions of market participants. The aim of regulatory policy can be to protect the interests of the end user or the interests of certain sectors – this being the difference between social regulation and economic regulation (Hughes p 26). Both are salient in the energy access discussion and within these policies. Perhaps the clearest example of this distinction is the role of tariff regulation.

18 policies include rules for off grid tariff regulation, which can either be in the form of the deregulation of tariffs in off grid spaces, an outline of how tariffs are regulated, or the acceptable regulated tariff prices. The difference between the former (deregulation) and the latter two policies (regulation) is the difference between economic and social regulation. One example of a policy of deregulation is the Notified Rural Regions of the Indian Electricity Act 2003. This section of the policy allows for

private operators in rural areas to provide power at an unregulated price. Other policies, such as the Nigerian Regulation for Mini-grids 2016, offer the option of a tariff that is agreed upon between the private operator and the community (V.20). However, even in this case, that tariff is agreed upon with potential oversight by the Nigerian Electricity Regulatory Commission. The aim of deregulating tariffs is to allow private companies to recoup sufficient costs in an area that would otherwise be challenging. Minigrids require high capital costs and often work in areas with low demand, which means that they may not be able to function at the nationally regulated electricity price. The aim, therefore, is to ensure that non-state businesses can work in the space, and therefore these are economic regulations.

On the other hand are social regulations, which aim to protect the interests of the end user. A great example would be the Section 13 of the Renewable Energy Act 2013 from the Gambia. This section states:

> "(1) Electricity generation from renewable energy resources or hybrid systems in off-grid areas which build the required facilities to connect end consumers ("Private Wire Network") are allowed to charge electricity tariffs to end consumers up to the current national retail tariff rates ("Approved Electricity Tariffs"), as determined by the Authority, provided the capacity of generating facility on such private wire networks system is no greater than two hundred kilowatts.
> "(2) Private Wire Networks with a capacity of generation from renewable energy resources or hybrid systems greater than two hundred kilowatts or wishing to charge tariffs greater than the approved electricity tariff may also be permitted, but shall justify any tariff to the Authority following the normal procedures under the Electricity Act." (Ministry of Energy, 2013)

In this case, minigrid operators are expected to sell power at up to the same price that the national grid charges. This may not be to the benefit of the private company, which may wish to charge more, but to the benefit of the end user that is able to better afford the power. This is not the only possible configuration of regulation, however. Vanuatu, for example, in their nationally appropriate mitigation action plan of 2015, determined that tariffs should be agreed between the private company and the Government of Vanuatu (UNDP 2015, p 53). The aim of this oversight is to protect the end user, so that they are not being charged exorbitant rates.

With tariff regulations often come rules around licensing. 12 policies in the sample include licensing regulations, which identify which parts of the market require a vendor to have a license and how licensing should occur. The aim of these policies is to allow the government to determine who is allowed to participate in certain markets. In the context of rural electrification, this is often to ensure the companies providing off grid solar are able to provide adequate products and services, and that they are not a ‘fly-by-night’ operator who might provide poor products and then disappear. These licensing requirements often incorporate rules around technical standards.

23 policies include a description of, or plan for, technical standards. Technical standards can be for the import of solar modules, solar panels, their installation or their maintenance. The most common is the requirement that imported solar products meet the ISO standards for solar energy products (ISO, 2018). Notes on technical standards are also prevalent in programmatic policies requiring enterprise engagement with government, as governments make specific requirements of the standards that enterprises must maintain. For instance, in the case of Zambia’s 2008 Rural Electrification Master Plan, solar development moving forward includes the unification and improvement of their technical standards:

> “9.4.5. Standardization of Implementation Plans, Applied Technologies and Equipment Specifications, and Development of Technical Manuals
> “Unification of technical standards, standardization of solar power generation technologies which align with local characteristics regarding design and installation items, etc., and technical manuals are needed for installation, implementation and operation maintenance. Currently the procurement of solar power generation facilities mainly relies on imports, but in order to promote the future utilisation of parts manufactured in the country, costs and quality of these products should achieve an international level, requiring the establishment of technical standards, quality improvement, and technological advancement for cost reduction, of solar power generation facilities.” (Ministry of Energy and Water Development, 2009)

This is something that had previously been identified as a hindrance to rural solar deployment (Ministry of Energy and Water Development 2009, s 9.1.1). Standardisation can benefit both the end user, by improving quality, and the sector as a whole, by improving trust in the product. Regulatory policies therefore have both an economic and social dimension, depending on the aim of the instrument.

2.3.4 Programmatic Policies

Research around REPs typically focuses on programmatic policies; that is, policies that outline a programme of distribution of off grid energy supply. Within programmatic policies, this research identifies a mode of distribution and incentives for distribution, which refer to enterprise engagement. Essentially, programmatic policies outline the relationship between the government, enterprises and end users, and the incentives in place to align them. A programmatic policy may involve more than one mode, particularly if it describes the distribution of more than one type of technology (ie minigrids and SHSs). Likewise, a programmatic policy regularly involves multiple incentives. Finally, as with institutional and regulatory policies, a programmatic policy may overlap with other categories. This section will briefly describe the nature of the programmatic policies surveyed before section 6 goes into greater depth on programmatic modes.

Modes express the relationship between government, enterprise, and end user in the provision of off grid solar power. There are five programmatic modes: market-based (included in 20 policies), private-public partnerships (14), private ESCOs (9), direct contracting (16) and government as distributer (2). All programmatic policies take at least one mode, but a policy may have more than one mode as REPs often include more than one technology and modes may overlap. Policies that provide incentives without an explicit structure (ie a subsidy with no plan for public distribution) assume a market development mode. Further details and examples of modes will be explored below.

In order to ensure that enterprises participate in the way that modes intend, incentives are built into the programmes to encourage involvement. In some cases, this is in order to encourage enterprises to get involved (a kind of economic incentive, a la regulatory policy), and in other cases the incentives encourage rural end users to purchase the systems or power (a kind of social incentive). They primarily take the form of subsidies (included in 24 of the policies), tax incentives (8), credit or financing (20), and capital grants (12).

Subsidies can target technologies or end users either through subsidising the technology or by providing subsidies only to a particular target population (ie households below the poverty line). This is the most popular incentive within the sample, likely due to its flexibility. A subsidy may be of any amount (some countries offer free connections to rural households) and may target any population (in some cases subsidies are primarily for community buildings). Subsidies are present in all modes: market development (10), private-public partnerships (7), private ESCOs (3), direct contracting (10) and government as distributer (2). It is perhaps worth noting that subsidies are used in half or fewer of the three former modes, and are slightly more prevalent in direct contracting and government as distributer.

The classic example of direct contracting is exemplified by Mozambique's 2016 programme managed by FUNAE, Off-grid renewable energy for rural electrification in Mozambique. In it, the government identifies the areas that require off grid technology, tenders out the project for private and non-state contractors, then provides a 100% end user subsidy for initial connection and a further end user subsidy for monthly payments to the contractor (UNFCCC, 2016). However, subsidies can also be integrated into a market development mode. For instance, India's Jawaharlal Nehru National Solar Mission (JNNSM) initially provided an end user subsidy for customers of certain solar home systems. Customers worked with companies to prepare the paperwork that would allow them access to a loan and a subsidy through the National Bank of Agriculture and Rural Development (NABARD). Any end user would have access to this subsidy if they were purchasing a system. This expanded the reach of these systems into rural areas without the identification of such populations by the government, unlike India's other rural electrification programmes.

Tax exemptions are another form of financial incentive that is present in a number of these policies. These may be exemptions from VAT or other duties that target downstream parts of the market. For example, the Renewable Energy Policy of Bangladesh, 2008 has a VAT exemption for renewable technologies:

> "5.2. To prompt renewable energy in power sector, all renewable energy equipments and related raw materials in producing renewable energy equipments will be exempted from charging 15% VAT. SEDA or power division of the MPEMR or its assignee until SEDA is formed, will fix up the acceptable mechanism to reach the benefits of tax exemption to end users in consultation with NBR." (MoP, 2008)

Other tax exemptions target upstream parts of the market by reducing or eliminating import taxes, for instance. The aim of these policies is to improve both the profitability of the technologies and to lower their costs for consumers.

Next is financing. Financing comes in two main forms: credit for businesses or microcredit for end users. A great example of the range of targets for financing is Rwanda's Renewable Energy Fund Project 2017, supported by the World Bank. The objective is to "increase electricity access in Rwanda through off-grid technologies and facilitate private sector participation in renewable off-grid electrification" (World Bank

2017b, s28, p 22). In order to do that, the Government of Rwanda will offer financing through four different 'windows': onlending through SACCOs [Savings and Credit Cooperatives] to households and micro-enterprises, onlending through banks (commercial and microfinance) to households and small and medium enterprises (SMEs), direct financing of mini-grid developers, direct financing of locally registered OSCs (World Bank 2017b, s 34, p 24). In summary, windows one and two offer financing to small businesses and end users through local cooperatives and banks. Windows three and found offer financing directly to companies for minigrid development and for registered off-grid solar companies. Policies with financing instruments do not necessarily include both financing for end users and for enterprises. Rwanda's four-window approach is unusual in its breadth of financing targets. However, both financing for companies and microfinancing for end users are commonly incorporated into the policies, making it the second most common form of incentive.

Finally, twelve of the policies include capital grants. It is possible to consider a technology-based subsidy as a capital grant, but in this typology, capital grants refer to government funding that is provided to the enterprise to cover high initial investments, not ongoing product costs. For that reason, capital grants are primarily an incentive for minigrid and microgrid developers. An interesting example is the World Bank funded Nigeria Electrification Project initiated in 2018. In the first component, the project aims to involve private investors in Nigeria's minigrid space by offering grants (here called subsidies) to the lowest bidder:

> **"35. Component 1.1: Minimum Subsidy Tender for Mini Grids (IDA US$70 million equivalent).** To initiate implementation, REA will select 250 sites in areas where there is already significant private sector interest. REA will invite private developers to bid for minimum capital cost subsidies according to their business plans to provide electricity to these sites." (World Bank 2018, p 16)

In that way, the government procures a system that requires the least government support for initial investment. Other policies take different approaches. They may offer a fixed grant percentage, such as South Africa's Non-Grid Electrification Policy Guidelines, or Lao PDR's Decree on Solar Energy Development. Or else the amount of funding may be agreed between the government and the company, as in the case of Tanzania's National Electrification Programme 2013-2022.

2.3.5 Other Policy Instruments

It should be noted that there are other policy instruments that are occasionally incorporated into these policies, but which have not been included in this typology due to their scarcity. Other forms of support for off grid power come in the form of awareness campaigns, training and other forms of capacity building. Amongst projects funded by international organisations, there can also be found implementation support and research and knowledge sharing. However, these policy instruments are much less common (cited between 1-3 times across all policies) and therefore are only mentioned here. Additionally, due to their vague character, little concrete information about the form of, say, capacity building is available.

2.4 Programmatic Modes

It is worth taking a moment to further explore the programmatic modes. Programmatic policies focus on setting up and incentivising the relationships between government, end user and enterprises. The programmatic mode sets up that relationship. It describes how these actors relate to one another with the aim of expanding energy access. There are five potential modes present in the data: market-based, energy service companies, private-public partnerships, direct contracting or government as the distributer. A single policy may implement more than one mode at a time, and each mode has a number of assumptions about *how* the relationship configuration will expand access. This provides a framework for analysing how actors within the system are intended to function, and how they do function. As with the REP typology as a whole, the identification of these modes helps researchers to better compare policies and the different approaches that countries take to electrification.

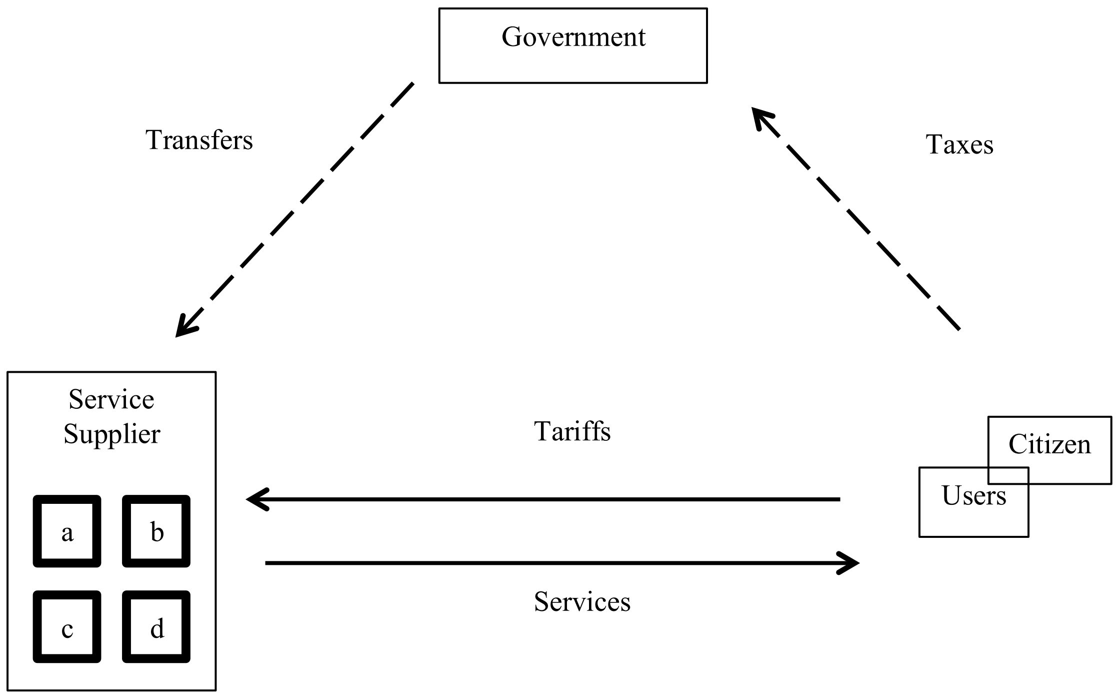

Figure 2.2: Market-based Arrangement

Country	Policy Title	Start	End
Zambia	Electricity Service Access Project	2017	2022
Malawi	Malawi Renewable Energy Strategy	2017	2030
Niger	Niger Solar Energy Access Project (NESAP)	2017	2024
Guinea	Decentralized Rural Electrification Project (PERD)	2002	2014
Gambia, The	Renewable Energy Act 2013	2013	
Lesotho	Lesotho Renewable Energy-Based Rural Electrification Project (LREBRE)	2006	2013
Rwanda	Rural Electrification Strategy 2016	2016	
Rwanda	Rwanda Renewable Energy Fund Project	2017	2023
Ethiopia	National Energy Policy 2013	2013	
Ethiopia	NAMA for Off Grid Rural Electrification	2016	2020
Ethiopia	Ethiopia Off-Grid Renewable Energy Program	2016	2023
Nigeria	Nigeria Electrification Project	2018	2023
Solomon Islands	Solomon Island SREP Investment Plan 2014	2014	
Mongolia	Renewable Energy for Rural Access Project	2006	2012
Vanuatu	Vanuatu Rural Electrification Project (Phases I and II)	2014	2022
Nicaragua	Offgrid Rural Electrification Project PERZA	2013	2011
Bangladesh	Renewable Energy Policy of Bangledesh	2008	
Comoros	Solar Market Development Project	1997	1999
India	JNNSM - Off Grid Scheme	2010	
Afghanistan	Rural Renewable Energy Policy	2013	

Table 2.1: Market-based Programmes

2.4.1 Market-based

Twenty policies in the sample include a focus on the market-based expansion of solar products as a means to expand energy access. Market-based programmes put an emphasis on lowering regulatory barriers and providing financing for enterprises trying to enter the off grid space. The market-based mode is defined by the manner in which end users are selected. In subsequent modes, the government has a hand in determining the target end users for the technology, but in the market-based mode, market forces make that determination. In practice this means that companies target those who are able and willing to pay for their products or services. This does not preclude the use of subsidies or financing to narrow a gap between willingness or ability to pay, so long as the determination of purchase rests with the company and end user.

For instance, the Malawi Renewable Energy Strategy 2017 has a strong focus on making the off-grid sector successful as a market independent of government support going forward:

> "It is hoped that the off-grid solar sector could play a hugely important role in achieving this goal through the spread of very small-scale personal solar devices to larger home systems. Initially, in the run up to 2020, with off-grid solar devices currently owned by only 13% (Business Innovation Facility, 2016) of households the industry will still rely on support from social enterprises and NGOs in order to develop the supply chain and provide subsidies for those who are most in need. By 2020, with costs falling and greater consumer awareness as the market develops, many sections of society will already be able to afford these products and make the switch to off-grid solar devices. By 2025 the market should almost be fully commercial as prices continue to fall and finance models are available for the poorest in society. By 2030 it is hoped that the market will have already reached full penetration and mini-grid and grid-scale power will begin to displace those who initially purchased off-grid solar products." (Republic of Malawi 2017, p 14-15)

This example is notable for the clarity of its strategy for future off grid energy. Both small solar systems and minigrids aim for commercial market status, with minigrids taking over for initially purchased systems. In order to reach this goal, the strategy also includes tax exemptions for solar imports, as well as introducing international technology standards for off grid solar and licensing for solar importers. The hope is that this will make it easier for private sector operators to work in the country and for end users to feel confident in the products available.

As a means to increased energy access, the market-based mode assumes that access will be expanded by a commercial off grid market, which in turn implies that the price of the off grid technology will be low enough and willingness to pay will be high enough that there will be no gap between need and access. The high cost of distribution in rural areas is also a challenge as private sector companies try to maintain a sufficient profit margin. This was a challenge in the Mongolia REAP, which had to switch its programmatic mode, as outlined in its 'Lessons Learned' section:

> "Proper market assessments are an essential requirement for projects that rely on the private sector for distribution of equipment, after-sales service, or the operation of local off-grid utilities. In small dispersed markets, scale may be insufficient for profitable private sector participation. In those circumstances it is important to determine whether the private sector has the financial capacity to benefit from purchasing the equipment at wholesale prices or to take on utility operation and maintenance. In Mongolia, owing to limited financial capacity, concentration in the capital city, and logistically challenging and small-scale market of herders, sales of SHS equipment by private dealers were slow. Similarly, owing to weak institutional and operational capacity of soum center utilities, the project-installed RDHT systems were transferred to be managed by aimag utilities." (World Bank Group 2018)

The challenge is that those most in need (ie most rural) are also those with the lowest ability to pay and the hardest to reach (Haanyika, 2006). That half of the market-based mode policies also include a subsidy suggests that governments are aware of this gap and are seeking to address it.

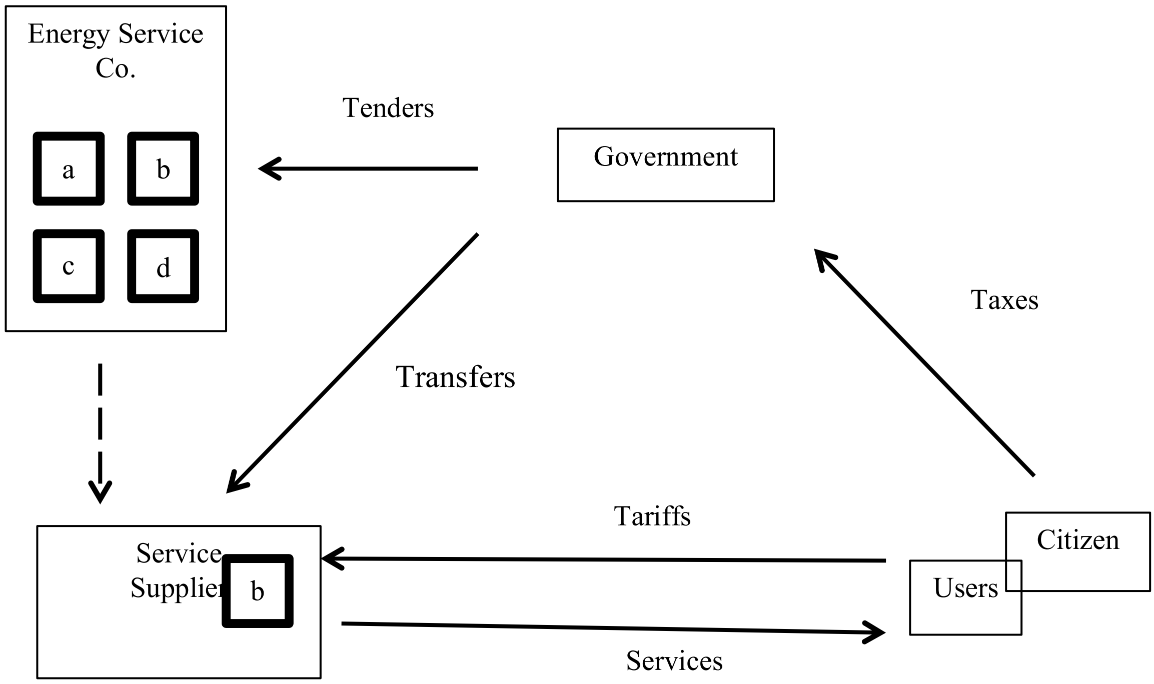

Figure 2.3: Energy Service Company Arrangement

Country	Policy Title	Start	End
Lesotho	Energy Policy 2015-2025	2015	2025
Namibia	NAMA in Namibia Rural Development	2015	2018
Cambodia	Cambodia Rural Electrification Strategy and Implementation Plan	2009	
Kenya	Sessional Paper no.4 on Energy	2004	2023
Kenya	Off Grid Solar Access Project for Underserved Counties 2017	2017	2023
South Africa	Energy Security Master Plan - Electricity	2007	2025
South Africa	Non-Grid Electrification Policy Guidelines	2012	
Comoros	Solar Market Development Project	1997	1999
Lao PDR	Decree on Solar Energy Development	2011	

Table 2.2 ESCO-based Programmes

2.4.2 Energy Service Companies (ESCOs)

Nine policies in the sample use a private ESCO mode, which establishes enterprises as service providers for particular designated regions, even where off grid electrification in necessary. ESCOs are essentially distribution companies and may have a purview that includes both grid and off grid regions. The key aspect of an ESCO is its comprehensive nature. Direct contracting may be for a single village or product, but an ESCO serves all the customers within its concession in order to meet their energy needs. In that way, ESCOs could be conceived of offering off grid energy services, as opposed to off grid products, although there is not a clear delineation between the two. It should be noted that ESCOs may take the form of public-private partnerships, as the ESCO is defined by its purview and not by its ownership or financing arrangement.

South Africa's concessionaires (another term for ESCO) are a good example of how the private sector takes over from government-run distribution companies. South Africa's 2012 Non Grid Electrification Policy Guidelines outline the expectation for the six concessions in the non-electrified portions of the country, which are to be served by six non-state concessionaries:

> "Off – grid electrification in the INEP is currently carried out by the private sector service providers (also known as the concessionaires) who have successfully tendered for rendering services in designated concession areas. Six concessionaires were identified through a bidding process for the provision of non-grid electrification in the concession areas.
> "The selected service providers were allocated exclusive rights to provide off-grid electrification in particular geographic areas. These areas are situated in broader areas earmarked for non-grid electrification, called concession areas. The rights last for 5 years, however, the service contract remains binding for a period of 20 years." (Department of Energy 2012, 7-8)

In addition to off grid electrification, the concessionaires are required to provide thermal fuels for cooking needs. In the case of South Africa, these concessionaires are intended to provide Tier 1 access to the non-grid areas under grid expansion can reach them, and therefore, these are short-term contracts. However, as seen in Table 2.2, many countries with lower rates of electrification have also chosen this mode of enterprise engagement.

Finally, employing an ESCO model assumes that there is enough enterprise interest in the concession space as well as adequate institutional capacity to monitor the progress and quality of the ESCO's work. This first challenge is made explicit in the project documents for Niger's Solar Energy Access Project (2017):

> "A careful approach is needed for the scale of concessions. Economies of scale are required to sustain mini-grids for rural electrification. Private financing is limited for investments in mini-grids except for densely populated urban areas because of the perceived high risk of these capital-intensive technologies in countries where rural consumers have low levels of demand and ability to pay. This has often resulted in higher engagement of the local private sector in small rural electrification concessions and a lesser appetite from the international private sector for larger concessions. Over time, the approach can evolve through the bundling of several small concessions into a larger one with lower investments and operation costs through economies of scale." (World Bank 2017b, 68)

Creating a concession that has financial appeal to enterprises can address the first assumption. The second assumption is that the government is capable of adequately monitoring the work of the ESCO. Introducing a private sector element into public service delivery actually involves greater oversight (Archibugi et al. 2003, p 52). As outlined in Section 10 of South Africa's Non Grid Electrification Policy Guidelines, the government is responsible for significant monitoring activities:

> "There should be periodic monitoring of concessionaire's and service providers' performance and regular reporting. Reports of work done should be submitted to both the Municipality and DoE.
> "The Department of Energy will monitor and verify off-grid installation claims and will disburse the capital subsidies at agreed intervals.
> "Municipalities are to also monitor and confirm installations.
> "Technical audits are also to be done prior to payment of the service provider." (Department of Energy 2012, s 10, p 13-14)

This requires an adequate amount of institutional capacity at the central and municipal level, in the case of South Africa. Other policies, particularly through programmes funded by the World Bank, are also explicit as the monitoring requirements of such an arrangement.

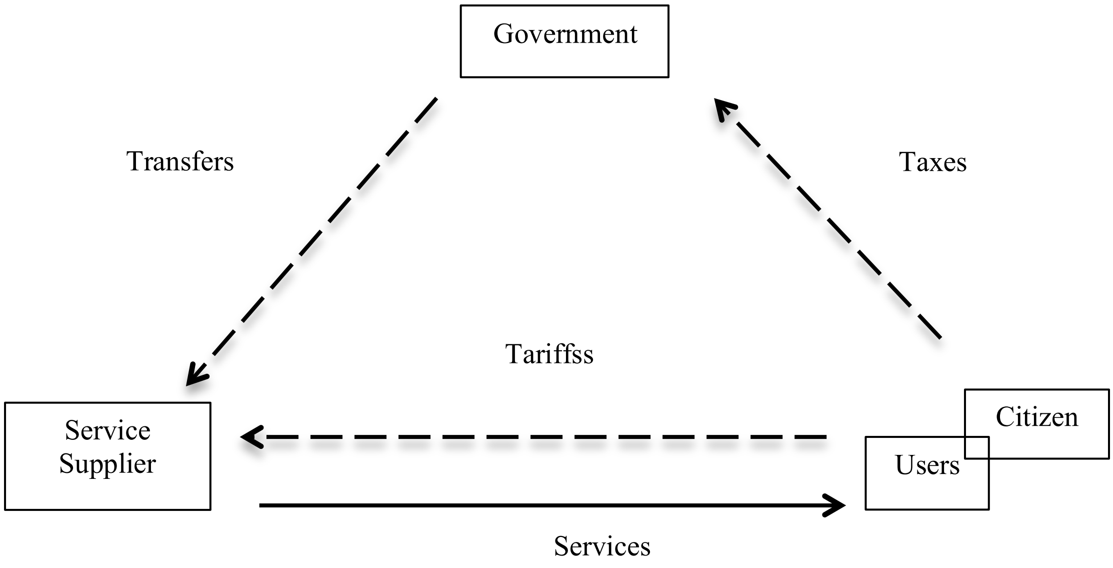

Figure 2.4: Public-Private Partnerships Arrangement

Country	Policy Title	Start	End
Zambia	Rural Electrification Master Plan	2008	2030
Malawi	Malawi Renewable Energy Strategy	2017	2030
Niger	Niger Solar Energy Access Project (NESAP)	2017	2024
Gambia, The	NAMA Design Document for Rural Electrification with Renewable Energy	2016	2030
Tanzania	National Electrification Programme 2013-2022	2013	2022
Ethiopia	NAMA for Off Grid Rural Electrification	2016	2020
Namibia	NAMA in Namibia Rural Development	2015	2018
Namibia	Off Grid Energy Master Plan	2007	
Cote d'Ivoire	Promoting renewable energy-based grids in rural communities for productive uses in Côte d'Ivoire	2012	2016
Kenya	Off Grid Solar Access Project for Underserved Counties 2017	2017	2023
Nigeria	Rural Electrification Strategy and Implementation Plan (RESIP)	2016	
Vanuatu	Vanuatu NAMA	2015	2020
South Africa	Non-Grid Electrification Policy Guidelines	2012	
Bangladesh	IDCOL SHS Program/Minigrids	2003	2021

Table 2.3 PPP-based Programmes

2.4.3 Public-Private Partnerships (PPPs)

Fourteen policies have at least one component that relies on partnerships between the government and the non-state sector. In this case, PPPs are a short hand for all partnerships involving the government and private or non-state actors, not exclusively commercial companies. PPPs may even be a partnership between the government and an NGO in the case of Tanzania's National Electrification Programme (Innovation Energie Developpement 2014, s 6.5.3). The definition of the PPP is nebulous, but is included in this list as separate from ESCOs or direct contracting due to the prevalence of the term in the policies sampled. PPPs are most popular with large-scale infrastructure projects, and so they are more likely to be relevant for minigrid or microgrid projects (Hughes 2012, p 155). Nevertheless, any REPs that use the term 'public-private partnership' are included in this discussion.

The focus here is on cooperation between actors and on sharing the benefits and risks of a project (Hughes 2012, p 154-156). While there is no standard contractual set up for a PPP, the logic behind their popularity is this: government has access to the liquidity and efficiency of the private sector, while the private sector has access to the clients (citizens) and risk mitigation of working with the government. This quote from Duffield (2010) outlines the exchange well:

> "PPPs are significantly different from other procurement approaches. PPPs involve the private sector taking the greatest responsibility for service delivery over the life of the facility compared with the other contracting options considered. They also have the highest level of price certainty, but this comes at the cost of responsibility for day-to-day decisions relating to both assets and the way in which services will be delivered – the setting of service standards remains a governmental decision." (Duffield 2010, p 212)

A good example of this is the Off Grid Solar Access Project for Underserved Countries in Kenya, a World Bank funded programme that included PPPs for minigrid development:

> "Mini-grids will be developed under a public-private partnership (PPP) whereby private investment and public funds co- finance construction of generation facilities, and public funding is used to construct the distribution network. A single private service provider (PSP) will be responsible for construction (and partial financing) of the generation system and for construction of the distribution network of each mini-grid. The same PSP will sign two long-term contracts with KPLC: (a) a 7–10-year PPA for the operation and maintenance (O&M) of the generation system and recovery of the privately financed part of the investment and (b) a 7–10-year service contract for O&M of the distribution network, including revenue cycle services (as required). Ultimately, after the recovery of the private

> investments, all assets (both generation and distribution) will be in GoK ownership. All electricity consumers supplied through mini-grids will be KPLC customers and pay the same tariff for each category charged to users connected to the national grid, ensuring effective implementation of a national uniform tariff policy." (World Bank 2017b, s 30, p 21)

Both parties have a financial stake in the project, which will then revert to government ownership once the private company has recouped its costs. At this stage, the service provider also becomes the government (KPLC). In the meantime, however, the government is able to access private financing and technical capacity to electrify rural households. For the private company, they have access to government financing and the opportunity to recoup their costs, thus mitigating the risk of taking on such a capital-intensive project in an area with low demand.

Taking partnerships as the primary programmatic mode assumes that the private sector is able to recoup their costs within the agreed upon framework (time period, financing, etc.). Low demand and low ability to pay are the hallmarks of the rural electricity customer (Haanyika, 2006). The PPP must be arranged in such a way as to allow the private sector to turn a profit over the course of the project. This may be less of a hurdle for partnerships with international aid organisations, nationally based NGOs, or social enterprises, which have a lower bar for cost recovery (Sengupta and Sahay, 2017).

2.4.4 Direct Contracting

With sixteen policies, direct contracting is the second most popular programmatic mode in the sample. Contracting (or direct contracting, or contracting out) public services creates *ex ante* competition, in which public service providers compete *for* the market rather than in it. The aim is to reduce costs and improve quality standards as bidders compete to provide the best service for the least cost. In the context of electrification, projects are identified by the government, who tender a contract for the completion of the project, usually to the private sector. In contrast to ESCOs, direct contracting programmes treat off grid as an energy product, rather than service. However, these are not discrete categories, but instead there is a continuum between energy service companies and direct contracted projects.

Mozambique recently instituted a programme – Off-grid renewable energy for rural electrification in Mozambique managed by FUNAE – in 2017, which takes this approach to off grid solar:

> "For solar PV electrification, FUNAE has a number of "kits", each tailor-made to suit a hospital, school, micro-enterprise, or households of different income levels. During the "baseline study" that FUNAE conducts for each community, they identify how many of each kit are needed in the community. The baseline study is used as a basis when tendering for suppliers, and the technology choices offers by suppliers must match this kit list." (CCC 2016, p 6)

As we can see, direct contracting allows the government to provide very specific contract requirements. Typically there are requirements for the bidder (eligibility requirements) as well as for the completion of the project. As with private ESCOs and PPPs, there is an emphasis on monitoring to ensure that the contract is completed adequately. However, unlike with private ESCOs, contracts are project-based not customer-based. This line can become blurred as contracts increase their emphasis on post-construction maintenance and monitoring.

Because of its cost-effectiveness, flexibility and perceived quality control, direct contracting is very popular in providing services. However, there are conditions that make contracting more (or less) successful. These have been outlined by Domberger and Jensen:

> "Contracting is likely to be more (less) successful wherever the magnitude and specificity of the physical assets required to provide the service are

> smaller (greater). Note that asset size and specificity have independent effects on contracting, but their interaction can be particularly powerful.
> “Contracting out is likely to be more (less) successful whenever the quality characteristics that are non-contractable are less (more) significant.
> “Contracting out is likely to be more (less) successful whenever the availability of competitive supply in the market, both actual or potential, is large (small).” (Domberger & Jensen 1997, p 71)

The first condition refers to the implications of ownership division. In short, with a small-scale asset, the contractor is more likely to have ownership and thus interest in maintaining the asset past its contract period. With larger assets, there is a greater chance of government ownership, which reduces the incentives for the enterprise contractor to consider long-term success. In the second condition, contracting works better when it is easy to quantify the quality characteristics of the service required (Domberger and Jensen, 1997). Finally, many have pointed out that tendering a project only works if there are already a number of prospective bidders to compete.

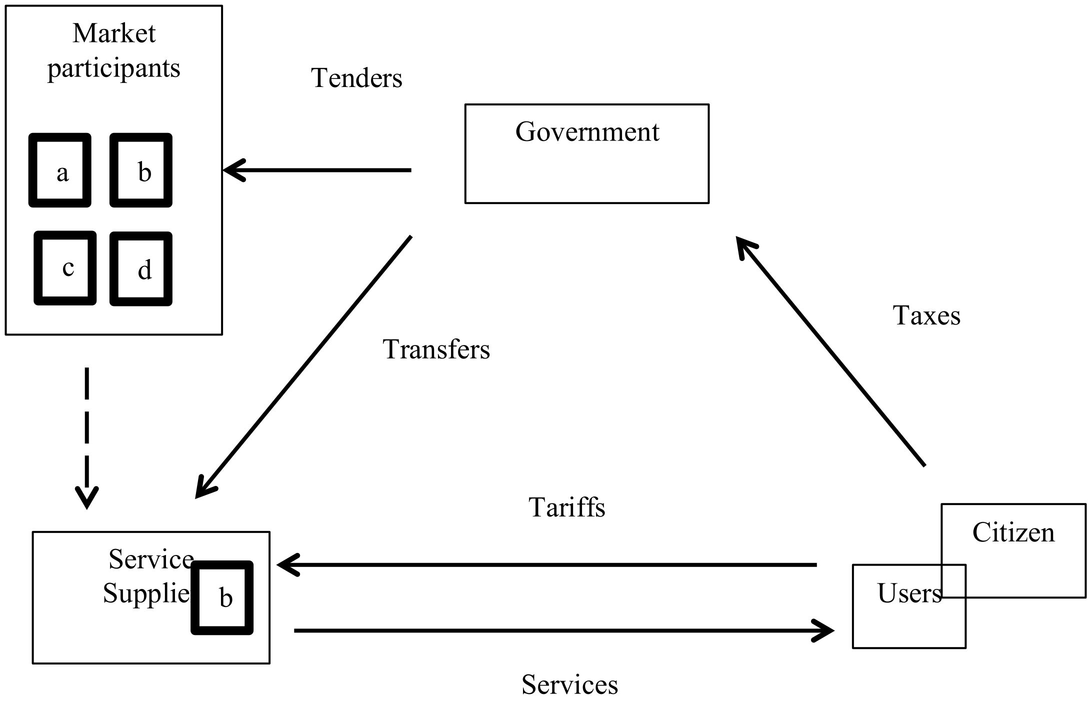

Figure 2.5: Direct Contracting Arrangement

Country	Policy Title	Start	End
Zambia	Electricity Service Access Project	2017	2022
Mozambique	Off-grid renewable energy for rural electrification in Mozambique managed by FUNAE	2016	
Lesotho	Lesotho Renewable Energy-Based Rural Electrification Project (LREBRE)	2006	2013
Angola	Power Sector Long Term Vision 2025	2018	2025
Tanzania	National Electrification Programme 2013-2022	2013	2022
Uganda	Rural Electrification Strategy and Plan	2013	2022
Namibia	NAMA in Namibia Rural Development	2015	2018
Myanmar	National Electrification Plan	2015	2020
Nigeria	Nigeria Electrification Project	2018	2023
Nigeria	Rural Electrification Strategy and Implementation Plan (RESIP)	2016	
Solomon Islands	Solomon Island Electricity Access and Renewable Energy Project Phase II	2017	
Solomon Islands	Renewable Energy Strategy and Investment Plan	2014	2019
Vanuatu	Vanuatu Rural Electrification Project (Phases I and II)	2014	2022
Vanuatu	Vanuatu NAMA	2015	2020
Gabon	Access to Basic Services in Rural Areas and Capacity Building Project	2015	2019
India	DDG Scheme - DDUGJY	2015	

Table 2.4 Direct Contracting-based Programmes

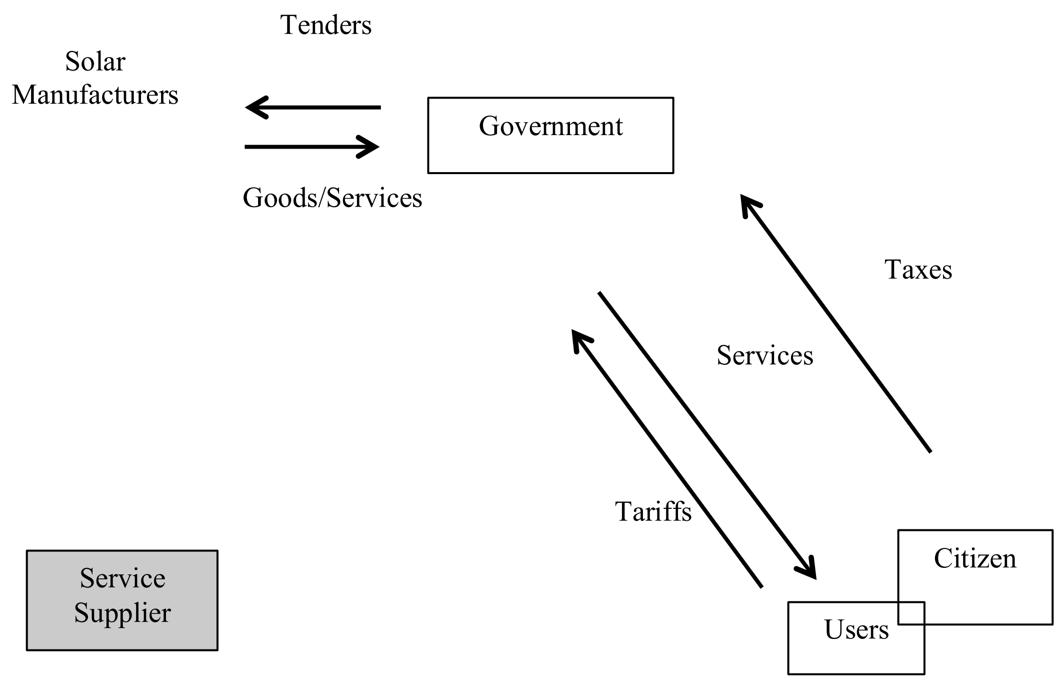

Figure 2.6: Government as Distributer Arrangement

Country	Programme Title	Start	End
Cambodia	Program For the Development of Rural Electrification	2013	2015
Mongolia	Renewable Energy for Rural Access Project	2006	2012

Table 2.5 Government as Distributer Programmes

2.4.5 Government as Distributer

Government as distributer is the least common form of programmatic engagement, only occurring in the sample twice: in the case of Cambodia and Mongolia. In this mode the government assumes the responsibility of distributing the product or service itself, although typically purchasing the off grid solar systems from a commercial manufacturer. Mongolia's Renewable Energy for Rural Access Project provides an excellent example. The programme provided solar home systems for rural herders, initially through private dealers with a subsidy. However, low sales caused the project to shift modes:

> "Initially, it was expected that selected private dealers would supply the certified SHSs to herders, using the project subsidy of $160 a unit. However, the dealers had only sold about 200 SHSs by 2008, while the government procured and sold over 40,000 SHSs during the same period. …Given these challenges, the project was restructured in 2009 to include bulk procurement, which allowed the purchase of SHSs at wholesale prices and reduced the capital cost for herders. The SHSs procured in bulk were distributed to herders through both private dealers and the government's administrative network." (World Bank Group 2018, p 6)

Distribution through the government's administrative network was expected in this case to address the poor reach of the private sector. However, for wider application of this mode, policymakers must determine that the government has the reach and the institutional capacity to be the primary distributer.

2.4.6 Modes in Practice

The sections above have considered modes as ideal-type, discrete service arrangements. In reality, a country may shift its programmatic mode over time, or a single country may employ multiple modes at once. Shifts over time may occur due to past experience, changes in funding arrangement, or political changes. The section above described the shift in Mongolia's Renewable Energy for Rural Access Project as it became clear that the private sector did not have the rural reach necessary. Another example is Lesotho's 2006-2013 Lesotho Renewable Energy-Based Rural Electrification Project (LREBRE). The project initially tried to set up a variety of pilot business models to develop the off grid solar market, however:

> "The GoL elected to amend the subsidy mechanisms and adopt a direct contracting approach that they proposed as a means to fast track the delivery of the proposed SHSs. This decision directly undermined the original design of the project, that removing barriers to the widespread uptake of renewable energy would support a market driven approach. The change in subsidy mechanisms and delivery models shifted the design of the project from a market-drive performance-based approach to a Government-led social-welfare type project." (GEF 2013, p 14).

On the other hand, we see multiple programmatic modes at work within a single country. Usually this is the case because of policy layering, or the use of different modes to target separate technologies and end users. In the case of Tanzania's National Electrification Programme 2013-2022, there are two tracks for off grid energy. Track one is a top-down approach similar to countries like India, which directly contracts out projects in rural areas and offers subsidies for products. Track two is a bottom-up approach where companies can offer up project ideas that may take the form of PPPs.

This can also include an agreed upon subsidy (Innovation Energie Developpement, 2014).

Due to the flexibility of PPPs, they are sometimes partnered with another mode. For instance, in Niger, the private ESCOs are considered to have a partnership with the government:

> "29. Two approaches will be promoted in this component. The first top-down approach (similar to that of PASE-Safo) will enable ANPER to prioritize the electrification of the biggest population centers outside the national utility concession through a competitive bidding process for the selection of PPPs to invest, construct, operate, maintain, and further expand access. The second bottom-up approach will encourage subproject developers and investors to submit unsolicited proposals to ANPER for electrification through isolated hybrid PV/diesel mini-grids …*PPP arrangements to be used in both approaches will range from licenses to authorizations to mini-concessions*, depending on the size of the installed generation capacity and the private sector's financial ability." (World Bank 2017b, s29, emphasis mine)

It is clear from the italicized text that PPPs may be private ESCOs or smaller projects, depending on the ability of the non-state service provider. This highlights the flexibility of the PPP mode, which may overlap with others, but also provides a way of describing partnerships that fall outside of the other four modes. Although policy layering and changes in modes over time provides added complexity in analysis, the typology helps us to more clearly articulate these complexities.

2.5 Historical Trends in the REP Typology

This collection of two decades of policies offers an opportunity to reflect on the trends in governance. What policy instruments have become more or less popular in the 21st century within off grid solar governance? Looking at the rate of each policy instrument from within policies from 2002 to 2017 (n=51), a few patterns emerge.

	2002-2005	2006-2009	2010-2013	2014-2017
Subsidies	19%	33%	55%	53%
Tax Incentives	0%	13%	11%	12%
Credit/Financing	31%	46%	43%	20%
Capital Grants	13%	33%	48%	12%

Rural Electrification Fund	63%	8%	4%	4%
Rural Electrification Agency	69%	0%	4%	0%
Technical Standards	6%	38%	77%	43%
Licensing	25%	33%	41%	8%
Tariff regulations	38%	33%	36%	27%

Table 2.6 Percentage of REPs that incorporate each policy instrument

Firstly, institutional policies – rural electrification funds and agencies – are must more prevalent in the period of 2002-2005 than in any other period. It is possible that countries first address institutional aspects of electrification before implementing additional programmes. Another possibility, is that rural electrification agencies (and their attendant funds) are required in the wake of power sector reform programmes that disincentivise expanding electricity access (Haanyika 2006). Therefore, it is possible that this spike in institutional policies is related to an increased incidence of power sector reform in South East Asia and sub-Saharan Africa in this period, especially given that after 1993 the World Bank and other development banks shifted towards lending conditionally on privatisation and reform (Wamukonya, 2003). Secondly, the incidence of subsidies appears to increase over time, although is should be noted that the number of policies for any one year is two to seven, so these numbers are merely indicative of possible trends.

Moving to look at programmatic policies alone (n=42), two main trends emerge. First, government as distributer has never been a popular programmatic mode during this period. Second, the incidence of direct contracting has increased substantially since 2002 within the sample. It is possible that this is the case because off grid systems are being treated as mature technology, and therefore governments are treating off grid energy like other energy infrastructure and contracting out projects, rather than treating them as emerging technology and focusing on approaches that purport to support greater innovation (Domberger and Jensen, 1997; Foxon *et al.*, 2005).

However, is hard to draw any significant conclusions from these findings, as they are limited by the small sample size, as well as skewed by the need to focus on English-language texts. In addition to privileging Anglophone countries, it always increases the prominence of World Bank programmes in the group, which means that the changing philosophical stance of the World Bank may have outsized impacts on the sample., Expanding the set of policies through adding other languages and working to find more policies from the 1990s would improve the data, and perhaps allow the researcher to test these trends for significance.

	2002-2005	2006- 2009	2010-2013	2014-2017
Market	33%	25%	38%	23%
PPP	33%	25%	20%	32%
ESCO	33%	38%	33%	11%
DC	0%	6%	6%	35%
Govt as distr.	0%	6%	3%	0%

Table 2.7 Percentage of programmatic policies taking each mode

These findings do not fit neatly into Sovacool's paradigm-based periodization in which programmes of the early 2000s focused on creating a market and programmes from the mid-2000s onward take a more holistic approach to energy access and development with multiple partners (2013). In this sample, market-based and public-private partnership modes appear to share a degree of popularity across each period.

However, the increasing use of direct contracting is suggestive of the long-running trend towards increasing contractualism in the new public management approach to governance (Manning, 2001; Lane, 2002). It is possible that LMIC governments are increasingly attuned to the potential benefits of outsourcing previous government functions to the private sector. This implies that electrification was previously the purview of government, and that is partly the case. State utility companies are often tasked with the responsibility of expanding access (Haanyika, 2006). However, the manufacture, assembly and installation of off grid solar technologies – as a novel technology – is unlikely to be a capacity that the government previously had, unless through state-owned energy companies. Additionally, NPM's popularity began over 40 years ago. So what accounts for a very recent increase in the direct contracting approach?

The strongest argument in my mind is that direct contracting has gained in popularity as off grid solar has found itself to be a more mainstream technology. That is, governments now view this as a mature technology, and therefore able to be implemented at scale (Khan and Arsalan, 2016). However, as the innovation systems literature suggests, innovation need not be the hardware but also the application of that hardware in a new context, and there is a good argument that off grid uses of solar would still fit within that definition (Ockwell and Byrne, 2017). Further research could be done into the assumptions behind the rise of direct contracting and whether this approach is the 'best fit' for off grid solar. Some possible answers will be touched upon in the coming chapters in the India context.

2.6 Conclusion

The aim of this chapter was to provide a new typology for rural electrification policies, so as to improve the comparison of policies and the contextualisation of single case studies. Without a shared vocabulary, it is difficult to ensure that comparisons are fair, hindering our ability to make causal claims about efficacy. Without a typology, it is difficult to determine the generalisability of our findings. The aim of this typology was to tackle both these challenges.

In order to do that, this chapter first explored how the literature has tackled rural electrification policies in the past, before considering the conceptual frameworks used to describe the relationship between government, non-state service provider and end user. This was done through the literature on political economy, innovation and public administration, before taking up the triangular framework (Archibugi *et al.*, 2003). The triangular framework helped to describe the programmatic modes that were outlined in the rural electrification typology. Using 54 policies from 30 different countries, the typology developed here provides a framework for determining policy type: institutional, regulatory or programmatic. Engagement in the programmes is incentivised through a number of common policy instruments. Finally, the chapter breaks down the relationship outlined in the programmatic mode: market-based, private ESCO, PPP, direct contracting or government as distributer. Each mode has its own assumptions about the competency and capacities of the market, economy, end user, government and its institutions.

The following chapters of this thesis will focus on India’s two largest national electrification policies: the Deendayal Upadhyaya Grameen Jyoti Yojana (DDUGJY) and the Jawaharlal Nehru National Solar Mission (JNNSM). The DDUGJY is a direct contracting policy, while the JNNSM focuses on market development. In exploring these policies more deeply, the REP typology will provide a framework for making claims about the generalisability of these findings. For instance, where the findings are specific to particular modes, it may be considered that the findings may be applicable to research on other, similar programmes. The typology is also central to the deconstruction of these policies in the following chapter.

3 India's Rural Electrification Policies

3.1 Introduction

Programmatic policies, as detailed in the previous chapter, are the most common policies in the sample. These programmes actively address the problems of electrification by trying to expand access. Each programme comes in one of five modes with incentives that encourage participation and attempt to align actors in the system: namely, the end user and the solar enterprise. There is an underlying logic to how each mode is intended to function and how it offers incentives to align the actors within its framework. There are assumptions underlying each logic, and often requirements that the government, end users and market must meet to maximise the efficacy of the mode.

This research is interested in how policies impact the market actors and the factors that influence that impact through these modes of engagement. Therefore, we must first distinguish between the types of programmes, which is the role of the REP typology presented in the previous chapter. This chapter asks, how do India's rural electrification policies fit into this typology? By understanding the assumptions of the approach that the Government of India takes, we can later compare these assumptions to the empirical evidence from the subsequent chapters.

India offers an excellent case study in the two most popular modes: direct contracting and market-based electrification. This chapter will break down these policies according to the REP typology, according to the policies most commonly cited in interviews with enterprises, government officials and experts in the field. These programmes take different approaches to how enterprises should be engaged in providing public services, and they target their incentives differently to align the relevant actors. This chapter addresses how the two most popular modes, direct contracting and market-based electrification, are intended to function, what the assumptions or requirements of that logic are, and touches on how their incentives try to align end users and solar enterprises .

First, section 3.2 offers up a brief note on the methodology. Section 3.3 breaks down the policies according to the REP typology while section 3.4 takes a deep dive on the logic and requirements of direct contracting and market-based electrification, and looked into how each programme uses incentives to align the interests of end users and solar enterprises. If the logic of the modes and incentives is not met, this will impact the efficacy of the programme. The next question, then, how do enterprises respond to these policies?

3.2 Methodology

As described in section 1.5.1, the most commonly cited policies within the interview data were broken down by policy instrument and programmatic mode in order to apply the typology from chapter two, and provide context for the rest of the thesis. Categorising the policies also helps define a universe of comparable policies to which these results could hold some generalizable lessons.

3.3 Deendayal Upadhyaya Grameen Jyoti Yojana & Jawaharlal Nehru National Solar Mission By Type

3.3.1 Typology of India's Rural Electrification Policies

The breakdown of India's rural electrification policies by type is found in Figure 3.1. Noticeably, there are no recent institutional policies recorded. In India, rural electrification is the purview of the Ministry of New and Renewable Energy (MNRE), which designates nodal agencies for state-by-state implementation. The rural electrification corporation (REC) was created in 1969, and is the national and state nodal agency for the disbursement of funds for RE, but there is no official rural electrification fund (REC, 2018a). Funding for each project comes through the national and state budget to MNRE and its state nodal agencies.

There are three policies that fall primarily under the ‘regulatory’ type. The first is the Electricity Act 2003, which outlines the notified rural regions in which tariff setting and private power provision are unregulated (GoI, 2003). The second two are the past and current standards regulations for solar products undertaking work for MNRE. Past standards required licensing based on the specifications determined b the International Electrotechnical Commission (MNRE, 2012b). Current standards, as of 2017, is the new “Indian Standard” that also requires regular testing of products and series of products (MNRE, 2017c).

The two main programmatic polices, the DDUGJY DDG Scheme and JNNSM off grid component take different modes. The DDG scheme takes a direct contracting approach, using product-subsidies to the non-state service delivery company as an incentive to participate and lower the cost for end users (MoP, 2013b). The JNNSM on the other hand uses a market-based approach, making the gap between cost and willingness to pay smaller, and thus increasing the potential market for off grid systems (MNRE, 2012a).

Last is the National Draft Microgrid Minigrid Policy, whose future is uncertain, but which was cited occasionally within the interviews (MNRE, 2016). This programme follows the guidelines set out by other state-based policies (see Bihar and Uttar Pradesh) and offers support, which “ can be in the form of upfront capital funding or grant, or low interest loans, generation- based or operational incentives etc., essentially to support the market for minigrid development” (MNRE 2016, p 12). However, it also outlines tariff regulations for companies that accept government funding. In that regard, it is considered a programme in the market-based mode, but it does contain regulatory elements (MNRE 2016, p 14). As this programme is similar to other minigrid programmes at the state level, it is included here to illustrate such policies. It is not, however, explored further as it is not yet official policy.

3.3.2 Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)

The DDUGJY is the primary rural electrification scheme in India, and has a budget of 39,175 crore rupees (approximately 5.6bn USD) transferred from the budget of the RGGVY, the original rural electrification scheme (Ministry of Power 2014, section 2.1, 2.3). Primarily, it contracts out the off grid electrification of rural villages in which grid connectivity is not feasible or cost effect, although amendments have changed that definition over time. New guidelines in 2011 allowed for electrification projects in smaller hamlets and in villages that have access to the national grid but are not receiving power (MNRE, 2011). More recent guidelines in 2013 further defined DDG as being for areas "which are getting less than six hours of power a day" (MoP, 2013a). Latest guidelines also offer greater specificity on the technology recommended:

> "1. If cost of electrification per HH with more than 1 lakh and no. of Households in the habitation is less than 15, it is recommended to provide connectivity through solar lighting or standalone system. However in case grid connection is not possible due to difficult terrain or forest, stand alone or solar lighting can be permitted irrespective of costs.
> "2. If the HHs in a hamlet are largely scattered and average length of distribution line per HH is more than 200 meters, standalone systems may be provided to restrict LT line losses under the scheme." (REC, 2015)

Villages are identified by the state nodal agencies (typically the state's renewable energy agency) based on the national census data, and then contracts for those villages are tendered by the nodal agency for non-state enterprises to bid for. The project developer shall be identified through direct contracting:

> "Selection of the Project developer shall be on the basis of tenders which will be called by the Implementing agencies in two parts, one part covering capital cost (as per 12.1 (a) above) and another covering cost of providing power for five years (as per 12.1 (b) above). The reimbursement of gap between operation and maintenance cost and revenue recovery to the project developer (after adjusting the collected tariff) will be paid out of service charges of the Implementing Agencies … As part of agreement (a) the project developer will be authorized to collect tariff in project area and (b) the state government will agree to reimburse the gap between O&M expenditure and revenue income from out of the service charges of implementing agencies to the project developer." (Ministry of Power 2009, p 9)

Usually these tenders are for solar home system-based electrification, but some have been put forward for solar, biomass or hybrid micro/minigrid systems as well. While the products are purchased or manufactured by the contractor at the market price, products are provided to the rural end user at a subsidised price. The difference between the two prices is provided to the contractor in instalments over the course of five years after inspections verify the quality of the work (MoP, 2013b). This was a change in 2013, with the idea being "to ensure that the developer has sufficient economic interest in the continuation of the project till five years of the commissioning" (MoP, 2013a). Finally, as mentioned in the section above, all participants in MNRE's programmes must adhere to certain technology standards. Further standards are also specified in the programme.

3.3.3 Jawaharlal Nehru National Solar Mission (JNNSM)

The JNNSM off grid component also targets end users with little or no grid access, but follows a market-based approach by providing subsidy and financing to end users to allow them to better access the solar market. The aim of the JNNSM off grid component is outlined in its Phase II Policy Document:

> "Solar Energy is the need for the developing country like India where large section of country's population is primarily located in rural areas and lacks access to electricity. Electricity is vital for a better quality of life - along with reduction in poverty and improvement in education, health and livelihoods. Rural areas in the country mainly lack in distribution infrastructure and itself developing a reliable distribution infrastructure will have a major fixed cost which the utilities presently not in a position to support. With this backdrop, NSM Phase II would focus on standalone solar off grid generating systems which would facilitate the rural consumers to meet their routine requirements of electricity. During Phase-II, it envisaged that around 20,000 villages/hamlets/basti/padas shall be covered through 'Energy Access' scheme by way of deployment of Off-Grid electricity generation projects… With this backdrop, Phase II of the mission would also focus on the off grid lighting systems such as use of solar lanterns, solar home lighting systems, and solar street lighting systems. Phase II would target for deployment of around ten (10) lakh off grid lighting systems." (MNRE 2012a, p 24-5)

The key difference between the JNNSM and DDUGJY is that the technology is primarily the criteria for support, not the specific end user. Starting with the now-defunct SHS portion of the programme, we see the use of subsidies tied to financing and technology specifications, as above. In this portion, particular systems were provided with both a subsidy and financing arrangements through the National Bank of Agriculture and Rural Development (NABARD). The still-extant microgrid/minigrid portion of the scheme is more straightforward, offering a capital subsidy to system integrators, but with certain requirements for the technology (MNRE, 2017a). While both portions of the scheme aimed to provide power to the rural user at a subsidised rate, the microgrid/minigrid scheme does so through directly providing the subsidy to the enterprise. In both the SHS and microgrid/minigrid scheme, the focus is on improving the financial ability to purchase the systems, but customers are identified and financing paperwork is supported by the solar enterprise, with the expectation that the right price and financing for the end user will be sufficient to allow the market to reach those in need. As above, in order to access the financial benefits, systems must meet requirements above and beyond the component standards for the industry.

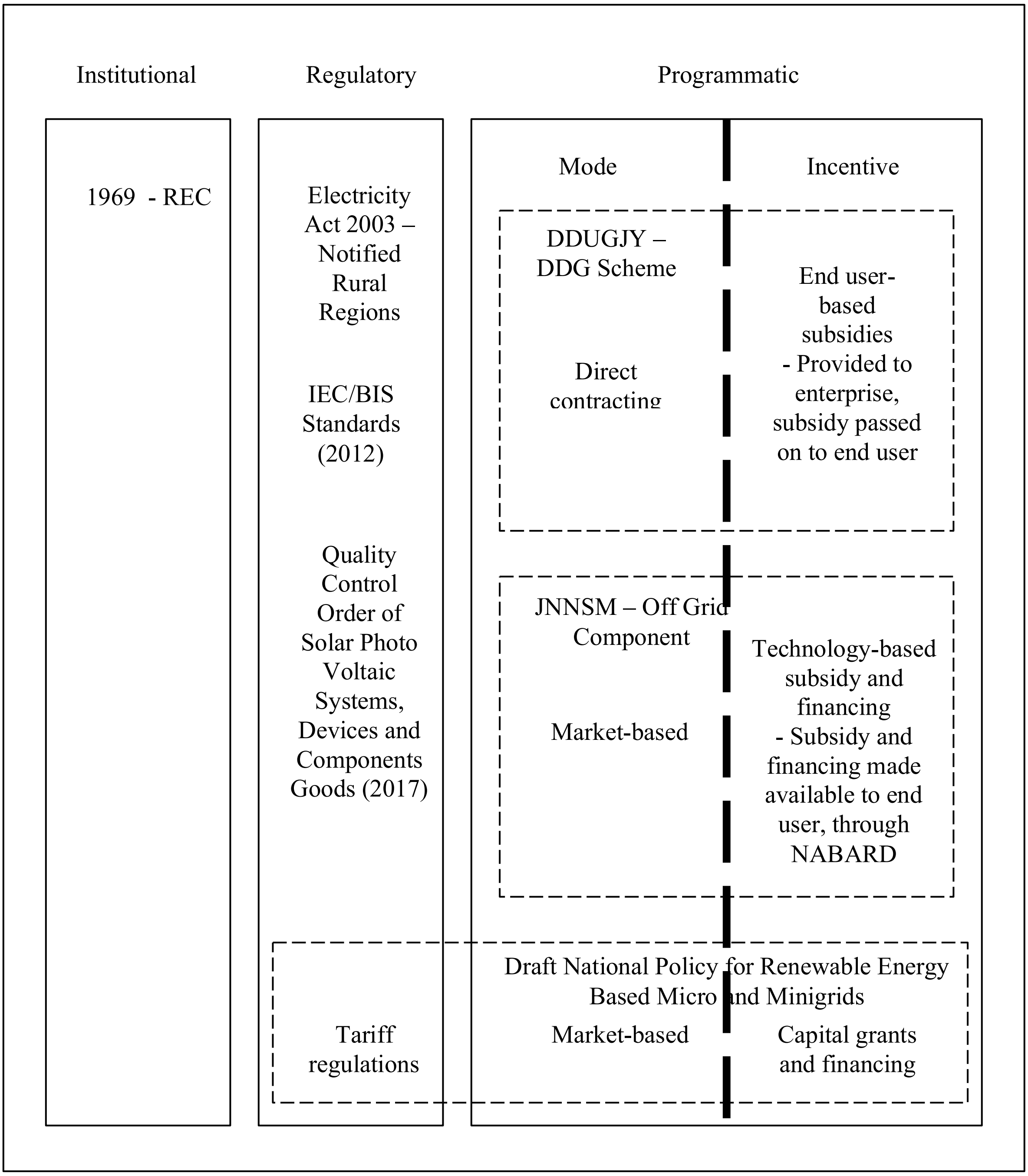

Figure 3.1: Breakdown of India's extant National REPs by type

3.4 Modes and Incentives

As briefly explored in Chapter 1, there is an underlying logic to each mode in terms of how it is intended to functionally bring power to off grid consumers. This section will go into greater depth on the logic behind direct contracting and market-based programmes before outlining how the incentives in the DDUGJY and the JNNSM hope to attract market actors (private, NGO, etc.) to participate in the programme. The two portions of the programme must work together to attract non-state actors to provide off grid services.

3.4.1 DDUGJY & Direct Contracting

The aim of direct contracting is to target the intended end user while also lowering costs, improving efficiency and improving the quality of service, the logic being that introducing competition to public service delivery will improve standards and lower expenditure (Hughes 2012, p 151-2). Evidence suggests that cost cutting is possible, but that it depends significantly on the sector and its characteristics (Hodge, 1998). The additional need for a certain profit margin – not necessarily present when the government is the distributer – also limits the ability to lower costs through this mode. It is also important to note that most research in the field focuses on high-income countries, specifically the United States, the United Kingdom and Australia (Prager, 1994; A. Hefetz and Warner, 2012; Johnston and Girth, 2012). Little explores whether such cost cutting remains valid for low- to middle-income countries.

However, to achieve positive results from contracting, there are certain characteristics that the government and the market must have. In the first instance, as off grid electrification targets specific populations, the government must know where those target populations reside. In India's case, the GoI relies on the nationwide census, which is conducted every ten years, to identify unelectrified villages and hamlets. There is also a need for institutional capacity to handle the implementation of the bidding as well as ongoing monitoring of the projects. The capacity requirements of contracting out are often underestimated, and in some circumstances make contracting a poor fit for service delivery (Prager 1994; Archibugi et al. 2003, p 52). The Indian Administrative Service (IAS) – the main branch of the All India Services – is the key civil service institution. In addition to state civil services, the IAS handle the policy crafting and implementation across Governments in order to maintain administrative continuity. Despite the reputation of the IAS, it currently faces understaffing issues (Vaishnav, Mehta and Kapur, 2017; Anand, 2018), and near-constant complaints about corruption (Gupta, 2005; Quah, 2008; Peisakhin and Pinto, 2010; Tribune News Service, 2018).

Domberger and Jensen also note that it can be difficult to quantify – and thus make contractible – service quality elements (Domberger and Jensen, 1997). Although there are some quality aspects of electricity that are difficult to measure, the multi-tier framework offers criteria that are often copied in policy – such as hours of evening power supply, total hours of power supply, maximum capacity (ESMAP, 2015). In

India's case, the prerequisite that contributing companies have their systems meet certain technical standards also addresses this quality issue (MNRE, 2017c).

The greatest caveat to the success of contracting is that the government must be tapping into a market with sufficient competition to reap its benefits. In other words;

> "Contracting out is likely to be more (less) successful whenever the availability of competitive supply in the market, both actual or potential, is large (small)." (Domberger & Jensen 1997, p 71)

A competitive market need not be a large one, but certainly requires at least two companies of sufficient quality to both be interested in bidding. It is interest in bidding that is an additional factor in the success of tenders; the contract must be favourable enough for the competing enterprises to turn a profit. Research suggests that, at least in an RE context, there needs to be financial support to enable enterprise engagement. Haanyika explains:

> "Commercialisation, privatisation and independent regulation usually leads to increased tariffs as these were suppressed by government department regulation for a long time on the understanding that electricity supply was an essential social service that needed to be affordable. Although increased tariffs enhance revenues thus availing more financial resources for system expansion and RE financing where consumer levies are used, higher tariffs are less affordable for rural consumers. This means that increased public subsidies may be required to support RE." (Haanyika 2006, p 2980)

This is certainly the case in the DDG Scheme. The projects initially had their capital costs and operating costs subsidised. The pattern of payment was such that 90% of the total project cost (capex and opex) were provided as a subsidy, with the first 70% of the capital cost paid over the course of development and the final 30% paid after the five year period of operation was completed (Ministry of Power 2009, p 6-7). As the guidelines have changed over the years, the subsidy amount has been adjusted. As of 2015, the subsidy regime was set out as in Table 3.1. It should be noted that the Government of India describes this support as a grant, but it is considered a subsidy in this typology because the subsidising cost is passed directly on to the consumer. That is, the consumer pays the subsidised rate for the solar system.

Through offering the subsidised rate to end users, and financially compensating the market actors, the government essentially offers up a market for the enterprises to capitalise on. These financial support mechanisms – note the loans as well as subsidies – incentivise market actors to participate in the tenders.

Agency	Nature of support	Quantum of support (percentage of project cost)	
		Other than special category states	Special Category States #
Govt of India	Grant	60	85
Discom Contribution	Own Fund	10	5
Lender (Fis/Banks)	Loan	30	10
Additional Grant from GoI on achievement of prescribed milestones	Grant	15	5
Maximum Grant by GoI (including additional grant on achievement of prescribed milestones)	Grant	75	90

Table 3.1 Central Financial Support for DDG Scheme (REC, 2015)

3.4.2 JNNSM & the Market-based Mode

In the REP typology, however, the market-based mode is only competition *in* the market. Market-based programmes focus on developing markets through incentivising investment, offering financial support, and knowledge sharing. The logic of a market-based approach is that competition allows the market to provide quality products at the lowest price. However, the assumption is that there is a financial incentive for companies to work in this space – that is, that enterprises can make a profit even from the rural poor.

Some research has claimed that this is possible. In 1999 Prahalad introduced the concept of the bottom of the pyramid, in which private enterprises considered the poorest segments of society as potential consumers, producers and entrepreneurs. Over the course of a decade he and colleagues outlined why multinational enterprises should target the poorest people on the planet as a way of ameliorating poverty while making a profit (Prahalad and Hart, 1999, 2001; Prahalad and Hammond, 2002). India has seen a range of these bottom of the pyramid approaches, most popularly the Amul ice cream offering (Karnani, 2007). This concept has proven very popular, although in recent years there has been a greater shift towards national, small and medium enterprises rather than MNEs (Kolk, Rivera-Santos and Rufín, 2014). However, detractors have pointed out that Prahalad overestimated the financial capabilities of the poor and that there are weighty ethical concerns about providing so-called "bad" products into a sensitive marketplace (Karnani, 2007).

In the case of electricity products, it has been estimated that energy expenditure of the world's poor is about $433 billion, accounting for 9% of total expenditure (Subrahmanyan and Gomez-Arias, 2008; IFC, 2012). As many of the world's poor live in rural areas lacking in reliable electricity access, several solar companies have taken a bottom of the pyramid approach (Subrahmanyan and Gomez-Arias, 2008). Because off grid solar energy often has a high up-front cost, microfinance has a large role to play. Microfinance is considered an important part of building a market at the bottom of the pyramid, but the poor often do not have access to banking services (Reeves and Sabharwal, 2013).

In terms of rural electrification in particular, Haanyika points out that:

> "Commercialised and/or privatised utilities tend to focus on profits and are therefore less interested in supply of electricity to non- profitable rural areas. On the other hand, the need for profits could stimulate innovations particularly in the approach to rural electrification and the application of cost-effective technologies." (Haanyika 2006, p 2980)

This may lead commercial enterprises to target peri-urban or grid-connected customers, who typically have some grid power and a greater ability to pay. In fact, this is the second assumption of the market-based mode: that those in need will be reached by the market. Evidence actually suggests that market-based approaches can work contrary to redistributive efforts (Warner, 2006). Given that, there is a role for governments to advocate the needs of the citizen (Warner and Hefetz, 2008). In the Indian context there are a number of NGOs and social enterprises (SEs) working in the off grid solar sector. A recent survey of the off grid solar market found that 22% of respondents were NGOs (Singh, 2016a). Both NGOs and SEs put a greater emphasis on reaching those in need, but based on my own enterprise interviews, distribution is one of their biggest issues (see ENT25).

In order to open the rural market to non-state enterprises, the GoI uses the JNNSM to narrow the gap between willingness and ability to pay. Capital grants are offered to microgrid and minigrid projects– originally at 30%, they are at 25% of capital expenditure as of March 2017 – through the programme. Solar home systems were originally financed and subsidised through the National Bank for Agriculture and Rural Development (NABARD). End users would submit a request for a subsidised loan and an additional subsidy for the SHS. Sometimes companies would collect the prospective customers and help them fill out the loan documents before submitting them to NABARD. The aim was to make purchasing a SHS feasible for poorer customers who could not pay the entire up front cost of the system. In turn, it allowed market forces to determine which customers to target, but opened up a deeper rural market.

However, there were implementation challenges that stymied the longevity of the SHS programme. In particular, NABARD was not familiar with energy products and was hesitant to grant the loans, particularly when central financing became backlogged (see interview with ENT33). The JNNSM Phase II policy document emphasises need to ease access to subsidies:

> "The Phase II would focus on ease of flow of subsidies with major contribution of capital subsidy schemes instead of interest subsidy schemes. There would be special support provided to individuals' for solar lanterns, solar home lighting systems, power plants up to 3 kWp and pumping systems up to 5 kWp capacity. The scheme will involve RRBS and scheduled commercial banks for solar home lighting systems and solar pumps. The scheme will be modified in order to make it more simplified to operate. …. Phase II would also provide support for providing solar power packs to individuals and support available for solar charging stations specially for village level entrepreneurs, etc. Focus of phase II would also involve support to SPV power plants for micro/mini grid SPV power plants with storage systems and distribution network." (MNRE 2012a, section 3.2.1)

In the Phase II policy document, there is also a provision for a JNNSM Energy Access Scheme, which offers 90% financing to off grid areas, but it should be noted that no enterprise or government official interviewed seemed to have experience with this, and it is possible that this programme is not currently in implementation (MNRE 2012a, section 3.2.2). In 2015, the solar home system portion of the programme was cancelled. It was reinstated in the next year before being cancelled again in March 2017 (MNRE, 2017b). For microgrids and minigrids, the national solar mission still offers a capital grant.

3.4.3 Target Enterprises

Returning to our triangular relationship framework, incentives are put in place to align the interests of the government, end user and service provider. Lowering the price of systems for end users aligns their needs for energy access with the non-state sector's needs for customers and profits. Profit, in this instance, being subsidised by the government. However, it should be noted that not all the policies in Figure 3.1 target the same non-state actors. Instead, they target specific types of enterprises, based on technology, turnover, supply chain position, and experience, among other characteristics. Table 3.2 gives a brief overview of which policies are applicable to which types of enterprises.

Policy	Technology Applicable	Other Applicability
DDUGJY – DDG Scheme	SHS primarily, some Micro/Mini	Larger, more experienced enterprises
JNNSM – SHS Off Grid	SHS	Must meet component standards
JNNSM - Micro/Mini Off Grid	Micro/Mini	Must meet component standards
Electricity Act 2003 – Notified Rural Regions	Micro/Mini	N/A
Component Standards	SHS, Micro/Mini	Manufacturers, participants in MNRE programmes (DDUGJY and JNNSM included)
Micro/Minigrid Policies	Micro/Mini	N/A

Table 3.2 Policy Target Enterprises

As we can see, SHS enterprises were previously able to access both the DDG Scheme and the JNNSM programme, although now only larger-scale enterprises that work with SHS have access to any government support. This is because the cancellation of the JNNSM SHS scheme ended the only support available for smaller SHS enterprises. Chapters 4 and 5 will delve deeper into the eligibility requirements for the DDG Scheme. For microgrid and minigrid enterprises, there is a wider range of applicable policies that offer deregulation of the space, financial support and tariff regulations for those that do receive central financial assistance.

This section has outlined the logic behind how the GoI tries to align the needs of end users and enterprises in order to promote rural electrification, as well as which types of enterprises are targeted by their incentives. Chapter three will next explore empirically how enterprises react to these policies and how their business models have changed over time in response to these modes and incentives.

3.5 Conclusion

Programmatic modes have an underlying logic as to how they are intended to improve energy access, and they use incentives to align the interests of end users and solar enterprises in order to do so. The assumptions and criteria for these logics is crucial for the efficacy of the programme. If a country does not have the requisite institutional capacity or if the social demographics make purchasing systems out of reach, the programme will lose its efficacy. Importantly, we see also that the characteristics of the market play a role in meeting these requirements. In the case of direct contracting, markets must contain a certain degree of competition for the government to see its benefits. In the market-based mode, market actors must be willing and able to reach those customers with a lower ability to pay.

There are other perspectives from which to view these assumptions. From the end user perspective, competition for the market in direct contracting is perhaps less important than ensuring the governmental capacity for monitoring and oversight (Duke, Jacobson and Kammen, 2002; Sovacool, D'Agostino and Jain Bambawale, 2011). In the case of market-based electrification, this issue becomes more clearly one of improving access to financing for the end user (improving ability to pay) or better signaling technology standards on products (improving willingness to pay) (Urpelainen and Yoon, 2015).

These are important perspectives, but ones that are already racking up large numbers of papers (Nieuwenhout *et al.*, 2001; Abdullah and Jeanty, 2011; Lemaire, 2011; Sovacool, D'Agostino and Jain Bambawale, 2011; Urpelainen and Yoon, 2015). Rather than focus on the perspective of the end user, this research is interested in the business perspective. If this chapter has outlined the logic and assumptions for market engagement, do market actors react in an expected manner? Are there implications for the market of applying both a direct contracting and market-based approach to electrification? How to enterprises respond to the incentives that seek to align these actors? Enterprises and market participants can take all sorts of forms: NGOs, social enterprises, commercial enterprises, sometimes even governmental organisations that act as NGOs. It is in exploring the breadth of these actors and the impact of REPs on their activities that we can answer these questions.

4 Enterprise Response to Policy Change

4.1 Introduction

Refocusing the study on the enterprise perspective, this chapter explores how enterprises respond to policy change. Although public administration literature evaluates the empirical evidence for impacts of changing policy on the market, this approach is generally ignored in the work on off grid technologies (Brass *et al.*, 2012; Girth *et al.*, 2012; Lecy and Van Slyke, 2013). It is important to take a step back and understand why an enterprise-centric approach is important, and the role of this chapter in the bigger picture of the thesis. The success or failure of a government intervention is dependent on the outcomes of that intervention. In this case, if a government sets up a policy of public-private partnerships to electrify remote rural areas, it is the electrification of such areas that determines the policy's success. And yet, that success is partially dependent on the private sector enterprise that makes up that partnership and the arrangement determined by policy. Therefore, in studying why policies succeed or fail, it is important to understand the relationship between policy and enterprise. An enterprise-centric approach allows for an inside look into how policy impacts those enterprises by seeing causal relationships at work. How have off grid solar enterprises in India changed their business models over time in response to policy change?

This chapter explores the impact of the Government of India's rural electrification policies through the lens of off grid solar enterprises. Shifting down to the organisation-level of granularity is necessary to see the effects of policy on the market landscape for two reasons: first, a lack of global market data over time prevents country-level analysis, and second, without this initial organisation-level investigation, it is challenging to determine which data to gather and where to focus analysis. Thus, from this point forward, the thesis focuses on an embedded case study of off grid solar enterprises in India. Using interviews with off grid solar enterprises, experts and government officials, I compare narratives of enterprise change to understand how business models change in response to policy interventions. Findings suggest that policies impact areas of the business models that are exposed to change, which in this case is an enterprise's revenue streams and customers. These changes have knock-on effects within the business model, which suggests that policies do not simply increase or decrease revenues, but change the shape of the enterprise landscape. In India, changes can be seen in a broad trend 1) towards grid-connected customers, and 2) some movement away from solar home systems by small and medium-scale enterprises.

In section 4.2 I go into greater detail on some of the methodological choices made in the change. Section 4.3 explores incentive impacts on finance and end user selection, and the causal relationships between enterprise characteristics. The findings have implications for the efficacy of the Government of India's energy access plans. Therefore section 4.4 outlines policy implication based on these findings. The chapter's findings are then summarised in section 4.5.

4.2 Methodology

In order to compare and contrast narratives of business model change, all narratives were categorised by business model component, followed by an exploration of the narratives based on the precipitating change element in the narrative. In the first instance, interviews were transcribed in NVivo. This chapter incorporates no grounded theory analysis, and therefore coding stopped once all narratives were identified, and these narratives are compiled in Appendix 2.

The characteristics of the enterprises were then categorised according to the nine building blocks of Osterwalder's business model canvas in order to better interface with other literature on business model development (Osterwalder, 2004; Osterwalder and Pigneur, 2010). Unlike in the following chapters, this chapter borrows Osterwalder's framework rather than creating an ontology through grounded theory. This is for three reasons. First, the interviews often focused on one or two aspects of the business model, and therefore acted as a single window into the enterprise. Even piecing together the view from each window, I would have been unable to describe the full picture. This leads on to the second point: Osterwalder's framework is very robust, enabling most descriptions to find a place within in (see Table 4.1). Although Hisham Zerriffi's approach (see Table 1.3) would also have been a reasonable choice, given that it was developed for describing off grid enterprises, it does not offer the same specificity. For instance Zerriffi's 'organisational form' must at least cover Osterwalder's 'distribution channel,' 'relationship with customer,' 'capability,' 'value configuration,' and 'partnerships.' Using Osterwalder's canvas allows greater clarity through its specificity. Finally, it is commonly used, improving the comparability of the findings (Chesbrough, 2010; Muzellec, Ronteau and Lambkin, 2015; Upward and Jones, 2016).

Product	**Customer Interface**	**Infrastructure Management**	**Financial Aspects**
Value Proposition	Target Customer (Customer Segment)	Value Configuration	Cost Structure
	Distribution Channel	Capability	Revenue Model
	Relationship with customer	Partnerships	

Table 4.1: Nine components of Osterwalder's Business Model Canvas

The business model concept was created specifically as a building block for future research, and Osterwalder anticipated that computer based research would be a part of that, therefore the components needed to be adequately defined (Osterwalder, 2004, p 2). Hence all the parts of the model connect to one another. The product is the offering of a value proposition. The customer is a criterion linked to the value proposition through a channel by the mechanism of the customer relationship. Cost structure and revenue model are linked to the value proposition through the price of its offering. And the value proposition is linked to infrastructure management through the value configuration activities (how things actually get done), partnership agreements and capability resources (Osterwalder, 2004). That is to say, all elements of the business model are interconnected within Osterwalder's ontology.

Once narratives were broken down into their parts, they were compared to explore how characteristics were impacted by policy (section 4.3.2) and what other factors influenced characteristic change (section 4.3.3). Finally, section 4.3.4 takes a step back and outlines what changes to the business model have occurred most commonly, attempting to sketch the changes that policy has made to the enterprise landscape.

In categorising these narratives, I have included the precipitating change as cited by the research subject, which sometimes were not attributed to aspects of the business model. Those elements were included in a longer list of factors within the narratives, which can be seen in the key (Table 4.2). Because each narrative of change includes the precipitating event, it is possible to determine which changes result from a particular programme. However, although it is therefore possible to determine which changes relate to the market-based or direct contracting mode, given that the enterprises exist within the context of both programmes, this chapter will not attempt to make a comparison of the two programmatic modes. As the main change within the past three years has been the double cancellation of the JNNSM subsidy and financing for solar home systems, India serves as a case study of a layered policy mix of the two modes, and the impact of policy change within this context.

Code	Business Model Component	Code	Business Model Component
C	Distribution Channel	IM	Infrastructure Management
CI	Customer Interface	P	Product (Value Proposition)
Cost	Cost Structure	Pol	Policy
CR	Cost Recovery	Partner	Partnerships
CS	Customer Segments	RM	Revenue Model
D	Demand	Sales	Sales
FA	Financial Aspects	SC	Supply Chain

Table 4.1 Key of narrative elements

It should also be noted that the business model components represent the dependent variable of this study. However, the findings suggest that when one component changes, other components may change as well, turning the dependent variable into an independent variable. This is a part of the argument within this chapter. The nature of the interviews is such that causality is explicitly discussed, and therefore, challenges with dependent variables subsequently becoming independent variables are partially side-stepped by focusing on the narrative order and explanation. It should be noted however, the human sensemaking often creates linear narratives where complexity exists, and so this approach is perhaps a necessary simplification (Dawson and Buchanan, 2005).

4.3 Narratives of Enterprise Change

4.3.1 Summary

Tables 4.3 and 4.4 cites 19 examples of the impact that the prominent rural electrification programmes have on the enterprises. The findings suggest that policies primarily influence revenue streams and customer segments, although the product offered is inextricably linked to the customer and finance options. Eleven enterprises are represented here, the majority of the enterprises in the study. Of the changes, 14 relate to subsidy regimes and three cite grid expansion. The two key policies cited are the JNNSM-NABARD subsidy and the RGGVY/DDUGJY programmes of grid extension. It is interesting to note that no enterprises cite the DDG Scheme.

While assessing the impacts of these changes on policy outputs is outside the scope of this study, the public administration literature would suggest that changes to the enterprise landscape would influence the success of these policies. However, as much of the JNNSM change influences firms that are generally not targeted by the DDG scheme, the greater influence is likely to be on end users outside of that scheme, which will be further explored in Chapter 5.

4.3.2 Impacts of Policy on Enterprise Characteristics

4.3.2.1 Subsidy and Finance

All seven changes to the revenue model are precipitated by subsidy changes. The connection is an intuitive one, but there are broader implications for financing and the lifecycle of an enterprise's revenue model. Once an enterprise has access to finance, it becomes easier to access additional finance, essentially creating a "virtuous cycle" of financing. Subsidies can reduce the time it takes for enterprises to break even, improving the attractiveness of the business model to investors. ENT32 described the importance of the 25% JNNSM capital subsidy for their minigrids like this:

> "And I was telling you that the business model is recovering it in 7 years time, but that's with the subsidy. If the subsidy wasn't around, it'll take us 20% more time, so possibly we would get it in 10 years back, 10 years time. Therefore the banks, which lend at the moment, are not accepting over a 10 year time frame, so to get back to the 7 year, 6 year time frame, we need to bring the capital cost down, operation cost down" (ENT32)

Similarly, once a customer has access to an end user subsidy, they also have access to the financing institution that provides it, because they are often channeled through some form of banking or microfinance, which allows the end user to also access loans. The two biggest examples are the JNNSM end user subsidy that was channeled through NABARD to the end user, and JNNSM subsidy channeled through SHGs.

A government subsidy can be used a seed money while an enterprise is still working out what its value proposition should be. This is what ENT27 did, although they were only able to do so because of the reputation and pro-social orientation of their umbrella organisation.

Case Study 1: ENT27 – NGO turned Social Enterprise

ENT27 is a spin out enterprise of a large non-governmental organisation, which was founded in 1984 and addresses the needs of rural working women. The NGO is active in 13 states, and acts as an umbrella organisation for a number of programs and projects interested in protecting and promoting women's livelihoods. ENT27 works solely in Bihar and sees solar energy as a way of improving productive working hours, as well as quality of life.

ENT27 was initiated in 2013 as a project that leased solar home systems to poor women, with the support of NABARD, the national rural development bank, which was attracted by reputation of ENT27's umbrella organisation. Initially they provided solar lamps, but found that they were of poor quality and broke within a year. They then provided solely small solar home systems with a panel, module, LED light and battery, enabling self-employed women to work longer hours. They worked through self help groups, which would do the work of collecting monthly rentals:

> "… we used to procure solar home light systems from manufacturers, we had project money for that. We used to provide it to self help groups, one of, part of the self help groups, and they in turn rented it to the local villages, and they would collect monthly rentals from these households. And what- the amount which the self help group was provided, these lights were subsidised…so it was almost 40% subsidy was offered to them" (ENT27)

This connection with an MFI worked out well for end users, who were later able to buy the systems through the SHGs when the enterprise shifted to a grant-based model.

Over time, it because clear that their customers wanted to own the products, not just lease them. This was challenging for poorer women, so they sold their systems with a 40% subsidy. This work was initially done in partnership with NABARD, and therefore the subsidy came through NABARD and the financing through the self help groups. However, the backlogging of subsidies in NABARD made the partnership untenable, and so the enterprise moved from a subsidy to a grant-based model. Revenues raised as grants helped to finance the systems. This had the additional impact of opening up the type of products that ENT27 could sell, since the NABARD subsidy had been tied to a single system. Currently they market, sell, install and service these solar home systems and are moving towards financial sustainability. When interviewed, the enterprise was beginning their own limited company and moving away from subsiding their products.

In all of these cases, central financial assistance improved access to financing, whether through banks or MFIs for enterprises and end users. However, it is worth noting that ENT27 is a good example in another way: all the enterprises that described being impacted by changes to the NSM are social enterprises. Typically, these are newer, smaller organisations (with the exception of ENT26) that do not bid for large DDG tenders but rely on programmes lower bars to entry.

ENT ID	Changes to Business Model	Overall Themes	Responsible Policy Change	Reasons for Changes
ENT11	1. Shift away from bank financing for end users	1. RM, CI	1. NABARD subsidy cancelled	1. The loss of subsidy broke the link between the ENT and NABARD banking
	2. Move from SHS to microgrids and rooftop solar	2. P	2. NABARD subsidy cancelled	2. Revenue model for SHS no longer worked without subsidy, so moved tech requiring no end user subsidy
	3. Move from SHS to microgrids also caused a shift from total cost recovery to partial cost recovery	3. RM	3. NABARD subsidy cancelled	3. Revenue model for SHS no longer worked without subsidy, so moved to microgrids, with a high capex and low to moderate likelihood of cost recovery, subsidised by rooftop projects
	4. Shift from both electrified and unelectrified areas into unelec hamlets	4. CS	4. NABARD subsidy cancelled	4. Revenue model for SHS no longer worked without subsidy, so moved to microgrids, which are most in demand in unelec clusters
ENT12	1. Sales dropped for a time	1. Sales	1. GoI introduced a scheme with 50% subsidy on SHS	1. When high subsidies are introduced, customers stopped buying full price products from ENT, alternatively, the rumor of subsidies cause prospective customers to anticipate subsidies, depressing demand
ENT14	3. Trying to move away from grant-based financing	3. RM	3. Micro/ Minigrid capex grant	3. Policy uncertainty makes incorporating subsidy into revenue model risky
ENT23	1. Increasing manufacture of grid connected technology	1. P	1-2. “Government incentive schemes” are “promoting grid tied” projects	1. Incentives from government encourage ENT to manufacture products for grid-connected projects
	2. Adding more grid-connected customers	2. CS		2. Increasing the manufacture of grid-connected products increase the amount of the ENT's work that focus on grid-connected customers
ENT24	1. Shift from microgrids to minigrids	1. P	1. Grid expansion under RGGVY/ DDUGJY	1. Grid expansion decreased the market for small off grid
	2. Shift from unelectrified to electrified villages	2. CS	2. Grid expansion under RGGVY/DDUGJY programmes	2. Grid expansion decreased the unelectrified market, unreliable grid increased demand in electrified villages
	3. Shifting focus of new work to Uttar Pradesh	3. CS	3. New UP Microgrid/Minigrid Policy is “one reason” for change	3. The new UP Microgrid/ Minigrid is favourable to the ENT's product, and is a reason why they are starting more projects in the UP

Table 4.3 Enterprise characteristics impacted by policy Pt I

ENT ID	Changes to Business Model	Overall Themes	Responsible Policy Change	Reasons for Changes
ENT25	1. Shift from unelectrified end users to both electrified and unelectrified	1. CS	1. Grid expansion under RGGVY/DDUGJ Y programmes	1. Grid expansion brought electricity access into areas that they work in
ENT26	1. Shift from government subsidy to no subsidy	1. RM	1. NABARD subsidy was cancelled	1. JNNSM subsidy cancellation meant that it was no longer available for the ENT's end users
ENT27	1. Enterprise began work in conjunction with government NABARD subsidy, connecting NABARD bank with SHGs for financing.	1. Partner, RM	1. NABARD subsidy	1. Needed financing for rural end users, NABARD subsidy was available and NABARD was happy to partner because of ENT's reputation
	2. Shift from subsidy to grant-based model	2. RM	2. NABARD subsidy backlogged, then cancelled	2. The backlogging and then cancellation of the subsidy meant that the revenue model was no longer viable, so the ENT moved to grant-financing
	3. Increased product range	3. P	3. NABARD subsidy was cancelled	3. Previous NABARD subsidy had only applied to one product, once cancelled, ENT27 added new tech
ENT32	1. Moved from 1 engineer with each grid to new monitoring technology and fewer engineers	1. CI, P	1. JNNSM subsidy decreased from 30%-25%, putting strains on their finances	1. As capital expenditure subsidy decreased, ENT had to decrease the number of engineers and focus more on monitoring to cut costs
ENT33	1. Incubatees do not offer subsidyto their end users.	1. RM	1. NSM-NABARD subsidy	1. Incubatee have too little experience to be elifible for NSM-NABARD subsidy & financing
ENT29	1. Targeting unelectrified areas with SHS	1. CS	1. Government partnership	1. Partnership with government allowed for subsidy, influenced type of end user

Table 4.4 Enterprise characteristics impacted by policy Pt II

Comparing the changes in business model, specifically the source and presence of the end user or capex subsidy, there is a common trend towards a subsidy-free model. The predominant financial pathway starts with a government subsidy, then moves to a grant-subsidised model and, finally, a number of enterprises are trying to remove the subsidy component from their model. This posited financing pathway is outlined in Figure 4.1 below.

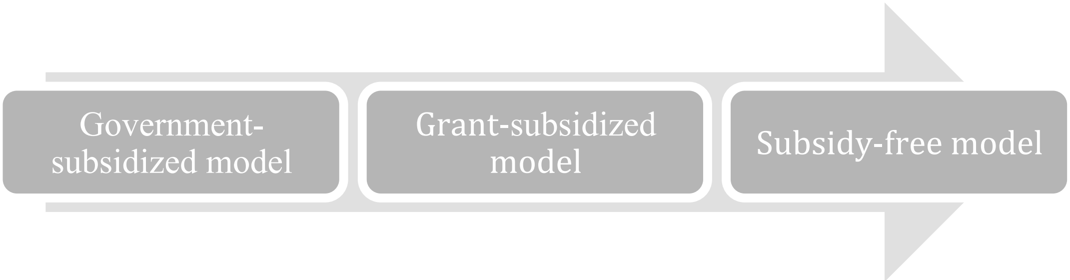

Figure 4.1: Proposed Financing Pathway

While enterprises rarely go through all three financial states, no enterprise in my sample has successfully moved from a later state to an earlier one. Six enterprises change their financial states according to this pathway. While some enterprises may adopt additional technologies that start at a grant based model (see the adoption of SHS by ENT13 or the adoption of microgrids by ENT28) no enterprises have yet moved from a subsidy-free model to a grant-based model, or from a grant-based model to a government-subsidised model with the same technology.

ENT26 and ENT11 moved from working with government subsidies to creating subsidy-free models. ENT 27 moved from a government subsidy to a grant subsidy when bottlenecks for the subsidy occurred:

> “We could have reached out to more number of people, but financing was a major problem for us. That was when we raised our own grant funds, so we got some funding for light 2,700 lights from one of the funders, then we started getting these lights and providing it to end users, even on individual basis. "

They are now setting up a private limited company with a subsidy free model. With their compound business model, ENT32 has moved from a government and grant-based capex subsidy to a government subsidy that no longer relies on grants:

> “So at first we tried to scale this model, we found the commercial establishments are the shops and the educational institutions, the schools where we are able to make this model viable because until that point we were 70% of the cost was the Capex which was met by this loans from NABARD. And other banks also pitched in later. 20% which is operational

> cost, which is salaries and maintenance costs for these batteries and so on, was met from our own foundation, and then a few other people started pitching in to help us out - other like-minded foundations. But before that, this was not a scaleable model unless we got rid of the grant part. It had to be completely financed, and you know?" (ENT32)

While this could be seen as a counter argument, the government grant was already present within the revenue model, and so removing the grant subsidy is actually a step towards a subsidy-free model, rather than a regression to greater reliance on government funding.

As another example, ENT23 typically works with a government-subsidy through engaging with tenders, but is now including more work with grant-subsidised models. Finally, ENT14 currently has a grant-based model, but is actively setting up a variety of projects to test a new subsidy-free model, because:

> "…these policies change so often that you cannot build on this, right? You can't invest, and solar is a long-term investment, it's not like a short-term, one-year pay back. It's like a seven, eight years, and in the seven, eight years, which is a long period on which the policy needs to be stable, suddenly the policy can change, suddenly. So that's why for solar I definitely struggle with the government policy. And we wanted to make it viable without government policy, without support of government because that can change"

Only two enterprises challenge this model. ENT21 works with seven ESCOs, all of which have grant financing and one of which has also has received the JNNSM subsidy. However, other ESCOs they work with are planning to apply for the NSM subsidy. Likewise, ENT24 currently does not receive a subsidy for any of its systems, but it is planning to apply for the subsidy moving forward. In both cases the application has not been approved, but the intention is present.

While this model seems to suggest that enterprises require a subsidy to initiate their work, eight enterprises never receive central financial assistance on their products, with many starting from a grant-subsidised model. It is possible that the difficulties of receiving subsidies, such as extensive bureaucracy and stringent enterprise and technological criteria, make grants more attractive. For instance, ENT24 has not applied for a subsidy until now because "the procedure is so winding." However, although this might account for the lack of enterprises that have successfully moved from grants to subsidies, it does not explain the number of enterprises that begin their work with subsidies. In the end, the greatest implication is that enterprises have a drive towards financial sustainability. ENT27's story complicates that story.

4.3.2.2 Subsidy, Product & Customer

Of the eight changes related to customers, five were precipitated by the initiation or cancellation of subsidies. Subsidies target specific beneficiaries, which changes the customers that an enterprise is financially capable of serving. Additionally, the move away from the government end user subsidy, and the increase in corporate social responsibility donor funding, changes the customers that enterprises are incentivised to serve.

Are subsidies required to give a temporary handicap to technologies that have not yet reached market readiness or is a subsidy needed for these technologies to reach the rural poor? India's two primary rural electrification subsidy regimes disagree on the answer. The JNNSM subsidy for off grid solar focuses on supporting a nascent technology as part of a general push towards solar, although the cancellations of the SHS end user NABARD subsidy impact the poor end user. However, the Government of India supports the rural poor specifically in their DDUGJY DDG Scheme, which focuses the subsidy on the location of end user rather than on the technology. Thus, the removal of the NABARD subsidy led to several enterprises – especially social enterprises - either picking up microgrids and moving deeper into the rural areas, or else shifting to minigrids and focusing on those areas with unreliable grid connections, shifting both product and customer, since appropriate financing was no longer available.

Additionally, eight enterprises have added donor-funded projects to their portfolio in the past few years, either as grant-based SHS projects or by adding microgrid projects to their repertoire. At least one enterprise attributed this to the Government of India's Corporate Social Responsibility policy, which came into force in 2014 as section 135 of the Companies Act, 2013. The CSR policy states that companies that have a "Net worth of INR 500 crore or more; or Turnover of INR 1000 crore or more; or Net Profit of INR 5 crore or more during any financial year" must spend 2% of their net profit on projects for stakeholders that support the common good (Government of Bihar, 2014). However, enterprises that engage with grant-based models find that donors have a great deal of control over the project, specifically the end user. ENT14 described an episode in which a donor company nearly pulled out because the intended village had become electrified in the course of the project, and they had wanted the project to be in an unelectrified area. This applies also to government enterprises:

Case Study 2: ENT23 – Public Sector Enterprise

Government-affiliated enterprises have the government as a bigger stakeholder in their work, but not the only one. ENT23 is the oldest organisation in the sample, having been founded in 1974 as a Government of India company. It was explicitly created in order to commercially produce products that were created through national R&D programmes, and has since focused on its own R&D in solar PV and on the commercialization of solar products.

Unlike many of the enterprises in the sample, which have focused on distribution, ENT23 manufactures solar home systems. As a government company, their systems meet the specifications for most government tenders, and they were the only enterprise in the sample that reported regularly bidding for and winning tenders for off grid solar home system projects. In addition to bidding on government tenders for the DDG scheme, they also did CSR projects, partnering with local organisations like ENT29 in Bihar to build and operate a small solar minigrid. Unlike most other enterprises in the sample, ENT23 does not have any significant partnerships, excepting those with smaller organisations for contracting work or local capacity. It does have a programme to give small contracts to start-ups in order to develop smaller companies in the sector.

The organisation manufactures and assembles stand-alone solar systems, as well as manufacturing panels for other types of systems. For instance, the company is increasing its manufacture of grid-connected products and increasingly turning its focus to customers on the national grid, in part because incentives from the government are "promoting grid-tied" projects. However, ENT23 does not need to wait until the government unveils a new programme to make its moves. Once a year, the company sits down with representatives from the central government to discuss priorities for the coming year and to ensure that their priorities are aligned.

ENT23 regularly works with CSR grant-based projects, and described the location and end user as being selected by the corporation: "See, if a project is being donated by someone else, they have their own way, their own specifications and we have to follow them" (ENT23). In this case, corporations wanted to provide their projects in areas that are near to their own factories, offices or other manufacturing facilities. This can mean that grant-based models have to manage an additional stakeholder whose interest is not necessarily in the financial sustainability of the project, or the need of the end user.

4.3.2.3 Grid Expansion, Customer & Product

On the other side of the spectrum is the Government of India's fast-paced grid expansion programme, the primary aspect of the DDUGJY. This policy focuses on the national grid as the solution to under-electrification, and there is a complicated relationship between the success of this programmes and that of off grid enterprises. This tension is played out in the competing narratives about the future of off grid energy, and its multiple possibilities. In the end, grid expansion changes the market by increasing the grid connected customer base, which is more commonly served by minigrids and larger solar home systems. The pace and quality of the grid extension has created two dominant narratives: one, the grid will soon be nearly everywhere, and two, the grid is elusive and of poor quality. Most government officials interviewed, especially those working with MNRE or the state nodal agencies, supported the first narrative. Off grid technologies are, in this narrative, for very remote areas only.

However, of the 16 enterprises, eleven provided off grid technologies to grid-connected customers, where the grid was considered to be unreliable. This gap between the government's expectation and the work of the enterprises was clearly described by minigrid system integrator ENT21:

> "Yeah, see there you could find a little bit of dichotomy between what the state government might be looking out for and what our programme is looking out for, because the state government would be looking out for areas which are off grid. So off grid is a very different beast, compared to unreliable grid areas where our programme primarily works. [Ours is] a private sector model, it's a market-based model … So in such cases, if you start looking at off grid areas then you would get into places where you have 15, 20 households and absolutely no productive load and there's no possibility of going. So I think that what I see is that, the government - there has been a UP policy last year, in fact that happened to a large extent because of this programme. The UP government came out with a mini grid policy last year. It was the first state ever in India to come out with a policy, so there, we do see - the government wants the mini grid operators to go into off grid areas and believes that the unreliable grid areas, as such, where the government grid is going to come anyways over a period of time, we should not be spending our time there." (ENT21)

However, all but one minigrid operator worked in unreliable grid areas, rather than in exclusively off grid villages. Where the national grid is unreliable, off grid enterprises see a range of new customers who need a technology that will augment their substandard access.

The related expectation was that grid extension would negatively impact off grid sales, but the experience so far has been mixed. Three enterprises experienced a drop in sales or demand, which has caused them to move to a different area or technology, such as ENT28, which claimed to have moved microgrids when the grid arrived in the village. On the other hand, SHS enterprise ENT25 has had the grid arrive in a number of their pilot villages, and they claim that sales drop slightly before the grid actually arrives, but increase after the grid has arrived:

> "So when the poles and wires got, were introduced to the village, demand went down, from this point, because people got this hope that, okay we will get electricity now. So, and they thought, we'll get stable, more capacity, so demand actually went down. After a few months they realised that even a) either the power is not coming at all, coming in the near future, or even if it has been introduced, it's unstable… then after a point, there was no hope from grid electricity, they got a reality check - that's the way it is in rural India, right? - so they got a reality check and demand shot up." (ENT25)

So even with a grid connection, customers revert to using their SHS in addition. This is proto-typical 'energy stacking,' in the same way that we might use an oven, a microwave and a rice cooker for our cooking needs. The impact on demand is therefore related both to the quality of the national grid and the anticipation of that quality. Both of these aspects will change as grid expansion continues, which actively changes the potential market for off grid products.

Expansion is a key component of the move towards providing for grid-connected customers. With a rapid expansion, but questionable quality of the grid, a new market of unreliably grid-connected customers has emerged. The enterprises that have moved into this market have had to shift their technology offerings and revenue models in order to capitalise on their demand, and this has primarily been reflected in the rise of the minigrid. In the past three years alone, five of the enterprises began minigrid projects for the first time (ENT32, ENT29, ENT31, ENT14, ENT21). Minigrids are, with one exception, for grid connected villages, because they are large pieces of infrastructure and require commercial, as well as domestic loads:

> "You see, why we are gravitating to commercial hubs. Earlier our biomass plants were primarily based in areas that had no grid, now that reality is going to change with the government promising every village is going to be grid connected. So earlier our offering was, I would say, meant for [not grid connected] people. …The changing reality of time is that every village is going to be grid connected, so you switch over to commercial hubs who are in need of reliable and good quality power, 24 by 7. And this is our focus now. " (ENT24)

However, while minigrids offer domestic lighting services, their focus is on commercial, agricultural or other productive loads, which may have implications for hamlets or other impoverished areas that require only domestic lighting. What is most clear is that these enterprise characteristics are interrelated, and the expansion of the grid does not just open up a new market, but changes the way in which end users are getting their power and the capacity of the systems that may serve them.

Case Study 3: ENT22 – Social Enterprise

Missing from these narratives are those enterprises that seemed un-buffeted by policy changes, which was sometimes achieved by finding financial support elsewhere. ENT22 was founded in 2009 with a large grant from a prominent international foundation. The aim of the enterprise was to bring the right products into rural India in the right way. That has meant focusing of the right type of products, which address health, livelihoods and quality of life. These products are sold at a small profit and are typically sourced from large, sometimes multinational corporations. The company bills itself on being responsive to demand, and so products are regularly being introduced and phased out as the business is tweaked.

These products are sold through rural entrepreneurs, who are predominantly women from low income areas. In this regard, the company is a distribution company, with a great deal of its time and effort going to training and communication with its network of entrepreneurs, which act as sales people as well as raising awareness in their communities of the value of these products. As of writing, the company worked with over 16,000 rural entrepreneurs across 13 states.

This enterprise expressed no narrative of change in relation to the government's national programmes, primarily because they do not engage with them. Their solar products do not receive a government subsidy, although the company itself sells the product at a subsidized rate. The focus of the organization is on scaling up, and it seems to work mainly through partnerships.

Financial support has instead come primarily from large international organisations. Its primary partners fall into three categories: development banks and agencies, multinational corporations and local skills and development organisations. Development banks and agencies have provided funding (World Bank, DFID, GIZ), multinational corporations sell their products through the enterprise (ie. Unilever) and

Indian based organizations focus on the development side (ie. Skill Council for Green Jobs). These funding partners were only possible because of ENT22's laser focus on social impact, which enable them to ignore the coming and going of subsidy regimes.

4.3.3 Impacts of Enterprise Characteristic Change

Stepping away from policy and exploring other narratives of change, we see that changes occur because of both exogenous and endogenous factors. Specifically, nine out of 18 enterprise changes are precipitated by another change within the business model. Tables 4.6 and 4.7 outline the precipitating factors of all changes described that do not directly cite policy, although the exogenous factors that they cite may be indirectly driven by other policy decisions. Half of the changes take place due to external circumstances, or factors exogenous to the business model. In three cases, demand changes the enterprise's off grid product, whether that is through sales of products or the opinions of the customer (ENT12, ENT28, ENT32). In the case of ENT28, they found that an increase in consumer demand led to a "natural progression" to larger systems, including microgrids. Likewise, ENT27 found that their customers preferred to buy panels out-right rather than renting them, and so they change their revenue model and their value proposition:

> "So we're two things: one was self help group model in which home light systems were being rented, and the other model was where women entrepreneurs were selling solar lamps on direct purchase and sale. And slowly what the impact of home light systems was tremendous and then there were households, at least 57 households came back to us, and said we want to own these products. We don't want to endlessly pay rent for it, and that was a very critical learning for us. That ownership of these decentralized renewable energy systems, and we realised that if actually we let them own it, then there would be more care and maintenance problems would be less. If people pay more attention, it's going to be easier for us to manage." (ENT27)

In other examples, a lack of cost recovery from a post-payment system leads to a shift to a pre-payment model (ENT24), and the low cost of solar led that same enterprise to shift towards solar hybrid minigrids. All these changes take place because external forces (demand, customer responsiveness, cost of solar) led to a change in the business model itself.

The other changes occur due to endogenous factors, namely shifts in other enterprise characteristics. A change in the supply chain position, for instance, shifted the products sold (ENT11, ENT13) and the channels (ENT25) that enterprises worked through. ENT25 chose early on in their lifespan to focus on product development, rather than distribution, which influenced the channel through which their customers receive the technology:

> "So as a company we decide that we won't get into distribution, we will have distribution partners, like micro finance institution, or government institutions, or NGOs, and there are other companies, like, other... companies who have foothold in rural areas. We ultimately use their services. So we'll have distribution partners across. They will distribute the kit for us, that is how we'll get the reach." (ENT25)

Other enterprises found that starting and ending partnerships affected the means of distribution also (ENT14, ENT26). In the case of ENT14, microfinance partnerships fell apart, which meant they were no longer able to provide financing, which led to a breakdown of their distribution channel and a move away from solar home systems:

> "And normally, the people work with a micro finance business, but they, in India the solar lantern, solar household system - it is sold mostly through micro finance, because people don't want to buy credit or 6 month of installment papers, that a microfinance company can do, because they have a much better... So anyone who's a micro finance company - so some of these product companies, they're tying up with these micro finance companies. So the smaller product, they don't even charge interest, they just give a four month installment and you pay. For a bigger product they give you also loan and all, right? Somehow in the basics what happened, after this 2009/10, our micro finance system was off. So without micro finance business, for us distribution was very challenging" (ENT 14).

Essentially, changes with one aspect of the business model, can lead to changes to other aspects. A good final example is ENT12, which used to sell a wide range of products, but then focused on solar products when only they were selling. However, having a small basket of products negatively impacted their village level entrepreneur channel of distribution:

> “So we started with different models to reach in rural market, so VLE, then we tried to associate with NGOs, then our dealer were already selling something and they're interested in our product. So VLE didn't work, because the basket was too small. Once we have a basket, then we will see again whether it works or not, but for now. … [VLEs] are bread earners in the family, they could not provide a sufficient basket so it didn't work….So, finally the model we developed was through dealers.”

While it was an exogenous demand that caused the enterprise to alter the products available, that change affected the success of their distribution channel. The implication is that some modes of distribution are more effective with a smaller selection of products (whether women VLEs or dealers). These findings reinforce the interdependency of business model components, which explains how a change in a single policy instrument may have an outsized, or unexpected, impact on the enterprise landscape.

4.3.4 Changes to the Enterprise Landscape

These findings suggest that during the course of their lifespan, enterprises that survive are highly agile, changing business models frequently. And so, rather than simply increasing or decreasing demand, a policy change can shift the shape of the entire enterprise landscape. Six enterprises adopted new technology, two scaled up microgrids to minigrids, and six dropped technologies. Similarly, enterprises changed payment methods (1), changed funding sources (5), changed end users (6), changed maintenance plans (1), and changed distribution methods (8). While each change comes with its own set of circumstances, we can see three broad trends: increased targeting of grid connected customers, an uptick in the popularity of microgrid and minigrids, and a general trend towards financial sustainability.

The move towards working with grid connected areas includes both grid connected technologies or, more commonly, off grid technologies in areas with unreliable connectivity. As seen in section 4.3.2.3, grid extension has opened up a new range of customers while limiting the number of truly off grid customers. Currently only two enterprises (ENT11 and ENT23) work in only off grid areas with their off grid technologies, and both these enterprises also have added additional grid connected technologies and projects. However, six enterprises have changed their end users, and five of those changes included work in more grid connected areas. Some enterprises expressed a belief that the grid was shortly going to be everywhere, and explained that it was increasingly difficult to find areas that were truly off grid, although many areas suffered from unreliable and poor quality electricity access.

Related to a shift towards grid connected end users, there is also an increase in the system size of technologies, with enterprises adding microgrids to their repertoire and microgrid enterprises scaling up to minigrids. Of the thirteen enterprises that have started or added new technologies since 2000, ten added or worked exclusively with micro and minigrids. Currently, five enterprises work with both SHS and a grid-based system, six work with just grid systems, and only four enterprises work solely with solar home systems. Minigrid systems have risen in popularity along with the move towards grid connected areas, in great part because minigrid operators require a certain amount of productive or commercial demand, which they believe is more readily available in areas that have unreliable connections. See ENT21, ENT24, ENT32, and ENT31 for examples.

The final trend noticeable in the narratives is a move away from government financing and towards greater cost recovery, which is partially a response to the end of the JNNSM-NABARD subsidy. For the most part, total financial sustainability, defined as complete cost recovery for the capital cost of the system coming from the end user, is an elusive dream for anything other than solar home system enterprises. Four out of seven minigrid operators already reported that their minigrid models should allow for total cost recovery over the payback period, although few systems have reached the end of their payback period. Multiple enterprises did identify the aim or plan to reach total cost recovery going forward, such as ENT27, which began by working with government, and is now trying to move to a subsidy free model:

> "We've done almost some 2,500 systems until now, and we're just in the process of setting up a distribution company now. We taking…this model and scaling it up, and we set up a company, it's a private, limited company…It will be functioning as a distribution company in the sense that we get products from manufacturers, provide end user financing and after sales service and products, and bridge that last mile gap…We also finalized what the model is, what the business plan is, where we're going to raise the investments in any case." (ENT27)

Or, as it was described by ENT29 who currently provide subsidised SHS, moving forward they are "planning a stable business model," which will not include a subsidy for end users. While some of these changes may be a natural progression away from policy risk (see section 5.2.1), some are a direct response to the changes to the off grid subsidy regime in the past three years. Additionally, the adoption of larger scale systems with more grid connected customers has improved the ability of the business model to recoup costs, highlighting the manner in which rural electrification policies shape the enterprises that provide off grid technologies.

ENTID	Changes to Business Model	Overall Themes	Reasons for Changes	Overall Themes
ENT11	1. Shifted from manufacturing and distribution to just distribution	1. SC	1. Could not compete with other manufacturers	1. FA
	2. Moved from solar lanterns to solar home systems	2. P	2. Shift of focus to distribution, rather than manufacturing	2. SC
ENT12	1. Moved from selling a range of products, now primarily sell solar products	1. P	1. Only solar products sold	1. Sales
	2. Shifted from VLE for distribution to selling via NGOs, now selling via dealers	2. C	2. Small basket of products did not allow for (male) VLEs to make sufficient money	2. P
ENT13	1. Stopped sale of solar lamps, but still provide in grant-based projects	1. P	1. Found distribution difficult	1. SC
	2. Began manufacturing solar panels	2. P	2. Acquired enough capital to manufacture panels, felt there was unmet demand	2. IM
ENT14	1. Stopped providing financing for products	1. CI/C	1. Previously enterprise had worked with microfinance, but microfinancing fell apart after 2010	1. Partner
	2. Stopped selling SHS	2. P	2. Manufacturing and Microfinance partnerships that were used for selling SHS ended	2. Partner
ENT24	1. Move from post-pay to pre-pay model	1. RM	1. Poor cost recovery from post-pay model	1. CR
	2. Inclusion of solar/biomass hybrid systems	2. P	2. Low cost of solar	2. Cost
ENT25	1. Focused on manufacturing and integration, use VLEs and MFIs for distribution and collection	1. CI/C	1. Early on, the enterprise realised that they could not produce and distribute the product	1. SC

Table 4.6 Enterprise characteristics impacted by other factors Pt I

ENTID	Changes to Business Model	Overall Themes	Reasons for Changes	Overall Themes
ENT26	1. Including built-in financing for systems	1. RM, CI/C	1. In period 2007-2009, enterprise finds range of new financing through partnerships with rural banks, credit cooperatives and microfinance agencies for end users	1. Partner
ENT27	1. Stopped selling solar lamps	1. P	1. Solar lamps were of poor quality and broke after approx. one year	1. Quality, Knowledge
	2. Enterprise moved from loaning to selling systems	2. RM	2. There was a desire to own products from end users.	2. D
	3. Enterprise beginning own limited company and moving towards a financially sustainable model with no subsidy	3. RM	3. Aim for sustainability	3. RM
ENT28	1. Adding larger and larger systems to their product line	1. P	1. It is a "natural progression" as end users experience a growth in consumer demand	1. D
ENT32	1. Focusing on solar products	1. P	1. Started with a range of products, but had demand for more solar capacity	1. D
ENT29	1. Enterprise aims to build maintenance capacity	1. VP	1. In order to "build a stable business model" and run future projects as a business	1. RM

Table 4.7 Enterprise characteristics impacted by other factors Pt II

4.4 Policy Implications

Governments do not stand alone in providing public services, but increasingly engage with and expect non-governmental organisations and the private sector to play their part. The Government of India is no exception, in that the current DDG Scheme requires the participation of third parties in tendering large-scale SHS projects. However, this research has highlighted how changes in levels of support have a strong impact on the enterprise landscape. It follows that if the Government of India hopes to minimise the number of tenders that are unmet, it would be wise to improve their support for the solar home system market. The Government of India's DDG Scheme presupposes a burgeoning SHS market, which can be tapped into to provide least-cost solutions for the most remote villages. In order to do that, the programme routes large-scale SHS tenders through state nodal agencies, which ask for bids from third parties. However, several enterprises noted that off grid tenders were regularly cancelled, postponed or re-tendered (BREDA, 2017; UPNEDA, 2017). While there is limited evidence confirming that these tenders are cancelled at higher rates than other programmes, there is recent evidence for tender cancellations of off grid solar projects.

Unmet tenders could occur for a variety of reasons: poor tender construction, changes to the grid expansion plans, or a lack of competition within the off grid solar sector. That lack of competition may not relate directly to the move away from SHS by SMEs, but other empirical studies have suggested that government has a role in supporting the sectors that it expects to provide public services (Girth *et al.*, 2012; Lecy and Van Slyke, 2013). As discussed in section 2.1, contracting out public services assumes robust competition in the sector in order to reap the intended benefits (Entwistle and Martin, 2005; A. Hefetz and Warner, 2012; Girth *et al.*, 2012). However, reliance on a few larger companies may not be viable in such a new industry. SMEs play a large role in the Indian economy, and although every sector is different, SMEs are considered to a key part of economic progress and a site of innovation and new competition particularly important in newer industries (Rothwell and Zegveld, 1982; Reynolds, 1997; Savlovschi and Robu, 2011; Das and Banerjee, 2018).

As mentioned above, poorly drafted tenders and changes to the DDUGJY plans are possible contributing factors to phenomena. However, the movement of 820 villages from the DDG scheme to the grid expansion scheme suggest that implementation has been slower than anticipated (REC, 2018b). Challenges in garnering enough bidders for the DGG scheme are likely to play a role. At the same time, support has moved from SHS to micro- and minigrids. This study has shown that enterprises are very responsive to changes in support, and there is evidence that this policy shift has contributed in part to the enterprise focus on grid-based systems. The double cancellation of the Jawaharlal Nehru National Solar Mission end user subsidy through NABARD was the most frequently cited policy change in the interviews. As explored in greater depth above, enterprises that relied on the subsidy moved either to larger grid-based systems, or towards subsidy free models. This limits their customer base to those rural users who can pay full price for energy access. Current off grid subsidies, outside of the tender system, focus solely on capital costs for minigrids and microgrids.

The public administration literature suggests that a more fruitful symbiotic relationship exists where the government supports the sector that it engages to provide public service (Girth *et al.*, 2012; Lecy and Van Slyke, 2013). If this is the case, the Government of India might consider improving its support for the solar home system market, which could be achieved in three ways. The first way to do this might be to better incorporate enterprise stakeholders in decision-making. Although stakeholder meetings and conferences already exist, enterprises broadly felt that their interests were not fully considered, and that these meetings existed more as a symbolic show of support than a true consultation.

Secondly, although officially all relevant households have access to electricity, financial support for SHS may still be necessary, whether through subsidy or through improved financing options. This is because many households fell outside the Saubhagya scheme, and those in areas relying on off grid energy will still require replacements in the future (Urpelainen, 2019). A key challenge in providing this support is that the costs of these systems are very low, making the administrative charges relatively high for each small loan or subsidy. This was a challenge that NABARD faced when it was administering the JNNSM SHS subsidy, but some experts believed that NABARD is still the correct institution for administering such a subsidy, because of its experience with implementing other rural policies.

Another way to address the issue of administration would be to have the enterprise act as an aggregator of subsidies. In this capacity, the enterprise would sell systems to the end user at the subsidised price, and apply to receive the subsidy on behalf of those customers, cutting down on administrative costs for the bank, but shifting them to the enterprise (Jain & Ramji 2016, pgs 25-26). It may also be worth considering using the new Direct Benefit Transfer scheme, which is already being rolled out for kerosene, to provide subsidies to those end users that already have bank accounts. This might add an obstacle for those who do not currently have bank accounts, but, conversely, it may encourage more rural customers to apply for bank accounts, which are commonly seen as the first step on the credit ladder.

Finally, eligibility requirements for participation in the DDG Scheme exclude small to medium sized enterprises, which is a challenge to scaling up through winning government contracts. While the scheme has now reached its end, future technology-based programmes will likely be in a similar position. To incorporate SMEs into the tender systems, eligibility requirements could be relaxed to allow enterprises with a shorter history to apply. Another challenge in accessing those tenders is that the size of the contract often precludes SMEs. By breaking tenders into smaller packages of households, SMEs could take on more manageable contracts, and larger enterprises could have more control over the amount of work they wish to take on. However, doing so would undoubtably increase administration and transaction costs. Still, studies in other contexts have suggested that current infrastructure and competition within the market are greater indicators of successful contracting than transaction costs (Amir Hefetz and Warner, 2012). While we cannot extrapolate such a study to this precise context, it does suggest that other factors than transaction costs may be important.

4.5 Conclusion

Governments are relying on non-state actors to provide rural electrification, and in the case of India, this involves central financial assistance that targets particular off grid technologies, as well as contracting out the electrification of rural villages. However, the impacts that policy changes have on enterprises have thus far been understudied (Brass *et al.*, 2012). In this study, fifteen enterprises have given their accounts of enterprise change, which have been analysed and compared.

The findings suggest that enterprises are impacted by policy directly where their business models interact with programmes, but changes have knock-on effects to the rest of the business model. When policy changes, it alters the entire enterprise landscape, which may impact the successful implementation of policy. In the Indian off grid solar context, revenue streams and technology are the two aspects of the business model that are initially impacted by rural electrification programmes. However, knock-on effects led many enterprises to change large parts of their business model.

In India, changes can be seen in a broad trend 1) towards grid-connected customers, 2) some movement away from solar home systems by small and medium-scale enterprises, 3) some evidence of a move towards financial sustainability. However, the main off grid electrification DDG scheme mainly floats tenders for solar home system projects. Given that the implementation of the DDG scheme has faced challenges, it is possible that these changes to the enterprise landscape have impacted the success of the programme. In either case, the changes to the enterprise landscape are likely to have implications for which end users are being targeted and which technologies are available for them. Further research might broaden these findings to additional rural electrification contexts, exploring whether enterprises in other countries respond in similar ways to policy changes.

There are also more general implications. Given that changes to the business model follow particular logical pathways (ie a lack of financing for solar systems leads to wealthier target customers and changes in the technology offered), there is an element of predictability to the impact of policy on the market. Analytical generalisation also applies, and therefore we might conclude that such logics also apply in other contexts. While the particular customers or technologies might depend on country- or region-specific features, the logical rules should apply. As a caveat, it is important to consider how the characteristics of a particular enterprise may influence the extent to which an enterprise is affected by policy change (see the next chapter). Nevertheless, it may be possible to anticipate how the introduction of a new programme, or the cancellation of an existing one, will influence the characteristics of the market. Given that certain programmatic modes have requirements – a degree of competition, for instance – it is crucial for policymakers to consider not just the immediate impact of a policy change on sales, but whether the policy supports the type of market that programmes require.

5 Factors influencing the Political Strategy of Enterprises

5.1 Introduction

The findings from the previous chapter suggest that policy interventions may create unintentional changes to the enterprise landscape. In India's case, small and medium-sized companies showed a movement away from solar home systems, in part because they were unable to access subsidies and financing for the systems. These companies were no longer eligible for subsidies, but even some companies that were eligible chose not to apply for them. This decision to engage with or disengage from rural electrification programmes affects the impact that policy change has on the enterprise.

The assumption inherent in much policy analysis is that enterprises will always engage with government programmes when they are able – that is, eligible (Niez, 2010; Khandker *et al.*, 2014; van de Walle *et al.*, 2015). However, the way in which enterprises position themselves towards government and policy is an oft-overlooked aspect for analysis in the RE context (Brass *et al.*, 2012). To design effective policy, enterprises must participate, information must be shared with enterprises, and government needs to understand the needs of enterprise. This relies on a flow of information, relationships and engagement. From the enterprise perspective, we are discussing political strategy (Hillman and Hitt, 1999; Hillman, Keim and Schuler, 2004;

Mellahi *et al.*, 2016). Enterprises make conscious decisions about how to work with the government, in an attempt to mitigate the risk that policy plays to their environment (Pfeffer and Salancik, 1978; Hillman, Withers and Collins, 2009). By understanding the actions of enterprises, we are better able to work with them and to anticipate their strategic reaction to policy change. So what political strategies do these enterprises employ, and what enterprise factors influence political strategy?

As seen in chapter 1, political strategy research focuses on big companies in HICs in contexts in which complying with regulation is mandatory, as opposed to working with optional programmes, which is much more common in this context. Therefore, the prior literature emphasizes lobbying over all things, because it is the most forceful way of minimising the risk of new regulations (Moore, 2001a; Polk and Schmutzler, 2005; Vining, Shapiro and Borges, 2005). These studies are inapplicable to a resource-constrained context full of small and medium-sized organisations in which policies are primarily in place to support new technologies and poor populations. We need to look within these interviews to understand what political strategy means in these contexts, and which factors are most prominent in influencing these strategies. While some new literature is trying to bring relevant theory to developing country studies, LMICs are also still underrepresented in accompanying theory (Ali, Frynas and Mahmood, 2017; Jamali and Karam, 2018; Frynas and Yamahaki, 2019). The findings of this chapter can improve our definition of political strategy by challenging the emphasis on lobbying, exploring new facets of political strategy and by applying old theory to new contexts.

This chapter has several overlaps with the previous chapter, which looks at changes within the business model. Aspects of the business model include political action, revenue model, and target customer, which will also be evaluated here as a part of political strategy. The question underpinning this chapter is not, ‘what political strategies do enterprises take?’ but instead ‘what factors influence political strategy?’ A change in business model may be in response to a change in policy *and simultaneously* an aspect of political strategy. In that way, this chapter approaches the issue of engagement with the government with the aim of improving policy design.

Section 2 details how a new framework for political strategy and tactics was derived from the interview data, while that framework is explored in section 3. Then section 4 breaks down the tactics used by enterprises in order to better articulate the factors that lead to particular strategies. Finally, in section 5, the chapter takes a step back to evaluate the conceptual contribution to political strategy literature, place those factors within the broader context of resource development theory, the resource-based view and institutional theory, and offer up some implications for policy design.

5.2 Methodology

This chapter begins by using grounded theory to describe the phenomenon of 'political strategy' within the interviews, and follows up by exploring factors that contribute to an enterprise's choice of tactics. As there is no single definition of political strategy, this chapter applies Mintzberg's definition of strategy as a plan, a pattern, a position or a perspective (Mintzberg, 1987). As Mintzberg also advocates for eclecticism in the use of these definitions, all four concepts were included here. The term 'political' is defined as anything from 'self-interest' in organizational studies literature to 'governmental personnel and/or policies' in comparative politics (Conge, 1988; Drory and Romm, 1990). This thesis sides more with the latter, including government and its actions as political.

Therefore, for primary coding, the question asked of the data was "What strategies (as in, plan, pattern, position or perspective) do these enterprises use to engage with government and the actions of government?" Secondary coding then collated those codes into broader categories of action. Finally, tertiary coding sought to synthesise those codes into higher-level tactics that fall within broader strategies of engagement or disengagement. Within our data, a set of behaviors emerged that does not fit within the current literature on political strategy (ie. leveraging policy), which will be discussed further in section 5.5.1.

It should also be noted that this portion of the research initially began during a collaborative paper with Dr Subhanjan Sengupta of BIMTECH, New Delhi on the strategies that new and renewable energy social enterprises take towards government and policy. In the initial paper, of which I was first author, a similar conceptual framework was constructed, and thereafter reassessed with the full data of all 17 interviews, as opposed to only those social enterprises. In the collaborative paper, 95% of the data belongs to my dataset, as well as the primary analysis and drafting. In this chapter 100% of the dataset is my data. The 5% data from my collaborator was on a different market – social enterprises that work in renewable energy, not necessarily off grid solar. Using all of my data, the conceptual framework developed here differs slightly from that collaborative paper.

In section 5, the excavated constructs are then used as a framework through which to understand the factors that impact decisions on political strategy. At this stage, each enterprise is treated as a case study of political strategy within the off grid solar sector. By examining which enterprises employ each tactic, buttressed by the contextual information given in the interviews, this section posits causal relationships between certain factors and enterprise strategy (Eisenhardt, 1989; Yin, 2009). These factors are subsequently considered in light of broader theories of resource dependence and institutional theory in section 5. In so doing, this research aims to explore the factors that influence decisions on political strategy in enterprises working in a sector that has traditionally relied heavily on central financial assistance and government support.

5.3 Excavated Constructs: Strategies & Tactics

5.3.1 Engagement and Disengagement

Enterprises within the sample took actions that represented either a strategy of engagement or disengagement. Actions of engagement sought to benefit from working with the government, while actions of disengagement attempt to avoid wasted resources and policy risk. These two key constructs stand in opposition to the majority of the literature on political strategy, which focus on typologies of engagement and assume that active disengagement is either the default position or legally untenable (ie. conforming to regulations are mandatory) (Weidenbaum, 1980; Hillman and Hitt, 1999; Getz, 2002; Mathur and Singh, 2011). However, as the sections below will explore, the off grid solar sector is in a position in which significant political attention is married with policy interventions that ask for engagement, but do not require it.

The resource-intensity of each action varies. Resources are the firm's assets, whether they are manpower, time, knowledge or physical assets (Wernerfelt, 1984). Capacity is defined as the capability to deploy such resources (Kamoche, 1996). Resource-intensity describes the amount of resources that must be deployed in order to complete the action, therefore the amount of capacity that is required.

Figure 5.1 outlines the excavated constructs that make up the strategies and tactics that enterprises take within the sample. A full word table is found in Appendix 3.

Categorising the activities of enterprises illuminates the range of possible approaches to government and provides a framework for analysing which tactics and strategies enterprises choose. In this framework, enterprises *take* a strategy *by using* a tactic *through* actions. For instance, an enterprise may take a strategy of engagement by leveraging policy through aligning with government priorities. Codes further clarify how those actions are revealed in the interviews.

5.3.2 Engagement: Leveraging Policy

Enterprises take action to leverage policy in order to take advantage of the policy environment as it currently exists, whether through directly or indirectly gaining access to policy benefits. The first aspect of this is engaging in government programmes. Three programmes were most commonly cited in the interviews when discussing political strategy: the DDG Scheme, the JNNSM, and India's CSR policy (Government of Bihar, 2014). All of the policies mentioned above are optional, in that the enterprises within this sample may take advantage of the benefits that they offer if you are eligible, however, it is not mandatory to engage with them. Direct engagement with policy typically falls outside of the definition of political strategy, and this will be discussed in section 5.1.1.

In addition to directly engaging in the programmes above, enterprises also align their activities with government priorities. This can take the form of selecting a technology to which the government has given its financial support, or else moving towards populations that the government has prioritised. Enterprises may also hedge risk by partnering with other enterprises that have direct engagement in these programmes, or else by shielding their own potential losses in engagement by inflating their tender bids or offering financial rewards for certification. Finally, some enterprises negotiate with government in order to align priorities or have access to benefits without going through the formal processes, which can be highly exclusionary.

Strategy	Tactics	Actions	Codes
Engagement	Leveraging Policy	Engaging in programmes	Getting accredited
			Applying for subsidy
			Bidding for tenders
			Doing CSR projects
		Aligning with government priorities	Following government priorities
			Moving to areas with favourable policy
			Moving towards grid connection areas
			Working in deregulated space
		Hedging policy risk	Hedging risk through partnerships
			Hedging risk through manipulation
		Negotiating	Negotiating with government
			Negotiating with implementing agents
	Building and Leveraging Relationships	Maintaining relationships	Maintaining relationships
			Talking to government
		Working with local actors	Working with local actors
		Partnering with government	Partnering with government
		Integrating government	Integrating government into supply chain
	Lobbying	Offering information	Offering information
		Giving feedback	Giving feedback through formal channels
			Giving individual feedback
			Giving collective feedback
		Championing policy	Championing policy
		Joining an industry organisation	Joining an industry organisation
	Monitoring	Anticipating	Anticipating government action
			Anticipating integration/non-integration
		Having awareness	Being aware of government vision
			Being aware of policy
		Waiting	Waiting to know government approach
Disengagement	Avoiding	Avoiding grid	Avoiding grid
		Stepping in	Stepping in where the government in not
	Not engaging	Not engaging in policy	Not applying
			Not bidding
			Disengaging from policy
		Not considering policy	Not taking grid expansion into account
			Not waiting for policy changes
		Not working with government	Not interacting with government
			Not partnering with government
			Not working with government

Figure 5.1: Excavated Constructs

5.3.3 Engagement: Building Relationships

Enterprises build and maintain relationships for future access to programmes and policy development (see Lobbying, below). This can take place at the local, state and national level, and enterprises regularly had engagement at all three. Relationships were maintained through regular communication and offering services. Many enterprises also worked with local actors - be that local politicians or councils in charge of the Gram Panchayat (census village) in which they were working.

In addition to these informal relationships, enterprises partnered directly with government or engaged them as a part of their supply chain. Partnerships with government took the form of joint projects or related programmes, such as a training centre. These differ from the partnerships outlined above, which are explicitly partnerships with external organisations in order to access policy benefits. Partnerships with government may provide benefits, but they additionally indicate positive relationships with government agencies. Another approach similar to partnership is integrating government into the supply chain. Two enterprises referenced this feature. In one case, the enterprise desired the government to act in the role of distributer, and in the other case, they were already providing their systems to a governmental organisation for that purpose. In all these cases, the focus of this tactic is on encouraging a relationship between the enterprise and government, whether for immediate or future benefit.

5.3.4 Engagement: Lobbying

Lobbying is a central, but ill-defined, aspect of the literature on corporate political action and public relations. There is a general consensus that lobbying is an action that enterprises take towards the government in order to influence policy, but what form that action takes is up for debate (e.g. Schuler 1996; Polk & Schmutzler 2005). For instance, lobbying has been defined as providing information or alternatively as financial transactions (Hillman and Hitt, 1999; Mathur and Singh, 2011). Within this chapter, lobbying is defined as when enterprises interact with government actors with the aim of shaping policy outcomes, as opposed to other relationship-building activities that do not aim to change policy. Under this definition, we see enterprises offering information, giving collective and individual feedback, championing policy and being a member of an industry organisation.

Feedback can be given individually or collectively, through informal or formal channels. This differs from championing policy, which focuses solely on suggesting particular policies ideas and offering support for policy changes, although of course they are related. In terms of collective feedback, the key industry group is the Clean Energy Access Network (CLEAN), which offers support to its members through networking, as well as lobbying government agencies.

5.3.5 Engagement: Monitoring

The final tactic for engagement can be challenging to identify within the interviews, in part because of its ubiquity. Monitoring includes watching for and anticipating the actions of government. Therefore, in the interviews it is described by actions such as anticipating, having awareness, and waiting. Weidenbaum identifies a similar concept, described as “positive anticipation” (Weidenbaum, 1980). In Getz’s typology, it would be considered being “proactive” (Getz, 2002). It is an active monitoring of the policy landscape.

Anticipation describes thinking through the actions, or potential actions, of policymakers and considering where an enterprise might fit into the government’s conception. This can be based on a kind of political calculus or technical reasoning. For instance, the government might be interested in minigrids that are suddenly making a lot of money, and may try to capture the benefits of such a business model innovation. Or else, the technical challenges of future integration of solar systems with the grid may cause a company to anticipate redundancy, rather than integration. Awareness of policy is an integral aspect of monitoring, and almost all enterprises expressed a thorough understanding of the policy landscape in their field.

Deciding to wait and see the outcomes of policy negotiation or change was framed as an active decision within the interviews. This was not described as a passive activity, but an active choice. In the case of ENT25, they prioritised other work over pursuing the benefits of recent policy change:

> “We have to see the details of [the policy], we are still eyeing for it, not that we are completely ignoring it, but again that's not top two priorities or top three priorities." (ENT25)

The enterprise is not disinterested in engaging with policy, but has lowered the priority of engagement, while still keeping an eye on government actions. In all cases, monitoring was the most common form of engagement.

5.3.6 Disengagement: Avoiding

A strategy of disengagement can be achieved through two routes: actively avoiding government interaction or simply choosing to continue work without considering the government or the impacts of its policies. It should be noted that the interview data is robust enough to define these as separate tactics, but that in application, there is a great deal of ambiguity as to the characteristic of any one action. That is, it is clear that avoidance and not engaging are separate categories, but it is difficult to discern in many interviews which is being described.

Avoidance is generally unacknowledged in the literature on political strategy (Pfeffer and Salancik, 1978; Hillman and Hitt, 1999; Getz, 2002), except in the case of Oliver's institutional theoretical approach, which recognises avoidance as a response to institutional pressures (Oliver, 1991a). However, Oliver's concept relies on deception given that the assumption is the engagement is mandatory. Once that assumption is dismissed, avoidance does not require deception, but only an effort to not interact. Within the data, few enterprises described avoidance, with the exception of the avoidance of the national grid. In avoiding the grid, enterprises avoid competition for electricity. Enterprises also avoided government by stepping in to work in regions where the central government was not inclined or able to work.

5.3.7 Disengagement: Not Engaging

As opposed to avoiding government interaction, many more enterprises choose not to engage, a tactic that is not even within the conception of most political strategy literature, which views policy engagement as mandatory (Oliver, 1991a; Hillman and Hitt, 1999; Getz, 2002). This can include not engaging in programmes, talking to government or considering the government's grid plans in their work. As described above, the government has a number of relevant programmes that might offer financial benefits to enterprises and their end users. However, many enterprises within the sample did not seek to engage in these programmes, often for one of three reasons: they were ineligible, the risk of policy change is too high, or they had previous, negative experiences working with the government. Additionally, enterprises chose not to interact with government, in some cases because of the belief that working with government involved a set of skills that they did not possess, or engaging in bribery. Finally, a range of enterprises expressed a disinterest in where the national grid was going to be installed and a disinterest in adjusting their own marketing to account for the grid. The factors and mechanisms behind these decisions will be further explored below.

5.4 Key Factors in Political Strategy Decisions

5.4.1 Leveraging Policy

By examining the enterprises that use each tactic, this research elucidates the most common factors in determining political strategy. The characteristics of actors in the market influence their actions and how they are likely to respond to policy changes. In order to anticipate how the market might respond to a change in mode or incentive, policymakers must take into account the characteristics of market actors.

In the case of leveraging policy, three enterprises bid for government tenders (ENT11, ENT23, ENT13), two within the DDG Scheme, however, only one enterprise (ENT23) reports regularly winning such tenders. Currently, three enterprises are receiving, or planning to receive subsidies through the National Solar Mission (ENT32, ENT21, ENT24), although that number used to be higher. Four enterprises previously received the subsidy, but no longer do (ENT11, ENT26, ENT27, ENT14). Finally, three enterprises described progressively doing more work in grid connected areas or with on grid systems (ENT11, ENT23, ENT32). However, four additional enterprises also do off grid work in grid-connected villages (ENT24, ENT21, EN14, ENT31).

Perhaps the main factor in engagement is eligibility, which is a required, but not sufficient, precondition for involvement in these programmes. Eligibility for bidding for tenders includes criteria about enterprise turnover, age, and experience, in addition to technical requirements for the solar systems that will be installed. These requirements prevent smaller companies from bidding for tenders. For the JNNSM, similar eligibility requirements are in place, but they focus more heavily on the technological specifications, which have become increasingly stringent (ENT11). The technological focus of each policy limits the companies that currently provide SHSs. These enterprises can only avail themselves of the DDG tender process, and only the largest

(ENT23) regularly bids on DDG projects. It should also be noted that ENT23 is the only public sector organisation in the sample. Similarly, minigrid companies are those that receive the national solar mission subsidy, which is currently only providing capital for microgrids and minigrids. However, eligibility is not sufficient reason to engage with the programmes. Two minigrid companies should be eligible for JNNSM subsidies but do not report seeking them (ENT13, ENT14), and two large SHS enterprises might be eligible to bid for DDG tenders but expressed no interest in doing so (ENT22, ENT26). The reasons that these enterprises do not seek to engage are further explored in the section 5.6.

Within the category of these enterprises that do engage, there were several aspects of risk hedging that took place. ENT13, which is a panel manufacturer that occasionally bids for non-DDG tenders, found that partnerships were a safer way to access the financial benefits. They cancelled their bid, and instead sought to partner with the company that had won it. In that way, they did not have to go through the costly and difficult process of applying, but were still able to get the work. In other cases, ENT13 inflated their anticipated cost for bid, so that they would be able to financially cover the cost of the project if the subsidy was held up for years, a commonly cited occurrence. The reason behind these actions was clear in all interviews: policies are unreliable and difficult to access. This has been cited for the hesistancy of minigrid enterprises to apply for the JNNSM subsidy: "There are certain reasons, but the *procedure is so winding*, that we do not avail of that subsidy" (ENT21; emphasis mine). Policy risk and its impacts will be explored further in section 5.6.

Negotiation is only a major part of ENT23's approach, which as a public sector organisation negotiates with the central government when detailing their annual plan, in order to assure that priorities are aligned. However, ENT27 did negotiate with NABARD as the JNNSM SHS subsidy was failing, in order to try to ensure that their self help groups would continue to receive the subsidy. It is notable that ENT27 does otherwise have a close relationship with the central and state governments in enacting other non-energy related policy programmes. This suggests that negotiation is more likely in enterprises that already have a close relationship with the government and enterprises that are viewed as key implementation actors.

Finally, enterprises may follow incentives towards new populations, as in the case of the general trends towards taking on more work in grid connected areas – either with off grid or grid-connected systems. Those enterprises that work with off grid technologies in grid-connected areas may be taking advantage of a new host of customers that grid expansion has created: those with unreliable access (Harish, Morgan and Subrahmanian, 2014b; Urpelainen, 2014). Technology has a large role to play here, in that it is larger solar home systems and minigrids that are typically employed in unreliable grid areas. Then there are those who do on-grid systems as a portion of their business, such as ENT11, ENT13, and ENT23. There is little connecting these players, in that they are all of different sizes, enterprise and organisation types.

5.4.2 Building Relationships

Those enterprises that make connections at the central government level differ from those than focus on state governments or local relationships, mainly due to technology and capacity. Rural electrification policy is drafted by the Government of India, and the off grid component is implemented through state nodal agencies, typically the state's renewable energy department. State governments also have their own priorities and policies, which may overlap with those of the central government. At the local level, Gram Panchayats (census villages) are run by a local council, who have jurisdiction over many of the rural villages in which these enterprises work. Within this sample, six enterprises described relationships with the central government, eight described relationships with state governments and four mentioned relationships with local political actors, as can be seen in Figure 5.2 below.

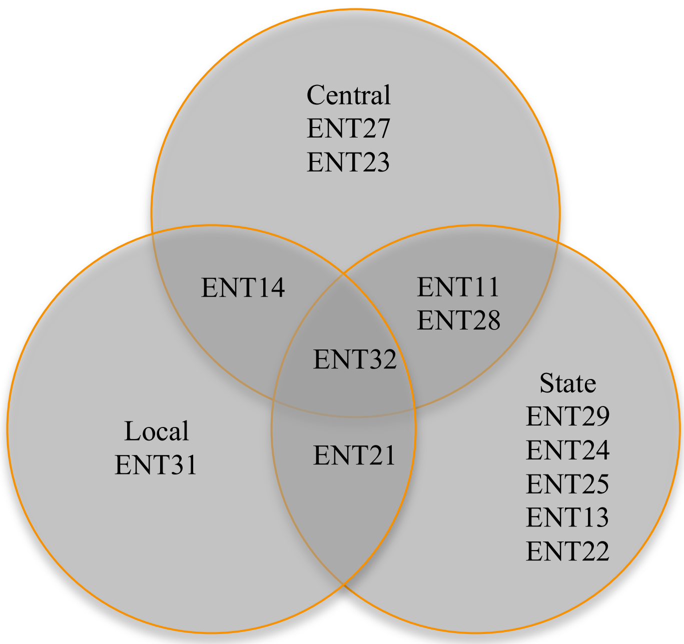

Figure 5.2: Relationships with levels of government

Relationships can take the form of partnerships, sharing information or offering help. In order to build relationships, enterprises sometimes described doing services for officials, as a way of creating a good impression:

> "But the whole point is he's the [bureaucrat], he's staffed with like 2, 3 people. You see the number of files in his rooms. I send him like 2, 3 proposals every month, because I'm this obnoxious guy. He reads them, he likes me. But he's like, 'uh you're here again, are you going to make me work? today is not a good day'. I basically tell him, 'sir, what is happening?'. I actually make a proposal for him […], and one of my guys will go and defragment his disk because that's the IT that's stressing him out - that's because we are smart salesmen." (ENT11)

An enterprise that works in dangerous areas explained that they regularly bring the government inspectors, who must check on the sites before the subsidy is dispensed, to the sites themselves:

> "They are very difficult areas. They're difficult terrain-wise and compounded with the conflict kind of a situation, so - and they're quite happy that we're working there and doing something. And we don't have a civil government option coming there and when I have to take them for inspection, I actually escort them to those places because they feel safer with us." (ENT32)

Another enterprise suggested that they give small gifts to local officials as a way of working with them:

> "And I'm learning to speak their language. That's all. I say clearly, you want watch? I'll get you watch. That's all. Forget what happens from here to here, you give me, you have watch coming out." (ENT31)

These types of exchanges were described at the central, state and local level. No enterprise explicitly discussed bribery, but only made oblique references to not feeling comfortable working with the government.

Technology seems to be the key factor in local engagement. Almost all enterprises had some kind of relationship with government, even very casually. However, only those enterprises working with minigrids went into detail about local engagement. ENT32 explains that this is because minigrids require buy-in from local authorities:

> "We speak to the village, because these are difficult areas where the government grid does not run. So instead of permission to take, we speak to the villagers arriving once - even if in a normal areas which is not a conflict area. I think that we will still take the okay from the local village Panchayat - the village head man and the village committee." (ENT32)

Outside of local authorities, minigrid enterprises place a greater emphasis on community relations:

> "In some cases, the ESCOs already had long-standing relationship with these communities because they do some other kind of work there, they are setting up these mini grids so there the community relationships are already there. Some progressively make their community relationships stronger after setting up the mini grid, so it's a mixed, but the relationship with the community is something which the ESCO at the local level, the last mile level has to do." (ENT21)

As a price must be agreed upon for the power, this is partially an aspect of business model. Community agreement, including local politicians and committees, is a prerequisite for the projects.

Six enterprises mentioned partnerships as a part of their activities, almost exclusively with state governments. Where partnerships are required in order to take advantage of those policies – as in the case of ENT27 – this is categorised as partnering to hedge political risk, as noted above. Three partnerships focused on particular off grid projects, whereas three others did not. Those that did not included a partnership between ENT24 and the state government of Bihar on skill development training, multiple partnerships between ENT22 and states on particular projects related to their non-energy products, and references to a partnership between ENT25 and the government for distribution. Those enterprises that were involved in off grid project-based partnerships were ENT29 (technically, a government organisation), ENT28 and ENT23.

Partnerships occur in order to take advantage of differing capabilities across sectors. Kolk et al summarise neatly what each party typically brings to the table:

> "Companies provide specific knowledge and expertise, NGOs the local embeddedness and contacts, and supporting activities such as training and capacity building, while the government supplies funding, usually to reduce risks, and facilitates the activities." (Kolk, van Tulder and Kostwinder, 2008)

Within the sample, the enterprises that partnered with government for projects were predominantly NGOs (ENT22, ENT28), social enterprises (ENT24) and public sector or government organisations (ENT29, ENT32). This area is not well explored by Kolk et al, which focuses on partnerships with private enterprises, and therefore does not consider the prevalence of government-NGO partnerships (Kolk, van Tulder and Kostwinder, 2008). However, much of the same logic applies. These enterprises are those most likely to share priorities with government, while still providing supplementary competencies. For instance, ENT24 is a social enterprise, which means that their interest is in providing both social benefit as well as making a profit (Sengupta and Sahay, 2017). ENT24 is in a partnership with the Government of Bihar:

> "Yes, we are - we have relationship with the Government of Bihar for training, and like the Ministry of New and Renewable Energy they have Surya Programme, that is for solar technicians, we have run one post and we have government, they have deputized their state nodal agency so they are also providing how they are connecting and that's all. …so basically, we have a center, a skill development center that works for government programmes." (ENT24)

ENT24's interest in social benefits marries well with the Government of Bihar's desire to improve the solar technical capacity of the state, but the Government of Bihar requires the enterprise's technical competency in order to roll out the programme.

All of the enterprises included in this work have a range of technical, business or social capabilities, and yet, there were few government partnerships. Why is that the case? A look at the capacity of those who engage in the most robust partnerships (ie size and longevity) suggests that the size of the enterprise is a key factor. ENT25's partnership with government consists of a single reference to using third parties for distribution, and given that they were in their pilot stages, this government partnership for distribution appears to be in a nascent stage of development, if it is currently functioning at all. The other enterprises that engage on projects were much larger: ENT24 is a medium-sized company, but ENT22, ENT23 and ENT28 were all large or very large. I define size in this study by the scale of output, ie household electrification. ENT29 is a small organisation, but is in fact the government actor with which ENT23 and ENT28 partnered. It is likely that a degree of size is needed to have the capacity to work with government:

> "[Respondents] also pointed at the paradox that smaller companies might have a greater need for government support, while larger companies will be better able to establish and maintain contacts with the government and its various Ministries. It seems difficult for smaller companies to handle the complexities, deal with bureaucratic procedures and afford the time and money needed to invest in these relationships." (Kolk, van Tulder and Kostwinder, 2008)

This alludes to a broader theme within strategy decision-making: capacity. It is possible that size is a proxy for capacity in this case, which Getz describes as one the primary organisational limits to achieving desired outcomes (Getz 2002, p 307). Partnerships, like engaging with policies, require far more man-hours than monitoring or transactional lobbying, which may be a one-off exchange (Hillman and Hitt, 1999). In summary, technology and size (as a proxy for capacity) are the main factors in the extent and focus of a enterprise's relationships with central, state and local government.

5.4.3 Lobbying

Lobbying is the tactic most discussed in the corporate political action literature, and so there are many theories about the reasons for, and limiting factors in, lobbying (e.g. Getz 2002; Hillman & Hitt 1999; Hillman et al. 2004; Lawton, Rajwani, et al. 2013; Mellahi et al. 2016). Lobbying here is defined as seeking changes to policy through petitioning, or giving feedback to, government officials or ministries. This can be individual feedback and championing of policy, or it can be collectively given through industry or trade groups.

When enterprises described the types of feedback that they gave, it was apparent that the key focus was on improving their access to policy. For instance, ENT11 is too small to take on a whole DDG Scheme tender of 150,000 solar home systems:

> "So we went back to the UP [Uttar Pradesh] and said 'break this tender up into 5 parts' - 30,000 each. Have it going to the district where you're going to implement it, have it going to the technology you're going to implement it, and then price it." (ENT11)

Similarly, ENT24 gave representation to the Government of Bihar on an upcoming minigrid policy:

> "[Uttar Pradesh] have brought very good policy, and Bihar is still in draft stage, so that is the status as of just now. There are not very many - state governments that have set out a clear cut policy - UP was the first one - and Bihar is following suit, but still in the draft stage, they have sought inputs from all the stakeholders, and still the policy, it is not out."

As an enterprise that works solely with minigrids, they stand to benefit from any supportive policies in the states in which they work, which in this case is Bihar and Uttar Pradesh. From this perspective, both resource dependence theory and institutional theory provide adequate explanations for why lobbying takes place. The former asserts that political action is used to reduce uncertainties, while the latter claims that enterprises are trying to claim legitimacy and institutional resources (Getz, 2002).

Enterprises within the sample put different levels of emphasis on feedback within the interview. Nine enterprises describe regularly giving representation to government, with the intention that this representation should improve the policy environment (ENT11, ENT28, ENT21, ENT23, ENT13, ENT26, ENT14, ENT24, ENT25). One enterprise very briefly mentions giving feedback (ENT12), and five enterprises do not describe giving feedback at all (ENT22, ENT31, ENT29, ENT32, ENT27).

While enterprises usually champion policies to benefit themselves, it is likely that their philosophical orientation as an NGO or social enterprise drives engagement even where direct benefit does not exist. Four enterprises championed specific policy positions, either with the aim of capturing benefits or because policy engagement is a part of their mission (ENT11, ENT21, ENT25, ENT28). However, several enterprises seemed to champion policies even where they were unlikely to directly benefit (ENT21, ENT28, ENT25). For instance, ENT28 places a great deal of emphasis on promoting rural development in the government, despite the fact that they receive no central financial assistance:

> "ENT28 has a vast experience of implementing different kinds of renewable energy models, which includes development of entrepreneurship, development of various technologies, connecting with different manufacturers, working with government on policy side, etc etc. So this is a very unique institution, where you will find people working on policy side, working at the grassroots level, so we have people working from grassroots to government." (ENT28)

This is in keeping with their mission as an organisation, which aims to promote clean energy through a range of activities, including policy advocacy and consultancy. Therefore, the larger scope of their organisation's mission is a contributing factor to their political strategy. Likewise, ENT21 and ENT25, have limited financial support from government (ENT21) or none at all (ENT25), but both have a strong philosophical orientation towards improving energy access, rather than promoting their own work to the exclusion of others. Therefore, political advocacy is important to the organisation independent of their own benefit from it. It is possible that an enterprise's social mission has greater weight in this particular context because of low instances of competition. No enterprise described competition outside of the tender process, and most enterprises had a more cooperative approach, engaging in partnerships, sharing information, and collectively giving representation through the industry trade group. Therefore, advocating policy that might aid another enterprise did not appear to be a zero sum game for enterprises.

On the subject of trade groups, 11 of the 15 enterprises are members of the industry organisation, the Clean Energy Access Network (CLEAN). Started in 2014, the group's mission is to "bring together diverse stakeholders across India working to improve energy access for the rural and urban poor and create an inspiring model for countries around the world to follow," which it aims to do through connecting enterprises with investors, policy advocacy, developing technology standards and guidelines on capacity building (CLEAN, 2018). Enterprises particularly brought up CLEAN when discussing providing government feedback:

> "At central level also, there are many organisations also, we are a member of CLEAN…So there're 4, 5 organisations which keep some annual meetings. So this question of off grid every time comes, because most of them are based in Delhi, they're able to bring people from MNRE also. And sometime they try to get people from Ministry of Energy also. So this issue keeps on getting discussed, that what are the issues, what are the problems, and sometimes we give feedback also. But this happens. State level, it's not happening." (ENT12)

Essentially, membership of CLEAN provides greater access to the central government, based on its connections and Delhi location, whereas CLEAN's membership has diverse locations across India. In a developing context, business associations can also make up for the capacity deficiencies of weak states, providing legitimacy to industry actors and improving coordination for political actors (Moore, 2001b; Pinkse and Groot, 2015).

Within the enterprises interviewed, there is no clear evidence of the main factors impacting membership of CLEAN. However, there are a few attributes, which may contribute to this decision. We can see that the two government-related organisations (ENT23, ENT29) are not members. Additionally, other non-members include larger organisations and those with a stronger state-focus. It makes sense that those enterprises that are less interested in influencing central government would not see value in membership. Literature on CPA regularly assumes that larger organisations may have less to gain from membership, as they have the capacity for individual, tailored representation (Hillman, Keim and Schuler, 2004). However, these traits also exist within the organisations that are members. When asked, an ex-executive of CLEAN described a different set of factors:

> "I'm not interested in the kind of players who spend 10% of their time on it. At least about 40-50% of their attention is on energy access, […] the other thing that gets left out is there are lots of these start ups that are cropping up here and there, […] so we did this workshop two weeks ago to link energy companies and micro finance, it was focused on the North East, but we had players from Assam and Manipur. We didn't have Himachal Pradesh, we didn't have Nagaland, we didn't have Mizoram, we didn't have Meghalaya. So I don't think that means that there's nothing happening there, it's just that

> means it's so much more remote and they're not in the mainstream and we don't know about them."

Essentially, he believed that the current membership list was representative from most perspectives, but may have missed smaller enterprises or those from more geographically remote regions.

However, given the strong membership numbers (122 organisations at the time of writing) and the compact number of players in the India off grid market (40-60 key players), it is perhaps an indication of the importance of industry groups within this context (Singh, 2016a; CLEAN, 2018). Firstly, as mentioned, industry groups play a crucial role in developing markets by compensating for institutional voids, as suggested by institutional theory (Moore, 2001b; Sinha, 2005). Secondly, as a nascent industry, off grid solar technologies are often provided by smaller organisations, which the resource-based view would claim are more likely to be members of business collectives (Wernerfelt, 1984; Getz, 2002). The fact that CLEAN focuses on the development of technological standards and capacity building reinforces this vision of the industry as a young one, still developing (CLEAN, 2018). Finally, this is also an industry with a high expectation of government interaction, given the years of experience of government interventions in support of both rural electrification and solar energy. Resource dependence theory supports the claim that industries with a greater reliance on government for resources, will have a greater incentive for engagement, which may translate in this case to greater membership of the industry group (Hillman, Withers and Collins, 2009).

There is little clear relationship between almost any known factor and the degree of emphasis on lobbying, with the exception of size. All but one of the medium-large scale enterprises gave a moderate to high emphasis on feedback. It is possible that larger scale enterprises have a greater capacity, but it is equally likely a matter of data - that larger enterprises are more likely to have a relational lobbying style, which is more likely to be discussed within the interview. Lobbying may be transactional (one-off exchanges) or relational (based on long term relationships) (Hillman and Hitt, 1999). For instance, a transactional approach might be like ENT24's feedback on a single relevant policy:

> "In that - in case that policy comes through, it has got certain negatives for us. And we have given our representation, hopefully they should take care of those areas." (ENT24)

Whereas a relational approach is closer to ENT25's example of maintaining relationships with the hope that they will be useful in the future:

> "We are still talking to government agencies to, so that we get traction somewhere - that's the point." (ENT25)

Ironically, in the example above the smaller enterprise (ENT25) describes a relational approach, and the larger (ENT24) is describing a more transactional approach. This suggests that size is not the only factor in determining which approach to use, although larger enterprises are expected to follow a transactional approach, which requires more capacity to sustain a long term relationship (Hillman and Hitt, 1999). Relational approaches are more likely to show up in my data, because of the length and intensity of the engagement, rather than a one-off example of when feedback was given. Therefore, the data does not give us any clear cut answers about the factors that influence the degree of lobbying, but might suggest that enterprises with a greater size are more likely to lobby government or else employ a relational approach to lobbying. Therefore, as in relationship building, human capacity is a key factor.

5.4.4 Monitoring

The final tactic under the engagement strategy is monitoring, which describes maintaining awareness of ongoing policy development, changes to programmes and overall political awareness. This is a crucial political activity, as firms are limited by the knowledge of their options. Wilts explains that effective political strategising depends on "the ability of the firm to recognise context-specific opportunities to influence public decision making," and that "[e]ngaging in political action thus means that firms must carefully monitor their environment to find ways to translate their economic interests into aims and goals of corporate political action" (Wilts, 2006). This is because an enterprise's political environment affects the importance of political action, and therefore the strategies that an enterprise might choose to employ (Keillor, Pettijohn and Bashaw, 2000). In particular, monitoring may play a larger role in sectors in which political developments are also seen as a threat, in order to mitigate policy risks (Baysinger, 1984; Wilts, 2006).

Unlike other forms of engagement, it is harder to judge the role that monitoring plays in each enterprise's political strategy, especially through these interviews. However it is worth noting that all enterprises described monitoring, or at least displayed an active awareness of, policy. In some cases, enterprises were monitoring specific forms of communication in order to take advantage of opportunities as they arose, such as ENT24 keeping an eye on upcoming subsidies:

> "So for the next set of sites, we're looking for government directive, on government circular, the government circular is out with, you put, the application online" (ENT24)

In other cases, enterprises kept abreast of the government's perspectives on the sector, differentiating how the government thought about off grid from their own opinions:

> "From the government side, as of now, I would say the focus is entirely on grid connected systems. We will see different policy as of now from the government side, and then there's a very little focus on off grid, honestly speaking. Their thinking is that the grid will reach to all the households, or all these villages by 2018. So they are working towards that. However, we at the institute think that there is going to be some issue, so we can also complement by our own action that is, you know, spreading the entrepreneurship or spreading the projects in the remote rural areas. So it's like, you know, government is doing through their own thinking, we are also doing through own thinking, but the goal is the same." (ENT28)

Even enterprises that did not specifically describe what type of monitoring takes place did express knowledge about, and interest in, the changing policy environment.

Given that, unlike other engagement tactics, monitoring appears ubiquitous, it is more pertinent to understand why this sector engages so heavily in this particular activity. Empirical evidence suggests why it plays an important role generally in crafting political strategy and mitigating policy risk (Baysinger, 1984; Keillor, Pettijohn and Bashaw, 2000; Wilts, 2006), but theory can give us greater insight into the importance of monitoring within this particular context. Resource Dependence Theory, as discussed in section 5.3, suggests that the high degree of policy attention given to rural electrification and solar energy will increase the importance of mediating policy risk, because enterprises will be more exposed to the vicissitudes of policy change (Hillman, Withers and Collins, 2009). In addition to having a greater incentive to watch for policy changes, monitoring has the lowest resource intensity of all the engagement tactics. That is, monitoring provides a great deal of potential benefit, without the capacity requirements of, say, building relationships with state governments (Wernerfelt, 1984). Both these theories provide helpful, and complementary, explanations for the ubiquity of monitoring within the off grid solar sector.

5.4.5 Avoiding

As we move on to disengagement strategy, it is important to note that an enterprise may choose to employ tactics from across strategies; they are not limited to one approach. The first tactic in a strategy of disengagement is avoiding. Unlike the role of avoiding in Oliver's study, avoidance in this case does not involve hedging risk in engagement, but instead actively keeping a distance between enterprise activities and regulated spaces (Oliver, 1991a). In this context, it takes the form of avoiding regulation and avoiding the national grid. Minigrid enterprises were those that predominantly discussed avoiding regulation through use of legislation on notified rural regions, which are areas in which private actors may offer power without tariff regulation (GoI, 2003). ENT32 expressed the desire to avoid regulation:

> "I think the biggest support [the government] could give me is to just stay out of my way at this point. Because they have all kinds of issues when they come in. Yeah, the further I am away from them the better it is working at the moment. […] once you come up with a successful business model there are all kinds of people who want to get into the game, and therefore you have a policy - or here, there is no government presence in those areas we work. They are very difficult areas." (ENT32)

As the enterprise touched upon, although the regulatory framework currently exempts most of the regions in which minigrids and microgrids are situated, there is a fear that success will bring regulation. In this way, technology is the key factor in which enterprises actively avoid regulation, but the broader reason is to avoid policy risk associated with tariff regulation. Although minigrid enterprises spoke most about this issue, it is equally relevant for those enterprises working now with microgrids.

Five of the 15 enterprises expressed a desire to avoid the national grid, whose expansion is the key feature of the current rural electrification programme (Niez, 2010). This policy risk is outside the ability of the enterprise to control, and therefore avoidance is a tactic to prevent damage to their business interests. Two of those enterprises discussed this in the context of their microgrid projects (ENT11, ENT28), two in the context of the work they undertook together on a very small minigrid (ENT23, ENT29), and one on the development of several of their minigrid projects (ENT21). If ENT28 finds that the grid has subsequently reached a village in which they have a microgrid, they claim to remove the system:

> "After that, we withdraw the system, if we see that it is not being used, and we shift it to some other locations." (ENT28)

Likewise, ENT21 describes minigrids being moved.

> "And we're seeing it - we have like 104, 105 plants in our portfolio - you would have seen at one point in time or another, at least 10% of them faced some problem or the other. So you take that call at that point in time, whether you should…The good thing is that it's modular assets, can be

> moved around to another place. And 3 or 4 such occasions one of the ESCOs has done that, moving the assets from one to the other." (ENT21)

Although almost all minigrid enterprises described a business model that relied on working in grid-connected villages, many still actively avoided them. It is possible that the balance required between partial connectivity and demand is difficult to achieve and may be hindered by a lack of access as well as too much. For both minigrids and microgrids grid expansion and improvement is expected to change the pattern of demand, putting the current business model at risk.

Alternatively, ENT23 and ENT29 suggest that avoidance of the grid is not due to competition but instead a cooperative model of electrification that prevents a duplication of efforts. ENT23 primarily manufactures solar home systems, and has a few small minigrid projects. ENT29 primarily works to support solar home system projects but also worked with ENT23 on their minigrid projects in Bihar. When asked whether ENT23 ever works in grid connected areas, like many other solar home system enterprises do, they responded that "[t]here's no point. It's just wasted." In these cases, the belief is that the government and these enterprises are working to electrify different areas. It is not surprising, then, that ENT23 is a public sector enterprise and that ENT29 is in fact an organisation within Bihar's state government. Therefore, it is not technology or enterprise type alone which determines whether an enterprise is likely to avoid the national grid, but instead a combination of these factors that determines *why* they choose to do so.

5.4.6 Not Engaging

The second main tactic of disengagement is not engaging with government and policy. Unlike avoidance, not engaging does not need to be active, but can instead represent a range of attitudes from disinterest to disenchantment. Breaking down the most common actions of not engaging, we see that technology and ineligibility initially play a big role in which enterprises do not engage. However, upon closer inspection, fears about policy risk and poor past experiences explain why many enterprises have disengaged from electrification programmes.

All five enterprises that expressed ambivalence to the location of the national grid provided solar home systems (ENT11, ENT22, ENT29, ENT25, ENT27). For instance, ENT22 explained that there is demand for their solar home system even in grid-connected areas because their product provides a slightly different service – having no need of fuel, and being available when the grid is unavailable. An individual might have multiple energy sources – kerosene lamps, grid access and a solar home system – in order to be prepared for all situations, essentially engaging in 'energy stacking'. This is the argument for the continued demand for off grid products in grid-connected regions. All of these enterprises expressed this ambivalence solely in the context of their work with solar home systems. This is a fairly striking argument in favour of technology as the primary factor in grid ambivalence. However, there are enterprises that provide solar home systems solely for non-grid connected end users (eg ENT23). This makes working with solar home systems a sufficient, but not required condition to undertake this action.

Nine enterprises explicitly described choosing not to apply for subsidy or bid for tenders (ENT22, ENT21, ENT26, ENT31, ENT12, ENT24, ENT25, ENT27, ENT14). Ineligibility for programmes is the most commonly cited reason for not engaging with them, although several enterprises attempted to apply or bid before being turned away due to ineligibility. Ineligibility takes a variety of forms. Ineligibility based on technology was common within solar home system enterprises (e.g. ENT22, ENT27, ENT28), since the NABARD subsidy was cancelled when these interviews took place. This led to enterprises shifting technologies, end users and revenue sources, as explored in the previous chapter.

At the time of writing, the only subsidy available for solar home systems is through the electrification programme's DDG scheme. Working through the DDG scheme requires enterprises to be eligible based on experience, size, turnover and age of the firm, amongst other similar requirements. As many of the enterprises in the sector are small to medium sized organisations, policies exclude most of them. This was echoed by ENT12:

> "One time [we bid] it was some technical issue, small technical issue. Otherwise our rate was higher. Plus most of the time we cannot even participate because the requirement is very high. Sometimes it's that you should manufacturer of system - we are only distributer - sometimes minimum turnover they put, so we normally don't qualify." (ENT12)

The enterprise no longer bids for tenders. Finally, ENT24 notes that applying for a government tender often has the prerequisite of having executed a government tender:

> "The second is, we would love to compete in that space, but the government tenders are never floated - they have a stupid condition that you should have won a contract and then executed that contract for a government

> organisation, which we have not done to date. So though we are an enlisted channel partner of Ministry of New and Renewable Energy, but still our tender got rejected by the Jharkhand government *on this premise that you have not got executed a project of the government*." (ENT24, emphasis mine)

Obviously, this creates a circular situation in which an enterprise cannot bid for a government tender without having executed a government tender, which they cannot do without bidding for a government tender.

The Catch-22 relates to a broader discussion about the poor design of these schemes. Even if we assume that blocking the majority of players is in the best interest of end users, the construction of tenders was often cited as a reason for not bidding:

> "Nobody bid for those tenders. Because they don't know how to operate! […] So [DDUGJY is] a programme which has two components, grid and off grid. In that the off grid model is through mini grids, the definition is you come put up the plant, that's the EPC part, and run it for 5 years and hand it over to a community organisation. It's extremely simple - they come in and put up and run it whichever way for 5 years, nobody monitors what they're doing for the consumers, what is the quality of the electricity, how they are being run, how the beefing up of community engagement is happening. And they pass it on to a VEC - village electrification - and is somebody training that committee? Does the committee know what to do when the electricity needs go up? Because we typically believe that access to electricity enables development." (ENT21)

ENT26 concurred that tenders were "designed to fail," citing this as the reason that they do not bid for them. Essentially, the tenders were not constructed to be beneficial or operational for both the end user and the enterprise. Poor implementation was also evident in the responses about subsidies. Some enterprises are ineligible to apply for subsidy because they had not submitted documents in time:

> "So the process of application to, for these subsidies, is perhaps not transparent enough. Plus the players are so small and so insulated into their area of work in the remote areas, they're not sensitive enough. So that's one of the roles we play, we make them aware these are there, what is the right time to apply for. So if you are not applying at the DPR stage for the subsidy, so they can come monitor your land before the plant was built and after the plant was built. So the simple lack of knowledge about this itself can delay the process, and then they can come, so - amongst, so I have a status of subsidy here, I have 90, this is slightly dated December last years, so amongst 94 of my sites, 50 are not eligible because they did not apply at the right time." (ENT21)

Challenges meeting the timetable for subsidies were also discussed by ENT24, who also described the difficult process of applying as "so winding, that we do not avail of that subsidy." Whether or not government is meeting its expected output targets of subsidies awarded or tenders filled, it is clear that the priority is not on smoothing the way for enterprise engagement.

Finally, other forms of non-engagement might be considered as working in a complementary mode. Specifically, ENT32 steps in where the government will not work, and ENT28 chooses to work in parallel to government schemes. Starting with ENT32, they work in extreme rural regions that the government cannot:

> "… the government wanted us to do something in another district called Pururia, […] which is - used to be a stronghold of the Maoist movement, so these extremist groups operating from those jungles, hilly jungles. And therefore the government was not able to penetrate those areas. So we started work there in about 25 villages, and then expanded to 30 villages." (ENT32)

On the other hand, ENT28 provides solar home systems at the same subsidy rate as the government was under the national solar mission, intentionally mirroring their scheme:

> "So earlier, under the National Solar Mission, government had provision of subsidy of 40% of the benchmark cost. So that 40% benchmark cost was diverted through areas […] regional rural banks, and a lot of people actually bought the product through availing that subsidy, and that was one of the critical factor in promoting the off grid energy in rural areas. [We are] also adopting the same, similar kind of model. We also had similar kind of scheme, giving 40% grant to the end beneficiaries and so that they can buy - but our target was purely poor, poor and very downtrodden people. Those who actually are not able to pay." (ENT28)

In mirroring the scheme, the only thing they changed was the end user selection, which was based solely on need. As explored in Chapter 4, the inclusion of rural banks in the national solar mission's scheme may have excluded those that are the poorest within these communities, and therefore, ENT28 is actually attempting a complementary scheme that addresses those that are not addressed by the plans of the central government. In which case, both ENT28 and ENT32 are not in competition with the government's rural electrification programmes, but independently acting to complement them.

Taking a step back, why would enterprises choose not to engage? Why would they choose not to seek the potential economic and political benefits of working with government or taking part in government programmes? As is pointed out in section 5.1, several enterprises should be eligible for participation in these programmes, but choose not to (ENT13, ENT14, ENT24, ENT22, ENT26). And even those that are not currently eligible for programmes expressed additional reasons for not partnering or working with government in other capacities (ENT12, ENT31, ENT25). Perhaps the most common factor in discussions of political strategy within these interviews is policy risk. Enterprises are aware that policy can change overnight, and that past agreements with government may not be kept. As discussed in Section 5.1, this is a key reason for hedging risk when approaching tenders, as ENT13 does.

Negative past experiences with policy highlight this risk and was a key factor in disengagement. They were not necessary for disengagement to occur, but were sufficient. Take for example, the experience of ENT24, which felt that future attempts at bidding would be pointless:

> "No, we did not apply for the Bihar government, but we do - but the Jharkhand government, the need in much more. The off grid space in Jharkhand is really good vis a vis Bihar, because the area, the Naxal affected areas and the population is sparse, spread out. So there the off grid solution is much more in demand unlike Bihar so we thought that we will fill the bid and win the contract but it got rejected, so now we are disappointed that the ninth, that responding to Bihar tender is foolhardy, there's not point in wasting and dropping your money for six months and they keep postponing tenders, and for one year you keep looking and you relax, because there's no point."

ENT14 has a similar story. Given that bidding for tenders requires the human capacity to watch for contracts, organise the bid, and submit to a long, bureaucratic process, a feeling that bids may come to nothing (a regular comment) or that they will be cancelled, or that the subsequent subsidy may take five years, or may never come – all these narratives contribute to a strategy of disengagement.

Back to the subject of capacity, ENT12 explains the huge amount of working capital that is required to successfully carry through a bid:

> "So that's another problem, we cannot participate. Even if I qualify, I don't have that kind of working capital that I provide the system and I get subsidy, which is obviously, I cannot have margin of 50%, I am having margin of 20%. So 30% more I still have to pay from my pocket. So that's a problem. But presently, most of the schemes are operated like this."

The need for working capital may be just another hindrance for smaller organisations wanting to work with the government. Likewise, ENT31:

> "MNRE said, we will open the gates for any entrepreneur who wants to come and put a micro grid. And we will give them support. Forget all these tenders - you go to a village, set up a power plant and come and take subsidy from us. When this thing happened a lot of people tried to do that. […] They enforced that you will have to come up with tariff regulations, you will have to come up with company to qualify, all that thing. Hence, now that work that was supposed to start, that also got stalled, because

> they're put too much - like in very simple language - they put up too much […] to a game which nobody wants to play. So nobody's coming, right?"

It also marries with the concerns that this money may never be repaid, as subsidy schemes get backlogged, and political winds change.

Finally, a handful of enterprises expressed the belief that solar products no longer needed a subsidy, which was the primary factor for ENT25 not seeking central financial assistance. In this case, non-engagement was less a reactionary approach, and rather a view of solar systems as market ready and rural end users as customers rather than beneficiaries. Therefore, government attempts at financial support were seen as unnecessary.

In summary, the largest factors in influencing non-engagement are technology and size. These could be seen primarily as proxies for eligibility, but even enterprises that are eligible or have been eligible for programmes in the past, choose not to work with government. Enterprises cited a variety of reasons, including poor design and implementation, policy uncertainty, the need for working capital, a lack of trust in government, and the negative impacts of including subsidy within a business model or market. The characteristics of an enterprise buffer or expose the organisation to these factors in different ways. Therefore, it is the interaction between the policy climate and the enterprise's characteristics that shape their political strategy.

5.5 Discussion and Conclusions

5.5.1 Conception of Political Strategy

The findings of our grounded theory approach suggest that strategies for leveraging – or choosing not to leverage – policy are active parts of a firm's political strategy, which is neglected by the focus on nonmarket strategy. As Figure 5.3 articulates, there is space for the exploration of another definition of political strategy – that which incorporates the market and nonmarket aspect of engaging political actors and policy. This offers a new, expanded definition of political strategy.

Political strategy is usually conceptualised as including political action and non-market strategies that improve the political standing of a corporation (Hillman and Hitt, 1999; Mellahi *et al.*, 2016). This research takes a wider scope in order to also look at what factors influence engagement or disengagement with government programmes, which is conceptualised as another political decision. This is possible because working within the JNNSM or DDUGJY is optional, and therefore a calculation of risk and benefit. By widening the scope of political strategy, we can explore the factors that influence all levels of engagement, and offer suggestions for improving the policy design process to take these factors into account.

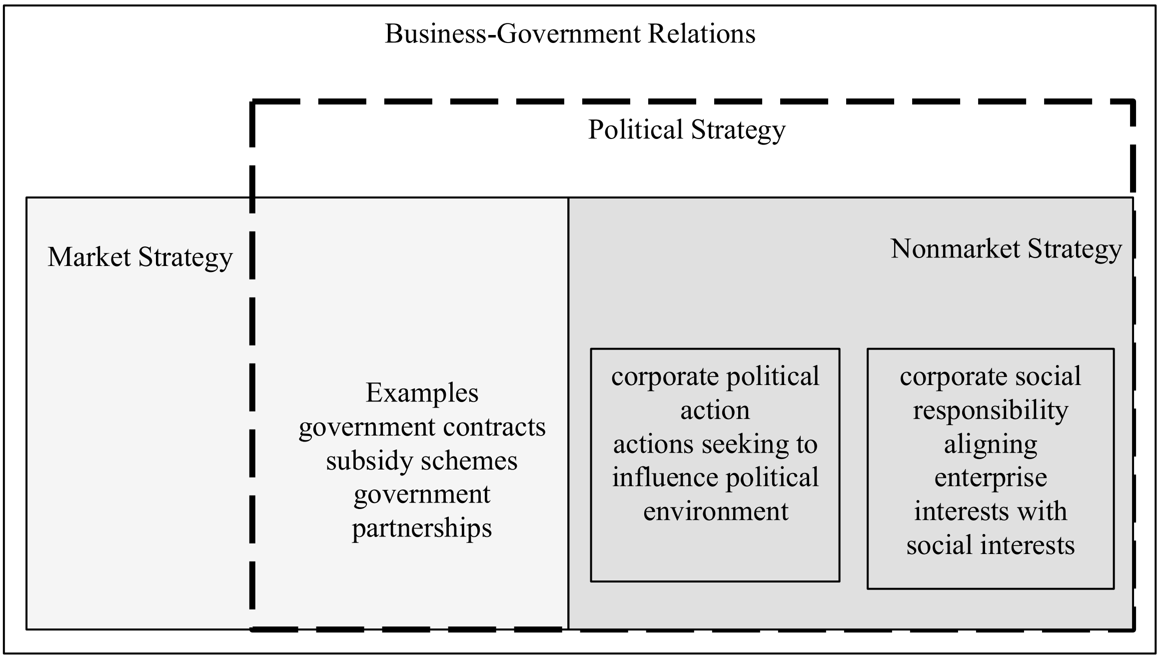

Figure 5.3: Positioning of Political Strategy in this chapter

Although Baron, referenced above, does not specify where government contracts fall in his conception of market vs nonmarket strategy, we might assume from his focus on the economic value of market strategy that this is where we might place contracts and subsidies (Baron, 1995). In Schuler et al 2002, government contracts are seen as a dependent variable, as one might consider ‘public policy’ in Hillman et al 2004 (Schuler, Rehbein and Cramer, 2002; Hillman, Keim and Schuler, 2004). However, incorporating government contracts into a business’s market strategy is another form of political strategising, reliant as it is on degree of dependence that a firm *chooses* to have on government. Therefore, Figure 5.1 places government contracts, as well as applying for subsidy, opting into government programmes, or partnering with government on projects as market strategies that also fall under political strategy.

Following McGrath’s definition of CPA as the “actions by firms which are intended to influence government policy”, then the work of CPA overlaps, but does not encompass, that of public affairs within the firm (McGrath, Moss and Harris, 2010).

The aspects of public affairs that focus on wider social relations fall outside of political strategy. Finally, some literature refers to business-government relations, which at first glance appears to fit neatly on the definition of political strategy that this chapter is attempting to construct. However, despite brief overlap (notably Meznar & Johnson), business-government relations primarily refers to the political economy of particular industries (Schneider, 1998; Mo and Moon, 2003; Meznar and Johnson, 2005; Cammett, 2007). Therefore, this chapter takes the definition of political strategy to be the combined actions of an enterprise towards government actors or policy. This is an expansion of the definition from previous studies, which have focused on what strategies businesses have taken to creating a favorable policy environment, without considering how they take advantage of their policy environment.

Even taking the definition to be limited to affecting the policy environment, it is unclear that including leveraging policy falls outside of ‘affecting the environment’, because it implies that the policies only affect their targets, and not that the very act of engagement with them does not affect the iterative process of policymaking. Take for instance the Namibian example from Chapter 2, in which the successful implementation of a solar programme through local shops embedded those same shops in future programmes.

The traditional approach to political strategy taken by past literature is partly a product of the context in which it is studied (see Dahan, 2005 for why it was not studied in France initially). In the North American context, it has focused on industries that were subject to taxes and regulation, for which engagement is mandatory, such as in the steel industry (Schuler, 1996; Bonardi et al., 2005). In a context where the engagement with policy is not mandatory, it makes more sense to view the option of engagement as an aspect of political strategy. Engagement with public policy is a part of political strategy, as such actions forge relationships between the company and the relevant ministry and claiming political legitimacy (Kernaghan, 1993; Suchman, 1995).

One counter argument is that this definition of political strategy blurs the line between political strategy and traditional business strategy, as it is articulated in the business model. However, the two are interrelated, as Osterwalder’s business model canvas neatly sets out – the political strategy of a firm is a part of its business model, and parts of the definition of political strategy find themselves elsewhere in the business model (ie partnerships) (Osterwalder, 2004). Therefore, to envision the two concepts as separate is to reimagine political strategy as only lobbying. Incorporating the full breadth of actions towards government, as well as policy, allows for a more accurate interpretation of how companies function in a space with mixed government involvement, high policy uncertainty and a greater dependence on policy support. Key Factors

The factors that attribute most to determining political strategy also shed some light on the inadequacies on the current political strategy literature and its accompanying theory. Size, technology and philosophy appear to be the most prevalent factors in determining political strategy. It is likely because these enterprise attributes may be considered proxies for organisational capacity, eligibility to participate in government schemes, prioritisation and the degree of policy risk inherent in their business model. More specifically, size may be a proxy for capacity (as in sections on engaging, relationships, lobbying) or for eligibility (as in section on engaging). Technology influences the degree of policy risk (as seen in the relationship between technology, the grid and disengagement tactics). Technology can also be a proxy for eligibility (as in section on engaging). Finally, philosophical orientation, related to enterprise type, may have an impact on enterprise priorities, leading to a lesser or greater emphasis on championing policy (as in lobbying).

What are the factors that contribute to the unique pattern of political strategies within the off grid solar sector? Size plays a large role in the popularity of some tactics, as opposed to others. For instance, monitoring is very popular, as opposed to relationship building, which may be related to the prevalence of small and medium scale organisations, as explored below. Additionally, the strong influence of government policy on the sector may have an impact on the importance of monitoring or relationship building, as opposed to other sectors that lack a history of dependence on subsidy, or ongoing government attention.

Conceptually, the prominence of size in political strategy suggests that there is probably an overemphasis in the literature on actions that require greater capacity, such as lobbying and relationship building. Those less time intensive tactics may deserve more attention, such as monitoring. Perhaps more interestingly, the importance of philosophical orientation suggests that the assumptions around political strategy are flawed. Political strategy assumes that enterprise’s are self-interested, suggesting that any attempts to generally improve the policy environment are a trade off between self-interest and improving the environment for all firms (Getz, 2002). A good political strategy can be viewed as a "competitive tool" (Hillman and Hitt, 1999, p 826). However, many enterprises included are social enterprises or NGOs and competition within the sample was very low. Therefore, some enterprises prioritised activities that would benefit all actors, potentially as a social good in and of itself. Social enterprises are increasingly prominent in LMIC, development sectors, and so our assumptions about political strategy as a zero sum game may be challenged in these contexts.

5.5.2 Policy Risk, Resource Dependence Theory and Disengagement

Past typologies have focused exclusively on active, positive political strategies, entirely missing the reality that strategies can also include active, negative strategies, namely: disengagement. As clearly described above, this is not a lack of having a strategy, but instead a decision taken by rational actors to avoid or ignore government activities. Avoidance is an option in International Business studies, where countries are able to choose their environment, but any option of disengagement is absent from the most popular typologies of political strategy (Hillman et al. 2004; Getz 2002; Lawton, Mcguire, et al. 2013; Oliver 1991). Only Oliver's typology of strategic response to institutional pressure includes 'avoid' as one of its five responses, offering up concealing nonconformity, buffering and escaping from institutional oversight as three tactics for avoidance (Oliver, 1991a). One possible reason for the under-appreciation of disengagement strategies is that government 'support', be it subsidies or tax incentives, appear to essentially be 'free money' for the organisation. Why would enterprises not seek to gain benefits from the government, especially in a context in which the MNRE have been supporting both the technology and the end users in question?

Resource dependence theory explains the rational active, negative response to that question. RDT posits that enterprises will be more engaged if their work depends on capturing government resources, ie. central financial assistance (Pfeffer and Salancik, 1978; Getz, 2002; Hillman, Withers and Collins, 2009). As a side effect of that dependence, enterprises are at the whim of policy changes, which may negatively impact their ability to capture those resources, ie. policy risk. Therefore, resource dependence theory allows us to see political strategy as a multidimensional decision that balances risk and potential rewards (through engagement and not engaging) with specific tactics for mitigating risk (through, for instance, lobbying). The degree to which enterprises are exposed to policy risk is influenced by some of the factors discussed, primarily technology. Enterprises working with grid-based technologies must negotiate the expansion of the national grid, which can be highly unpredictable in when and where it arrives. Current engagement also increases political risk, which is a reason to follow a strategy of disengagement. In that case, an enterprise is not taking advantage of potential financial benefits, but also does not expect significant, and unpredictable, disruptions.

Conceptually, then, the chapter argues strongly in favour of incorporating disengagement into the conception of political strategy. The benefit of doing so is more than capturing a fully picture of reality. By identifying disengagement, it allows us to actually ‘see’ disengagement as something quantifiable, and to characterise a lack of action as something other than unavoidable. By which I mean, if disengagement is a strategy, then we can evaluate why actors choose it. It releases us of the assumption that actors must engage, and if they are not, it is because they are unable. This leads us nicely onto the topic of eligibility.

5.5.3 Eligibility, Institutional Theory and Legitimacy

Eligibility does more than maintain quality implementation, it also has the potential to undermine the direct contracting programmes that rely on competition. Eligibility, as discussed above, is a critical component of all current off grid programmes run by the Government of India. Enterprises must prove their eligibility, but evidence from the interviews suggests that enterprises often apply to programmes before being rejected for not meeting requirements. Rather than see eligibility as simply a pre-requisite to access the benefits that policy provides, we can use institutional theory to unpick the ways in which eligibility requirements aim to enhance the legitimacy of enterprises and rural electrification programmes, and explore the importance of this legitimacy in our specific context.

Institutional theory focuses on the way in which institutions permeate society. In the context of organisational research, institutional theory sees enterprises as reacting to institutional pressures, but also sharing in the same social construction of norms and practices that define how enterprises function (Oliver, 1991a; Haanyika, 2006; Tian, Hafsi and Wu, 2009). According to institutional theory, firms engage in CPA in order to promote their own legitimacy and take advantage of institutional resources (Getz, 2002; Lawton, Mcguire and Rajwani, 2013). In this context, legitimacy can mean a variety of things, but we can take Suchman’s definition:

> "Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions." (Suchman, 1995)

What does this have to do with eligibility? Eligibility requirements, and the certification that an enterprise can receive upon meeting them, confers a degree of legitimacy to the enterprise. Even in the debate between strategic-legitimacy and institutional-legitimacy, we can see evidence within this example. In strategic-legitimacy, legitimacy is claimed and exchanged for benefits, as in how certification gives an enterprise access to engagement and potential benefits. In institutional legitimacy, legitimacy is part of a broader shared belief system between institution, organisation, and the public (Suchman, 1995). An enterprise receives legitimacy through meeting criteria and participating in programmes, while the government simultaneously maintains the legitimacy of the programme itself by only working with enterprises that reach these stringent requirements. This is legitimacy at the macro-level, rather than solely being a judgement within an individual's mind, it is the collective judgement of an organisation (Bitektine and Haack, 2015). In that way, legitimacy is created by eligibility requirements.

This concept may have greater importance in the Indian context, in which relevant organisations take a variety of forms (NGOs, SEs, etc.), and the government faces implementation challenges more common in emerging markets (ie. poverty, corruption). A pocket of literature explores legitimacy particularly in the case of novel institutional arrangements in developing countries, specifically the role of foreign NGOs and the rise of public-private partnerships (Atack, 1999; Börzel and Risse, 2002; Lister, 2003; Bäckstrand, 2006; Kapiriri, 2012). Its relevance is also elevated by the challenge of weak institutions, which may require additional work to assert their legitimacy (Kapiriri and Martin, 2007). It should be noted that while weak institutions are a challenge for many low-income countries, defining the nature of India's own institutions is much more complex (Sinha, 2005). Nevertheless, eligibility requirements do not simply serve to improve implementation, but also have a role in improving the perception of an enterprise's own legitimacy within the workplace, as well as ensuring the legitimacy of government programmes that supply public goods to the country's poorest.

This leads to a co-creation of legitimacy that keeps certain enterprises 'in' and certain enterprises 'out', therefore accruing benefits for the same organisations. There are pragmatic reasons for doing so, but this system creates enterprises that hog all the benefits, which is especially noteworthy when those enterprises are public sector enterprises. An anecdotal example comes from complaints that there was only one enterprise that was still eligible for accreditation after new stringent technology requirements. This enterprise, who was not a part of my sample, happened to be an organisation that had been supported by ENT23, the public sector enterprise. Bias towards a few organisations hamstrings the competition that is the base assumption of the DDG scheme.

Another way to look at institutional theory is through the lens of entrepreneurship literature, where much of what we would call ‘mitigating risk’ or ‘coming in where the government does not’ could be considered bricolage. Bricolage refers to the cobbling together of resources to create something new, and is often discussed in opposition to a strategy of optimization. Optimization refers to an enterprise focusing on acquiring the best possible resources with the aim of creating something that is more valuable than the sum of its parts (Desa and Basu, 2013). Enterprises in LMICs may be under additional incentives to take a strategy of bricolage, given the different challenges to access resources and market opportunities in extreme conditions, such as higher transaction costs or discouragement from pursuing certain markets because of the “inherent inability for firm to efficiently compete, given the higher costs of operations” (Khoury and Prasad, 2016, pg 941).

These challenges often arise from a lack of supportive institutions, which act of resource gatekeepers (Desa, 2012). Enterprises can be both the agents upon which institutions act, and influence the shape of those institutions, and bricolage may just be one way in which enterprises “mitigate the lack of institutional support” (Desa, 2012):

“In emerging markets as well as in underdeveloped economies, the explanations offered by institutional theory can be strengthened by incorporating the role of informal practices that fill voids in the formal institutional structure. Not so much as an immediate mechanism of institutional change, but as an alternative, slower process of actor–initiated institutional transformation” (Desa, 2012, pg 742)

Although he does not go into detail, Desa is discussing political strategy: the influence of actors within the market on its institutions. In this context, bricolage includes “informal practices that fill institutional voids” through mitigating risk or seeing potential where the government has not. Optimization would be determining what specific a policy goal would be – ie. getting included in the DDG scheme – and focusing resources on achieving that goal.

What we see in these interviews follows the bricolage approach much more consistently than optimization. A great example is ENT32, who described moving into areas in which the government could not reach. This was not just in order to avoid the government, but also to take their work to populations that were deemed 'impossible' to reach. The result was that the government now relies on ENT32 to bring them to these regions, which can often be dangerous. This is an excellent example of how bricolage may be possible because social enterprises may have a different conception of what is possible than established organisations (Baker and Nelson, 2005). It is likely that the high percentage of social enterprises in our sample explain the emphasis on bricolage approaches.

5.5.4 Implications for Policy Design

By understanding how and why enterprises engage with policy, policymakers may be better able to design policies that intentionally support and engage the organisations with which they aim to participate. For instance, if a ministry wishes to take advantage of new technologies being used by small and medium-scale renewable energy enterprises, understanding that resource intense activities will hinder engagement allows policymakers to choose more inclusive policy designs. Literature on non-market strategies and corporate political action aim to answer questions about why government engagement occurs and how effective it is (Getz, 2002; Lawton, Rajwani and Doh, 2013). In this context, the concept is primarily of interest to organisations and scholars. However, by opening up the concept of 'political strategy' to include the take up of or disengagement from government programmes and schemes, the concept also becomes a useful tool for policy design. Ideally, using this framework to understand the strategies of target enterprise populations, government actors can improve the efficacy of their policies.

Political strategy also plays a part in the broader argument of this thesis. Findings in the previous chapter suggest that policy intervention changes the enterprise landscape, which may transform the market into one with different characteristics from those assumed in the initial intervention. In turn, this may impact the efficacy of policy. As explored here, how that market transforms is partially influenced by the engagement that the actors have with policy, as determined by their political strategy. While a variety of enterprise characteristics factor into strategy decisions, they do so in a manner consistent with resource dependence theory and institutional theory. As with the previous chapter, this suggests a degree of predictability in the level of engagement a market might have with policy based on its characteristics. Therefore, while the broader thesis of unintentional shifts to the enterprise landscape might suggest that policy interventions are necessarily flawed, the findings from this chapter offer a way of thinking through potential unintended impacts and improving policy design.

6 END USER SELECTION AND TARGET CUSTOMERS

6.1 Introduction

As of writing, the Government of India has officially electrified every household in the Saubhagya scheme (GoI, 2018). This aggressive expansion has been due in part to the Government's belief that electricity is a "basic human need" and the "key to accelerating economic growth, generation of employment, elimination of poverty and human development" (MoP, 2006b). While the programme may be at its end, for the enterprises that implemented it, the programme was always just one part of their activities, which must now continue without it.

All enterprises must decide where they will focus their work, whether it is the state they choose to headquarter in, the characteristics of the regions they target, or the individuals to whom donated or subsidised panels are given. This is perhaps even more so the case with microgrids and minigrids, where the individual villages are selected by the enterprise, in conjunction with the community. The characteristics of end users targeted by India's main RE programmes and those that are targeted by enterprises can be a test of whether their interests align. As a fair metric of the success of RE programmes is their ability to reach end users, and enterprises play an important implementing role in these progammes, this alignment has implications for the effectiveness of policy. Who are the target populations of rural electrification policies and off grid solar enterprises, and what factors influence which populations are targeted?

A brief note on methodology for this study can be found in section 6.2, followed by the outline of dimensions of selection in section 6.3. Sections 6.4 and 6.5 apply those dimensions as a framework to analyse the role of selection in rural electrification policy and off grid enterprises. Finally, section 6.6 concludes with a discussion of selection in financing and the implications of these findings on inequality and policy design.

Literature on targeting the poor has focused primarily on a single dimension: per capita wealth (Prahalad and Hart, 2001; Kolk, Rivera-Santos and Rufín, 2014). Through using grounded theory to see how customer selection is actually conceptualised in a market that targets the poor, this chapter offers a more nuanced conception of targeting that allows for multiple factors at multiple levels. It also provides a way of testing the alignment of actors in the space. Past research has also focused on whether electrification can improve development and gender equity, with much less attention being spent to the role of inequality even within off grid access (Alstone *et al.*, 2011; Khandker *et al.*, 2014; Urpelainen, 2014; Aklin *et al.*, 2017b). This chapter offers insight into the necessary inequalities in the market, casting doubts on the equity assumptions related off grid electrification.

6.2 Methodology

Like in chapter five, this chapter first uses grounded theory to create a construct of the 'target population', which is then used to compare the target populations of programmes and enterprises. Primary level codes were the building blocks for further abstraction, which creates the dimensions of selection. Primary coding asked, 'what are the target populations for this organisation?' These primary codes are verbatim text from the interviews. Secondary codes are the categories that they fall into: namely, individual, village, region, state, demand, demographics, geography, need, and grid access. Tertiary codes are selection level and selection criteria. Tables 6.1 and 6.2 compile these concepts.

In section 5, three key REPs are explored against these dimensions, using government interviews to expand on the contemporary intentions of the main implementation bodies. Government interview responses and primary sources are categorised according to the dimensions in the framework. Likewise, in section 6, enterprise interviews are categorised according to the dimensions of the selection framework, and then compared by technology. Finally, the role of selection in financing and inequality is discussion in section 7, using interview data from all three interview types.

6.3 Dimensions of Selection

6.3.1 Dimensions of Selection

Within the interviews, including with experts and government officials, selection can be broken down into two dimensions: selection criteria and selection level. These dimensions can be seen in tables 6.1 and 6.2. A full word table is found in Appendix 4. Selection criteria are the characteristics that organisations use to target end users, and they are: demand, need, grid access, demographics, geography and attitude. Selection criteria are interrelated, and are the criteria used by enterprises, financing bodies and the state and central government. Additionally, there are four selection levels, which are the granularity at which selection takes place: by individual, village, region or state. These dimensions provide a framework by which to explore how government programmes, technology and financing target specific populations.

6.3.2 Selection Criteria

6.3.2.1 Demand

One of the most common factors in selection is demand, which, while related to need, focuses on the economic desire for electricity, meaning that if a solar system is available, the end user would hypothetically be willing and able to pay the price for it. Demand was most frequently cited as a factor when discussing the microeconomics of a project or business model, particularly where the enterprise was looking for productive or commercial loads as part of the model. Where business models looked for productive or commercial loads, these were favoured over domestic connections, as their demand for power was greater and less seasonally dependent:

> "…our first priority is the commercial guys because the probability of their staying with us throughout the season … Because residential customers during winter, they'll cut off, they'll say no I don't want to recharge or they'll reduce the wattage…So we are not denying residential customers, our mix

> is 60-40. 60% commercial, 40% residential and at places it is the other way around. 40% commercial, 60% residential." (ENT 24)

The potential for commercial demand was also considered. For instance, one enterprise working with minigrids looked to play an active role in ramping up demand, "look[ing] at various kinds of interventions for load ramp-up." (ENT21) Finally, the role of grid connection on demand will be addressed in section 6.4.2.3.

6.3.2.2 Need

For some enterprises, the greatest decision factor was need, which could be defined as a lack of electricity access or a lack of ability to pay for such access. While need and demand are similar, need was based on factors related to socioeconomic status, such as wealth, caste and gender. Several enterprises went out of their way to incorporate women, both as end users and village level entrepreneurs, such as ENT 27, an enterprise selling SHSs:

> "So the idea is that people who is actually very poor cannot afford to buy the renewable energy technology upfront. Second, they cannot avail the loan also, even they have the capacity to pay installment, the bank will not provide them loan, so that's another challenge. So basically, working with the different SHG groups, self help groups of women, we basically tried to push this technology, and promote this technology, create awareness among the women and poor class that this technology is really helpful for you."

6.3.2.3 Grid Access

Almost all enterprises took grid connectivity into account when deciding where to work. In some cases, it was perceived that grid connection would lower willingness to pay and that it reduced the end user's need for solar technologies. Grid access was fundamental in targeting customers:

> "So now that reality is going to change, that is our assumption. I would say strategy has to factor in the changing reality of time. The changing reality of time is that every village is going to be grid connected, so you switch over to commercial hubs who are in need of reliable and good quality power, 24 by 7. And this is our focus now. " (ENT24)

Primary Dimensions	Secondary Dimensions	Example
Selection Level	Individual	ENT uses a "rigorous selection process" for choosing the beneficiaries within a region to be electrified Most areas are about 30% relatively wealthy and 70% poor The systems go first to: 1) HHs with school going children, 2) single women and 3) not rich people, but poor people "Rich people will throw it away", but you will find poor people "appreciate ENT23" (ENT23)
	Village	"So what is the density of households? What is the existing commercial load, if any? Are there any institution which are doing well? ....So when we do the site study, we include all this, and also see the projection of energy use based on these parameters. Then we select the village, identify the site for the ESCOs. So when the village will come up, typically there is a lot of scalability, because of its positioning within a cluster of villages." (ENT21)
	Region	" We have sort of 3 locations - we have a tribal community lab in Orissa, an urban community lab in Bangalore and a rural community lab in Manipal, which is on the coast of Karnataka. And the idea was that each of these labs are imbedded in the areas, or the kind of communities that they work in so that it's easier to gauge what the needs are." (ENT33)
	State	"Rajasthan, geographically is completely different than Bihar. Bihar has population density. Bihar has no other economic pull factors other than electricity. Bihar is very very politically alive and active. Rajasthan is just the opposite. It has umpteen numbers of solar days - they have very large, dispersed communities. So the entire strategy of meeting the energy needs in Rajasthan is very different from what a Bihar would be doing." (ENT21)

Table 6.1: End User Selection Construct Table: Selection Level

Primary Dimensions	Secondary Dimensions	Example
Selection Criteria	Demand	"The second part is the demand. So I think definitely the demand is somewhat dependent on the grid connection and al... But even then, I think there is sufficient demand. Choose the right location and I believe the demand is there." (ENT14)
	Demographics	"Where people don't live in clusters, stand alone systems are appropriate" (REC)
	Geography	"...the way we modeled out this whole mini grid scenario was that there'd be a private operator who would set up this mini grid in remote rural areas and the private sector party will raise its own financing and the [redacted] would also get in some concessionary finance for helping set up this mini grid, in the form of debt, concessionary debt." (ENT21)
	Need	"So we did it with the help of DFID funding, and right now we are doing it with some of the corporates. So the idea is that people who is actually very poor cannot afford to buy the renewable energy technology upfront…So basically, working with the different SHG groups, self help groups of women, we basically tried to push this technology, and promote this technology, create awareness among the women and poor class that this technology is really helpful for you." (ENT28)
	Grid Access	"Northeast, because the grid power cannot reach the remote locations of Northeast of India, so we are working with Northeast organisations for that. It's still going on, as we are talking, they are installing our kits. So Northeast we again are focusing on because they need electricity and they have been devoid of basic electricity for so long. So I personally would like to have them have electricity as soon as possible." (ENT25)

Table 6.2: End User Selection Construct Table: Selection Criteria

In other cases, grid connected villages were sought out. This was because grid connected villages often had greater commercial or productive activities, which increased their demand and made providing power more profitable. The low quality of the grid in these areas leaves unmet demand for solar technologies to address (Sovacool, D'Agostino and Jain Bambawale, 2011; Harish, Morgan and Subrahmanian, 2014b). In one instance, this was called "energy stacking", where a household may have multiple energy sources to meet its needs.

Essentially, targeting customers based on grid access can be either a proxy for demand or for need, but as it is not always possible to disentangle the criteria, it is considered as an independent category. As an independent category it has unique relationships to other concepts, such as anticipation. In all cases, grid connectivity was linked to a change in the end user's expectation. Where this was damaging to sales, the anticipation of the grid lowered demand and a grid connection raised the expectation of what power could do, beyond simple home lighting. On the other hand, the expectation of the grid could be greater than reality. One enterprise, which has done research on this topic, found that demand decreased before the grid arrived and then increased again after the village was connected, because the quality of the grid's power was less than expected (ENT25).

6.3.2.4 Demographics

Selection made on the basis of demographics focused primarily on population, population density, and the clustering of households, hamlets and villages. These criteria were related to technological applicability, efficiency and profitability. For example, ENT12 has the intention for their products "to go to at least each village which has a population above 2000."

6.3.2.5 Geography

In the case of geography, organisations make determinations based primarily on how "remote" or "rural" an area is. In many cases, this is to imply that the area has little to no grid connection, is agricultural, poor or difficult to physically reach. Such as: "the way we modelled out this whole mini grid scenario was that there'd be a private operator who would set up this mini grid in remote rural areas" (ENT 21). It should be noted that the Government of India's grid expansion plans and DDG scheme rely on a mixture of geographical and census (demographic) data, which will be explored further in section 6.5.

6.3.2.6 Attitude

In several interviews, enterprises expressed the importance of the attitude of prospective or current states, end users and entrepreneurs. At the state level, some states, such as Rajasthan, were regarded as having a pro-business attitude. Rajasthan was also regarded as supportive of solar technologies, while beliefs about the attitude of Uttar Pradesh were based on the interviewee's opinion of the state's new Minigrid/Microgrid Policy. Attitude at a more individual level mattered particularly to enterprises that used village level entrepreneurs, as 'entrepreneurial spirit' was important. Finally, the attitude of end users was also taken into account. One enterprise expressed the opinion that people who needed the technologies had a better attitude, particularly that they were more appreciative (ENT 23).

6.3.3 Selection Level

6.3.3.1 Individual

Selection takes place at the individual level to provide highly subsidised solar home systems, select local entrepreneurs, and provide financing. Government programmes or donor-based projects were the only examples of individual level selection for end users, outside of financing. In these circumstances, individuals were selected for their socio-economic factors, such as gender, caste and poverty (ENT23). In addition to end users, those enterprises using village level entrepreneurs are making that selection at an individual level, usually taking into account attitude, capacity and gender.

However, many of the enterprises that provided solar home systems have connections with banks or microfinance institutions, which do select individual beneficiaries. Banks and microfinance institutions are interested in the individual's capacity to pay back a loan, and so much of their decision-making revolves about wealth and income, and they leave out the poorest of the poor (Hermes and Lensink, 2011). At least one enterprise implied that social status, such as caste, also makes a difference in accessing loans: "so in effect about half of [our potential customers] would get the loans. And mostly we saw the pattern that the half that got the loans were also the top half of the community. And also sometimes it would also be religiously or community motivated" (ENT 11). This is explored further in sections 5 through 7.

6.3.3.2 Village

In this case village-level selection refers to both Gram Panchayat villages, according to the Indian government's definition, as well as smaller habitations such as hamlets. The main factors for enterprises that select which villages to market or work in are demographics, geography, grid connectivity, demand, and need. Villages are most frequently selected using census data as sites in which to set up minigrid or microgrids:

> "So first we do desk research and we identify the exact villages on the basis of the census data, and other triangulated data from other databases. We put that data together and say, okay, within these states, this state's block, villages, these are the ones…and then there are site assessment surveys that are carried out on the ground." (ENT21)

The Government of India, as discussed in section 5, also uses this data to select which villages require DDG technologies, and therefore which villages will receive subsidised systems. As above, attitude also becomes a factor where enterprises incorporate village level entrepreneurs into their business model.

6.3.3.3 Region

A region could be considered larger or smaller than a state, based primarily on a geographical area, but is usually a smaller area. Most frequently, regions are cited in relation to remote areas within a state. The key difference between regions and states is the relationship to government. Selection at a regional level never references the role of the state government or local authorities. Regions are selected as areas in which to create regional offices, search for potential sites, and market or distribute the product, with the expectations that higher percentages of potential end users are in the region.

6.3.3.4 State

India is constituted of 29 states and seven union territories. Although this research focused primarily on Rajasthan, Uttar Pradesh and Bihar, many enterprises were present in multiple states, and described the factors that influenced where they worked. State-level selection is typically discussed as an issue of need or profit, depending on the priorities of the enterprise. For one social enterprise, need was the driving factor:

> "Part of the reason [we are not in Rajasthan anymore] is that our focus has been more in terms of the more energy starved areas like Bihar and Jharkhand, UP, Orissa - our focus is on these states. So Rajasthan we have not focused much." (ENT 14)

Other factors, such as demographics or grid connectivity contribute to either creating a state with a great need for DDG solutions or where profitable demand can be found. State government attitudes and policies are occasionally a cited factor in state-level selection. It should also be noted also that enterprises regularly changed the states that they were working in based on policy or business model changes.

6.4 Features of Selection in Government of India Policy

6.4.1 Selection in National Rural Electrification Policy

The decisions that governments make about the intended recipients of policy influence the range, price and sustainability of the technologies made available to end users. Using the framework of dimensions developed in Figures 6.1 and 6.2, this section compares the level and criteria of selection for the three most commonly cited electrification programmes within the interviews. Findings suggest that selection in these policies is primarily driven by the aim to address the needs of the poorest populations, and do so by selecting beneficiaries based on geography, demographics and energy access. However, working with banks to provide financing for the Jawaharlal Nehru National Solar Mission introduced contradictory selection criteria that focused on the ability of the end user to repay the loan (Table 6.3).

It is important to note that these interviews took place February-April 2017, before Prime Minister Nahrendra Modi announced the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya) in September 2017, which aimed to electrify all households by December 2018. This new policy addresses several of the criticisms leveled against previous electrification programmes, namely the definition of village electrification. However, it destabilises the future of off grid energy in India.

	Selection Level				Selection Criteria					
	Indi	Village	Region	State	Need	Demand	Grid Access	Demo	Geo	Atti
Notified Rural Regions			x		x				x	
DDG Scheme		x			x		x	x	x	
JNNSM	x	x			x					
***NABARD bank financing**	x				*Wealth, caste, etc. as a proxy for ability to repay loan					

Table 6.3 Selection Dimensions in Rural Electrification Programmes

6.4.2 The Electricity Act, 2003

Notified rural regions aim to facilitate access for those in need by using geography as a proxy for access at the regional level. The designation of notified rural regions from The Electricity Act, 2003 plays a role in the work of microgrid and minigrid enterprises. In Section 14, the Act stipulates that a generator or distributer of electricity does not require a license in one of these rural areas:

> "Provided also that where a person intends to generate and distribute electricity in a rural area to be notified by the State Government, such person shall not require any licence for such generation and distribution of electricity, but he shall comply with the measures which may be specified by the Authority under section 53" (GoI, 2003)

Essentially, the state government selects regions that allow for non-government electricity generation and distribution based on geography as a proxy for those end users with the greatest need for private electricity grids.

6.4.3 RGGVY & DDUGJY (2009-2015 & 2015-2019)

The current DDG Scheme selects villages based on demographics, geography and grid access in order to reach those with the greatest access and financial need. The intense expansion of access under the scheme is partly possible due to the triaging of villages into those which will be electrified by national grid expansion and those which will be covered by the government's DDG programme, based on geography and demographics (MoP, 2013b). The aim is to ensure that all villages are receiving electricity, even if grid extension is not technically or economically feasible. Interviews with officials reinforced the assertion that the national grid expansion was priority, but that geography made reaching some villages impossible and that those villages were given off grid technology. The expectation is that they will not be able to afford or access these technologies on their own.

Electrification of these villages are then contracted out to private and public sector enterprises, with a large subsidy (between 60-85%) available for the end user (MoP, 2013b, 2015). The final number depends on the subsidy provided by the State Government and the socio-economic status of the state (MoP, 2013b). Tender-based implementation focuses the availability of DDG and financial support to just these villages, which the government believes have the greatest need for technology and subsidy to access it.

6.4.4 Jawaharlal Nehru National Solar Mission (2009-Present)

The off grid portion of the JNNSM provided subsidies in order to promote energy access through NABARD, which selected individual recipients based on their likelihood to repay loans. In its original form, it offered a 30% capital subsidy for off grid solar PV with a 5% interest bearing loan available through NABARD (MNRE, 2017a). In 2014, the terms of the NABARD loan became a 40% subsidy for individuals, with the 30% subsidy available for minigrid or microgrid projects.

The scheme identified "energy access" as one of its thrust areas for its Phase II Off Grid Scheme, to provide solar energy in "areas where grid has not reached, or the areas where grid has reached but the electricity is not available" (MNRE, 2012a). In addition to providing financing for these under-developed areas, the scheme offers a much higher, 90% subsidy for "special states" that represent the most remote, deprived and unstable states (MNRE, 2017a). Offering additional financing to these areas attempts to redress the disparity in their development.

However, NABARD's provision of the subsidy and loan through rural banks introduced selection criteria that focused on minimising risk to the banks. Enterprises that worked with the solar home subsidy during that period reported difficulties in securing loans for prospective customers:

> "Which basically meant that the base of the base of the pyramid, the extreme poor would always be left behind. Because nobody would give a loan to the extreme poor, I mean it's very difficult for them … somebody who doesn't have land, somebody who's a migrant labour, somebody who doesn't have capital or livestock of any kind." (ENT11)

Without capital or a financial history, banks were concerned about the financial risk of providing the subsidy. One enterprise noted that the subsidy would only be provided to the self help groups that they were working with:

> "So by the bank financing was limited to self help groups even though the scheme allowed financing to individual members, but the banks were very focused that they would financed and the financing was done to SEWA self help groups." (ENT27)

Self help groups already have financing experience in rural areas. It appears likely that the banks were attempting to mitigate risk by choosing 'safer' borrowers. ENT11 were also concerned that discriminatory practices were taking place:

> "Now we don't work with the banks that closely anymore. The banks decide - so the way it used to work is I would go to a rural community, or find people, make them sign up all these loan documents, right? And that would be be my job. Exhaustive loan documents. And I would figure out what would be the right product for them, and I would fill in my paperwork. And I would go to the bank with a big file, let's say 50 odd people, and we'll look at each file and they'll say, "this guy, no, we can't give it to him - this guy's a fucking thief. The guy, oh, I don't like his..." So about 30% of them would get shafted right at that point. Then when we would go back and try and collect the money, because now another 30% would fuck off, so in effect about half of them would get the loans. And mostly we saw the pattern that the half that got the loans were also the top half of the community. And also sometimes it would also be religiously or community motivated"

Again, the banks seem interested to providing for the 'top half' of the community. This creates a tension between the aim of the programme and the way in which the programme is designed. For further discussion on the interplay between finance and selection, see Section 6.6.1.

Technology (& Fin.)	Minigrid	Microgrid
Selection Criteria - Demographics	So when we do site selection we focus on clustering. So what is the density of households? (ENT21)	So when we go in for our electrification,… is we've look at hamlets and we electrify them. Because we know A) they're not getting electricity for a long time and B) the population of hamlets are increasing substantially so these are becoming permanent residences (ENT11)
Selection Criteria - Geography	So it was again - it has to be remote village, right?...So it needs to be looked at from both economic strata of the society, as well as how remote location. (ENT14)	
Selection Criteria - Grid Access	The changing reality of time is that every village is going to be grid connected, so you switch over to commercial hubs who are in need of reliable and good quality power, 24 by 7. And this is our focus now. (ENT24)	Earlier our biomass plants were primarily based in areas that had no grid, now that reality is going to change with the government promising every village is going to be grid connected. So earlier our offering was, I would say, meant for [not grid connected] people. One light point, one mobile charging point and a nominal fee of 100 rupees. (ENT24)
Selection Criteria - Demand	So we select those villages which have a high density of productive loads, and if given access to energy 24 by 7, whenever they wanted it, they would - their income levels would dramatically change. (ENT23)	
Selection Criteria - Need	We go locate these guys who are underserved, who have poor access to power, to energy and they have a need of 24 by 7. (ENT23)	Which basically meant that the base of the base of the pyramid, the extreme poor would always be left behind. Because nobody would give a loan to the extreme poor...So with micro grids, we've managed to break through that. Because now what happens is our micro grids (ENT11)
Selection Criteria - Attitude	It needs to be a good entrepreneur … Entrepreneurship, the location needs to be remote, and we know that the lights won't really come, or it's going to have an impact. And at least some willingness to pay. (ENT14)	

Table 6.4: Representative Quotations: Minigrids & Microgrids

Technology (& Fin.)	Solar Home System	Financing
Selection Criteria - Demographics	So this is - now our intention was to go to at least each village which has a population above 2000. So we should have a presentation there - a representation there. (ENT12)	And mostly we saw the pattern that the half that got the loans were also the top half of the community. And also sometimes it would also be religiously or community motivated. (ENT11)
Selection Criteria - Geography	So in campaigns we also specifically target those regions. So this is our, this is a time when - the prior work is done to identify such villages and such areas so we can go freely in these next 2, 3 months. (ENT27)	CSRs who want to develop local markets in the regions where they have their manufacturing base do partner to provide subsidies to villages in the local region (ENT22)
Selection Criteria - Grid Access	In the summer months, what we also do is we have demo vans, which goes specifically to these remote areas, with very poor electricity connections. (ENT27)	In fact, one of our partners...who are also funding part of this...had a requirement that they would contribute only if there was no grid connection. (ENT14)
Selection Criteria - Demand		So you do all of that, and then on that basis, on that data you do a business model at the unit level. And that unit level business model, if it sort of seems viable, then accordingly then you make that decision (ENT21)
Selection Criteria - Need	We also had similar kind of scheme, giving 40% grant to the end beneficiaries and so that they can buy - but our target was purely poor, poor and very downtrodden people. Those who actually are not able to pay. (ENT28)	You are able to reach the next level of customers with greater level of subsidies.... especially in semi-urban and rural areas your customer segment usually remains the same, with greater levels of subsidy you're able to penetrate that next level of the market. (ENT26)
Selection Criteria - Attitude	So I think one of the reason of success was, even for 2000 or 3000 rupees, [female VLEs] were happy because they were not earning and they were not expected to earn. But when we tried, we tried males. (ENT14)	I would go to the bank with a big file, let's say 50 odd people, and we'll look at each file and they'll say, "this guy, no, we can't give it to him - this guy's a fucking thief."… So about 30% of them would get shafted right at that point. (ENT11)

Table 6.5: Representative Quotations: Solar Home Systems and Financing

6.5 Features of Selection in Enterprise by Technology Type

6.5.1 Features of Selection by Technology Type

The following section explores the dimensions of selection as they apply to the three primary technologies represented: solar minigrids, solar micrograms and solar home systems. Minigrids and microgrids, due to similarities in their fundamental structure, have certain demographic and geographic requirements (ie they require clustering) and have a focus on the village-level of selection. Solar home systems, due to their range of capacity and costs, also have a range of target end users. Therefore, aspects of selection are clearest when viewed through their methods of financing and distribution. Tables 6.4 and 6.5 provide some relevant quotations to supplement those present in the text. The sections below delve into the purpose and manner of selection for each technology type, relying on the narratives provided by the off grid solar enterprises. Table 1.7 should be referenced for the enterprise codes cited.

6.5.2 Minigrids: Focus on demand

Interviews included six enterprises that worked with minigrid solutions, with most grids serving over 100 households. Four enterprises had minigrids in Bihar, three had minigrids in Uttar Pradesh, and only one had ever had a minigrid in Rajasthan. Other states that enterprises worked in included: Haryana, Jharkhand and West Bengal.

Minigrid enterprises make their selection at the village-level but the greater the capacity of the grid, the greater the requirements for the village economy. Minigrids have a single or hybrid power source – in this case, a solar or solar hybrid plant – with a grid connecting multiple users. Typically this requires multiple members of the community to pay for a connection or power, and so the enterprise must decide in which villages, or cluster of villages, to install and provide power.

Village level selection takes a number of factors into account, but interviewees focused on the load requirement for a village economy. Site evaluations or site assessments take into consideration geography, demographics, energy usage as well as anticipated demand changes using modeling software. The latter two factors were more important, with all interviews making reference to the importance of productive loads. For smaller minigrids, these loads were more often agricultural (such as a pump) and for larger minigrids these loads extended to commercial lighting and refrigeration or small-scale manufacturing (such as sewing machines). This even extended to encouraging the demand growth:

> "So a business model to succeed needs to have consumers, needs to have a growing load and also works under the demand side, so then to see a consistent- So every plant has a life of about 10 years, how would the plant survive in a rural setting, how would the plant survive for 10 years, if you don't work on the demand side? So we actually look at various kinds of interventions for load ramp-up…So if someone's selling milk, you encourage them to look at the next level of, let's say, refrigeration, so that the shelf life of milk goes up, and then maybe to mechanize some part of it so that he can sell more, utilise more of its raw material, then progressively go towards making cheese, then maybe, an ice cream parlor….It just wouldn't happen by itself, so we call it inorganic enterprise development." (ENT21-B)

The interest in fostering demand and in commercial loads mirrored the selection of grid connected versus off grid villages. Enterprises with smaller minigrids were less concerned with increasing demand. Enterprises with minigrids under 15kW looked for customers in off grid regions, whereas minigrid enterprises with >15kW capacity exclusively required grid connected villages. Larger minigrids sought out grid connected villages because they aimed to supplement the hours of grid electricity. Commercial and productive loads required more reliable grid access, and so would be willing to pay for additional access via the minigrid:

> "We go locate these guys who are underserved, who have poor access to power, to energy and they have a need of 24 by 7. They were provided with that kind of a facility, they would better their lot in terms of income levels a concern, livelihoods a concern. So we select those villages that have a high density of productive loads, and if given access to energy 24 by 7, whenever they wanted it, they would - their income levels would dramatically change. For instance, in most of our villages they have got access to power in just the last 6 months" (ENT32)

The quality of access via the minigrid was described in similar terms to rural access via the national grid. The minigrid was described as providing up to 8 hours of service a day, using AC current and providing for commercial, agricultural, community and domestic loads. Within houses, access can still be as basic as a few lighting points. However, for larger minigrids domestic connections were not prioritised, and it was considered a more commercially viable business model with less domestic demand and greater commercial load:

> "…our first priority is the commercial guys because the probability of their staying with us throughout the season is much more vis a vis the residential customers…. So we would love to have more of commercial and less of residential for reasons of consistent revenue generation" (ENT24)

These selection criteria – villages with high commercial or productive load – originate with the commercially driven business model. Every minigrid operator interviewed expected for the grid to generate revenue, at least enough to cover operations and maintenance. Most expected the minigrids to recoup costs completely and break even in between 7-15 years. For most of the systems, users paid after the fact based on their usage, but some charged a monthly rate in advance. Given that most of these are social or commercial enterprises, rather than NGOs, the emphasis on selecting villages with higher load profiles and expected demand growth is logical.

6.5.3 Microgrids: Focus on Need

Microgrids serve around 40-60 households. Three of the enterprises interviewed installed microgrids of between 2-8kW capacity, each having installations in Uttar Pradesh, Bihar or West Bengal. Microgrid enterprises also chose end users at the village level, but, as they do not expect 100% cost recovery, their focus is on the need of the end user. Instead of productive loads, microgrid enterprises focused discussion on the needs of their end users, who were characterised as domestic households with low ability to pay and little to no access to clean lighting. There is a degree of selection within such villages, since in most circumstances, an entire community must agree to a connection for a microgrid to be put in place. However, the focus of selection was on seeking remote geographies, clustered households and households without grid access. Clustered households, either in the form of a village or a hamlet, are required for the microgrid to maintain efficiency. Remoteness and access are related both to the willingness to pay and the need for clean lighting:

> "We actually focusing right now on those districts or pockets where the scenario is still not very good in terms of electricity condition. So we are focusing to reach out there, and then we will think of, you know. We are trying to reach out to the remotest area of the country." (ENT 28)

All enterprises explained that microgrids were set up exclusively in off grid areas, because this was where need for electric lighting was greatest. They actively avoided areas where the national grid was expanding and even claimed that where the grid arrived, they "withdraw the system, if [they] see that it is not being used, and [they] shift it to some other locations" (ENT28).

Microgrid enterprises claimed that their grids offered between 4-24 hours of electricity, although evidence suggests that 4-6 hours is more realistic (Schnitzer *et al.*, 2014). They rarely offered more than domestic lighting and sometimes mobile charging. Microgrids utilised both AC and DC current. All of the microgrid enterprises interviewed collect money for their service, although it should be noted that no business model currently has recouped the full cost of the system. Working in off grid areas can be explained both by avoiding grid competition (business model) and the focus on serving needs (business philosophy). The link to business philosophy is also apparent when discussing end user selection. For example, ENT32 is an enterprise that is focused on preventing environmental degradation, and its microgrids were originally in place to serve areas with delicate ecosystems. They explicitly claim that environmental protection is an ongoing focus of their work. ENT11, quoted above, cites the difficulty in serving the base of the pyramid as one of the reasons they work with microgrids. Finally, ENT28 has a philosophical focus on "clean energy." The expansion of the national grid, which interrupts their work, is seen in a positive light, rather than negatively impacting their model:

> "It's not a problem. The people have got the electricity so what is the issue now. We should be happy about it, so our, the programmes reason or mission also gets fulfilled. …Our idea is that people should get the clean lighting option. If they are having the grid, and they are using - they are not having the problem of indoor air pollution. So that's okay." (ENT28)

In this context, 'clean' energy refers not to total carbon emissions, but to air pollution in the home. The focus on a socially or environmentally conscious business philosophy impacts the areas in which they work, and the end users that they choose to work with.

6.5.4 Solar Home Systems: Dependent on Financing and Distribution

Nine interviews were conducted with enterprises that had experience with solar home systems (SHS). The systems that they sold or provided had a capacity between 2-80Wp, with most in the 10-60Wp range. At the lowest end, these systems provided light for a single point for a few hours. At the highest end, these systems had multiple lights, mobile phone charging, the ability to charge other devices and lamps, or a fan. A single outlier had enough capacity with multiple systems to power a radio, television or tablet for up to 2 hours. The market price for these systems was between 400-6000 rupees ($5.60-$83.90), although many of them sold the systems at a subsidised rate, most subsidies coming from the enterprise or donors. Enterprises had installed between 115 to 250,000 systems.

Solar home system enterprises have a much wider range of selection criteria because there are many more business models in the market. The level and selection criteria are based on the method of distribution and the source of financing. Donor-based models focus on need. These are models whose main source of financing are grants. In this situation, funding sources give a large donation, such as through the Corporate Social Responsibility scheme, and direct the enterprise to where and which recipients should receive the SHSs. In some cases, this is as selective as the enterprise surveying each individual in order to prioritise the marginalised. For instance, giving systems to women, lower castes, or the extreme poor. In essence, the focus on need can be extremely targeted. In its less selective form, donors may just aim to electrify villages near their factories or operations.

Village Level Entrepreneurship is a very common model for distribution. The enterprise will select and train local entrepreneurs who will provide the last mile distribution to villagers, educating neighbours, selling and monitoring systems. This model has a moderate level of selectivity. VLEs must have a level of ambition to do the work, but some organisations also seek to redress inequalities by selecting only women VLEs. In addition to supporting women's employment, the sales for a VLE may be too little to support a family, and so a better fit for women working part time, as explained by a solar home system enterprise, which saw another enterprise having better success with women salespeople:

> "They used only ladies. So I think one of the reason of success was, even for 2000 or 3000 rupees, they were happy because they were not earning and they were not expected to earn. But when we tried, we tried males. Obviously they have an alternate job. They are bread earners in the family, they could not provide a sufficient basket so it didn't work." (ENT12)

In addition to some selection that takes place at the entrepreneur level, VLE models may include microfinancing, which also comes with its own set of criteria. For instance, several VLE-based models include microfinancing that comes from self help groups (SHGs). These groups were set up in 1985, and now there are over 2 million self help groups acting as microfinance agents across the country (Singh, Ruivenkamp and Jongerden, 2011). Additionally, wherever financing is required, a degree of selectivity is expected in order to manage risk. See section 7.1 for further discussion on the role of finance in selection.

Finally, the dealership model focuses on regions with demand. In this model, SHSs are sold from the enterprise to multiple dealers who sell systems from their storefront or own distribution networks. Only one enterprise (ENT12) currently used the dealership model, and they had less knowledge about the customers that they sold to and essentially sold their product to any dealers who had demand for solar home systems. This was the closest that the formal market got to the informal marketplace.

6.6 Discussion

6.6.1 Enterprise user selection and financing

Greater sophistication in the end user selection construct allows us to see interesting patterns in financing. End user selection is heavily influenced by the financier of the DRE technology. The global need for increased access to electricity will cost much more money than international investment can provide, and cross-national studies on financing for energy access highlight the importance of public financing, through either direct investment or subsidies (Mainali and Silveira, 2011; Glemarec, 2012; Subhes C. Bhattacharyya, 2013). Private finance will also be required to bridge the gap, but there are barriers to investment that are limiting private involvement, in addition to expected low rates of return (Glemarec, 2012; Subhes C. Bhattacharyya, 2013). In part due to India's Corporate Social Responsibility policy, much private investment comes in the form of donor-funded projects. Donor funding regularly came with stipulations regarding the selection criteria for the end user. For instance, one microgrid/minigrid operator had a financial partner who required the DRE grid to be placed in an area with no grid connection, which posed a problem when the grid was unexpectedly extended to the village.

In addition to project financing, there is a need for end user based financing (Glemarec, 2012; Subhes C. Bhattacharyya, 2013). One of the great challenges of energy access is the inability of the poor to pay upfront costs for off grid solutions. Financing options depend of the banking system, which may require public banks or microfinance organisations to provide short term loans (Glemarec, 2012). As covered in section 6.4, the JNNSM previously routed the end user solar subsidy through NABARD. However, NABARD seemed concerned with mitigating the financial risk of loaning to the poor, and so it took measures to avoid loaning to those poorest populations. Enterprises that were interested in reaching the bottom of the pyramid would help prospective customers work through the paperwork, but there were challenges since the banks would cater to the top half of the community (ENT11). In addition to discriminating against poorer or lower caste communities, in partnerships with NABARD, one enterprise found that they were only comfortable loaning to the local self help group, so that the SHG was essentially taking on the risk of lending to the poor. While end user financing may be necessary for providing technology at the bottom of the pyramid, banks are wary of lending money to such customers.

The shift to microfinance after the numerous cancellations of the JNNSM-NABARD did not come with as many concerns about selection, although one of the most common sources of microfinance, women-only self help groups, have historically provided loans primarily to female members. Providing credit is still a challenge for enterprises, and many mentioned partnerships with microfinance institutions, since these were not readily available for most end users. However, MFIs often have shorter maturities, which may not be ideal for the poorer, agricultural borrower. Additionally, past experience for MFIs across a range of countries found that MFIs experienced higher than average defaults on energy systems, in part due to the poor quality of their systems (Glemarec, 2012).The poorest of the poor may also not be able to benefit from MFIs due to risk aversion and not being accepted into MFI programmes (Hermes and Lensink, 2011). The latest evidence from randomized control trials also suggest that microfinance may not be the panacea it is often made out to be (Banerjee, Karlan and Zinman, 2015). MFIs in that regard fall into the same categories as banks, in that their own interests in financial security must be balanced with the social need to offer finance at the bottom of the pyramid.

6.6.2 Selection and inequality

Through the prism of the end user selection framework, it becomes clear that the inability to pay upfront costs leaves poorer people out of the more sustainable business models, and so they are much more likely to be supplied systems that rely on one-time donation. A lack of cost recovery may impact the investment that enterprises have in the outcomes and future of the projects. This challenges the assumptions inherent in much of the literature on energy access, which sees off grid electrification as an agent for greater equality by focusing on how it can improve lives, but ignoring the inequalities even within the off grid space (Urpelainen, 2014; Monyei, Adewumi and

Jenkins, 2018). Although there is a great amount of literature on sustainable business models, there is a much greater emphasis on social and environmental sustainability than economic sustainability (Schrader, Freimann and Seuring, 2012; Bocken *et al.*, 2014). Economic sustainability, in the form of cost recovery or market-based models, is crucial to the replicability and scalability of models. Experience from a range of development literature exposes the institutional issues with donor-based models (Smith, 2005; Parks, 2008; Bennett *et al.*, 2011). Hisham Zerriffi's work on rural electrification underlines the importance of economic sustainability by placing it as one of his criteria for judging off grid energy business models (Zerriffi, 2014). Over-dependence on donors has been recognised as a challenge for the market over the past decade (Urmee, Harries and Schlapfer, 2009; Friebe, Flotow and Täube, 2013; Ahlborg and Hammar, 2014). Nevertheless, donor-based models have historically been a popular model for providing off grid electricity, and the shift from donor-based models has been difficult (Kolk and van den Buuse, 2012).

By exploring how enterprises select end users, we see how inequality is perpetuated through off grid technologies. Financially sustainable business models, which are able to recoup the costs of their systems, are primarily able to reach areas with some grid connection or users who are able to pay up front, or through a bank loan. The poorest, most remote users are not able to pay in full or qualify for credit. In these cases, they are targeted by donor-based models or provided systems that are highly subsidised. The financial sustainability of business models also has a relationship with technology. Business models that aim to recoup costs are usually minigrids and solar home systems. Microgrids – and some solar home system projects – rely more heavily on donations, since they do not have commercial or productive outputs that can reliably provide profits. It should however be noted that minigrid business models are fairly untested, and require 7-15 years of operation in order to break even.

The most remote, poorest and disenfranchised members of the rural community are targeted by enterprises providing off grid systems with the least capacity and least emphasis on financial sustainability. This reinforces existing inequality. Enterprises that provide minigrids, which have the greatest capacities and range of productive and domestic uses, focus on grid-connected areas that already have commercial activity. This is in part because these systems prioritise cost-recovery. Solar home systems come in a range of capacities and business models, but their reliance on loan financing excludes the poorest from sustainable business models. Finally, microgrids provide basic lighting and mobile phone usage, but are often CSR or other donor-funded models, focusing on the poorest of the poor, but only capable of recouping maintenance costs. In all these cases, when batteries die (after 2-3 years) or panels need to be replaced (after 10-15 years) additional funds will be necessary (Nieuwenhout *et al.*, 2001). Where there is not enough cost-recovery, these systems will rely on donations being available yet again. This leaves the most disenfranchised members of society in a continued place of uncertainty and need.

6.6.3 Policy Implications

Given the strong relationship between financing, selection and inequality, this chapter suggests that there are broader systemic issues that governments must consider. Rural electrification policy, while offering government finance, is only one part of the puzzle. The financing system also includes national and international donors, independent banks, government banks, and microfinance institutions. As fresh economic research has complicated the supposed successes of microfinance, it is important to undertake further research into the trade offs between financing types in rural regions (Banerjee, Karlan and Zinman, 2015). For instance, are there better outcomes from national bank financing or from microfinance? It is also important to quantify the results of this study. To what extent are donor-subsidised systems different in capacity and outcomes from systems purchased up front or in a pay-as-you-go model? Some of this research is already under way, but the findings from this chapter underscore their importance (Hermes and Lensink, 2011).

However, it is clear from this chapter that some inequality in financial sustainability and system capacity is a logical result of the relationship between a company's product, revenue streams and the customer's willingness or ability to pay. Those with a lower willingness to pay are targeted by enterprises with less financial sustainability built into their model. As one of the aims of electricity access is reducing poverty and inequalities, national and state governments are well-positioned to disrupt this inequality (United Nations, 2015). There are two ways in which to do this: first, expand government financing, and second, regulate the degree to which microfinance and banks can discriminate against poorer or disadvantaged customers. In the first case, Rwanda's Renewable Energy Fund Project 2017, supported by the World Bank, is a viable example. The Government of Rwanda opened four financing 'windows', which offer loans to customers and to businesses, with a particular emphasis on small and medium scale enterprise (World Bank, 2017d). Expanding the realm of who is considered worthy to offer finance to includes microfinance. Microfinance institutions, both within this research and in other corroborating findings, can exacerbate inequality through discrimination against the poor and other disadvantaged social classes (Tchouassi, 2011; Johnson, 2013). However, it is possible for MFIs to take a more positive, active approach to changing their own institutional culture as a form of self-regulation (Chakrabarty and Bass, 2014). It is also possible that governments can encourage codes of ethical conduct. These are possible options, but the reality is that exclusion from markets is not necessarily fixed by having rules on paper:

> "Going further, interventions must incorporate strategies for empowerment and engagement with social regulatory structures by facilitating agency through the myriad types of education and training programmes for women, minorities and excluded groups that have long been part and parcel of development activity." (Johnson 2013, S49)

This truth is social institutions are multifaceted and resistant to change, making concrete policy suggestions challenging.

6.7 Conclusion

India's main REPs invite market actors to participate in the off grid space through technology-based subsidies and tendering out projects. At the same time, many enterprises have sought to provide rural energy using a range of off grid solar technologies and business models. Each actor – government, funding body, and enterprise – must determine to which end users to supply or target their activities. Using interviews with government officials, experts and enterprises, this chapter has explored how these actors determine where they work and who are the recipients of their products.

Government policies in the off grid space now focus solely on supplying technology for the neediest members of society, namely those in the most remote regions, or in 'backwards' areas. For enterprises, the type of technology influences where they can work, as grid-based technologies require a degree of clustering or additional demographic needs. There is also an economic element, with minigrid business models often relying on commercial or productive loads. Solar home systems are the most flexible due to their range of capacity and costs and their stand-alone nature. However, in all cases, one of the greatest factors in end user selection is the financier. Decisions around selection criteria are often made by those who are providing the up front capital expenditure or the loan. In cases where banks or microfinance institutions provide financing to the end user, their criteria for offering a loan are not aligned with the government's programmes. The government's focus on supplying those in need is in tension with the lender's emphasis on risk mitigation.

Business model sustainability is also linked with financial selection. Those who are too poor to reach the threshold for loan financing or who are too remote to have a minigrid are therefore not able to avail themselves of a system with a sustainable business model. The poorest and most remote populations are instead targeted by donor-based or highly subsidised systems. This disparity between the focus on cost recovery may have real impacts when batteries and panels need to be replaced, and has the potential to reinforce existing inequalities. These issues appear to be the unavoidable, but they must be addressed by policymakers if financing for rural end users is to be truly effective and fair. Offering guarantees to lenders might mitigate the risk of lending to end users with no credit history, and providing clear guidelines about the integration of stranded solar assets into the national grid may change the economic evaluation of rural customers. In all cases, these findings challenge the assumption that enough financing can address all development needs.

Conceptually, the new framework offers a much broader and more nuanced approach to categorising end user selection. Throughout the chapter this nuance is used to demonstrate how actors in the system are not aligned. Policymakers must be aware of the alignment of the actors within programmatic policies in order to build programmes that are more inclusive and cognisant of their limitations. The findings also draw attention to the inequalities that are built into the market, despite the best intentions of the actors. This challenges the literature on off grid electrification and equality to be more nuanced, and to further explore how inequity is baked into the market structure.

7 CONCLUSIONS

7.1 Impact of enterprise engagement, reexamined

If there are two main lessons to be drawn from this thesis they are these: actors within the system must be aligned and if they are not, it can lead to ineffectiveness. Actors within the off grid solar market and the rural electrification programmes must be aligned in their capabilities and their interests. The conceptual frameworks developed in chapters 2, 5 and 6 all improve the articulation of the intended or actual alignment of these actors. The REP typology articulates what the capabilities of the market must be, while the political strategy construct outlines how enterprises work in their own interests. Finally, the new target end user construct creates a framework for testing the alignment of policy with the market actors.

The empirical chapters explore the impacts of misalignment on which enterprises target which end users with which technologies in the Indian context. The findings include the bifurcation of the off grid solar market, wherein enterprises with greater cost recovery are moving towards wealthier customers after the loss of microfinancing. Even when financing was in place, there was tension between the interests of the banks and the interests of the government. Finally, the movement towards grid connected customers may have played into the challenges in getting tenders for the DDG scheme filled, pushing villages into the grid extension scheme, and lowering the efficacy of the programme.

7.2 Conceptual Findings

Chapters 2, 5 and 6 offer up new conceptual frameworks where there is either a lack of clarity or there is a need to reorient the theoretical constructs to be based in the LMIC context. The findings are important because they improve how we see and measure aspects of implementation: policy design, political strategy and population targeting. Chapter 2's REP Typology primarily addresses the first concern, in response to the few comparative studies of rural electrification that do little to categorise their varying forms and approaches (Niez, 2010; Javadi et al., 2013; Sovacool, 2013). In order to situate this research, and to improve comparison moving forward, I identify three types of rural electrification policy evident in a sample of 52 policies from 30 countries that are relevant to off grid solar power. The primary types of policy are institutional, regulatory and programmatic policies. Programmatic policies focus on expanding access, either through defining a specific population or a target installed capacity, and reach that target by 1) setting up a system by which enterprises will disseminate technology, and 2) creating incentives to align all the actors within the system.

Programmatic policies try to engage non-government actors in public service delivery. Within programmatic policies, governments try to engage outside organisations through five modes of engagement: market-based, energy service companies, public-private partnerships, direct contracting or government as distributer. Market-based engagement focuses on promoting technology or access to the rural market and relies on market forces to reach the target population. Energy service company arrangements vary, but are defined by a responsibility to a geographical region that includes long-term energy services, as opposed to selling energy products. Public-private partnerships are the most flexible arrangement, potentially overlapping with some of the other modes, but are increasingly common with governments partnering with large multinational companies for off grid electrification (ie BBOXX, Off Grid Electric, etc.). Direct contracting involves identifying the particular end users that require access and tendering out projects to provide electricity to those end users. Finally, governments occasionally take on the burden of distribution themselves, which is the final mode of engagement in which the government essentially becomes an off grid energy enterprise.

Turning to the political strategy that enterprises employ, Chapter 5 addresses the dearth of literature on strategy in smaller organisations in LMICs by constructing a vision of political strategy from within the interviews. Enterprises make active decisions to engage with or disengage from policy and policymakers, and these decisions make up an enterprise's political strategy. Findings from the interviews show how enterprises may take a strategy engagement or disengagement with the government and policy regimes. Tactics of engagement include leveraging policy, building relationships, lobbying, and monitoring. Tactics of disengagement include avoiding and not engaging with policy.

This construct that emerges pushes back on several assumptions and trends within the political strategy literature. First, political strategy should be expanded to include leveraging policy. This has been considered outside the realm of political strategy, which has focused on only how organisations attempt to influence their political environment. However, there is evidence that engaging with policy does influence its future shape, perhaps fitting it conceptually within the pre-existing definitions of political strategy. For example, Namibian shops that participated in government solar schemes were embedded within future solar policies (Stockmayer et al., 2015). The inclusion of 'leveraging policy' is arguably also an important dimension in the context of a sector with heavy government engagement (Hillman, Withers and Collins, 2009).

Second, the new conceptual framework argues for the inclusion a strategy of disengagement. This has been an oversight in previous constructions of political strategy, which have treated strategies as things that are done to actively improve the environment, not other responses to the political environment (Oliver, 1991b; Hillman and Hitt, 1999). Besides capturing a more accurate picture of reality, adding disengagement allows attempts to avoid or ignore government to become 'visible' and hence measurable in empirical studies. In this way, we can ask questions about who chooses to disengage and why.

Finally, the empirical findings – that size and philosophy impact strategy – push back at some of the assumptions within the literature. First, the prominence of size as a factor suggests that there is an overemphasis on lobbying and relationship building within the literature, as these can be resource-intensive activities that smaller organisations may not have the capacity to do. Additionally, political strategy assumes that actions that improve the political environment are done in order to improve it for the enterprise itself. That is, that enterprises are primarily self interested (McWilliams, Van Fleet and Cory, 2002). However, almost all enterprises in the off grid sector have a social component to their mission. In fact, social enterprises are prominent in the LMIC development sectors in general, and so the benefit to other enterprises in the sector – otherwise defined as 'competitors' – may also been seen as a benefit to the enterprise itself, pushing back on the idea that political strategy is a zero sum game.

Chapter 6 addresses the implications of these actions, and the prominent government programmes, on the end user of off grid solar. By first constructing a multi-dimensional framework for describing the target end user, it tries to bring nuance to a discussion which has often focused on per capita income as its only indicator (Prahalad and Hart, 2001). Selection takes place at different levels of granularity (selection levels) and using different criteria (selection criteria). Selection levels include individual, village, region and state. Selection criteria include demand, demographics, geography, need and grid access. These facets of selection are then applied to the government and market actors in order to analyse the targeting of populations within policy and enterprise business models. The construct allows us to test the alignment of actors in the space and observe the way in which programmes that centralize financing create tension between cost recovery and social good. This illuminates the inequalities that are still prominent within off grid programmes, despite the vision of off grid access as an agent of greater equity.

7.3 Empirical Findings

Enterprise business models respond to policy first through changes to revenue streams or customer segments. Shifting to the evidence from the 15 off grid solar enterprises in India, over two thirds of enterprises explained how policy had shaped their business model. Eleven enterprises cited rural electrification policy changes as antecedents to change within the business model, with 19 total incidents of change. Changes in policy regimes first affected revenue streams or customer segments, as changes to subsidy or other forms of support focus on the technology or the customer being support. Therefore, these aspects of the business model were most exposed to policy change.

Single changes to a business model often lead to other changes within the business model. Changes to revenue streams or customer segments particularly affected the technologies that enterprises provided, but they also affected the partnerships that enterprises engaged in, financing needs, distribution models, community engagement, *as well as one another. For instance, when the National Solar Mission subsidy for solar home systems was cancelled in 2015, ENT11 was unable to reach their previous customer base and changed to microgrids, which forced them to move to Uttar Pradesh, which has a greater population density in rural regions. Subsidies or capital grants did more than make technologies affordable, they initiated a virtuous cycle of financing, allowing enterprises and end users to access loans that they might not have been able to access without a government grant or subsidy. ENT32 explained how the subsidy for minigrids under the JNNSM allowed them to access other bank financing, because it brought their anticipated total cost recovery time to under ten years, the required threshold for many additional investments. Where money comes from influences whom the enterprises target, such as the increase in donor funding through India's Corporate Social Responsibility policy leading to investment near factory sites. India's fast-paced grid expansion also has a complicated relationship with the success of off grid enterprises and the technologies that they adopt, many choosing to move into areas where the grid already partially serves customers. Minigrid companies and some medium and large-scale solar home system providers explicitly target areas where there is already grid connection.*

A single policy change may drastically change the shape of the enterprise landscape. In the case of India, a break in the JNNSM subsidy scheme and the expansion of the national grid has contributed to enterprises moving toward grid-connected customers. When the loan and subsidy to rural end users was cancelled, several solar home system companies reported struggling to reach these customers and changing their product, customers and financing to take advantage of where there was a higher willingness to pay. Notably, a move towards the grid has been partnered by a move towards larger scale technologies, primarily minigrids and microgrids. These trends are evidenced in all sizes of organisations, but the movement away from solar home systems is particularly clear in small and medium-scale enterprises. Therefore, although individual policy changes may initially only increase or decrease sales, the finding suggest that the characteristics of the off grid market may change significantly and quickly as enterprises adapt to the new market conditions.

Evidence also suggests that changes in the enterprise landscape have the potential to impact the efficacy of other rural electrification policies. The majority of tenders in the DDG Scheme require solar home systems. There is some evidence that these tenders have been less successful than desired, and 820 villages were moved from *the DDG Scheme over to the grid expansion scheme (BREDA, 2017; UPNEDA, 2017; REC, 2018b). It is possible to see challenges in tendering the SHS projects as related to a lack of support for and move away from that technology.*

An enterprises' response to policy is partly dependent on how much of the business model (especially revenue streams, partnerships, and customers) is exposed to policy changes. An enterprise can adjust its exposure and environment through its political strategy. The main factors that influence an enterprise's choice of tactics are eligibility, past experience with government, and capacity. Enterprises are constrained by their eligibility for access to subsidies, contracts and financing as governments place restrictions on the types of enterprises with which they will work. Both the DDG Scheme and JNNSM have requirements for the types of organisations to which they offer projects and financing, including turnover, past government experience, and technology specifications. Eligibility is sufficient to explain the actions of many enterprises, but does not account for at least four enterprises that appear to be eligible, but still do not apply for financial support. Here, past negative experiences of working with government also played a significant role in decision-making. Past negative experiences included applying for subsidies and not receiving them, finding that the tender was then cancelled, confusion in the application process or having to wait too long for subsidies to be released to the enterprise.

The size of an organisation – here, as a proxy for capacity – also has a strong impact on the types of political engagement an enterprise will use. Each of the four main tactics has a differing level of resource intensiveness. Leveraging policy, for instance, requires greater resources than monitoring the government's outputs. Small and medium-sized organisations, those we can infer have fewer man-hours at their disposal, are more likely to engage in less resource intensive tactics and actions. Indeed, some smaller organisations focus on partnerships and relationship building over engaging in programmes because of the resource-intensiveness of direct engagement, eligibility concerns, and potential risks in engagement. For instance, ENT13 dropped out of one tender in favour of partnering with the winning enterprise, figuring that this was a less resource-intensive action with a higher likelihood of success.

Finally, although programmatic policies include incentives that align the actors within the system, not all enterprises target the end users intended by rural electrification programmes. The DDG Scheme targets off grid villages primarily with solar home systems but as many enterprises have moved to working with minigrids and microgrids, few enterprises focus on purely off grid customers anymore. The DDG Scheme has suffered from a low interest in their tenders, which has led to tender cancellations and slowed the uptake of off grid technologies via government programmes. Over 800 villages have been moved from the off grid scheme to the grid expansion programme (REC, 2018b). In the meantime, there is a move towards enterprises providing off grid technologies in grid-connected areas, which is outside the scope of the DDUGJY scheme. Minigrid enterprises focus almost exclusively on grid connected areas, in great part because those villages already have a certain demand for electricity, which is a requirement for cost recovery, given high capital costs of the systems. Microgrids are primarily still set up in unelectrified villages, but that is only possible because of low cost-recovery expectations and donor financing. Finally, solar home systems come in a range of capacities from 2-80Wp, and so different systems and business models relate to the range of customers that SHS enterprises target. As a rule of thumb, the larger the system, the more they target previously-grid connected customers.

7.4 India and Beyond

7.4.1 India and the rise of direct contracting

The arc of policy has been bending toward greater private sector participation for decades, whether that is considered a part of improving the sustainability of programs or the long-lasting effect of New Public Management in policy discussions (Lane, 2002). India's DDG scheme and JNNSM off grid component do appear to rely on the private sector, engaging non-government actors through competitive bidding and financial support. However, those who engage in the DDG scheme are often not technically private sector actors. The only enterprise in the sample that regularly won DDG tenders was a government-owned enterprise (ENT23). In that case, the DDG scheme begins to look more like the government contracting out to that parts of itself that have technical competencies required to perform the task at hand. It is possible that this is the same in other contexts. Although direct contracting may appear to be the result of NPM principles being integrated into LMIC infrastructure projects, it is possible that direct contracting is more lip service than true shift in governance (Batley, Larbi and Palgrave Connect (Online service), 2004).

The direct contracting approach may also be obscuring the fact that the private sector is not in a position to be the key implementing partner of off grid solar. There are a number of good reasons for this, many of them cited as arguments against the private sector at the bottom of the pyramid. The private sector needs profits, and the poorest and most remote people cost the most to reach and have the least money to compensate (Haanyika, 2006; Kolk, Rivera-Santos and Rufín, 2014). Another reason that the private sector may not be in a position to implement these policies goes back to the socio-technical innovations systems literature. While solar energy may be a mature technology, it is still innovative in the context of off grid appliances, and may still be in need of further refinement as businesses and NGOs discover what works and what does not (Khan and Arsalan, 2016). However, rural electrification programs are essentially infrastructure expansion programs, which typically work with well-established mature technologies. Direct contracting in this context may be a premature attempt to scale a technology that is not yet mature. As few countries have what is considered an 'off grid solar market,' it seems likely that other countries are in the same position: struggling to move off grid solar from its niche into the dominant paradigm.

The market-based mode on the other hand, as seen in the JNNSM, takes the 'private sector entrepreneurship' approach, focusing on supporting private sector innovation (Ockwell and Byrne, 2017). Within this case study, social enterprises did use the support of the JNNSM to try innovative technologies and business models. However, Ockwell and Byrne are quick to point out that this does not necessarily lead to a reorienting of development towards greater sustainability, because an innovative approach is more than an innovation, but also its embeddedness in our dominant regime and the socio-technical apparatus that makes that possible (Ockwell and Byrne, 2017, pg 143). All that is to say, India's support through the National Solar Mission seems better aligned to the state of the off grid market. However, whether is through market-based mode or direct contracting, inequality has a complicated relationship to scale.

7.4.2 Scale and inequality

Scaling up technologies does not just increase the number of people with a solar home system, but scales up the inequalities that are a part of the technological system. Governments have a role to play in trying to counteract, not exacerbate, *economic inequality, whether through pro-poor subsidies or through supportive niches where innovators are creating beneficial socio-technical artefacts.*

Chapter 6 made it clear that, without government support, the poorer end users are targeted by enterprises offering less capacity and less long-term sustainability, which may have an impact on maintenance and scalability. Unreliable policy support has contributed to a move from smaller to larger systems, from solar home systems to micro/minigrids, and from off grid customers towards grid connected ones. Those enterprises that still target purely off grid end users often do so with small systems, high subsidies, and low financial sustainability (ie cost recovery is unlikely to cover capital costs and operational expenditures). While this is intuitive, as many off grid customers have a lower ability to pay, the upshot is that poorer customers are targeted by those enterprises that may not be able to scale without large injections of capital from outside donor and government agencies. Therefore, the enterprises that target poorer customers are likely to have less long-term sustainability and may no longer be extant when systems fail and batteries need to be replaced. Low cost-recovery and a reliance on donor grants may also limit the ability of these enterprises to scale up. Even those policies that support customers with no grid access (ie DDG Scheme) face challenges getting tenders fulfilled. In the end, it is end users with greater grid connectivity that are targeted by the enterprises with the largest systems, best likelihood of scalability and greatest staying power.

But scale also comes at a cost. Scaling up through direct contracting selects for established players in the field, further entrenching those organisations in a position of market power. Namibia's solar shops are a great example. Since 2007, each subsequent REP has included these same shops into their program, embedding these organisations within the government's support and allowing them to reap further rewards (Stockmayer et al., 2015). The benefit is likely that these shops have grown the competencies required to implement the policies. This no doubt offers efficiencies and may improve implementation, but it does reduce competition for others trying to enter the market. It creates an unequal playing field for new enterprises.

Scaling up also has an impact on social inequality. Economies (and efficiencies) of scale are achieved through the replication of activities. As in, scale is the same artefact (technology, application, delivery system, etc.) replicated many times over. Therefore, the nature of the artefact is replicated. That is to say, scaling up a *technology and its concurrent artefacts (business models, etc.) replicates its relationship to the social actors in its orbit. For instance, the JNNSM solar home system subsidy did increase the number of people with access to solar home systems, but it also replicated the inequalities inherent in microfinancing (Tchouassi, 2011). Likewise, technologies that support greater equality, such as solar home systems sold by women, scale up the benefits of the technology as they expand. This is neither good nor bad, but instead of feature of scaling that governments should be aware of.*

Innovators are trying to address social justice. ENT25 spoke at length about the way in which their solar modules encouraged interaction between different social classes. ENT27 focused on how women had a greater ability to conduct their business with solar home systems. These socio-technological systems have the same potential to be scaled up as the PV panels of ENT23's DDG projects. The key is for the government to be upon to supporting these niches of socio-technical innovation, and support their movement from niche into the dominant regime.

7.5 Policy Implications

The findings of this thesis have potential policy implications both for the Indian context specifically and for policymakers designing and evaluating rural electrification policies. Broadly put, in designing programmatic policies, policymakers must understand the market the mode of engagement needs, understand the market the country has, and support the market the mode needs. The implications for the Indian context fall along those same logical pathways, but bring specific knowledge to bear on the recommendations. In all cases, these are only the implications thrown up by the findings of each chapter, and do not take into account what is politically feasible.

In the specific India case, there are three primary implications for the Ministry of New and Renewable Energy (MNRE), under whose jurisdiction sits off grid electrification. First, as the DDG Scheme requires large-scale solar home system-based tenders, the MNRE may wish to reconsider financial support for enterprises working with solar home systems. As many such enterprises have left solar home systems behind and are now 'burned' by changing policies, this may be a tall order. However, if it is possible, support should focus on scaling up enterprises in the hopes that scaled up enterprises will reach further customers and be eligible to bid for MNRE tenders through the DDG Scheme. As the literature on public administration suggests, it is often the role of government to support the very markets that they require for public services. Studies from the USA have shown that where the government supports nonprofits is where nonprofits are more prevalent, rather than nonprofits stepping in where the government is not (Lecy and Van Slyke, 2013). Likewise, competition is often low in areas where the governments wish to contract out public services, forcing the government to use their own resources to support the private markets they then wish to take advantage of (Girth et al., 2012). Governments must support private and nonprofit sectors in order to use them to provide public services.

Despite the concerns registered above, Namibia provides an interesting example of building upon the market that the country has in order to create the market that rural service provision needs. In 2007, the Government of Namibia initiated the Off Grid Energy Master Plan, which created Energy Shops from currently functioning businesses that would provide a range of off grid solar products and act as a go between for customers looking for loans from the government's solar loan programme. Then in 2015, the Government of Namibia followed up with a Nationally Appropriate Mitigation Action Plan in Namibia Rural Development that built upon the previous energy shops concept. This voluntary, non-binding action plan outlined how Namibia will improve its off grid electrification through two interventions: tendering hybrid minigrids and tendering for private actors to set up Energy Zones:

> The OGEMP defined the concept of Energy Shops. Energy Shops are established within a reasonable distance of targeted communities and sell suitable, approved energy products and compatible appliances to consumers. Under Intervention B, this concept is developed further into the concept of Energy Zones (EZs), by adding a Rural Productivity Zone (RPZ)) component (Stockmayer et al. 2015, 73).

Energy Zones would be new standalone renewable installations in a single building or compound that would promote new entrepreneurial activities by providing a space for electricity access and where people could sell appliances and charge batteries. Through this slow, conscious building of the off grid market, first through turning rural businesses into energy shops and then energy shops into energy zones, the Government of Namibia exemplifies the need to create the market you need for rural electricity provision.

Small and medium-scale enterprises are an important site of innovation and job creation in the market, and it is important for governments to support SMEs, especially in newer sectors (Beaver and Prince, 2004; Loader, 2007). Scaling up SMEs would be aided by an expansion of enterprises deemed eligible to participate in the DDG Scheme. Chapters 4 and 5 note both that small and medium sized enterprises face challenges in meeting eligibility requirements and in winning tenders even where eligible. The challenge of engaging SMEs in public procurement is well articulated in a study by Kim Loader:

> "The findings suggest that while procurement officers would like to do business with small firms, in practice their primary aim is to achieve value for money. While these two aims are not mutually exclusive, small firms are less likely to succeed in winning contracts on the basis of value for money while it continues to emphasise cost and quality, because of a view that large firms are more likely to meet these criteria. If value for money is interpreted broadly, to include a range of criteria beyond cost and quality, then smaller, and especially local, firms may have an opportunity to exploit their relative strengths such as responsiveness and flexibility. However, other developments in procurement—such as collaboration and rationalization of the supplier base—emphasise the narrower interpretation of value for money and are working against the smaller supplier. The continually changing procurement environment is also likely to disadvantage small businesses disproportionately." (Loader 2007, 313)

While it is understandable that eligibility requirements should be in place in order to protect customers from fraudulent or incapable businesses, shutting out enterprises from the primary form of government support (large, subsidised contracts) contributed to the bifurcation of the market between large, SHS providers and, now, small micro and minigrid companies. A happy medium exists in the case of ENT32, which offers tenders separately within their own projects to small and medium-sized companies as a way to access new talent and help grow other off grid businesses. As ENT32 is a state-owned company, this perhaps fits within their philosophical purview, but it is unreasonable to expect other large-scale enterprises to actively promote their competition. Therefore, it falls to MNRE to draw smaller companies into their policies in a way that benefits both the enterprise and the end user, perhaps through smaller, targeted tenders that aim to give enterprises experience with government tenders and support in scaling up. Splitting tenders into lots and simplifying procurement processes has been recommended by other scholars interested in increasing the proportion of SMEs that successfully bid for public tenders (Perry, 2011). Taking a softer touch approach, some research suggests that mentoring SMEs and ushering them through the tender process can also be beneficial to engagement (McKevitt and Davis, 2015).

Finally, the eligibility challenge was not solely a product of stringent enterprise eligibility, it was also a result of increasingly stringent technology specifications

(MNRE, 2012b, 2017c). Technology requirements are considered to be beneficial to developing the off grid solar market as they increase trust in the product and protect consumers from fly-by-night operators or the worst effects of technology dumping (Luthra *et al.*, 2015; Yaqoot, Diwan and Kandpal, 2016). However, increasingly strict requirements for products provided through the DDG Scheme were commonly cited as a reason not to apply; the companies found that their products had become ineligible. One enterprise even believed that at the time of the interviews, only one other non-state enterprise sold products that reached such specifications. While that information is unconfirmed, it is true that several enterprises that previously bid for tenders no longer did so, some claiming ineligibility. Finding a balance between protecting the needs of consumers and allowing for a large enough pipeline of bidders for tenders is challenging, but vital, as cancelled tenders and removing 820 villages from the DDG Scheme suggests troubles in keeping up with the off grid target (BREDA, 2017; UPNEDA, 2017; REC, 2018b).

Taking a step back to look at the broader implications, policymakers should understand the characteristics of the market they need, the market they have and what that means for seeking to support the enterprises that make up such a market. While it is important to make these evaluations when designing or revamping programmatic policies, this thesis has shown how layered policy has just as much power to bear on the market. In the case of India, it was the JNNSM programmatic policy's cancellation that precipitated some of the move away from solar home systems, which is the primary technology of the DDG scheme. The impacts of one policy on the market affect others. Other countries in the sample for Chapter 2 have both compound policy mixes and layered policy mixes. For instance, Cambodia's 2009 Rural Electrification Strategy and Implementation Plan offers up a strategy for the whole power sector in which the government electricity operator (EDC) first leads the rural electricity enterprises (REEs) in the electrification of rural areas before absorbing their assets in the long term. This was followed up by the 2013-2015 Program For the Development of Rural Electrification, in which could purchase a solar home system from the government with a loan at a subsidised rate. The two policies overlap, but the first takes a private ESCO approach, while the second sets up the government as the key distributer of solar technology. The relationship between these two policies impacts the market actors. Therefore, policymakers should evaluate all policies together in order to rationalize the signals to enterprises (Howlett and Rayner, 2007; Rogge, Kern and Howlett, 2017).

Firstly, Chapter 2 defines and explores the five modes of engagement that programmatic policies use, as well as describing their assumptions. This is an important starting point for policy analysis and policymakers. The question should be asked: do all rural electrification policies make the same assumptions about the characteristics of the market and the enterprises within it? Are the assumptions compatible? And of course, it is then vital to determine whether the market does indeed share the characteristics required of the programmatic policy. A classic example would be taking a direct contracting approach (in a domestic context) without determining whether the country contains at least two viable enterprises that would bid for tenders. Without sufficient competition, the benefits of tendering cannot be captured (Prager, 1994; Johnston and Girth, 2012).

The reality is that national and international political forces have a large role in promoting certain policies. As discussed in Chapter 2, there has been a global movement towards the privatisation of public service delivery (Donahue, 1989; Miraftab, 2004; Cook and Uchida, 2008). Indeed, the World Bank's latest policy of the "cascade approach" prioritises private investment:

> "When a project is presented ask - *Is there a sustainable private sector solution that limits public debt and contingent liabilities?* If the answer is '*Yes'*- promote such private solutions. If the answer is *'No'* - ask whether it is because of: (i) Policy or regulatory gaps or weakness? If so, provide WBG support for policy and regulatory reforms. (ii) Risks? If so, assess the risks and see whether WBG instruments can address them. If you conclude that the project requires public funding, pursue that option." (World Bank Group, 2017)

While the aim of such a policy is to maximise the impact of World Bank financing, this approach holds firm to the World Bank's ideological interest in promoting private solutions (Dreher, Minasyan and Nunnenkamp, 2015). While the formulation above explicitly asks about the market context of the programme, it is important to note the private sector starting point of the cascade and the impact that this may have on the dozens of rural electrification programmes initiated with the help of the world bank in that past 20 years (Cordella, 2018). While true ideological neutrality is impossible to achieve, focusing on the assumptions and requirements of each mode is an excellent starting point.

Once assured that the current market and the assumptions of the mode of engagement are a good match, policymakers would do well to anticipate how the characteristics of the market will affect 1) the impact of policy change on the enterprise landscape, and 2) levels of engagement. Chapter 4 goes some way to exploring how the first question might be answered in retrospect, but similar logic could be used to anticipate likely changes. For instance, if the new programme includes financing for certain technologies, it is likely enterprises will move towards these technologies, which will shift their needs for financing, potentially the types of customers they target, and a host of business model aspects. The findings from Chapters 4 and 6 can be extrapolated further to show how the interrelations between aspects of the business model lead groups of businesses acting in a similar manner. Similar research attempts to track how renewable energy enterprises change over time and how the characteristics of the country's institutions and policies affect the business models of such enterprises (Gabriel and Kirkwood, 2016). Survey-based studies with a longitudinal scope might bridge these two approaches.

Chapter 5 goes some way to connecting the characteristics of the market to general trends in how enterprises engage with policy and government. It should be borne in mind that many factors influence an enterprise's political strategy, but understanding the characteristics of the market might go some way to anticipating the degree of engagement (Oliver, 1991a; Getz, 2002; Hillman, Withers and Collins, 2009). For instance, small and medium sized enterprises may have a smaller appetite for political risk. Therefore, changes to policy are more likely to cause them to disengage with government, lowering the engagement with and efficacy of future policy. Likewise, larger enterprises have a higher human capacity, which is often required for keeping abreast of current developments, building relationships with government and certainly with engagement with policy. Therefore, a market with larger enterprises may better engage with policy, even in the case of several policy changes. In all cases, it is crucial to anticipate how the programme and enterprises will interact by assessing the characteristics of the market, via the market actors (or enterprises).

Finally, the key lessons of chapter 6 are two-fold. The first lesson is that the source of financing has the greatest role in selection, and appeals to increase microfinancing do not solve all the challenges of working at the base of the pyramid. Indeed, the very nature of financing exacerbates inequalities, as necessary risk management within the financing institution prioritises the wealthy (Tchouassi, 2011; Johnson, 2013). Findings from this thesis also add a social dimension to these inequalities, as some enterprises referenced other markers of social status, such as caste (see ENT11). In all cases, it is challenging to find an appropriate alternative to microfinance in rural areas, especially given some of its successes (Reeves and Sabharwal, 2013). Instead, it is possible that greater oversight over microfinance institutions could seek to embed values that prioritise social justice (Johnson, 2013; Chakrabarty and Bass, 2014).

Lastly, the chapter reinforces a narrative that has run throughout the thesis: in a layered policy mix, changes to one policy can misalign the market and existing programmes. Through looking at how programmes and enterprises select target customers, it is clear that changes to India's subsidy regime contributed to a move towards grid-connected customers, which was at odds with the requirements of the extant DDG Scheme. A broader lesson to be drawn from this perspective is that policymakers must not focus on the target population of their policies alone, but also on the target populations of the enterprises within the market.

A joined up long-term approach requires four things: awareness, knowledge, flexibility, and consistency. The first is the hardest to achieve, but governments must be aware of the ways in which the mismatch between market and policy design undermine their policy goals, and the ways in which inequality can be exacerbated through scaling up under each programmatic mode. It may seem like awareness of policy design considerations is impossible to manufacture, but the history of 'evidence-based policy' provides an excellent example of how civil society organisations can draw attention even to policy design and the policy process. 'Evidence-based policy' became a buzzword when the Campbell Collaboration was established to conduct systematic reviews of the evidence for social and educational policies, inspired by the Cochrane Collaboration, which had done the same for 'evidence-based medicine' (Marston and Watts, 2003). Now, it is a phrase used globally to encourage more information in the policy process (Newman, 2017). Even in this context, civil society organisations can promote awareness of how the policy process 1) fails certain segments of the population, and 2) neglects to incorporate learning about the state of the market into design decisions.

This leads nicely into the second requirement: knowledge. Whether its goal-setting and policy design, governments can act without enough information to make effective decisions. Knowledge in this context means both "an accurate or realistic assessment of the capabilities of more concrete policy tools or their possible calibration" and a realistic assessment of the capabilities and limitations of the market (Howlett, 2009, pg 75). Governments must commission research into the market, the impacts of these policies on end users, and new and innovative technological solutions, as a starting point. Capturing information and promoting its diffusion within government and the civil service is key to creating better policy (Ockwell and Byrne, 2017, pg 157-8).

Next, flexibility or the ability to change is crucial in any policy context, but especially when working with nascent technologies. Technological change and learning will necessarily alter the visions that government has for the future. Managing that change involves keeping knowledge up to date, as above, as well as negotiating what that change looks like with other stakeholders. Therefore, governments should meet regularly with stakeholders, especially market actors and civil society organisations, as well as allow for experimentation (Ockwell and Byrne, 2017, pg 158). Experimentation can take the form of pilot projects to test new interventions and technologies, in order to promote new visions of what the future of the off grid space could look like, and to bring actors towards a shared vision (Ockwell and Byrne, 2017, pg 55-57).

Finally, consistency is required. This may seem counter-intuitive given the emphasis of the previous chapter on flexibility, but flexibility with alternative visions is different from inconsistency. Consistency in this context refers to adherence to the lessons that have been learned and to the principles of improved policymaking as described above. This consistency could be achieved through embedding learning in the civil service, rather than focusing on politicians. Civil servants move around within a bureaucracy but their knowledge has greater staying power than government ministers who may be rotated out of power in a relatively short timeframe. In this vision of joined up long-term policymaking, the entrenchment of market power and perpetuation of social inequalities are checked through buy-in from multiple interest groups. This includes the involvement of civil society (through awareness raising), citizens (through elections), civil service (through policy design), governments (through goal setting), and market actors (through new innovations, stakeholder engagement). Although more powerful actors will no doubt attempt to co-opt others into their vision, the large set of varied interests set up a system checks and balances.

7.6 Future research

While the findings within this thesis support the policy implications above, further research would broaden the applicability and usability of the findings. Both additional qualitative and new quantitative analysis could build on this research. Firstly, although the findings from the embedded enterprise case studies within India have a degree of analytical generalisation, additional case countries could improve the applicability of the findings. I would recommend a similar project of enterprise-based research in a market with a higher expectation of off grid electrification, such as Rwanda, Tanzania or Togo. Despite India's aggressive electrification policies, the Government of India views off grid energy as a temporary measure, expecting that almost all villages will eventually be reached by the national grid (GoI, 2018). The expectation is that the next ten years will see the future of off grid in sub-Saharan Africa (IEA, 2017). Exploring additional countries and markets using the same framework and approach would improve the analytical generalisability by filling in gaps that may not be addressed by the India case (such as the use of mobile banking). Further research could either examine countries with policies that follow the same modes of engagement as India to compare changes to the market, or else a contrasting mode of engagement, such as ESCOs, PPPs or government distributers.

Rwanda is an interesting case because, in addition to having a low rate of rural electrification, its Rural Electrification Strategy 2016 places a heavy emphasis on market development. The programme explicitly aims for the private sector to sustainably provide access in the future through four programmes: 1) providing solar home systems for lowest income households, 2) creation of a risk mitigation facility for the solar private sector actors, 3) supporting private sector minigrids with site identification and government financing, 4) and further grid expansion. Although the third component involves tenders and the first involves public provision of solar, the emphasis is on market engagement. In this way, the Rwanda case is an inverse of India, which has both market-based elements and direct contracting, but government procurement is prioritised in the off grid space. Additionally, off grid multinational company BBOXX has some presence there, where it is setting up a modern rural house as an aspirational pilot for investors to see what the future of off grid technology can be (Byumvuhore, 2018).

Indeed, it is worth noting that this research has focused solely on domestic off grid solar markets, and therefore has not included growing multinational companies that work in off grid solar. These companies, such as BBOXX and Off Grid Electric, are increasingly relevant to the story of global energy access as more countries sign large contracts for electrifying areas with them (Kabeer, 2018). Off Grid Electric – now known as Zola Electric – recently won $55 million from Helios Investment Partners and General Electric (Foehringer Merchant, 2018). The US-based company has sold over 150,000 systems in Africa, focusing their work on Ghana and the Ivory Coast. BBOXX is a London-based company, initiated in 2017, who is now working with EDF to provide solar systems in Togo, as described above (Krieger, 2018). Further research might explore similar research topics – the impact of policy for choice of country, political strategy towards managing policy risk – within these organisations. Given their international reach, it is possible that understanding how these companies function will have an outsized impact in the future, especially given the dearth of research on these companies thus far (Girardeau and Pattanayak, 2018).

Taking a more quantitative approach, further research could quantify the efficacy of these programmes, to solidify and broaden the conclusions of the thesis. The two primary challenges here are data access and reliability and untangling the contributing factors to efficacy. A more enterprise-specific approach may help with the both the former and the latter. For instance, if one were able to access the sales data from individual enterprises, the findings of this research could be falsified or bolstered. In all cases, the challenges of enlisting quantitative research here stands. Finally, more quantitative and survey-based scoping of existing off grid solar markets (as in Singh 2016) could help cobble together a broader picture of what these markets look like and how they are changing over time.

7.7 Final Thoughts

There is no way to provide electricity access without the assistance of non-state actors. Despite different politics and policy, all rural electrification programmes must engage with private actors, non-governmental organisations, and social enterprises, whether to manufacture, sell or distribute technology. These enterprises do the hard work on the ground of reaching customers, providing systems, keeping them functional and educating end users on their use. To ignore the impact of policy on these enterprises and focus solely on the outputs does little to understand why programmes do or do not function. The integral *why* is the purview of qualitative research and this thesis.

The rich and detailed interviews that made up the cornerstone of this research offer a peek into the 'black box' of enterprise decision-making. Organisations large and small believe in the social aspect of their work. Without their solar technologies, how can women breathe fresh air in their own homes? How can villages expand their agricultural production? How can children do their homework at night? Above and beyond all these developmental impacts, the enterprises in this sector believe that energy access is a right. This belief is supported by a government that has put rural electrification front and centre and by a history of kerosene subsidies. And yet, despite the strong social justice element of the work, no enterprise functioned solely on a donor-only model. No one was just giving systems away. The range of business models on display arose from the interplay between the desire to reach the rural poor and the need to create sustainability, to expand scalability and to support a market.

Programmatic policies aim to make this balance easier, but no two programmes are created the same. To transfer the same approach from one country to another without consideration of what makes the approach work is a recipe for inefficiency and ineffectiveness. By looking into how enterprises change and what characteristics impact their interactions with policy and government, this research offers another way of looking at how these programmes function. The findings offer up a set of questions for better designing programmes. Policymakers must take account of three things: 1) what are the characteristics of the market that each mode of engagement requires, 2) what are the characteristics of the current market, and 3) given those characteristics, what are the likely changes to the market if this programme is implemented?

While there are certainly challenges that are beyond the scope of policymaking, a mindfulness that markets are made up of individual actors alters the thinking behind our analysis. Changes in support alter the entire landscape of actors, sometimes in predictable ways. Improving policy engagement through enterprise-level thinking may improve the efficacy of these programmes that seek to provide power to so many. Huge strides in electricity access are likely to take place by 2030, but it is up to individual governments to make sure that they happen in a way that supports the environment, the country, and the people.

8 REFERENCES

Abdullah, S. and Jeanty, P. W. (2011) 'Willingness to pay for renewable energy: Evidence from a contingent valuation survey in Kenya', *Renewable and Sustainable Energy Reviews*. Pergamon, 15(6), pp. 2974–2983. doi: 10.1016/J.RSER.2011.03.016.

Acheampong, M. *et al.* (2017) 'In pursuit of Sustainable Development Goal (SDG) number 7: Will biofuels be reliable?', *Renewable and Sustainable Energy Reviews*. Pergamon, 75, pp. 927–937. doi: 10.1016/J.RSER.2016.11.074.

Ács, Z. J. and Naudé, W. (2013) 'Entrepreneurship, stages of development, and industrialization', *Pathways to industrialization in the 21st Century*, pp. 373–392.

Aggarwal, V. K. (2001) 'Corporate Market and Nonmarket Strategies in Asia: A Conceptual Framework', *Business and Politics*. Cambridge University Press, 3(02), pp. 89–108. doi: 10.2202/1469-3569.1020.

Agnihotri, A. (2013) 'Doing good and doing business at the bottom of the pyramid', *Business Horizons*. 'Kelley School of Business, Indiana University', 56(5), pp. 591–599. doi: 10.1016/j.bushor.2013.05.009.

Ahlborg, H. and Hammar, L. (2014) 'Drivers and barriers to rural electrification in Tanzania and Mozambique - grid-extension, off-grid, and renewable energy technologies', *Renewable Energy*. Elsevier, 61, pp. 117–124. doi: 10.1016/j.renene.2012.09.057.

Aklin, M. *et al.* (2017a) ‘Does basic energy access generate socioeconomic benefits? A field experiment with off-grid solar power in India’, *Science Advances*. American Association for the Advancement of Science, 3(5), p. e1602153. doi: 10.1126/sciadv.1602153.

Aklin, M. *et al.* (2017b) ‘Does basic energy access generate socioeconomic benefits? A field experiment with off-grid solar power in India’, *Science Advances*. American Association for the Advancement of Science, 3(5), p. e1602153. doi: 10.1126/sciadv.1602153.

Akoijam, A. S. and Krishna, V. V (2017) ‘Exploring the Jawaharlal Nehru National Solar Mission (JNNSM): Impact on innovation ecosystem in India’, *African Journal of Science, Technology, Innovation and Development*. Taylor & Francis, 0(0), pp. 1–13. doi: 10.1080/20421338.2017.1359466.

Alatas, V. *et al.* (2012) ‘Targeting the Poor: Evidence from a Field Experiment in Indonesia’, *American Economic Review*, 102(4), pp. 1206–1240. doi: 10.1257/aer.102.4.1206.

Ali, W., Frynas, J. G. and Mahmood, Z. (2017) ‘Determinants of Corporate Social Responsibility (CSR) Disclosure in Developed and Developing Countries: A Literature Review’, *Corporate Social Responsibility and Environmental Management*. John Wiley & Sons, Ltd, 24(4), pp. 273–294. doi: 10.1002/csr.1410.

Alonso, J. M., Clifton, J. and Díaz-Fuentes, D. (2015) ‘Did new public management matter? An empirical analysis of the outsourcing and decentralization effects on public sector size’, *Public Management Review*. Taylor & Francis, 17(5), pp. 643–660.

Alstone, P. *et al.* (2011) ‘Expanding women’s role in Africa’s modern off-grid lighting market’. World Bank, Washington, DC.

Amrutha, A. A., Balachandra, P. and Mathirajan, M. (2017) ‘Role of targeted policies in mainstreaming renewable energy in a resource constrained electricity system: A case study of Karnataka electricity system in India’, *Energy Policy*. Elsevier, 106, pp. 48–58. doi: 10.1016/J.ENPOL.2017.03.044.

Anand, J. (2018) ‘“Almost half the employees Delhi govt needs do not exist”’, *The Hindu*, 7 August. Available at:

https://www.thehindu.com/news/cities/Delhi/almost-half-the-employees-delhi-govt-needs-do-not-exist/article24618507.ece.

Andrews, R. and Entwistle, T. (2010) ‘Does cross-sectoral partnership deliver? An empirical exploration of public service effectiveness, efficiency, and equity’, *Journal of Public Administration Research and Theory*, 20(3), pp. 679–701. doi: 10.1093/jopart/mup045.

Archibugi, D. *et al.* (2003) ‘Triangular Relations in Public Service Economics’, *International Review of Applied Economics*, 17(1), pp. 49–68. doi: 10.1080/713673168.

Arze del Granado, F. J., Coady, D. and Gillingham, R. (2012) ‘The Unequal Benefits of Fuel Subsidies: A Review of Evidence for Developing Countries’, *World Development*. Pergamon, 40(11), pp. 2234–2248. doi: 10.1016/J.WORLDDEV.2012.05.005.

Astley, W. G. (1985) ‘Administrative Science as Socially Constructed Truth’, *Administrative Science Quarterly*, 30(4), p. 497. doi: 10.2307/2392694.

Astley, W. G. and Zammuto, R. F. (1992) ‘Organization Science, Managers, and Language Games’, *Organization Science*. INFORMS , 3(4), pp. 443–460. doi: 10.1287/orsc.3.4.443.

Atack, I. (1999) ‘Four Criteria of Development NGO Legitimacy’, *World Development*. Pergamon, 27(5), pp. 855–864. doi: 10.1016/S0305-750X(99)00033-9.

Autio, E. *et al.* (2014) ‘Entrepreneurial innovation: The importance of context’, *Research Policy*. North-Holland, 43(7), pp. 1097–1108. doi: 10.1016/J.RESPOL.2014.01.015.

Azimoh, C. L. *et al.* (2015) ‘Illuminated but not electrified: An assessment of the impact of Solar Home System on rural households in South Africa’, *Applied Energy*. Elsevier, 155, pp. 354–364. doi: 10.1016/J.APENERGY.2015.05.120.

Bacharach, S. B. (1989) ‘Organizational Theories: Some Criteria for Evaluation’, *Academy of Management Review*. Academy of Management Briarcliff Manor, NY 10510 , 14(4), pp. 496–515. doi: 10.5465/amr.1989.4308374.

Bäckstrand, K. (2006) 'Multi-stakeholder partnerships for sustainable development: rethinking legitimacy, accountability and effectiveness', *European Environment*. Wiley-Blackwell, 16(5), pp. 290–306. doi: 10.1002/eet.425.

Baker, T. and Nelson, R. E. (2005) 'Creating something from nothing: Resource construction through entrepreneurial bricolage', *Administrative science quarterly*. SAGE Publications Sage CA: Los Angeles, CA, 50(3), pp. 329–366.

Baldwin, E. *et al.* (2015) 'Electrification and rural development: issues of scale in distributed generation', *Wiley Interdisciplinary Reviews: Energy and Environment*. John Wiley & Sons, Ltd, 4(2), pp. 196–211. doi: 10.1002/wene.129.

Banerjee, A., Iyer, L. and Somanathan, R. (2005) 'History, Social Divisions, and Public Goods in Rural India', *Journal of the European Economic Association*. Wiley/Blackwell (10.1111), 3(2–3), pp. 639–647. doi: 10.1162/jeea.2005.3.2-3.639.

Banerjee, A., Iyer, L. and Somanathan, R. (2007) 'Chapter 49: Public Action for Public Goods', in *Handbook of Development Economics*. Elsevier, pp. 3117–3154. doi: 10.1016/S1573-4471(07)04049-1.

Banerjee, A., Karlan, D. and Zinman, J. (2015) 'Six Randomized Evaluations of Microcredit: Introduction and Further Steps', *American Economic Journal: Applied Economics*, 7(1), pp. 1–21. doi: 10.1257/app.20140287.

Banerjee, A. and Somanathan, R. (2007) 'The political economy of public goods: Some evidence from India', *Journal of Development Economics*. North-Holland, 82(2), pp. 287–314. doi: 10.1016/J.JDEVECO.2006.04.005.

Bansal, H. (2003) 'SHG-Bank Linkage', *Journal of Microfinance*. Marriott School, Brigham Young University, 5(1). Available at: https://scholarsarchive.byu.edu/esr/vol5/iss1/3 (Accessed: 7 October 2018).

Barbour, E. *et al.* (2016) 'A review of pumped hydro energy storage development in significant international electricity markets', *Renewable and Sustainable Energy Reviews*. Pergamon, 61, pp. 421–432. doi: 10.1016/J.RSER.2016.04.019.

Bardhan, P. and Mookherjee, D. (2005) 'Decentralizing antipoverty program delivery in developing countries', *Journal of Public Economics*. North-Holland, 89(4), pp. 675–704. doi: 10.1016/J.JPUBECO.2003.01.001.

Bardhan and Pranab (1999) 'The Political Economy of Development in India: Expanded edition with an epilogue on the political economy of reform in India', *OUP Catalogue*. Oxford University Press. Available at: https://ideas.repec.org/b/oxp/obooks/9780195647709.html (Accessed: 7 July 2018).

Barman, M. *et al.* (2017) 'Performance and impact evaluation of solar home lighting systems on the rural livelihood in Assam, India', *Energy for Sustainable Development*. Elsevier, 38, pp. 10–20. doi: 10.1016/J.ESD.2017.02.004.

Barnett, P. *et al.* (2009) 'Implementing new modes of governance in the New Zealand health system: An empirical study', *Health Policy*, 93(2–3), pp. 118–127. doi: 10.1016/j.healthpol.2009.06.004.

Baron, D. P. (1995) 'Integrated Strategy: Market and Nonmarket Components', *California Management Review*. California Management Review, 37(2), pp. 47–65. Available at: http://ezproxy.lib.cam.ac.uk:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=9504072292&site=ehost-live&scope=site.

Barro, R. (1997) Determinants of economic growth : A cross-country empirical study. Cambridge, Mass.: MIT Press.

Batley, R., Larbi, G. A. and Palgrave Connect (Online service) (2004) *The changing role of government : the reform of public services in developing countries*. Palgrave Macmillan. Available at: https://books.google.co.uk/books?hl=en&lr=&id=t0GEDAAAQBAJ&oi=fnd&pg=PR5&dq=public+goods+delivery+developing+countries&ots=b45g3We99Y&sig=dzYIu8SkkOut2TfK5FN0CLzsp4s&redir_esc=y#v=onepage&q=public goods delivery developing countries&f=false (Accessed: 6 July 2018).

Batley, R., McCourt, W. and Mcloughlin, C. (2012) 'Editorial', *Public Management Review*. Routledge , 14(2), pp. 131–144. doi: 10.1080/14719037.2012.657840.

Batley, R. and Mcloughlin, C. (2010) ‘Engagement with Non-State Service Providers in Fragile States: Reconciling State-Building and Service Delivery’, *Development Policy Review*. Wiley/Blackwell (10.1111), 28(2), pp. 131–154. doi: 10.1111/j.1467-7679.2010.00478.x.

Baumol, W. J. (1990) ‘Entrepreneurship: Productive, unproductive and destructive. 98 J’, *Pol. Econ*, 893.

Baysinger, B. D. (1984) ‘Domain Maintenance as an Objective of Business Political Activity: An Expanded Typology’, *Academy of Management Review*. Academy of Management Briarcliff Manor, NY 10510, 9(2), pp. 248–258. doi: 10.5465/amr.1984.4277642.

Beaver, G. and Prince, C. (2004) ‘Management, strategy and policy in the UK small business sector: a critical review’, *Journal of Small Business and Enterprise Development*, 11(1), pp. 34–49. Available at: https://search.proquest.com/docview/219320189?rfr_id=info%3Axri%2Fsid%3Aprimo (Accessed: 5 December 2018).

Bennett, S. *et al.* (2011) ‘Sustainability of donor programs: evaluating and informing the transition of a large HIV prevention program in India to local ownership’, *Global Health Action*. Taylor & Francis, 4(1), p. 7360. doi: 10.3402/gha.v4i0.7360.

Bergek, A. *et al.* (2008) ‘Analyzing the functional dynamics of technological innovation systems: A scheme of analysis’, *Research Policy*. North-Holland, 37(3), pp. 407–429. doi: 10.1016/J.RESPOL.2007.12.003.

Berger, P. L. and Luckmann, T. (1991) The social construction of reality : a treatise in the sociology of knowledge. Penguin.

Bernstein, J. A. *et al.* (2008) ‘The health effects of nonindustrial indoor air pollution’, *Journal of Allergy and Clinical Immunology*. Mosby, 121(3), pp. 585–591. doi: 10.1016/J.JACI.2007.10.045.

Besley, T. and Burgess, R. (2002) ‘The Political Economy of Government Responsiveness: Theory and Evidence from India’, *The Quarterly Journal of Economics*. Oxford University Press, 117(4), pp. 1415–1451. doi: 10.1162/003355302320935061.

Bhattacharyya, Subhes C (2013) ‘Financing energy access and off-grid electrification: A review of status, options and challenges’, *Renewable and Sustainable Energy Reviews*. Elsevier, 20, pp. 462–472.

Bhattacharyya, Subhes C. (2013) ‘Financing energy access and off-grid electrification: A review of status, options and challenges’, *Renewable and Sustainable Energy Reviews*. Elsevier, 20, pp. 462–472. doi: 10.1016/j.rser.2012.12.008.

Bhattacharyya, S. C. (2014) ‘Viability of off-grid electricity supply using rice husk: A case study from South Asia’, *Biomass and Bioenergy*. Pergamon, 68, pp. 44–54. doi: 10.1016/J.BIOMBIOE.2014.06.002.

Birnbaum, P. H. (1985) ‘Political strategies of regulated organizations as functions of context and fear’, *Strategic Management Journal*. Wiley-Blackwell, 6(2), pp. 135–150. doi: 10.1002/smj.4250060204.

Bitektine, A. and Haack, P. (2015) ‘The “macro” and the “micro” of legitimacy: Toward a multilevel theory of the legitimacy process’, *Academy of Management Review*. Academy of Management Briarcliff Manor, NY, 40(1), pp. 49–75.

Bloomberg NEF (2017) *Private equity deals signal profits in off-grid solar*, *Bloomberg NEF*. Available at: https://about.bnef.com/blog/private-equity-deals-signal-profits-off-grid-solar/ (Accessed: 26 April 2019).

Bluedorn, A. C. *et al.* (1994) ‘The Interface and Convergence of the Strategic Management and Organizational Environment Domains’, *Journal of Management*. Sage PublicationsSage CA: Thousand Oaks, CA, 20(2), pp. 201–262. doi: 10.1177/014920639402000201.

Blum, N. U., Bening, C. R. and Schmidt, T. S. (2015) ‘An analysis of remote electric mini-grids in Laos using the Technological Innovation Systems approach’, *Technological Forecasting and Social Change*. North-Holland, 95, pp. 218–233. doi: 10.1016/J.TECHFORE.2015.02.002.

Blumentritt, T. P. (2003) ‘Foreign Subsidiaries’ Government Affairs Activities’, *Business & Society*. SAGE Publications, 42(2), pp. 202–233. doi: 10.1177/0007650303042002003.

Blumentritt, T. P. and Nigh, D. (2002) ‘The Integration of Subsidiary Political Activities in Multinational Corporations’, *Journal of International Business Studies*. Palgrave Macmillan UK, 33(1), pp. 57–77. doi: 10.1057/palgrave.jibs.8491005.

Bocken, N. M. P. *et al.* (2014) ‘A literature and practice review to develop sustainable business model archetypes’, *Journal of Cleaner Production*. Elsevier Ltd, 65, pp. 42–56. doi: 10.1016/j.jclepro.2013.11.039.

Boddewyn, J. J. and Brewer, T. L. (1994) ‘International-business political behavior: New theoretical directions’, *Academy of management review*. Academy of Management Briarcliff Manor, NY 10510, 19(1), pp. 119–143.

Börzel, T. A. and Risse, T. (2002) ‘Public-Private Partnerships : Effective and Legitimate Tools of International Governance’, *On the Reconstitution of Political Authority*, (0), pp. 0–22. doi: 10.3362/9781908176202.

Brady, H. E. (2002) ‘Models of Causal Inference: Going Beyond the Neyman-Rubin-Holland Theory’, in *Annual Meetings of the Political Methodology Group*. University of Washington.

Brass, J. N. *et al.* (2012) ‘Power for Development: A Review of Distributed Generation Projects in the Developing World’, *Annual Review of Environment and Resources*, 37(1), pp. 107–136. doi: 10.1146/annurev-environ-051112-111930.

BREDA (2017) *E-Tender Cancellation Notice BREDA/Tenders/SPV/SWPS/19/2017-18*. Available at: http://www.breda.bih.nic.in/Uploads/Cancelled Tender/_260720171231.pdf (Accessed: 4 December 2018).

Bruce, S. and Stephenson, S. (2016) SDG 7 on Sustainable Energy for All: Contributions of International Law, Policy and Governance.

BT (2018) ‘India achieves 20 GW solar capacity goal four years ahead of deadline’, *Business Today*, 31 January. Available at: https://www.businesstoday.in/current/economy-politics/india-achieves-20-gw-solar-capacity-goal-4-years-ahead-deadline/story/269266.html (Accessed: 9 October 2018).

Burger, A. (2018) ‘BBOXX Emerges as Key Player in Togo’s Solar-Fueled Electrification Drive’, *Solar Magazine*, 14 November. Available at:

https://solarmagazine.com/bboxx-emerges-as-key-player-togo-solar-fueled-electrification-drive/ (Accessed: 4 December 2018).

Burr, V. (1995) An introduction to social constructionism. Routledge.

Byumvuhore, F. (2018) ‘Off-grid communities set to benefit from solar powered rural homes’, *The New Times*, 21 November. Available at: https://www.newtimes.co.rw/news/featured-grid-communities-set-benefit-solar-powered-rural-homes-0 (Accessed: 4 December 2018).

Cabraal, A., Cosgrove-Davies, M. and Schaeffer, L. (1996) ‘Best practices for photovoltaic household electrification programs’, *Conference Record of the Twenty Fifth IEEE Photovoltaic Specialists Conference 1996*, pp. 1357–1362. doi: 10.1109/PVSC.1996.564385.

Cammett, M. (2007) ‘Business–Government Relations and Industrial Change: The Politics of Upgrading in Morocco and Tunisia’, *World Development*. Pergamon, 35(11), pp. 1889–1903. doi: 10.1016/J.WORLDDEV.2007.01.003.

Carson, D. and Coviello, N. (1996) ‘Qualitative research issues at the marketing/ entrepreneurship interface’, *Marketing Intelligence & Planning*, 14(November 1996), pp. 51–58. doi: 10.1108/02634509610131162.

CEA (2018) *Growth of the Electricity Sector in India from 1947-2018*. New Delhi. Available at: http://www.cea.nic.in/reports/others/planning/pdm/growth_2018.pdf.

CEEW (2013) *Developing Effective Networks for Energy Access: An Analysis*. Available at: http://ceew.in/pdf/an_analysis_on_developing_effective_networks_for_energy_access.pdf.

CEL (2019) Central Electronics Ltd.

Chakrabarti, Snigdha and Chakrabarti, Subhendu (2002) ‘Rural electrification programme with solar energy in remote region–a case study in an island’, *Energy Policy*. Elsevier, 30(1), pp. 33–42. doi: 10.1016/S0301-4215(01)00057-X.

Chakrabarty, S. and Bass, A. E. (2014) ‘Institutionalizing Ethics in Institutional Voids: Building Positive Ethical Strength to Serve Women Microfinance Borrowers in

Negative Contexts', *Journal of Business Ethics*. Springer Netherlands, 119(4), pp. 529–542. doi: 10.1007/s10551-013-1833-9.

Charmaz, K. (2006) *Constructing grounded theory : a practical guide through qualitative analysis*. Sage Publications. Available at: http://cul.worldcat.org/title/constructing-grounded-theory-methods-for-the-21st-century/oclc/926701765?referer=brief_results (Accessed: 5 January 2018).

Chatterjee, E. (2018) 'The politics of electricity reform: Evidence from West Bengal, India', *World Development*. Pergamon, 104, pp. 128–139. doi: 10.1016/J.WORLDDEV.2017.11.003.

Chaurey, A. and Kandpal, T. C. (2010) 'Assessment and evaluation of PV based decentralized rural electrification: An overview', *Renewable and Sustainable Energy Reviews*. Pergamon, 14(8), pp. 2266–2278. doi: 10.1016/J.RSER.2010.04.005.

Chesbrough, H. (2010) 'Business Model Innovation: Opportunities and Barriers', *Long Range Planning*. Pergamon, 43(2–3), pp. 354–363. doi: 10.1016/J.LRP.2009.07.010.

Choudhary, S. (2017) 'After diesel and LPG, government to now end subsidy on kerosene', *The Economic Times*, 3 August. Available at: https://economictimes.indiatimes.com/industry/energy/oil-gas/after-diesel-and-lpg-government-to-now-end-subsidy-on-kerosene/articleshow/59888617.cms (Accessed: 11 July 2018).

Christensen, T. and Lægreid, P. (2016) The Ashgate research companion to new public management. Routledge.

CLEAN (2018) *Overview : Clean Energy Access Network*. Available at: http://thecleannetwork.org/about-us/overview.aspx (Accessed: 1 June 2018).

Cohen, S. (2001) 'A strategic framework for devolving responsibility and functions from government to the private sector', *Public Administration Review*, 61(4), pp. 432–440. doi: 10.1111/0033-3352.00047.

Comello, S. D. *et al.* (2017) 'Enabling Mini-Grid Development in Rural India', *World Development*. Pergamon, 93, pp. 94–107. doi: 10.1016/J.WORLDDEV.2016.12.029.

Common, R. (2017) ‘Public management and policy transfer in South-East Asia’, in *Policy transfer in global perspective*. Routledge, pp. 143–161.

Conge, P. J. (1988) ‘The concept of political participation: Toward a definition’. JSTOR.

Cook, P. (2011) ‘Infrastructure, rural electrification and development’, *Energy for Sustainable Development*. Elsevier, 15(3), pp. 304–313. doi: 10.1016/J.ESD.2011.07.008.

Cook, P. and Uchida, Y. (2008) ‘The performance of privatised enterprises in developing countries’, *Journal of Development Studies*, 44(9), pp. 1342–1353. doi: 10.1080/00220380802264838.

Cook, R. G. (1996) ‘Influencing government: what do small firms do?’, *Journal os Small Business Strategy*, 7(1), pp. 49–68.

Cook, R. G. and Barry, D. (1993) ‘When Should the Small Firm Be Involved in Public Policy ?’, *Journal of Small Business Management*, 32(1), pp. 39–50.

Cook, R. G. and Barry, D. (1995) ‘Shaping the External Environment: A Study of Small Firms’ Attempts to Influence Public Policy’, *Business & Society*, 34(3), pp. 317–344.

Cook, R. G. and Fox, D. R. (2000) ‘Resources, Frequency, and Methods: An Analysis of Small and Medium-Sized Firms’ Public Policy Activities’, *Business & Society*. Sage PublicationsSage CA: Thousand Oaks, CA, 39(1), pp. 94–113. doi: 10.1177/000765030003900107.

Corbin, J. and Strauss, A. (2008) Basics of Qualitative Research: Techniqures and Procedures for Developing Grounded Theory. 3rd edn. London: SAGE Publications.

Cordella, T. (2018) *Optimizing Finance for Development*. 8320. doi: 10.4324/9780203392294.

Coston, J. M. (1998) ‘A Model and Typology of Government-NGO Relationships’, *Nonprofit and Voluntary Sector Quarterly*, 27. Available at: https://heinonline.org/HOL/Page?handle=hein.journals/npvolsq27&id=350&div=25&collection=journals (Accessed: 20 June 2018).

Currie-Alder, B. et al. (2014) International development: ideas, experience, and prospects. OUP Oxford.

Dahan, N. (2005) 'Can There Be a Resource-Based View of Politics?', *International Studies of Management & Organization*, 35(2). Available at: https://www.tandfonline.com/doi/abs/10.1080/00208825.2005.11043729 (Accessed: 6 June 2018).

Das, K. K. and Banerjee, S. (2018) 'Micro, Small & Medium Enterprises in India : A Way Forward', *Journal of Modern Management & Entrepreneurship*, 8(2), pp. 413–420.

Dawson, P. and Buchanan, D. (2005) 'The way it really happened: Competing narratives in the political process of technological change', *Human Relations*. Sage Publications London, Thousand Oaks CA, New Delhi, 58(7), pp. 845–865.

Department of Energy (2012) *Non Grid Electrification Policy Guidelines*. Republic of South Africa.

Desa, G. (2012) 'Resource mobilization in international social entrepreneurship: Bricolage as a mechanism of institutional transformation', *Entrepreneurship theory and practice*. SAGE Publications Sage CA: Los Angeles, CA, 36(4), pp. 727–751.

Desa, G. and Basu, S. (2013) 'Optimization or bricolage? Overcoming resource constraints in global social entrepreneurship', *Strategic Entrepreneurship Journal*. Wiley Online Library, 7(1), pp. 26–49.

Domberger, S. and Jensen, P. (1997) 'Contracting out by the public sector: theory, evidence, prospects', *Oxford Review of Economic Policy*. Oxford University Press, 13(4), pp. 67–78. doi: 10.1093/oxrep/13.4.67.

Donahue, J. D. (1989) *The privatization decision: Public ends, private means*. New York: Basic Books New York.

Dornan, M. (2011) 'Solar-based rural electrification policy design: The Renewable Energy Service Company (RESCO) model in Fiji', *Renewable Energy*. Pergamon, 36(2), pp. 797–803. doi: 10.1016/J.RENENE.2010.07.015.

Dortolina, C. A. and Nadira, R. (2005) 'The Loss That is Unknown is No Loss At All: A Top-Down/Bottom-Up Approach for Estimating Distribution Losses', *IEEE Transactions on Power Systems*, 20(2), pp. 1119–1125. doi: 10.1109/TPWRS.2005.846104.

Doty, D. H. and Glick, W. H. (1994) 'Typologies as a Unique Form of Theory Building: Toward Improved Understanding and Modeling', *The Academy of Management Review*, 19(2), p. 230. doi: 10.2307/258704.

Drees, J. M. and Heugens, P. P. M. A. R. (2013) 'Synthesizing and Extending Resource Dependence Theory', *Journal of Management*. SAGE PublicationsSage CA: Los Angeles, CA, 39(6), pp. 1666–1698. doi: 10.1177/0149206312471391.

Dreher, A., Minasyan, A. and Nunnenkamp, P. (2015) 'Government ideology in donor and recipient countries: Does ideological proximity matter for the effectiveness of aid?', *European Economic Review*. North-Holland, 79, pp. 80–92. doi: 10.1016/J.EUROECOREV.2015.07.004.

Drory, A. and Romm, T. (1990) 'The definition of organizational politics: A review', *Human relations*. Sage Publications Sage CA: Thousand Oaks, CA, 43(11), pp. 1133–1154.

Dsouza, S. (2019) *100% electrification: Assessing ground reality*, *Brookings*. Available at: https://www.brookings.edu/opinions/100-electrification-assessing-ground-reality/ (Accessed: 26 April 2019).

Duffield, C. F. (2010) 'Different delivery models', in Hodge, G. E., Greve, C., and Boardman, A. E. (eds) *International Handbook on Public-Private Partnerships*. Cheltenham: Edward Elgar Publishing.

Duke, R. D., Jacobson, A. and Kammen, D. M. (2002) 'Photovoltaic module quality in the Kenyan solar home systems market', *Energy Policy*. Elsevier, 30(6), pp. 477–499. doi: 10.1016/S0301-4215(01)00108-2.

Dutz, M. A., Ordover, J. A. and Willig, R. D. (2000) 'Entrepreneurship, access policy and economic development: Lessons from industrial organization', *European Economic Review*. North-Holland, 44(4–6), pp. 739–747. doi: 10.1016/S0014-2921(00)00030-1.

Edler, J. and Fagerberg, J. (2017) ‘Innovation policy: what, why, and how’, *Oxford Review of Economic Policy*. Oxford University Press, 33(1), pp. 2–23. doi: 10.1093/oxrep/grx001.

Eisenhardt, K. M. (1989) ‘Building Theories from Case Study’, *The Academy of Management Review*, 14(4), pp. 532–550.

Entwistle, T. and Martin, S. (2005) ‘From competition to collaboration in public service delivery: A new agenda for research’, *Public Administration*, 83(1), pp. 233–242. doi: 10.1111/j.0033-3298.2005.00446.x.

Eriksson, P. and Kovalainen, A. (2008) *Qualitative Methods in Business Research*. London: SAGE Publications.

ESMAP (2015) *Beyond Connections: Energy Access Redefined, Technical Report 008/15*. Available at: http://www.worldbank.org/content/dam/Worldbank/Topics/Energy and Extract/Beyond_Connections_Energy_Access_Redefined_Exec_ESMAP_2015.pdf.

Esmark, A. (2009) ‘The Functional Differentiation of Governance: Public Governance beyond Hierarchy, Market and Networks’, *Public Administration*. Blackwell Publishing Ltd, 87(2), pp. 351–370. doi: 10.1111/j.1467-9299.2009.01759.x.

ET Bureau (2017) ‘Saubhagya: Government launches Saubhagya scheme for household electrification - The Economic Times’, *The Economic Times*, 25 September. Available at: https://economictimes.indiatimes.com/news/economy/policy/government-launches-saubhagya-scheme-for-household-electrification/articleshow/60828887.cms (Accessed: 7 April 2018).

Farmer, D. J. (1995) The language of public administration: Bureaucracy, modernity, and postmodernity. University of Alabama Press.

Flyvbjerg, B. (2006) ‘Five Misunderstandings About Case-Study Research’, *Qualitative Inquiry*. Sage PublicationsSage CA: Thousand Oaks, CA, 12(2), pp. 219–245. doi: 10.1177/1077800405284363.

Foehringer Merchant, E. (2018) ‘Off Grid Electric Secures $55 Million in Series D Financing’, *Greentech Media*, 24 January. Available at: https://www.greentechmedia.com/articles/read/55-million-investment-sets-new-record-for-off-grid-service-companies#gs.vLe4gJw (Accessed: 4 December 2018).

Foster, V. and Steinbuks, J. (2009) *Paying The Price For Unreliable Power Supplies: In-House Generation Of Electricity By Firms In Africa*. The World Bank (Policy Research Working Papers). doi: 10.1596/1813-9450-4913.

Foxon, T. J. *et al.* (2005) 'UK innovation systems for new and renewable energy technologies: drivers, barriers and systems failures', *Energy Policy*. Elsevier, 33(16), pp. 2123–2137. doi: 10.1016/J.ENPOL.2004.04.011.

Freeman, C. (1982) 'The economics of industrial innovation'.

Freeman, C. and Soete, L. (1997) 'Development and the diffusion of technology', *The Economics of Industrial Innovation*. London: Pinter Publishers, pp. 351–365.

Friebe, C. A., Flotow, P. von and Täube, F. A. (2013) 'Exploring the link between products and services in low-income markets-Evidence from solar home systems', *Energy Policy*, 52, pp. 760–769. doi: 10.1016/j.enpol.2012.10.038.

Frynas, J. G. and Yamahaki, C. (2019) 'Corporate Social Responsibility: An Outline of Key Concepts, Trends, and Theories', in *Practising CSR in the Middle East*. Cham: Springer International Publishing, pp. 11–37. doi: 10.1007/978-3-030-02044-6_2.

Fuller, S. and McCauley, D. (2016) 'Framing energy justice: perspectives from activism and advocacy', *Energy Research & Social Science*. Elsevier, 11, pp. 1–8. doi: 10.1016/J.ERSS.2015.08.004.

Gabriel, C. A. and Kirkwood, J. (2016) 'Business models for model businesses: Lessons from renewable energy entrepreneurs in developing countries', *Energy Policy*. Elsevier, 95, pp. 336–349. doi: 10.1016/j.enpol.2016.05.006.

Gangopadhyay, S., Ramaswami, B. and Wadhwa, W. (2005) 'Reducing subsidies on household fuels in India: how will it affect the poor?', *Energy Policy*. Elsevier, 33(18), pp. 2326–2336. doi: 10.1016/J.ENPOL.2004.04.024.

Garg, V. *et al.* (2017) *Kerosene Subsidies in India: The status quo, challenges and the emerging path to reform*. Available at: http://www.iisd.org/sites/default/files/publications/kerosene-in-india-staus-quo-path-to-reform.pdf.

Geels, F. W. (2002) ‘Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study’, *Research policy*. Elsevier, 31(8–9), pp. 1257–1274.

Geels, F. W. *et al.* (2017) ‘The socio-technical dynamics of low-carbon transitions’, *Joule*. Elsevier, 1(3), pp. 463–479.

GEF (2013) Lesotho Renewable Energy-Based Rural Electrification Project (LREBRE) DRAFT Terminal Evaluation Report. Lesotho.

George, A. L. and Bennett, A. (2005) *Case studies and theory development in the social sciences*. Cambridge, Mass: MIT Press (BCSIA studies in international security).

Gerring, J. (2005) ‘Causation: A Unified Framework for the Social Sciences’, *Journal of Theoretical Politics*, 17(2), pp. 163–198. doi: 10.1177/0951629805050859.

Getz, K. A. (2002) ‘Public affairs and political strategy: Theoretical foundations’, *Journal of Public Affairs*, 1(4), pp. 305–329. doi: 10.1002/pa.77.

Gilbert, B. A., McDougall, P. P. and Audretsch, D. B. (2006) ‘New venture growth: A review and extension’, *Journal of management*. Sage Publications Sage CA: Thousand Oaks, CA, 32(6), pp. 926–950.

Gilson, L., Russell, S. and Buse, K. (1995) ‘The political economy of user fees with targeting: Developing equitable health financing policy’, *Journal of International Development*. Wiley-Blackwell, 7(3), pp. 369–401. doi: 10.1002/jid.3380070305.

Girardeau, H. and Pattanayak, S. K. (2018) ‘Environment for Development Household Solar Adoption in Low- and Middle-Income Countries A Systematic Review’, *Environment for Development Discussion Paper Series*, 18–10(June).

Girth, A. M. *et al.* (2012) ‘Outsourcing public service delivery: Management responses in noncompetitive markets’, *Public Administration Review*, 72(6), pp. 887–900. doi: 10.1111/j.1540-6210.2012.02596.x.

Glaser, B. G. and Strauss, A. L. (1967) The discovery of grounded theory : strategies for qualitative research. Aldine Publishing Company.

Glemarec, Y. (2012) ‘Financing off-grid sustainable energy access for the poor’, *Energy Policy*. Elsevier, 47(SUPPL.1), pp. 87–93. doi: 10.1016/j.enpol.2012.03.032.

GOGLA (2018) Standardized Impact Metrics for the Off-Grid Solar Energy Sector Table of Contents.

GoI (2003) *The Electricity Act, 2003*. India. Available at: http://cercind.gov.in/Act-with-amendment.pdf.

GoI (2015) *Skill Council for Green Jobs*. Available at: http://sscgj.in/ (Accessed: 1 October 2018).

GoI (2018) *Saubhagya Dashboard*. Available at: http://saubhagya.gov.in/ (Accessed: 11 April 2018).

González-Pernía, J. L., Jung, A. and Peña, I. (2015) 'Innovation-driven entrepreneurship in developing economies', *Entrepreneurship & Regional Development*. Routledge, 27(9–10), pp. 555–573. doi: 10.1080/08985626.2015.1075602.

Goodsell, C. T. (2003) The case for bureaucracy: A public administration polemic. Sage.

Government of Bihar (2014) *Corporate Social Responsibility (CSR) Policy, Government of Bihar*. Available at: http://finance.bih.nic.in/documents/csr-policy.pdf (Accessed: 26 October 2017).

Government of Rajasthan (2014) *Solar for a Brighter Future: Rajasthan Solar Energy Policy, 2014*. India. Available at: http://mnre.gov.in/file-manager/UserFiles/Grid-Connected-Solar-Rooftop-policy/Rajasthan-Solar-Energy-Policy-2014.pdf.

Government of Uttar Pradesh (2016) 'Uttar Pradesh Mini-Grid Policy'.

Government of Uttar Pradesh (2017) *Uttar Pradesh Solar Energy Policy, 2017*. Available at: http://www.mohfw.nic.in/NRHM/State Files/up.htm.

Guest, G., Bunce, A. and Johnson, L. (2006) 'How Many Interviews Are Enough?', *Field Methods*, 18(1), pp. 59–82. doi: 10.1177/1525822X05279903.

Gujba, H. *et al.* (2012) 'Financing low carbon energy access in Africa', *Energy Policy*. Elsevier, 47, pp. 71–78. doi: 10.1016/J.ENPOL.2012.03.071.

Gupta, A. (2005) 'Narratives of corruption', *Ethnography*. Sage PublicationsSage CA: Thousand Oaks, CA, 6(1), pp. 5–34. doi: 10.1177/1466138105055663.

Haanyika, C. M. (2006) ‘Rural electrification policy and institutional linkages’, *Energy Policy*, 34(17), pp. 2977–2993. doi: 10.1016/j.enpol.2005.05.008.

Haanyika, C. M. (2008) ‘Rural electrification in Zambia: A policy and institutional analysis’, *Energy Policy*. Elsevier, 36(3), pp. 1044–1058. doi: 10.1016/J.ENPOL.2007.10.031.

Hadani, M., Munshi, N. and Clark, K. (2017) ‘The More You Give, the More You Get? The Impact of Corporate Political Activity on the Value of Government Contracts’, *Business and Society Review*. John Wiley & Sons, Ltd (10.1111), 122(3), pp. 421–448. doi: 10.1111/basr.12122.

Hair, J. F. J. *et al.* (2007) *Research Methods for Business*. UK Edition. Chichester: John Wiley & Sons.

Hairat, M. K. and Ghosh, S. (2017) ‘100 GW solar power in India by 2022 – A critical review’, *Renewable and Sustainable Energy Reviews*. Pergamon, 73, pp. 1041–1050. doi: 10.1016/J.RSER.2017.02.012.

Hanna, R. *et al.* (2017) ‘Evaluating business models for microgrids: Interactions of technology and policy’, *Energy Policy*. Elsevier, 103, pp. 47–61. doi: 10.1016/J.ENPOL.2017.01.010.

Harish, S. M. *et al.* (2013) ‘Adoption of solar home lighting systems in india: What might we learn from karnataka?’, *Energy Policy*. Elsevier, 62, pp. 697–706. doi: 10.1016/j.enpol.2013.07.085.

Harish, S. M., Morgan, G. M. and Subrahmanian, E. (2014a) ‘When does unreliable grid supply become unacceptable policy? Costs of power supply and outages in rural India’, *Energy Policy*. Elsevier, 68, pp. 158–169. doi: 10.1016/J.ENPOL.2014.01.037.

Harish, S. M., Morgan, G. M. and Subrahmanian, E. (2014b) ‘When does unreliable grid supply become unacceptable policy? Costs of power supply and outages in rural India’, *Energy Policy*. Elsevier, 68, pp. 158–169. doi: 10.1016/j.enpol.2014.01.037.

Harish, S. M. and Raghavan, S. V (2011) ‘Redesigning the National Solar Mission’, *Economic and Political Weekly*, XLVI(23), pp. 51–58.

Hart, D. K. (1984) ‘The Virtuous Citizen, the Honorable Bureaucrat, and "Public" Administration’, *Public Administration Review*. WileyAmerican Society for Public Administration, 44, p. 111. doi: 10.2307/975550.

Hearn, J. (1998) ‘The “NGO-isation” of Kenyan society: USAID & the restructuring of health care’, *Review of African Political Economy*. Taylor & Francis Group , 25(75), pp. 89–100. doi: 10.1080/03056249808704294.

Den Heeten, T. *et al.* (2017) ‘Understanding the present and the future electricity needs: Consequences for design of future Solar Home Systems for off-grid rural electrification’, in *2017 International Conference on the Domestic Use of Energy (DUE)*. IEEE, pp. 8–15. doi: 10.23919/DUE.2017.7931816.

Hefetz, Amir and Warner, M. E. (2012) ‘Contracting or public delivery? the importance of service, market, and management characteristics’, *Journal of Public Administration Research and Theory*, 22(2), pp. 289–317. doi: 10.1093/jopart/mur006.

Hefetz, A. and Warner, M. E. (2012) ‘Contracting or Public Delivery? The Importance of Service, Market, and Management Characteristics’, *Journal of Public Administration Research and Theory*. Oxford University Press, 22(2), pp. 289–317. doi: 10.1093/jopart/mur006.

Hekkert, M. P. *et al.* (2007) ‘Functions of innovation systems: A new approach for analysing technological change’, *Technological Forecasting and Social Change*. North-Holland, 74(4), pp. 413–432. doi: 10.1016/J.TECHFORE.2006.03.002.

Hermes, N. and Lensink, R. (2011) ‘Microfinance: Its Impact, Outreach, and Sustainability’, *World Development*. Elsevier Ltd, 39(6), pp. 875–881. doi: 10.1016/j.worlddev.2009.10.021.

Hillman, A. J. and Hitt, M. A. (1999) ‘Corporate political strategy formulation: A model of appoach, participation, and strategy decisions’, *Academy of Management Review*, 24(4), pp. 825–842. doi: 10.5465/AMR.1999.2553256.

Hillman, A. J., Keim, G. D. and Schuler, D. (2004) 'Corporate Political Activity: A Review and Research Agenda', *Journal of Management*. No longer published by Elsevier, 30(6), pp. 837–857. doi: 10.1016/J.JM.2004.06.003.

Hillman, A. J., Withers, M. C. and Collins, B. J. (2009) 'Resource Dependence Theory: A Review', *Journal of Management*. SAGE PublicationsSage CA: Los Angeles, CA, 35(6), pp. 1404–1427. doi: 10.1177/0149206309343469.

Hodge, G. (1998) 'Contracting Public Sector Services: A Meta-Analytic Perspective of the International Evidence', *Australian Journal of Public Administration*. Wiley/Blackwell (10.1111), 57(4), pp. 98–110. doi: 10.1111/j.1467-8500.1998.tb01565.x.

Hoggett, P. (1996) 'New modes of control in the public service', *Public administration*. Wiley Online Library, 74(1), pp. 9–32.

Holtorf, H. *et al.* (2016) 'Incorporating the institutions' perspective into a proposed model for assessing success of solar home system implementations', in *2016 4th International Conference on the Development in the in Renewable Energy Technology (ICDRET)*. IEEE, pp. 1–7. doi: 10.1109/ICDRET.2016.7421515.

Hood, C. (1991) 'A public management for all seasons?', *Public administration*. Wiley Online Library, 69(1), pp. 3–19.

Hood, C. (1995) 'The "New Public Management" in the 1980s: variations on a theme', *Accounting, organizations and society*. Pergamon, 20(2–3), pp. 93–109.

Hossain Mondal, M. A. (2010) 'Economic viability of solar home systems: Case study of Bangladesh', *Renewable Energy*. Pergamon, 35(6), pp. 1125–1129. doi: 10.1016/J.RENENE.2009.10.038.

Hotho, J. J. and Pedersen, T. (2012) 'Beyond the "rules of the game": three institutional approaches and how they matter for international business', *Handbook of institutional approaches to international business*. Edward Elgar Publishing Cheltenham, 236.

Howlett, M. (2009) 'Governance modes, policy regimes and operational plans: A multi-level nested model of policy instrument choice and policy design', *Policy Sciences*. Springer, 42(1), pp. 73–89.

Howlett, M. (2011) Designing Public Policies: Principles and instruments. Oxon: Routledge.

Howlett, M. and Rayner, J. (2007) 'Design principles for policy mixes: cohesion and coherence in "new governance arrangements"', *Policy and Society*. Taylor & Francis, 26(4), pp. 1–18.

Hughes, O. E. (2012) *Public management and administration: An introduction*. Macmillan International Higher Education.

Hysing, E. (2009) 'From Government to Governance? A Comparison of Environmental Governing in Swedish Forestry and Transport', *Governance*. Blackwell Publishing Inc, 22(4), pp. 647–672. doi: 10.1111/j.1468-0491.2009.01457.x.

IEA (2017) Energy Access Outlook 2017: From Poverty to Prosperity.

IFC (2012) *Lighting Asia: Solar Off-Grid Lighting*. Available at: http://www.ifc.org/wps/wcm/connect/311790804b5ca8d783fbc3bbd578891b/Lighting-Asia-offgrid-lighting-Report072512.pdf?MOD=AJPERES (Accessed: 7 August 2017).

IIPS (2015) *National Family Health Survey*. Available at: http://rchiips.org/nfhs/factsheet_NFHS-4.shtml# (Accessed: 9 October 2018).

Innovation Energie Developpement (2014) National Electrification Program Prospectus.

ISO (2018) *ISO/TC 180 - Solar energy*. Available at: https://www.iso.org/committee/54018/x/catalogue/ (Accessed: 27 August 2018).

Jack, G. and Westwood, R. (2006) 'Postcolonialism and the politics of qualitative research in international business', *Management International Review*. Gabler Verlag, 46(4), pp. 481–501. doi: 10.1007/s11575-006-0102-x.

Jacobsson, S. and Bergek, A. (2006) 'A Framework for Guiding Policy-makers Intervening in Emerging Innovation Systems in "Catching-Up" Countries', *The European Journal of Development Research*. Palgrave Macmillan UK, 18(4), pp. 687–707. doi: 10.1080/09578810601094902.

Jain, A. and Ramji, A. (2016) 'Reforming Kerosene Subsidies in India: Towards better alternatives', (April).

Jamali, D. and Karam, C. (2018) ‘Corporate social responsibility in developing countries as an emerging field of study’, *International Journal of Management Reviews*. Wiley Online Library, 20(1), pp. 32–61.

Javadi, F. S. *et al.* (2013) ‘Global policy of rural electrification’, *Renewable and Sustainable Energy Reviews*. Pergamon, 19, pp. 402–416. doi: 10.1016/J.RSER.2012.11.053.

Johnson, S. (2013) ‘From Microfinance to Inclusive Financial Markets: The Challenge of Social Regulation’, *Oxford Development Studies*. TF , 41(sup1), pp. S35–S52. doi: 10.1080/13600818.2012.734799.

Johnston, J. M. and Girth, A. M. (2012) ‘Government Contracts and “Managing the Market”: Exploring the Costs of Strategic Management Responses to Weak Vendor Competition’, *Administration and Society*, 44(1), pp. 3–29. doi: 10.1177/0095399711417396.

Jolly, S., Raven, R. and Romijn, H. (2012) ‘Upscaling of business model experiments in off-grid PV solar energy in India’, *Sustainability Science*, 7(2), pp. 199–212. doi: 10.1007/s11625-012-0163-7.

Joseph, K. L. (2010) ‘The politics of power: Electricity reform in India’, *Energy Policy*. Elsevier, 38(1), pp. 503–511. doi: 10.1016/J.ENPOL.2009.09.041.

Kabeer, N. (2018) ‘BBOXX and GE Electric Enter Partnership to Provide Solar Solutions in Congo - Mercom India’, *MERCOM India*. Available at: https://mercomindia.com/bboxx-ge-electric-partnership-solar-solutions-congo/ (Accessed: 6 October 2018).

Kalpana, K. (2016) *Women, Microfinance and the State in Neo-liberal India*. Routledge India. doi: 10.4324/9781315543321.

Kamoche, K. (1996) ‘Strategic human resource management within a resource-capability view of the firm’, *Journal of Management studies*. Wiley Online Library, 33(2), pp. 213–233.

Kapiriri, L. (2012) ‘Priority Setting in Low Income Countries: The Roles and Legitimacy of Development Assistance Partners’, *Public Health Ethics*. Oxford University Press, 5(1), pp. 67–80. doi: 10.1093/phe/phs004.

Kapiriri, L. and Martin, D. K. (2007) 'A Strategy to Improve Priority Setting in Developing Countries', *Health Care Analysis*. Springer US, 15(3), pp. 159–167. doi: 10.1007/s10728-006-0037-1.

Kapoor, K. *et al.* (2014) 'Evolution of solar energy in India: A review', *Renewable and Sustainable Energy Reviews*. Pergamon, 40, pp. 475–487. doi: 10.1016/J.RSER.2014.07.118.

Kar, S. K., Sharma, A. and Roy, B. (2016) 'Solar energy market developments in India', *Renewable and Sustainable Energy Reviews*. Pergamon, 62, pp. 121–133. doi: 10.1016/J.RSER.2016.04.043.

Karnani, A. (2007) 'The Mirage of Marketing to the Bottom of the Pyramid: How the Private Sector Can Help Alleviate Poverty', *California Management Review*, 49(4). Available at: http://journals.sagepub.com/doi/pdf/10.2307/41166407 (Accessed: 29 April 2018).

Katz, C. (1994) 'Playing the Field: Questions of Fieldwork in Geography', *The Professional Geographer*. Taylor & Francis Group , 46(1), pp. 67–72. doi: 10.1111/j.0033-0124.1994.00067.x.

Keillor, B. D., Pettijohn, C. E. and Bashaw, R. E. (2000) 'Political Activities in the Global Industrial Marketplace', *Industrial Marketing Management*. Elsevier, 29(6), pp. 613–622. doi: 10.1016/S0019-8501(00)00121-8.

Van Kersbergen, K. and Van Waarden, F. (2004) '"Governance" as a bridge between disciplines: Cross-disciplinary inspiration regarding shifts in governance and problems of governability, accountability and legitimacy', *European Journal of Political Research*. Blackwell Publishing Ltd., 43(2), pp. 143–171. doi: 10.1111/j.1475-6765.2004.00149.x.

Khan, J. and Arsalan, M. H. (2016) 'Solar power technologies for sustainable electricity generation–A review', *Renewable and Sustainable Energy Reviews*. Elsevier, 55, pp. 414–425.

Khandker, S. R. *et al.* (2014) 'Who benefits most from rural electrification? Evidence in India', *Energy Journal*, 35(2), pp. 75–96. doi: 10.5547/01956574.35.2.4.

Khanna, T. and Palepu, K. (1999) 'Policy shocks, market intermediaries, and corporate strategy: the evolution of business groups in Chile and India', *Journal of*

Economics & Management Strategy. Wiley-Blackwell, 8(2), pp. 271–310. Available at: http://ezproxy.lib.cam.ac.uk:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=2026808&site=ehost-live&scope=site.

Khanna, T. and Palepu, K. G. (1997) *Why Focused Strategies May Be Wrong for Emerging Markets*, *Harvard Business Review*. Available at: https://hbr.org/1997/07/why-focused-strategies-may-be-wrong-for-emerging-markets (Accessed: 6 June 2018).

Khanna, T., Palepu, K. G. and Bullock, R. (2008) 'House of Tata: Acquiring a Global Footprint'. Available at: https://www.hbs.edu/faculty/Pages/item.aspx?num=35985 (Accessed: 6 June 2018).

Khemani, S. (2004) 'Political cycles in a developing economy: effect of elections in the Indian States', *Journal of Development Economics*. North-Holland, 73(1), pp. 125–154. doi: 10.1016/J.JDEVECO.2003.01.002.

Khoury, T. A. and Prasad, A. (2016) 'Entrepreneurship amid concurrent institutional constraints in less developed countries', *Business & Society*. SAGE Publications Sage CA: Los Angeles, CA, 55(7), pp. 934–969.

Kilby, P. (2004) 'Is empowerment possible under a new public management environment? Some lessons from India', *International Public Management Journal*. Taylor & Francis Ltd., 7(2), p. 207.

Kobayashi, A. (1994) 'Coloring the Field: Gender, "Race," and the Politics of Fieldwork', *The Professional Geographer*. Wiley/Blackwell (10.1111), 46(1), pp. 73–80. doi: 10.1111/j.0033-0124.1994.00073.x.

Kohli, A. (1989) 'Politics of economic liberalization in India', *World Development*. Pergamon, 17(3), pp. 305–328. doi: 10.1016/0305-750X(89)90205-2.

Kolk, A. and van den Buuse, D. (2012) 'In search of viable business models for development: sustainable energy in developing countries', *Corporate Governance: The international journal of business in society*, 12(4), pp. 551–567. doi: 10.1108/14720701211267865.

Kolk, A. and Pinkse, J. (2007) 'Multinationals' Political Activities on Climate Change', *Business & Society*. Sage PublicationsSage CA: Los Angeles, CA, 46(2), pp. 201–228. doi: 10.1177/0007650307301383.

Kolk, A., Rivera-Santos, M. and Rufín, C. (2014) 'Reviewing a Decade of Research on the "Base/Bottom of the Pyramid" (BOP) Concept', *Business and Society*, 53(3), pp. 338–377. doi: 10.1177/0007650312474928.

Kolk, A., van Tulder, R. and Kostwinder, E. (2008) 'Business and partnerships for development', *European Management Journal*. Pergamon, 26(4), pp. 262–273. doi: 10.1016/J.EMJ.2008.01.007.

Krieger, H. (2018) 'Togo off-grid energy provider receives boost', *African Law & Business*, 4 December. Available at: https://www.africanlawbusiness.com/news/8846-togo-off-grid-energy-provider-receives-boost (Accessed: 4 December 2018).

Krithika, P. R. and Palit, D. (2013) 'Participatory Business Models for Off-Grid Electrification', in. Springer, London, pp. 187–225. doi: 10.1007/978-1-4471-4673-5_8.

Lam, N. L. *et al.* (2016a) 'Kerosene subsidies for household lighting in India: what are the impacts?', *Environmental Research Letters*. IOP Publishing, 11(4), p. 044014. doi: 10.1088/1748-9326/11/4/044014.

Lam, N. L. *et al.* (2016b) 'Kerosene subsidies for household lighting in India: what are the impacts?', *Environmental Research Letters*. IOP Publishing, 11(4), p. 044014. doi: 10.1088/1748-9326/11/4/044014.

Lane, J.-E. (2002) New public management: an introduction. Routledge.

Lawton, T., Mcguire, S. and Rajwani, T. (2013) 'Corporate Political Activity: A Literature Review and Research Agenda', *International Journal of Management Reviews*, 15(1), pp. 86–105. doi: 10.1111/j.1468-2370.2012.00337.x.

Lawton, T., Rajwani, T. and Doh, J. (2013) 'The antecedents of political capabilities: A study of ownership, cross-border activity and organization at legacy airlines in a deregulatory context', *International Business Review*. Pergamon, 22(1), pp. 228–242. doi: 10.1016/J.IBUSREV.2012.04.001.

Lecy, J. D. and Van Slyke, D. M. (2013) ‘Nonprofit sector growth and density: Testing theories of government support’, *Journal of Public Administration Research and Theory*, 23(1), pp. 189–214. doi: 10.1093/jopart/mus010.

Lemaire, X. (2011) ‘Off-grid electrification with solar home systems: The experience of a fee-for-service concession in South Africa’, *Energy for Sustainable Development*. International Energy Initiative, 15(3), pp. 277–283. doi: 10.1016/j.esd.2011.07.005.

Levi-Faur, D. (2009) ‘Regulatory capitalism and the reassertion of the public interest’, *Policy and Society*, 27(3), pp. 181–191. doi: 10.1016/j.polsoc.2008.10.002.

Liming, H. (2009) ‘Financing rural renewable energy: A comparison between China and India’, *Renewable and Sustainable Energy Reviews*. Pergamon, 13(5), pp. 1096–1103. doi: 10.1016/J.RSER.2008.03.002.

Lin, A. C. (1998) ‘Bridging Positivist and Interpretivist Approaches to Qualitative Methods’, *Policy Studies Journal*, 26(1), pp. 162–180. doi: 10.1111/j.1541-0072.1998.tb01931.x.

Linder, S. H. (1999) ‘Coming to Terms With the Public-Private Partnership’, *American Behavioral Scientist*. Sage Publications, 43(1), pp. 35–51. doi: 10.1177/00027649921955146.

Lister, S. (2003) ‘NGO Legitimacy’, *Critique of Anthropology*. SAGE Publications, 23(2), pp. 175–192. doi: 10.1177/0308275X03023002004.

Loader, K. (2007) ‘The Challenge of Competitive Procurement: Value for Money Versus Small Business Support’, *Public Money and Management*, 27(5), pp. 307–314. doi: 10.1111/j.1467-9302.2007.00601.x.

Lundvall, B.-A. (1992) ‘National systems of innovation: An analytical framework’, *London: Pinter*.

Luthra, S. *et al.* (2015) ‘Barriers to renewable/sustainable energy technologies adoption: Indian perspective’, *Renewable and Sustainable Energy Reviews*. Pergamon, 41, pp. 762–776. doi: 10.1016/J.RSER.2014.08.077.

Lux, S., Crook, T. R. and Woehr, D. J. (2011) ‘Mixing Business With Politics: A Meta-Analysis of the Antecedents and Outcomes of Corporate Political Activity’, *Journal of Management*. SAGE PublicationsSage CA: Los Angeles, CA, 37(1), pp. 223–247. doi: 10.1177/0149206310392233.

Mahoney, J. (2007) ‘Qualitative Methodology and Comparative Politics’, *Comparative Political Studies*, 40(2), pp. 122–144. doi: 10.1177/0010414006296345.

Mahoney, J. and Goertz, G. (2006) ‘A Tale of Two Cultures: Contrasting Quantitative and Qualitative Research’, *Political Analysis*. Cambridge University Press, 14(03), pp. 227–249. doi: 10.1093/pan/mpj017.

Mainali, B. and Silveira, S. (2011) ‘Financing off-grid rural electrification: Country case Nepal’, *Energy*. Pergamon, 36(4), pp. 2194–2201. doi: 10.1016/J.ENERGY.2010.07.004.

Malerba, F. (2005) ‘Sectoral systems of innovation: a framework for linking innovation to the knowledge base, structure and dynamics of sectors’, *Economics of Innovation and New Technology*. Taylor & Francis , 14(1–2), pp. 63–82. doi: 10.1080/1043859042000228688.

Malesky, E. and Taussig, M. (2017) ‘The Danger of Not Listening to Firms: Government Responsiveness and the Goal of Regulatory Compliance’, *Academy of Management Journal*. Academy of ManagementBriarcliff Manor, NY, 60(5), pp. 1741–1770. doi: 10.5465/amj.2015.0722.

Mane, R. P. (2006) ‘Targeting the Poor or *Poor Targeting*’, *Journal of Asian and African Studies*. Sage PublicationsSage CA: Thousand Oaks, CA, 41(4), pp. 299–317. doi: 10.1177/0021909606065788.

Manning, N. (2001) ‘The legacy of the New Public Management in developing countries’, *International Review of Administrative Sciences*. Sage Publications London, Thousand Oaks, CA and New Delhi, 67(2), pp. 297–312.

Marston, G. and Watts, R. (2003) ‘Tampering with the evidence: a critical appraisal of evidence-based policy-making’, *The drawing board: An Australian review of public affairs*, 3(3), pp. 143–163.

Martin, J. (1990) ‘Deconstructing Organizational Taboos: The Suppression of Gender Conflict in Organizations’, *Organization Science*. INFORMS , 1(4), pp. 339–359. doi: 10.1287/orsc.1.4.339.

Marx, K. (1859) *A Contribution to the Critique of Political Economy*. Moscow: Progress Publishers. Available at: https://www.marxists.org/archive/marx/works/1859/critique-pol-economy/ (Accessed: 8 July 2018).

Mathur, I. and Singh, M. (2011) ‘Corporate political strategies’, *Accounting & Finance*, 51(1), pp. 252–277. doi: 10.1111/j.1467-629X.2010.00386.x.

Mawhood, R. and Gross, R. (2014) ‘Institutional barriers to a “perfect” policy: A case study of the Senegalese Rural Electrification Plan’, *Energy Policy*. Elsevier, 73, pp. 480–490. doi: 10.1016/J.ENPOL.2014.05.047.

Maxwell, J. A. and Mittapallo, K. (2010) ‘Realism as a Stance for Mixed Methods Research’, in Tashakkori, A. and Teddlie, C. (eds) *SAGE Handbook of Mixed Methods in Social & Behavioral Research*. 2nd edn. SAGE Publications. doi: http://dx.doi.org/10.4135/9781506335193.n6.

Mccollum, D. *et al.* (2017) *SDG 7 Ensure Access To Reliable , Sustainable and Modern Energy*. Available at: http://pure.iiasa.ac.at/id/eprint/14591/.

McGrath, C., Moss, D. and Harris, P. (2010) ‘The evolving discipline of public affairs’, *Journal of Public Affairs*. Wiley Online Library, 10(4), pp. 335–352. doi: 10.1002/pa.369.

McKevitt, D. and Davis, P. (2015) ‘How to interact, when and with whom? SMEs and public procurement’, *Public Money & Management*. Routledge, 35(1), pp. 79–86. doi: 10.1080/09540962.2015.986897.

McLoughlin, C. (2011) ‘Factors affecting state-non-governmental organisation relations in service provision: key themes from the literature’, *Public Administration and Development*. Wiley-Blackwell, 31(4), pp. 240–251. doi: 10.1002/pad.611.

McMullen, J. S. (2011) ‘Delineating the Domain of Development Entrepreneurship: A Market-Based Approach to Facilitating Inclusive Economic Growth’, *Entrepreneurship Theory and Practice*. SAGE PublicationsSage CA: Los Angeles, CA, 35(1), pp. 185–193. doi: 10.1111/j.1540-6520.2010.00428.x.

McWilliams, A., Van Fleet, D. D. and Cory, K. D. (2002) ‘Raising Rivals’ Costs Through Political Strategy: An Extension of Resource-based Theory’, *Journal of Management Studies*. Wiley/Blackwell (10.1111), 39(5), pp. 707–724. doi: 10.1111/1467-6486.00308.

Mellahi, K. *et al.* (2016) ‘A Review of the Nonmarket Strategy Literature: Toward a Multi-Theoretical Integration’, *Journal of Management*, 42(1), pp. 143–173. doi: 10.1177/0149206315617241.

Merriam, S. B. *et al.* (2001) ‘Power and positionality: negotiating insider/outsider status within and across cultures’, *International Journal of Lifelong Education*, 20(5), pp. 405–416. doi: 10.1080/02601370120490.

Metcalfe, J. S. (2005) ‘Systems Failure and the Case for Innovation Policy’, in *Innovation Policy in a Knowledge-Based Economy*. Berlin/Heidelberg: Springer-Verlag, pp. 47–74. doi: 10.1007/3-540-26452-3_3.

Meuleman, L. and Niestroy, I. (2015) ‘Common But Differentiated Governance: A Metagovernance Approach to Make the SDGs Work’, *Sustainability*. Multidisciplinary Digital Publishing Institute, 7(9), pp. 12295–12321. doi: 10.3390/su70912295.

Meznar, M. B. and Johnson, J. H. (2005) ‘Business-Government Relations Within a Contingency Theory Framework: Strategy, Structure, Fit, and Performance’, *Business & Society*. Sage PublicationsSage CA: Thousand Oaks, CA, 44(2), pp. 119–143. doi: 10.1177/0007650305275305.

Meznar, M. B. and Nigh, D. (1995) ‘Buffer or bridge? Environmental and organizational determinants of public affairs activities in American firms’, *Academy of Management Journal*, 38(4), pp. 975–996. doi: 10.2307/256617.

Miller, D. and Hope, C. (2000) ‘Learning to lend for off-grid solar power: policy lessons from World Bank loans to India, Indonesia, and Sri Lanka’, *Energy Policy*. Elsevier, 28(2), pp. 87–105. doi: 10.1016/S0301-4215(99)00071-3.

Millinger, M., Mårlind, T. and Ahlgren, E. O. (2012) ‘Evaluation of Indian rural solar electrification: A case study in Chhattisgarh’, *Energy for Sustainable Development*. Elsevier, 16(4), pp. 486–492. doi: 10.1016/J.ESD.2012.08.005.

Mills, E. (2017) ‘Global Kerosene Subsidies: An Obstacle to Energy Efficiency and Development’, *World Development*. Pergamon, 99, pp. 463–480. doi: 10.1016/J.WORLDDEV.2017.05.036.

Milner, H. R. (2007) ‘Race, Culture, and Researcher Positionality: Working Through Dangers Seen, Unseen, and Unforeseen’, *Educational Researcher*. SAGE

PublicationsSage CA: Los Angeles, CA, 36(7), pp. 388–400. doi: 10.3102/0013189X07309471.

Min, B. and Golden, M. (2014) ‘Electoral cycles in electricity losses in India’, *Energy Policy*. Elsevier, 65, pp. 619–625. doi: 10.1016/J.ENPOL.2013.09.060.

Ministry of Energy (2013) *Renewable Energy Act 2013*. Gambia.

Ministry of Energy and Water Development (2009) *Rural Electrification Master Plan for Zambia 2008 - 2030*. Zambia.

Minniti, M. (2008) ‘The role of government policy on entrepreneurial activity: Productive, unproductive, or destructive?’, *Entrepreneurship: Theory and Practice*, 32(5), pp. 779–790. doi: 10.1111/j.1540-6520.2008.00255.x.

Mintzberg, H. (1987) ‘The strategy concept I: Five Ps for strategy’, *California management review*. SAGE Publications Sage CA: Los Angeles, CA, 30(1), pp. 11–24.

Miraftab, F. (2004) ‘Public-Private Partnerships: The Trojan Horse of Neoliberal Development?’, *Journal of Planning Education and Research*. Sage PublicationsSage CA: Thousand Oaks, CA, 24(1), pp. 89–101. doi: 10.1177/0739456X04267173.

Mishra, T. (2017) ‘Off-grid power producers fret as “Saubhagya” clouds fortunes’, *Business Line*, 17 October. Available at: https://www.thehindubusinessline.com/news/offgrid-power-producers-fret-as-saubhagya-clouds-fortunes/article9912923.ece (Accessed: 11 July 2018).

MNRE (2011) Annex to Order No. 44/01/2007-RE dated 05.01.2011. India.

MNRE (2012a) *Jawaharlal Nehru National Solar Mission - Phase II Policy Document*. India. Available at: http://indianpowersector.com/electricity-regulation/national-solar-mission/.

MNRE (2012b) Minimal technical requirements/standards for SPV systems/plants to be deployed during F.Y. 2012-2013 under the programmes of Ministry of New and Renewable Energy. India.

MNRE (2016) *Draft National Policy for Renewable Energy based Micro and Mini Grids*. India. Available at: http://mnre.gov.in/file-manager/UserFiles/draft-national-Mini_Micro-Grid-Policy.pdf.

MNRE (2017a) *JNNSM Scheme/Documents*, *MNRE*. India. Available at: http://www.mnre.gov.in/solar-mission/jnnsm/introduction-2/ (Accessed: 7 August 2017).

MNRE (2017b) *No.NB.HO.DOR.GSS/4742/Solar/2016-2017*. India. Available at: http://nabard.org/auth/writereaddata/File/Stoppage of Subsidy Scheme of MNRE routed through NABARD.pdf.

MNRE (2017c) Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017. New Delhi, India.

Mo, J. and Moon, C. (2003) 'Business-Government Relations under Kim Dae-jung', in *Economic crisis and corporate restructuring in Korea : reforming the chaebol*. Cambridge University Press, p. 342.

Mollik, S. *et al.* (2016) 'Prospects, progress, policies, and effects of rural electrification in Bangladesh', *Renewable and Sustainable Energy Reviews*. Pergamon, 65, pp. 553–567. doi: 10.1016/J.RSER.2016.06.091.

Mondal, A. H. M., Kamp, L. M. and Pachova, N. I. (2010) 'Drivers, barriers, and strategies for implementation of renewable energy technologies in rural areas in Bangladesh—An innovation system analysis', *Energy Policy*. Elsevier, 38(8), pp. 4626–4634. doi: 10.1016/J.ENPOL.2010.04.018.

Monga, A., Mehta, A. and Ranjan, S. (2012) 'Problems and prospects of contracting out in India: A case study', *Retrieved 29th November*.

Monyei, C. G., Adewumi, A. O. and Jenkins, K. E. H. (2018) 'Energy (in) justice in off-grid rural electrification policy: South Africa in focus', *Energy research & social science*. Elsevier, 44, pp. 152–171.

Moore, P. W. (2001a) 'What Makes Successful Business Lobbies? Business Associations and the Rentier State in Jordan and Kuwait', *Comparative Politics*. Comparative Politics, Ph.D. Programs in Political Science, City University of New York, 33(2), p. 127. doi: 10.2307/422375.

Moore, P. W. (2001b) 'What Makes Successful Business Lobbies? Business Associations and the Rentier State in Jordan and Kuwait', *Comparative Politics*. Comparative Politics, Ph.D. Programs in Political Science, City University of New York, 33(2), p. 127. doi: 10.2307/422375.

MoP (2006a) No. 44/26/05-RE (Vol-II) - Rural Electrification Policy, The Gazette of India. New Delhi, India.

MoP (2006b) *No.44/26/05-RE (Vol-II)*, *The Gazette of India*. New Delhi, India. Available at: http://mserc.gov.in/acts/No4_REPolicy.pdf.

MoP (2008) Renewable Energy Policy of Bangladesh. Bangladesh.

MoP (2009) Guidelines for Village Electrification through Decentralized Distributed Generation (DDG) under Rajiv Gandhi Grameen Vidyutikaran Yojana in the XI Plan – Scheme of Rural Electricity Infrastructure and Household Electrification. India.

MoP (2013a) Annex to Order N.44/01/2007-RE dated 01/04/2013. India.

MoP (2013b) *No. 44/01/2007-RE: Decentralized Distributed Generation (DDG)*. India. Available at: https://powermin.nic.in/en/content/decentralized-distributed-generation-ddg# (Accessed: 7 April 2018).

MoP (2014) *Guidelines Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)*. India. Available at: http://www.rggvy.gov.in/rggvy/rggvyportal/memo/DDUGJY_Guidelines.pdf.

MoP (2015) *Tripartite Agreement*. India. Available at: http://ddugjy.gov.in/mis/portal/DDG/DDUGJY.pdf.

MoP (2018) *Power Sector at a Glance ALL INDIA*. Available at: https://powermin.nic.in/en/content/power-sector-glance-all-india (Accessed: 28 September 2018).

Morse, J. M. *et al.* (2002) 'Verification Strategies for Establishing Reliability and Validity in Qualitative Research', *International Journal of Qualitative Methods*. SAGE PublicationsSage CA: Los Angeles, CA, 1(2), pp. 13–22. doi: 10.1177/160940690200100202.

Morse, J. M. (2004) 'Constructing Qualitatively Derived Theory: Concept Construction and Concept Typologies', *Qualitative Health Research*. Sage PublicationsSage CA: Thousand Oaks, CA, 14(10), pp. 1387–1395. doi: 10.1177/1049732304269676.

Morse, J. M. and Penrod, J. (1999) 'Linking Concepts of Enduring, Uncertainty, Suffering, and Hope', *Image: the Journal of Nursing Scholarship*.

Wiley/Blackwell (10.1111), 31(2), pp. 145–150. doi: 10.1111/j.1547-5069.1999.tb00455.x.

Moyo, D. (2009) Dead aid: Why aid is not working and how there is a better way for Africa. Macmillan.

Muir, M. A., Areikat, S. and VandenBroek, A. (2014) Using the UN sustainable development goals to achieve integrated approaches to water scarcity, agriculture and energy for West Asia and North Africa. New York.

Mukherjee, I. and Howlett, M. (2016) 'An Asian perspective on policy instruments: policy styles, governance modes and critical capacity challenges', *Asia Pacific Journal of Public Administration*, 38(1), pp. 24–42. doi: 10.1080/23276665.2016.1152724.

Muller, E. *et al.* (2003) 'Health risk assessment of kerosene usage in an informal settlement in Durban, South Africa', *Atmospheric Environment*. Pergamon, 37(15), pp. 2015–2022. doi: 10.1016/S1352-2310(03)00125-0.

Mullery, C. B., Brenner, S. N. and Perrin, N. A. (1995) 'A Structural Analysis of Corporate Political Activity', *Business & Society*. Sage PublicationsSage CA: Thousand Oaks, CA, 34(2), pp. 147–170. doi: 10.1177/000765039503400203.

Mullings, B. (1999) 'Insider or outsider, both or neither: some dilemmas of interviewing in a cross-cultural setting', *Geoforum*. Pergamon, 30(4), pp. 337–350. doi: 10.1016/S0016-7185(99)00025-1.

Muzellec, L., Ronteau, S. and Lambkin, M. (2015) 'Two-sided Internet platforms: A business model lifecycle perspective', *Industrial Marketing Management*. Elsevier, 45, pp. 139–150. doi: 10.1016/J.INDMARMAN.2015.02.012.

Naeher, L. P. *et al.* (2007) 'Woodsmoke Health Effects: A Review', *Inhalation Toxicology*. Taylor & Francis, 19(1), pp. 67–106. doi: 10.1080/08958370600985875.

Nagar, R. and Ali, F. (2003) 'Collaboration Across Borders: Moving Beyond Positionality', *Singapore Journal of Tropical Geography*. Wiley/Blackwell (10.1111), 24(3), pp. 356–372. doi: 10.1111/1467-9493.00164.

Newman, J. (2017) 'Deconstructing the debate over evidence-based policy', *Critical policy studies*. Taylor & Francis, 11(2), pp. 211–226.

Nienhüser, W. (2008) ‘Resource dependence theory - how well does it explain behavior of organizations? - ProQuest’, *Management Revue*, 19(1–2), pp. 9–32. Available at: https://search.proquest.com/docview/37030935?rfr_id=info%3Axri%2Fsid%3Aprimo (Accessed: 23 May 2018).

Nieuwenhout, F. D. J. *et al.* (2001) ‘Experience with solar home systems in developing countries: a review’, *Progress in Photovoltaics: Research and Applications*. Wiley-Blackwell, 9(6), pp. 455–474. doi: 10.1002/pip.392.

Niez, A. (2010) ‘Comparative study on rural electrification policies in emerging economies. Keys to successful policies’, *International Energy Agency*, p. 114.

Nill, J. and Kemp, R. (2009) ‘Evolutionary approaches for sustainable innovation policies: From niche to paradigm?’, *Research policy*. Elsevier, 38(4), pp. 668–680.

Nilsen, P. (2015) ‘Making sense of implementation theories, models and frameworks’, *Implementation Science*. BioMed Central, 10(1), p. 53. doi: 10.1186/s13012-015-0242-0.

O’Reilly, M. and Parker, N. (2013) ‘“Unsatisfactory Saturation”: a critical exploration of the notion of saturated sample sizes in qualitative research’, *Qualitative Research*. SAGE PublicationsSage UK: London, England, 13(2), pp. 190–197. doi: 10.1177/1468794112446106.

Ockwell, D. and Byrne, R. (2017) Sustainable Energy for All: Innovation, technology and pro-poor green transformations. New York: Routledge.

Oliver, C. (1991a) ‘Strategic Responses to Institutional Processes’, *The Academy of Management Review*, 16(1), pp. 145–179.

Oliver, C. (1991b) ‘STRATEGIC RESPONSES TO INSTITUTIONAL PROCESSES’, *Academy of Management Review*. Academy of Management Briarcliff Manor, NY 10510 , 16(1), pp. 145–179. doi: 10.5465/amr.1991.4279002.

Oliver, C. and Holzinger, I. (2008) ‘The Effectiveness of Strategic Political Management: A Dynamic Capabilities Framework’, *Academy of Management Review*. Academy of Management Briarcliff Manor, NY , 33(2), pp. 496–520. doi: 10.5465/amr.2008.31193538.

Osterwalder, A. (2004) The Business Model Ontology - A Proposition in a Design Science Approach. University of Lausanne, Switzerland.

Osterwalder, A. and Pigneur, Y. (2010) *Business model generation : a handbook for visionaries, game changers, and challengers*. Available at: https://www.wiley.com/en-gb/Business+Model+Generation:+A+Handbook+for+Visionaries,+Game+Changers,+and+Challengers-p-9780470876411 (Accessed: 2 February 2018).

Ostrom, V. and Ostrom, E. (2014) 'Public Goods and Public Choices', in Cole, D. H. and McGinnis, M. D. (eds) *Elinor Ostrom and the Bloomington School of Political Economy Vol 2, Resource Governance*. Lexington Books, pp. 3–35.

Palit, D. *et al.* (2013) 'The trials and tribulations of the Village Energy Security Programme (VESP) in India', *Energy Policy*. Elsevier, 57, pp. 407–417. doi: 10.1016/J.ENPOL.2013.02.006.

Palit, D. and Bandyopadhyay, K. R. (2017) 'Rural electricity access in India in retrospect: A critical rumination', *Energy Policy*. Elsevier, 109, pp. 109–120. doi: 10.1016/J.ENPOL.2017.06.025.

Palit, D. and Chaurey, A. (2011) 'Off-grid rural electrification experiences from South Asia: Status and best practices', *Energy for Sustainable Development*. Elsevier, 15(3), pp. 266–276. doi: 10.1016/J.ESD.2011.07.004.

Parikh, J., Smith, K. and Laxmi, V. (1999) 'Indoor Air Pollution: A Reflection on Gender Bias', *Economic and Political Weekly*, 34(9), pp. 539–544. Available at: https://www.jstor.org/stable/4407707?seq=1#metadata_info_tab_contents (Accessed: 25 September 2018).

Parks, T. (2008) 'The rise and fall of donor funding for advocacy NGOs: understanding the impact', *Development in Practice*. Routledge , 18(2), pp. 213–222. doi: 10.1080/09614520801899036.

Patai, D. (1994) 'When Method Becomes Power (Response)', in Gitlin, A. D. (ed.) *Power and method : political activism and educational research*. Routledge, p. 248.

Peisakhin, L. and Pinto, P. (2010) 'Is transparency an effective anti-corruption strategy? Evidence from a field experiment in India', *Regulation & Governance*.

Wiley/Blackwell (10.1111), 4(3), pp. 261–280. doi: 10.1111/j.1748-5991.2010.01081.x.

Peng, M. W., Wang, D. Y. L. and Jiang, Y. (2008) 'An institution-based view of international business strategy: a focus on emerging economies', *Journal of International Business Studies*. Palgrave Macmillan UK, 39(5), pp. 920–936. doi: 10.1057/palgrave.jibs.8400377.

Perry, C. (2011) Supporting SME access to public procurement opportunities, Research and Information Service Research Paper. Belfast.

Perry, J. L. *et al.* (1988) 'The Public-Private Distinction in Organization Theory : A Critique and Research Strategy', *The Academy of Management Review*, 13(2), pp. 182–201.

Pfeffer, J. and Salancik, G. R. (1978) *The External Control of Organizations: A Resource Dependence Perspective*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1496213 (Accessed: 6 June 2018).

Pillow, W. (2003) 'Confession, catharsis, or cure? Rethinking the uses of reflexivity as methodological power in qualitative research', *International Journal of Qualitative Studies in Education*. Taylor & Francis Group , 16(2), pp. 175–196. doi: 10.1080/0951839032000060635.

Pinkse, J. and Groot, K. (2015) 'Sustainable entrepreneurship and corporate political activity: Overcoming market barriers in the clean energy sector', *Entrepreneurship Theory and Practice*. SAGE Publications Sage CA: Los Angeles, CA, 39(3), pp. 633–654.

Pitt, M. M., Rosenweig, M. R. and Hassan, M. N. (2005) *Gender, the Household Division of Labor and the Health Effects of Indoor Air Pollution*. Available at: https://www.hks.harvard.edu/centers/cid/publications/faculty-working-papers/cid-working-paper-no.-119 (Accessed: 25 September 2018).

Pitta, D. A., Guesalaga, R. and Marshall, P. (2008) 'The quest for the fortune at the bottom of the pyramid: potential and challenges', *Journal of Consumer Marketing*, 25(7), pp. 393–401. doi: 10.1108/07363760810915608.

Polk, A. and Schmutzler, A. (2005) ‘Lobbying against environmental regulation vs. lobbying for loopholes’, *European Journal of Political Economy*. North-Holland, 21(4), pp. 915–931. doi: 10.1016/J.EJPOLECO.2005.04.003.

Prager, J. (1994) ‘Contracting out Government Services: Lessons from the Private Sector’, *Public Administration Review*. WileyAmerican Society for Public Administration, 54(2), p. 176. doi: 10.2307/976527.

Prahalad, C. and Hart, S. (1999) Strategies for the bottom of the pyramid: creating sustainable development. doi: 10.2139/ssrn.914518.

Prahalad, C. K. and Hammond, A. (2002) ‘Serving the world’s poor, profitably’, *Harvard Business Review*, 80(9), p. 48. doi: 10.1108/02756660710732611.

Prahalad, C. K. and Hart, S. L. (2001) ‘The Fortune at the Bottom of the Pyramid’, *Strategy & Business*, (26).

Priyadarshee, A. and Ghalib, A. K. (2011) ‘The Andhra Pradesh Microfinance Crisis in India: Manifestation, Causal Analysis, and Regulatory Response’, *SSRN Electronic Journal*. doi: 10.2139/ssrn.1983206.

Quah, J. S. T. (2008) ‘Curbing Corruption in India: An Impossible Dream?’, *Asian Journal of Political Science*. Taylor & Francis Group , 16(3), pp. 240–259. doi: 10.1080/02185370802504266.

Quitzow, R. (2015) ‘Dynamics of a policy-driven market: The co-evolution of technological innovation systems for solar photovoltaics in China and Germany’, *Environmental Innovation and Societal Transitions*. Elsevier, 17, pp. 126–148. doi: 10.1016/J.EIST.2014.12.002.

Rahman, S. (2006) ‘Development, Democracy and the NGO Sector: Theory and Evidence from Bangladesh’, *Journal of Developing Societies*. SAGE PublicationsLondon, Thousand Oaks, and New Delhi, 22(4), pp. 451–473. doi: 10.1177/0169796X06072650.

Rai, A. S. (2002) ‘Targeting the poor using community information’, *Journal of Development Economics*. North-Holland, 69(1), pp. 71–83. doi: 10.1016/S0304-3878(02)00053-6.

Ramachandra, T. V., Jain, R. and Krishnadas, G. (2011) 'Hotspots of solar potential in India', *Renewable and Sustainable Energy Reviews*. Pergamon, 15(6), pp. 3178–3186. doi: 10.1016/J.RSER.2011.04.007.

Ramchandran, N., Pai, R. and Parihar, A. K. S. (2016) 'Feasibility assessment of Anchor-Business-Community model for off-grid rural electrification in India', *Renewable Energy*. Pergamon, 97, pp. 197–209. doi: 10.1016/J.RENENE.2016.05.036.

Rao, N. D. (2012) 'Kerosene subsidies in India: When energy policy fails as social policy', *Energy for Sustainable Development*. Elsevier, 16(1), pp. 35–43. doi: 10.1016/J.ESD.2011.12.007.

Ravallion, M. (1999) 'Are poorer states worse at targeting their poor?', *Economics Letters*. North-Holland, 65(3), pp. 373–377. doi: 10.1016/S0165-1765(99)00173-1.

Ravallion, M. (2009) 'How Relevant Is Targeting to the Success of an Antipoverty Program?', *The World Bank Research Observer*. Oxford University Press, 24(2), pp. 205–231. doi: 10.1093/wbro/lkp009.

Ravallion, M., Heil, M. and Jalan, J. (2000) 'Carbon emissions and income inequality', *Oxford Economic Papers*. Oxford University Press, 52(4), pp. 651–669. doi: 10.1093/oep/52.4.651.

Raven, R. *et al.* (2016) 'Niche construction and empowerment through socio-political work. A meta-analysis of six low-carbon technology cases', *Environmental Innovation and Societal Transitions*. Elsevier, 18, pp. 164–180.

REC (2015) 'Amendment to DDG Guidelines dated 02.09.2015'.

REC (2018a) *Corporate Profile*. Available at: http://www.recindia.nic.in/corporate-profile (Accessed: 30 August 2018).

REC (2018b) *GARV Dashboard*. Available at: http://garv.gov.in/dashboard (Accessed: 21 June 2018).

Reeves, M. and Sabharwal, N. (2013) 'Microfinance and mobile banking for the bottom of the pyramid', *Journal of Enterprising Communities: People and Places in the Global Economy*, 7(2), pp. 155–166. doi: 10.1108/17506201311325805.

Rehman, I. H. *et al.* (2005) 'Availability of kerosene to rural households: a case study from India', *Energy Policy*. Elsevier, 33(17), pp. 2165–2174. doi: 10.1016/J.ENPOL.2004.04.014.

Reiche, K., Covarrubias, A. and Martinot, E. (2000) 'Expanding Electricity Access to Remote Areas : Off-Grid Rural Electrification in Developing Countries', *World Power 2000*, pp. 52–60. Available at: http://www.martinot.info/Reiche_et_al_WP2000.pdf.

Rennings, K. (2000) 'Redefining innovation — eco-innovation research and the contribution from ecological economics', *Ecological Economics*. Elsevier, 32(2), pp. 319–332. doi: 10.1016/S0921-8009(99)00112-3.

Republic of Malawi (2017) *Malawi Renewable Energy Strategy*. Malawi.

Reserve Bank of India (2011) Report of the Sub-Committee of the Central Board of Directors of Reserve Bank of India to Study Issues and Concerns in the MFI Sector. Available at: https://www.rbi.org.in/scripts/PublicationReportDetails.aspx?UrlPage=&ID=608.

Reserve Bank of India (2013) *Master Circular on SHG-Bank Linkage Programme*. Available at: https://www.rbi.org.in/commonman/English/Scripts/Notification.aspx?Id=1234.

Reserve Bank of India (2017) *Directions on Managing Risks and Code of Conduct in Outsourcing of Financial Services by NBFCs*. Available at: https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=11160&Mode=0.

Reynolds, P. D. (1997) 'New and Small Firms in Expanding Markets', *Small Business Economics*. Kluwer Academic Publishers, 9(1), pp. 79–84. doi: 10.1023/A:1007916217140.

Ridder, H. G., Hoon, C. and McCandless Baluch, A. (2014) 'Entering a dialogue: Positioning case study findings towards theory', *British Journal of Management*, 25(2), pp. 373–387. doi: 10.1111/1467-8551.12000.

Rodrik, D. (2008) One economics, many recipes: globalization, institutions, and economic growth. Princeton University Press.

Rogge, K. S., Kern, F. and Howlett, M. (2017) ‘Conceptual and empirical advances in analysing policy mixes for energy transitions’, *Energy Research and Social Science*. Elsevier, 33(September), pp. 1–10. doi: 10.1016/j.erss.2017.09.025.

Rogge, K. S. and Reichardt, K. (2016) ‘Policy mixes for sustainability transitions: An extended concept and framework for analysis’, *Research Policy*. Elsevier B.V., 45(8), pp. 1620–1635. doi: 10.1016/j.respol.2016.04.004.

Romer, P. M. (1994) ‘The Origins of Endogenous Growth’, *Journal of Economic Perspectives*, 8(1), pp. 3–22. doi: 10.1257/jep.8.1.3.

Rose, G. (1997) ‘Situating knowledges: positionality, reflexivities and other tactics’, *Progress in Human Geography*. Sage PublicationsSage CA: Thousand Oaks, CA, 21(3), pp. 305–320. doi: 10.1191/030913297673302122.

Rothwell, R. and Zegveld, W. (1982) ‘Innovation and the Small and Medium Sized Firm’, in University of Illinois at Urbana-Champaign’s Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1496714 (Accessed: 21 June 2018).

Roy, B. and Hartigan, J. (2008) ‘Empowering the Rural Poor to Develop Themselves: The Barefoot Approach’, *innovations*, Spring, pp. 67–93.

Sahoo, S. K. (2016) ‘Renewable and sustainable energy reviews solar photovoltaic energy progress in India: A review’, *Renewable and Sustainable Energy Reviews*. Pergamon, 59, pp. 927–939. doi: 10.1016/J.RSER.2016.01.049.

Sareen, S. (2018) ‘Energy distribution trajectories in two Western Indian states: Comparative politics and sectoral dynamics’, *Energy Research & Social Science*. Elsevier, 35, pp. 17–27. doi: 10.1016/J.ERSS.2017.10.038.

Savlovschi, L. I. and Robu, N. R. (2011) ‘The role of SMEs in modern economy’, *Economia. Seria Management*, 14(1), pp. 277–281.

Schmidt, T. S., Blum, N. U. and Wakeling, R. S. (2013) ‘Attracting private investments into rural electrification – a case study on renewable energy based village grids in Indonesia’, *Energy for Sustainable Development*, 17(6), pp. 581–595. doi: 10.1016/j.esd.2013.10.001.

Schneider, B. R. (1998) ‘Elusive Synergy: Business-Government Relations and Development’, *Comparative Politics*. Comparative Politics, Ph.D. Programs in Political Science, City University of New York, 31(1), p. 101. doi: 10.2307/422108.

Schnitzer, D. et al. (2014) Microgrids for Rural Electrification: A critical review of best practices based on seven case studies.

Schot, J. and Geels, F. W. (2008) ‘Strategic niche management and sustainable innovation journeys: theory, findings, research agenda, and policy’, *Technology analysis & strategic management*. Taylor & Francis, 20(5), pp. 537–554.

Schrader, C., Freimann, J. and Seuring, S. (2012) ‘Business Strategy at the Base of the Pyramid’, *Business Strategy and the Environment*, 21(5), pp. 281–298. doi: 10.1002/bse.727.

Schuler, D. (1996) ‘Corporate political strategy and foreign competition : The case of the steel ... Reproduced with permission of the copyright owner . Further reproduction prohibited without permission .’, *Acedemy of Management Journal*.

Schuler, D. A., Rehbein, K. and Cramer, R. D. (2002) ‘Pursuing Strategic Advantage Through Political Means: A Multivariate Approach’, *Academy of Management Journal*. Academy of Management Briarcliff Manor, NY 10510 , 45(4), pp. 659–672. doi: 10.5465/3069303.

Schumpeter, J. A. (1934) *Theory of economic development*. Routledge.

Schumpeter, J. A. (1939) *Business cycles*. McGraw-Hill New York.

Seibel, H. D. (2012) ‘A approach towards self-reliance and sustainability of the SHG sector in India: SHG Sector Own Control’, *The Microfinance Review*, 4(1). Available at: https://www.hf.uni-koeln.de/data/aef/File/f SHG Sector Own Control in India.pdf.

Sen, A. (1992) ‘The Political Economy of Targeting’, in. Annual Bank Conference on Development Economics, World Bank. Available at: https://scholar.harvard.edu/sen/publications/political-economy-targeting.

Sengupta, S. and Sahay, A. (2017) 'Comparing mission statements of social enterprises and corporate enterprises in the new and renewable energy sector of India: a computer aided content analysis study', *Journal of Global Entrepreneurship Research*. Springer Berlin Heidelberg, 7(1), p. 21. doi: 10.1186/s40497-017-0079-x.

Sengupta, S., Sahay, A. and Croce, F. (2018) 'Conceptualizing social entrepreneurship in the context of emerging economies: an integrative review of past research from BRIICS', *International Entrepreneurship and Management Journal*. Springer, 14(4), pp. 771–803.

Shaffer, B., Quasney, T. J. and Grimm, C. M. (2000) 'Firm Level Performance Implications of Nonmarket Actions', *Business & Society*. Sage PublicationsSage CA: Thousand Oaks, CA, 39(2), pp. 126–143. doi: 10.1177/000765030003900202.

Sindane, A. M. (2004) 'Public administration versus public management: parallels, divergences, convergences and who benefits?', *International Review of Administrative Sciences*. Sage Publications Sage CA: Thousand Oaks, CA, 70(4), pp. 665–672.

Singh, K. (2016a) 'Business innovation and diffusion of off-grid solar technologies in India', *Energy for Sustainable Development*. International Energy Initiative, 30, pp. 1–13. doi: 10.1016/j.esd.2015.10.011.

Singh, K. (2016b) 'Business innovation and diffusion of off-grid solar technologies in India', *Energy for Sustainable Development*. Elsevier, 30, pp. 1–13.

Singh, N. T. (2009) 'Micro Finance Practices In India: An Overview', *International Review of Business Research Papers*, 5(5), pp. 131–146. Available at: https://www.bizresearchpapers.com/12. Tejmani.pdf.

Singh, S., Ruivenkamp, G. and Jongerden, J. (2011) 'A State of the Art of Self Help Groups in India', *Journal of Human Ecology*, 36(2), pp. 91–102. Available at: http://www.krepublishers.com/02-Journals/JHE/JHE-36-0-000-11-Web/JHE-36-2-000-11-Abst-PDF/JHE-36-2-091-11-2148-Singh-S/JHE-36-2-091-11-2148-Singh-S-Tt.pdf (Accessed: 11 August 2017).

Sinha, A. (2005) 'Understanding the Rise and Transformation of Business Collective Action in India', *Business and Politics*. Cambridge University Press, 7(02), pp. 1–35. doi: 10.2202/1469-3569.1112.

Skoufias, E., Davis, B. and de la Vega, S. (2001) 'Targeting the Poor in Mexico: An Evaluation of the Selection of Households into PROGRESA', *World Development*. Pergamon, 29(10), pp. 1769–1784. doi: 10.1016/S0305-750X(01)00060-2.

Smith, A. (1817) An Inquiry into the Nature and Causes of the Wealth of Nations. Рипол Классик.

Smith, A., Voß, J.-P. and Grin, J. (2010) 'Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges', *Research policy*. Elsevier, 39(4), pp. 435–448.

Smith, H. (2005) 'Ownership and capacity: Do current donor approaches help or hinder the achievement of international and national targets for education?', *International Journal of Educational Development*, 25(4), pp. 445–455. doi: 10.1016/j.ijedudev.2005.04.007.

Sovacool, B. K. (2013) 'A qualitative factor analysis of renewable energy and Sustainable Energy for All (SE4ALL) in the Asia-Pacific', *Energy Policy*. Elsevier, 59, pp. 393–403. doi: 10.1016/J.ENPOL.2013.03.051.

Sovacool, B. K., D'Agostino, A. L. and Jain Bambawale, M. (2011) 'The socio-technical barriers to Solar Home Systems (SHS) in Papua New Guinea: "Choosing pigs, prostitutes, and poker chips over panels"', *Energy Policy*. Elsevier, 39(3), pp. 1532–1542. doi: 10.1016/J.ENPOL.2010.12.027.

Sovacool, B. K. and Dworkin, M. H. (2015) 'Energy justice: Conceptual insights and practical applications', *Applied Energy*. Elsevier, 142, pp. 435–444. doi: 10.1016/J.APENERGY.2015.01.002.

Spivak, G. C. (2010) 'Can the Subaltern Speak?', in Morris, R. C. (ed.) *Can the subaltern speak? : reflections on the history of an idea*. New York: Columbia University Press.

Stockmayer, M. et al. (2015) Nationally Appropriate Mitigation Action : Rural development in Namibia through electrification with renewable energies. Namibia.

Subrahmanyan, S. and Gomez-Arias, T. J. (2008) 'Integrated approach to understanding consumer behavior at bottom of pyramid', *Journal of Consumer Marketing*, 25(7), pp. 402–412. doi: 10.1108/07363760810915617.

Suchman, M. C. (1995) 'Managing Legitimacy: Strategic and Institutional Approaches', *Academy of Management Review*. Academy of Management Briarcliff Manor, NY 10510 , 20(3), pp. 571–610. doi: 10.5465/amr.1995.9508080331.

Sultana, F. (2007) 'Reflexivity, positionality and participatory ethics: Negotiating fieldwork dilemmas in international research', *ACME*. Okanagan University College, 6(3), pp. 374–385. Available at: https://experts.syr.edu/en/publications/reflexivity-positionality-and-participatory-ethics-negotiating-fi (Accessed: 17 September 2018).

Suryanarayana, M. H. and Silva, D. (2007) 'Is Targeting the Poor a Penalty on the Food Insecure? Poverty and Food Insecurity in India', *Journal of Human Development*. Routledge , 8(1), pp. 89–107. doi: 10.1080/14649880601101457.

Taylor, M. (2011) '"Freedom from Poverty is Not for Free": Rural Development and the Microfinance Crisis in Andhra Pradesh, India', *Journal of Agrarian Change*. Wiley/Blackwell (10.1111), 11(4), pp. 484–504. doi: 10.1111/j.1471-0366.2011.00330.x.

Tchouassi, G. (2011) Microfinance, inequality and vulnerability: Empirical analysis from Central African countries, Journal of Development and Agricultural Economics. No. 37B New Ogorode Road, Sapele P.O. Box 1005, Sapele. Available at: https://academicjournals.org/journal/JDAE/article-abstract/F8AEDE92403 (Accessed: 3 December 2018).

Tian, Z., Hafsi, T. and Wu, W. (2009) *Institutional Determinism and Political Strategies an Empirical Investigation*, *Business & Society*. Available at: http://bas.sagepub.com/content/48/3/284.short.

Tribune News Service (2018) 'CBI protecting corrupt IAS officers, alleges AAP', *The Tribune*, 13 August. Available at:

https://www.tribuneindia.com/news/delhi/cbi-protecting-corrupt-ias-officers-alleges-aap/636315.html (Accessed: 29 August 2018).

Tsang, E. W. K. (2014) 'Generalizing from Research Findings: The Merits of Case Studies', *International Journal of Management Reviews*. Wiley/Blackwell (10.1111), 16(4), pp. 369–383. doi: 10.1111/ijmr.12024.

UNDP (2015) NAMA on Rural Electrification in Vanuatu. Vanuatu.

UNDP (2018) *Derisking Renewable Energy Investment : Off-Grid Electrification*. Available at: http://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/derisking-renewable-energy-investment/drei--off-grid-electrification--2018-.html.

UNFCCC (2016) Off-grid renewable energy for rural electrification in Mozambique managed by FUNAE. Mozambique.

UNFCCC (2018) *Nationally Appropriate Mitigation Actions (NAMAs) | UNFCCC*. Available at: https://unfccc.int/topics/mitigation/workstreams/nationally-appropriate-mitigation-actions (Accessed: 6 December 2018).

United Nations (2015) *SDG 7: Energy*. Available at: http://www.un.org/sustainabledevelopment/energy/ (Accessed: 17 October 2017).

UPNEDA (2017) *Cancellation Notice Tender UPNEDA/Solar power pack/2017*. Available at: http://upneda.org.in/?q=section/cancellation-notice-tender-no-upnedasolar-power-pack2017 (Accessed: 4 December 2018).

Upward, A. and Jones, P. (2016) 'An Ontology for Strongly Sustainable Business Models', *Organization & Environment*. SAGE PublicationsSage CA: Los Angeles, CA, 29(1), pp. 97–123. doi: 10.1177/1086026615592933.

Urmee, T. and Harries, D. (2011) 'Determinants of the success and sustainability of Bangladesh's SHS program', *Renewable Energy*. Pergamon, 36(11), pp. 2822–2830. doi: 10.1016/J.RENENE.2011.04.021.

Urmee, T., Harries, D. and Schlapfer, A. (2009) 'Issues related to rural electrification using renewable energy in developing countries of Asia and Pacific', *Renewable Energy*. Elsevier Ltd, 34(2), pp. 354–357. doi: 10.1016/j.renene.2008.05.004.

Urmee, T. and Md, A. (2016) ‘Social, cultural and political dimensions of off-grid renewable energy programs in developing countries’, *Renewable Energy*. Elsevier Ltd, 93, pp. 159–167. doi: 10.1016/j.renene.2016.02.040.

Urpelainen, J. (2014) ‘Grid and off-grid electrification: An integrated model with applications to India’, *Energy for Sustainable Development*. Elsevier, 19, pp. 66–71. doi: 10.1016/J.ESD.2013.12.008.

Urpelainen, J. (2016) ‘Energy poverty and perceptions of solar power in marginalized communities: Survey evidence from Uttar Pradesh, India’, *Renewable Energy*. Pergamon, 85, pp. 534–539. doi: 10.1016/J.RENENE.2015.07.001.

Urpelainen, J. (2019) *Universal Rural Electrification in India? Not So Fast*, *Power for All*. Available at: https://www.powerforall.org/campaigns/india/universal-rural-electrification-india-not-so-fast (Accessed: 11 March 2019).

Urpelainen, J. and Yoon, S. (2015) ‘Solar home systems for rural India: Survey evidence on awareness and willingness to pay from Uttar Pradesh’, *Energy for Sustainable Development*. Elsevier, 24, pp. 70–78. doi: 10.1016/J.ESD.2014.10.005.

Urpleinen, J. (2018) ‘Newly Electrified Villages in India Lag in Quality, Reliability: Researchers - The Energy Collective’, *The Energy Collective*, 16 March. Available at: http://www.theenergycollective.com/jurpelai/2427895/newly-electrified-villages-in-india-lag-in-quality-reliability-researchers (Accessed: 7 April 2018).

Vaishnav, M., Mehta, P. B. and Kapur, D. (2017) ‘Weak public institutions behind India’s low state capacity - Livemint’, *livemint*, 15 May. Available at: https://www.livemint.com/Opinion/W5Fx1zCQNdnmCRDx9AAQ6O/Weak-public-institutions-behind-Indias-low-state-capacity.html (Accessed: 29 August 2018).

Vigoda, E. (2000) ‘Are You Being Served? The Responsiveness of Public Administration to Citizens’ Demands: An Empirical Examination in Israel’, *Public Administration*. Wiley/Blackwell (10.1111), 78(1), pp. 165–191. doi: 10.1111/1467-9299.00198.

Vigoda, E. (2002) 'From Responsiveness to Collaboration: Governance, Citizens, and the Next Generation of Public Administration', *Public Administration Review*. Wiley/Blackwell (10.1111), 62(5), pp. 527–540. doi: 10.1111/1540-6210.00235.

Vijay Ramamurthi, P. *et al.* (2016) 'National Level Implications of the Implementation of SDG 7: Access to Modern Cooking Fuels in India'. Southern Voice. Available at: https://econpapers.repec.org/paper/svoopaper/36.htm (Accessed: 25 September 2018).

Vining, A. R., Shapiro, D. M. and Borges, B. (2005) 'Building the firm's political (lobbying) strategy', *Journal of Public Affairs*. Wiley-Blackwell, 5(2), pp. 150–175. doi: 10.1002/pa.17.

van de Walle, D. (1998) 'Targeting Revisited', *The World Bank Research Observer*. Oxford University Press, 13(2), pp. 231–248. doi: 10.1093/wbro/13.2.231.

van de Walle, D. *et al.* (2015) 'Long-Term Gains from Electrification in Rural India', *The World Bank Economic Review*, p. lhv057. doi: 10.1093/wber/lhv057.

Wamukonya, N. (2003) 'Power sector reform in developing countries: mismatched agendas', *Energy Policy*. Elsevier, 31(12), pp. 1273–1289. doi: 10.1016/S0301-4215(02)00187-8.

Warner, M. E. (2006) 'Market-based Governance and the Challenge for Rural Governments: US Trends', *Social Policy and Administration*. Wiley/Blackwell (10.1111), 40(6), pp. 612–631. doi: 10.1111/j.1467-9515.2006.00523.x.

Warner, M. E. and Hefetz, A. (2008) 'Managing Markets for Public Service: The Role of Mixed Public-Private Delivery of City Services', *Public Administration Review*. Wiley/Blackwell (10.1111), 68(1), pp. 155–166. doi: 10.1111/j.1540-6210.2007.00845.x.

Weidenbaum, M. L. (1980) 'Public Policy: No Longer a Spectator Sport for Business'. St Louis: Murray Weidenbaum Publications. Available at: http://openscholarship.wustl.edu/mlw_papers (Accessed: 3 April 2018).

Weingast, B. R. and Wittman, D. A. (2008) *The Reach of Political Economy*. Edited by D. A. Wittman and B. R. Weingast. Oxford University Press. doi: 10.1093/oxfordhb/9780199548477.003.0001.

Welch, C. *et al.* (2011) 'Theorising from case studies: Towards a pluralist future for international business research', *Journal of International Business Studies*. Palgrave Macmillan UK, 42(5), pp. 740–762. doi: 10.1057/jibs.2010.55.

Welch, C. and Piekkari, R. (2017) 'How should we (not) judge the "quality" of qualitative research? A re-assessment of current evaluative criteria in International Business', *Journal of World Business*. JAI, 52(5), pp. 714–725. doi: 10.1016/J.JWB.2017.05.007.

Wernerfelt, B. (1984) 'A resource-based view of the firm', *Strategic Management Journal*. Wiley-Blackwell, 5(2), pp. 171–180. doi: 10.1002/smj.4250050207.

Whetten, D. A. (1989) 'What Constitutes a Theoretical Contribution?', *Academy of Management Review*. Academy of Management Briarcliff Manor, NY 10510 , 14(4), pp. 490–495. doi: 10.5465/amr.1989.4308371.

WHO (2002) 'The health effects of indoor air pollution exposure in developing countries'. World Health Organization. Available at: http://www.who.int/indoorair/publications/health_effects/en/ (Accessed: 25 September 2018).

Wicks, A. C. and Freeman, R. E. (1998) 'Organization Studies and the New Pragmatism: Positivism, Anti-positivism, and the Search for Ethics', *Organization Science*. INFORMS , 9(2), pp. 123–140. doi: 10.1287/orsc.9.2.123.

Williams, M. (2000) 'Interpretivism and Generalisation', *Sociology*, 34(2), pp. 209–224. Available at: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/B77F9B4133790AEB0F96C162BB0CC763/S0038038500000146a.pdf/interpretivism_and_generalisation.pdf (Accessed: 2 February 2018).

Williams, N. J. *et al.* (2015) 'Enabling private sector investment in microgrid-based rural electrification in developing countries: A review', *Renewable and Sustainable Energy Reviews*. Elsevier, 52, pp. 1268–1281. doi: 10.1016/j.rser.2015.07.153.

Wilts, A. (2006) 'Identities and Preferences', *Business & Society*, 45(4), pp. 441–463.

Wodon, Q. T. (1997) 'Targeting the poor using ROC curves', *World Development*. Pergamon, 25(12), pp. 2083–2092. doi: 10.1016/S0305-750X(97)00108-3.

Wong, P. K., Ho, Y. P. and Autio, E. (2005) 'Entrepreneurship, Innovation and Economic Growth: Evidence from GEM data', *Small Business Economics*. Kluwer Academic Publishers, 24(3), pp. 335–350. doi: 10.1007/s11187-005-2000-1.

Wood Mackenzie (2019) *Strategic investments in the off-grid energy access sector | Wood Mackenzie*. Available at: https://www.woodmac.com/news/editorial/growing-offgrid-energy-access-sector/ (Accessed: 26 April 2019).

World Bank (2008) The Welfare of Rural Electrification : A Reassessment of the Costs and Benefits. Washington, D.C. doi: 978-0-8213-7368-2.

World Bank (2017a) *Access to electricity (% of rural population) | Data*. Available at: https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=IN (Accessed: 10 July 2018).

World Bank (2017b) *Kenya Off-Grid Solar Access Project for Underserved Counties*. Available at: http://documents.worldbank.org/curated/en/212451501293669530/pdf/Kenya-off-grid-PAD-07072017.pdf.

World Bank (2017c) Niger Solar Electricity Acces Project - Project Appraisal Document. Niger. doi: 10.1179/136485908x337463.

World Bank (2017d) Rwanda Electrcity Service Access Project - Project Appraisal Document. Rwanda. doi: 10.1179/136485908x337463.

World Bank (2018) *Nigeria Electrification Project*. Nigeria. Available at: https://data.worldbank.org/.

World Bank Group (2017) Maximizing Finance for Development: Leveraging the Private Sector for Growth and Sustainable Development. Washington, D.C.

World Bank Group (2018) *Mongolia - Renewable Energy For Rural Access Project (REAP)*. Mongolia. Available at: http://documents.worldbank.org/curated/en/182811475080172467/pdf/000020051-20140625234238.pdf.

Wren, A. (2008) *Comparative Perspectives on the Role of the State in the Economy*. Edited by D. A. Wittman and B. R. Weingast. Oxford University Press. doi: 10.1093/oxfordhb/9780199548477.003.0035.

Wry, T., Cobb, J. A. and Aldrich, H. E. (2013) 'More than a metaphor: Assessing the historical legacy of resource dependence and its contemporary promise as a theory of environmental complexity', *The Academy of Management Annals*. Taylor & Francis, 7(1), pp. 441–488.

Yadav, A. K., Malik, H. and Chandel, S. S. (2015) 'Application of rapid miner in ANN based prediction of solar radiation for assessment of solar energy resource potential of 76 sites in Northwestern India', *Renewable and Sustainable Energy Reviews*. Pergamon, 52, pp. 1093–1106. doi: 10.1016/J.RSER.2015.07.156.

Yadoo, A. and Cruickshank, H. (2010) 'The value of cooperatives in rural electrification', *Energy Policy*. Elsevier, 38(6), pp. 2941–2947. doi: 10.1016/j.enpol.2010.01.031.

Yadoo, A. and Cruickshank, H. (2012) 'The role for low carbon electrification technologies in poverty reduction and climate change strategies: A focus on renewable energy mini-grids with case studies in Nepal, Peru and Kenya', *Energy Policy*. Elsevier, 42, pp. 591–602. doi: 10.1016/J.ENPOL.2011.12.029.

Yaqoot, M., Diwan, P. and Kandpal, T. C. (2015) 'Public financing of solar lanterns versus subsidizing kerosene for domestic lighting in India: A feasibility assessment', *Renewable Energy*. Pergamon, 80, pp. 564–572. doi: 10.1016/J.RENENE.2015.02.044.

Yaqoot, M., Diwan, P. and Kandpal, T. C. (2016) 'Review of barriers to the dissemination of decentralized renewable energy systems', *Renewable and Sustainable Energy Reviews*. Elsevier, 58, pp. 477–490. doi: 10.1016/j.rser.2015.12.224.

Yin, R. K. (1981) 'The Case Study as Serious Research Strategy', *Knowledge: Creation, Diffusion and Utilization*, 3(1), pp. 97–114.

Yin, R. K. (2009) *Case Study Research: Design and Methods*. Fourth. SAGE Publications.

Yin, R. K. (2014) *Case study research: design and methods*. Fifth edit. Los Angeles: SAGE.

Yunus, M. (2009) Creating a world without poverty: Social business and the future of capitalism. Public Affairs.

Zerriffi, H. (2007a) ‘From acai to access: distributed electrification in rural Brazil’, *International Journal of Energy Sector Management*, 2(1), pp. 90–117. doi: 10.1108/17506220810859114.

Zerriffi, H. (2007b) ‘From açaí to access: distributed electrification in rural Brazil’, *International Journal of Energy Sector Management*, 2(1), pp. 90–117. doi: 10.1108/17506220810859114.

Zerriffi, H. (2014) *Rural electrification.* Springer.

9 Appendices

APPENDIX 1: COMPLETE LIST OF POLICIES SURVEYED

APPENDIX 2: SUMMARIZED NARRATIVES OF CHANGE

APPENDIX 3: ENGAGEMENT STRATEGY WORD TABLE

APPENDIX 4: DISENGAGEMENT STRATEGY WORD TABLE

APPENDIX 1: COMPLETE LIST OF POLICIES SURVEYED

Country	Policy Title	Start	REF	REA	Tech	License	Tariff	Subs.	Tax	Fin.	Grants
Zambia	Rural Electrification Act 2003	2003	1	1	0	0	0	0	0	0	0
Zambia	Rural Electrification Master Plan	2008	0	0	1	0	0	0	0	0	0
Zambia	Electricity Service Access Project	2017	0	0	0	0	0	1	0	1	0
Malawi	Malawi Renewable Energy Strategy	2017	0	0	1	1	0	0	1	0	0
Malawi	Rural Electrification Act 2007	2007	1	0	0	1	1	1	0	0	1
Niger	Niger Solar Energy Access Project (NESAP)	2017	0	0	0	0	0	1	0	1	0
Mozambique	Off-grid renewable energy for rural electrification in Mozambique managed by FUNAE	2016	0	0	1	0	1	1	0	0	0
Guinea	Decentralized Rural Electrification Project (PERD)	2002	0	1	0	0	1	0	0	1	1
Gambia, The	NAMA Design Document for Rural Electrification with Renewable Energy	2016	0	0	0	0	0	0	1	0	0
Gambia, The	Renewable Energy Act 2013	2013	0	0	1	0	1	0	1	0	0
Zimbabwe	Rural Electrification Fund Act Chapter 13:20	2002	1	1	0	0	0	0	0	0	0
Lesotho	Energy Policy 2015-2025	2015	0	0	0	0	0	0	0	0	0
Lesotho	Lesotho Renewable Energy-Based Rural Electrification Project (LREBRE)	2006	0	0	1	0	0	1	0	1	0
Angola	Power Sector Long Term Vision 2025	2018	1	1	0	1	0	0	1	1	0
Tanzania	Rural Energy Act 2005	2005	1	1	0	0	0	0	0	0	0
Tanzania	National Electrification Programme 2013-2022	2013	0	0	0	0	0	1	0	1	1
Rwanda	Rural Electrification Strategy 2016	2016	0	0	1	0	0	0	0	0	0
Rwanda	Rwanda Renewable Energy Fund Project	2017	0	0	0	0	0	0	0	1	0
Uganda	Rural Electrification Strategy and Plan	2013	0	0	1	0	1	1	0	0	1
Ethiopia	Rural Electrification Fund Establishment Proclamation 2003	2003	1	0	0	1	0	0	0	1	0
Ethiopia	National Energy Policy 2013	2013	0	0	0	0	0	0	1	1	0
Ethiopia	NAMA for Off Grid Rural Electrification	2016	0	0	0	0	1	1	0	1	1
Ethiopia	Ethiopia Off-Grid Renewable Energy Program	2016	0	0	1	0	0	0	0	1	0
Namibia	NAMA in Namibia Rural Development	2015	0	0	0	0	1	0	1	0	1

Namibia	Code of Practice and Register of Products for Namibian Solar Energy Technologies 2006	2006	0	0	1	0	0	0	0	0	0
Namibia	Off Grid Energy Master Plan	2007	0	0	0	0	0	1	0	0	0
Cambodia	Cambodia Rural Electrification Strategy and Implementation Plan	2009	0	0	0	1	1	0	0	1	1
Cambodia	Program For the Development of Rural Electrification	2013	0	0	0	0	0	1	0	1	0
Cambodia	Royal Decree NS/RKT/1204/048 On the Establishment of Rural Electrification Fund of the Kingdom of Cambodia	2004	1	0	0	0	0	0	0	0	0
Cote d'Ivoire	Promoting renewable energy-based grids in rural communities for productive uses in Côte d'Ivoire	2012	0	0	0	0	0	0	0	0	0
Kenya	Sessional Paper no.4 on Energy	2004	0	1	0	1	1	1	0	1	0
Kenya	Off Grid Solar Access Project for Underserved Counties 2017	2017	0	0	0	0	1	1	0	0	0
Myanmar	National Electrification Plan	2015	0	0	1	0	0	1	0	0	0
Nigeria	Electric Power Sector Reform Act 2005	2005	1	1	0	1	0	0	0	0	0
Nigeria	NERC Regulation for Mini-grids 2016	2016	0	0	1	1	1	0	0	0	0
Nigeria	Nigeria Electrification Project	2018	0	0	1	0	0	0	0	0	1
Nigeria	Rural Electrification Strategy and Implementation Plan (RESIP)	2016	0	0	1	0	0	0	0	0	0
Solomon Is.	Electricity Access and Renewable Energy Project Phase II	2017	0	0	0	0	1	1	0	0	0
Solomon Is.	Renewable Energy Strategy and Investment Plan	2014	0	0	0	0	0	0	0	0	0
Solomon Is.	Solomon Island SREP Investment Plan 2014	2014	0	0	1	0	0	1	0	0	0
Mongolia	Renewable Energy for Rural Access Project	2006	0	0	1	0	0	1	0	1	0
Vanuatu	Vanuatu Rural Electrification Project (Phases I and II)	2014	0	0	1	0	0	1	0	0	0
Vanuatu	Vanuatu NAMA	2015	0	0	0	0	1	0	0	0	1
Gabon	Access to Basic Services in Rural Areas and Capacity Building Project	2015	0	0	0	0	1	1	0	0	0
Nicaragua	Offgrid Rural Electrification Project PERZA	2013	0	0	1	0	0	1	0	1	0
South Africa	Energy Security Master Plan - Electricity	2007	0	0	0	0	0	0	0	0	0
South Africa	Non-Grid Electrification Policy Guidelines	2012	0	0	1	1	0	1	0	0	1
Bangladesh	Ordinance No. LI of 1977	1977	1	1	0	0	0	0	0	0	0
Bangladesh	Renewable Energy Policy of Bangledesh	2008	0	0	0	0	0	0	1	1	0
Bangladesh	IDCOL SHS Program/Minigrids	2003	0	0	1	0	1	1	0	0	0

Comoros	Solar Market Development Project	1997	0	0	0	0	0	0	0	1	0
India	DDG Scheme - DDUGJY	2015	0	0	1	0	0	1	0	0	0
India	Notified Rural Regions - Electricity Act 2003	2003	0	0	0	1	1	0	0	0	0
India	JNNSM - Off Grid Scheme	2010	0	0	1	0	0	1	0	1	0
Afghanistan	Rural Renewable Energy Policy	2013	0	0	1	1	1	1	1	1	1
Lao PDR	Decree on Solar Energy Development	2011	0	0	1	1	1	0	0	0	1

APPENDIX 2: SUMMARIZED NARRATIVES OF CHANGE

ENT ID	Starting Business Model	Changes to Business Model	Responsible Policy Change	Overall Themes	Reasons for Changes	Overall Themes
ENT11	ENT11 began with SHS for both grid and non-grid connected end users, which included a government subsidy, and the expectation of partial cost recovery for the full capital cost of the system.	1. Shift away from bank financing for end users	1. NABARD subsidy cancelled	1. Revenue Model, Customer Interface	1. The loss of subsidy broke the link between the ENT and NABARD banking	1. Policy
		2. Move from SHS to microgrids and rooftop	2. NABARD subsidy cancelled	2. Product	2. Revenue model for SHS no longer worked without subsidy, so moved to microgrids and rooftops, which do no require end user subsidy	2. Policy
		3. Move from SHS to microgrids also caused a shift from total cost recovery to partial cost recovery	3. NABARD subsidy cancelled	3. Revenue Model	3. Revenue model for SHS no longer worked without subsidy, so moved to microgrids, which have a high capex and low to moderate likelihood of cost recovery, subsidized by rooftop projects	3. Policy
		4. Shift from both electrified and unelectrified areas into unelectrified hamlets	4. NABARD subsidy cancelled	4. Customer Interace/Customer Segments	4. Revenue model for SHS no longer worked without subsidy, so moved to microgrids, which are most in demand in unelectrified housing clusters	4. Policy
		5. Shifted from manufacturing and distribution to just distribution	5. N/A	5. Supply Chain Position	5. Could not compete with other manufacturers	5. Financial Aspects
		6. Moved from solar lanterns to solar home systems	6. N/A	6. Product	6. Shift of focus to distribution, rather than manufacturing	6. Supply Chain Position
ENT12	ENT12 began with SHS for both grid and non-grid connected customers, with no subsidy, total cost recovery for the	1. Sales dropped for a time	1. GoI introduced a scheme with 50% subsidy on SHS	1. Sales	1. When high subsidies are introduced, customers stopped buying full price products from ENT, alternatively, the rumor of subsidies cause prospective customers to anticipate subsidies, depressing demand	1. Policy

ENT12	systems and the use of village level entrepreneurs for distribution	2. Moved from selling a range of products, now primarily sell solar products	2. N/A	2. Product	2. Only solar products sold	2. Sales
		3. Shifted from VLE for distribution to selling via NGOs, now selling via dealers	3. N/A	3. Channels	3. Small basket of products did not allow for (male) VLEs to make sufficient money	3. Product
ENT 13	ENT13 began with the manufacture of solar lanterns.	1. Stopped sale of solar lamps, but still provide in grant-based projects	1. N/A	1. Product	1. Found distribution difficult	1. Supply Chain Position
		2. Began manufacturing solar panels	2. N/A	2. Product	2. Acquired enough capital to manufacture panels, felt there was unmet demand	2. Infrastructure Management
ENT 14	ENT14 began working with solar lanterns before moving on to SHS, which were for both grid and non grid connected users. They dd not provide a subsidy for the systems, and expected total cost recovery.	1. Stopped providing financing for products	1. N/A	1. Customer Interface/ Channel	1. Previously enterprise had worked with microfinance, but microfinancing fell apart after 2010	1. Partnerships
		2. Stopped selling SHS	2. N/A	2. Product	2. Manufacturing and Microfinance parterships that were used for selling SHS ended	2. Partnerships
		3. Trying to move away from grant-based financing	3. Microgrid/Minigrid CapEx subsidies	3. Revenue Model	3. Policy uncertainty makes incorporating subsidy into revenue model risky	3. Policy
ENT 21	ENT21 is a new enterprise with three models for their minigrids. Some minigrids are for grid connected customers only, and expect total cost recovery for the system, although some of these minigrids also recieve a government subsidy. The last minigrid model is for non grid connected users, is typically grant-based and has the expectation of partial cost recovery.					

ENT 22	ENT22 has three SHS models, all for both grid and non grid connection end users. The first two are subsidy free, expect the total cost for the system to be paid, and are distributed through either microfinance organisations or village level entrepreneurs. The final model is brant-based and therefore has the expectation of no or only partial cost recovery.					
ENT 23	ENT23 began by manufacturing and providing SHS to non grid connected users with a government subsidy through DDG tenders, sold the systems at price the provided only partial cost recovery.	1. Increasing manufacture of grid connected technology	1-2. “Government incentive schemes” are “promoting grid tied” projects	1. Product	1. Incentives from government encourage ENT to manufacture products for grid-connected projects	1. Policy
		2. Adding more grid-connected customers		2. Customer Interface/ Customer Segments	2. Increasing the manufacture of grid-connected products increase the amount of the ENT's work that focus on grid-connected customers	2. Policy
ENT 24	ENT24 began with microgrids for non grid connected customers, which expected only partial cost recovery for the capex and opex costs.	1. Shift from microgrids to minigrids	1. Grid expansion under RGGVY/DDUGJY programmes	1. Product	1. Grid expansion decreased the market for small off grid systems	1. Policy
		2. Shift from unelectrified to electrified villages	2. Grid expansion under RGGVY/DDUGJY programmes	2. Customer Interface/ Customer Segments	2. Grid expansion decreased the unelectrified market, unreliable grid increased demand in electrified villages	2. Policy
		3. Shifting focus of new work to Uttar Pradesh	3. New UP Microgrid/Minigrid Policy is “one reason” for that change	3. Customer Interface/ Customer Segments (state)	3. The new Uttar Pradesh Microgrid/Minigrid is favorable to the ENT's product, and is a reason why they are starting more projects in Uttar Pradesh	3. Policy
		4. Move from post-pay to pre-pay model	4. N/A	4. Revenue Model	4. Poor cost recovery from post-pay model	4. Cost Recovery
		5. Inclusion of solar/biomass hybrid systems	5. N/A	5. Product	5. Low cost of solar	5. Cost Structure

ENT 25	ENT25 began with a SHS type product that focused on providing power for non grid connected customers, expecting total cost recovery and providing no subsidy.	1. Shift from unelectrified end users to both electrified and unelectrified	1. Grid expansion under RGGVY/DDUGJY programmes	1. Customer Interface/ Customer Segments	1. Grid expansion brought electricity access into areas that they work in	1. Policy
		2. Focused on manufacturing and integration, use VLEs and MFIs for distribution and collection	2. N/A	2. Customer Interface/Channels	2. Early on, the enterprise realized that they could not produce and distribute the product	2. Supply Chain Position
ENT 26	ENT26 began with SHS that were for both grid and non grid connected customers. The systems recived a government subsidy and had the expectation of partial cost recovery.	1. Shift from government subsidy to no subsidy	1. NABARD subsidy was cancelled	1. Revenue Model	1. JNNSM subsidy cancellation meant that it was no longer available for the ENT's end users	1. Policy
		2. Including built-in financing for systems	2. N/A	2. Revenue Model, Customer Interface/Channels	2. In period 2007-2009, enterprise finds range of new financing through partnerships with rural banks, credit cooperatives and microfinance agencies for end users	2. Partnerships
ENT 27	ENT27 began with SHS for non grid connected users, which were distributed through self help groups and received a government subsidy. The sale of these systems partially covered the full cost of the SHS.	1. Enterprise began work in conjunction with government NABARD subsidy, connecting NABARD bank with SHGs for financing.	1. NABARD subsidy	1. Partnerships, Revenue Model	1. Needed financing for rural end users, NABARD subsidy was available and NABARD was happy to partner because of ENT's reputation	1. Policy, Customer Interface/ Customer Segments
		2. Shift from subsidy to grant-based model	2. NABARD subsidy backlogged, then cancelled	2. Revenue Model	2. The backlogging and then cancellation of the subsidy meant that the revenue model was no longer viable, so the ENT moved to grant-financing	2. Policy
		3. Increased product range	3. NABARD subsidy was cancelled	3. Product	3. Previous NABARD subsidy had only applied to one product, once cancelled, ENT27 added new tech	3. Policy

ENT27		4. Stopped selling solar lamps	4. N/A	4. Product	4. Solar lamps were of poor quality and broke after approx. one year, didn't 'understand the technology'	4. Quality, Knowledge
		5. Enterprise moved from loaning to selling systems	5. N/A	5. Revenue Model	5. There was a desire to own products from end users.	5. Demand
		6. Enterprise beginning own limited company and moving towards a financially sustainable model with no subsidy	6. N/A	6. Revenue Model	6. Aim for sustainability	6. Revenue Model
ENT 28	ENT28 began with SHS and Microgrids. SHS were for grid and non grid connected customers, received a grant, had partial cost recovery, and were distributed through SHGs or village level entrepreneurs. The microgrids are for non grid connected users only, rely on grant funding and expect partial recovery of opex and capex costs.	1. Adding larger and larger systems to their product line	1. N/A	1. Product	1. It is a "natural progression" as end users experience a growth in consumer demand	1. Demand
ENT 31	ENT31 has a range of products but is currently scaling up their minigrid systems. These are for both grid and non grid connected end users, have a grant subsidy for the capital expenditure, but expect hgih levels of cost recovery, either partial or total.					
ENT 32	ENT32 began their off grid electrification work with microgrids	1. Moved from 1 engineer with each grid to new monitoring technology	1. JNNSM subsidy decreased from 30%-25%, putting strains	1. Customer Interface, Product	1. As capital expenditure subsidy decreased, ENT had to decrease the number of engineers and focus more on	1. Policy

ENT32	for non grid connected customers, which were enabled by grants for capex, and expected partial cost recovery.	and fewer engineers	on their finances		monitoring to cut costs	
		2. Focusing on solar products	2. N/A	2. Product	2. Started with a range of products, but had demand for more solar capacity	2. Demand
ENT 33	ENT33 is an incubator for sustainable energy companies, with a heavy focus on rural electrification, including a number of off grid solar entrepreneurs.	1. Incubatees do not offer subsidy to their end users.	1. NSM-NABARD subsidy	1. Revenue Model	1. Incubatee have too little experience to be elifible for NSM-NABARD subsidy & financing	1. Policy
GOV 21	GOV21 works with solar home systems and microgrids. SHS are specifically for non grid connected end users, and receive either a grant or government subsidy, meaning that they expect only partial cost recovery in the sale of the system. The microgrids they work with are also intended for non grid connected end users, are reliant on grants, and expect only partial cost recovery, primarily for the operating costs.	1. Targeting unelectrified areas with SHS	1. Government partnership	1. Customer interface/ Customer Segments	1. Partnership with government allowed for subsidy, influenced type of end user	1. Partnership
		2. Enterprise aims to build maintenance capacity	2. N/A	2. Value Proposition	2. In order to "build a stable business model" and run future projects as a business	2. Revenue Model

APPENDIX 3: ENGAGEMENT STRATEGY WORD TABLE

Tactics	Sub-Tactics	S2 Codes	Examples
Leveraging Policy	Engaging in programmes	*Getting accredited*	1. so every bidder has to provide - okay, can they provide this benchmark cost, or below benchmark cost, and also they have to get certification from government that their factory and all are properly done. (ENT14)
			2. So though we are an enlisted channel partner of Ministry of New and Renewable Energy (ENT24)
		Applying for subsidy	1. Yeah, there is a central government subsidy which is given by the MNRE for mini grids and that sort of predates these state policies. (ENT21)
			2. As of now, for the next upcoming sites, 10 more sites, we are planning to process the application. (ENT24)
		Bidding for tenders	1. We bid like - we said, we'll do 15000, which is 10%. Because that's how much capital I have to do it at that low price. (ENT11)
			2. Oh yeah, we do tenders all the time. We don't win all of them. Because tenders, the problem with tenders, the basic systemic problem with tenders it's always the lowest quote, right? (ENT11)
		Doing CSR projects	1. I should, now I am. This project is also CSR project, local. (ENT13)
			2. Yeah, social part of our work, I would say is about 20% of our business. 80% is profit. 80% is not profit - commercial, commercial. (ENT23)
	Aligning with government priorities	*Following government priorities*	1. So and then we moved, and the neighboring state, the Jharkhand state - the government said we have a similar issue here with these left wing extremists, guerrillas who operate here. So why don't you help us out in those neighboring districts, so we moved into three districts which are further into the next state. (ENT32)
			2. But if it's a project tender, and specifications are mentioned then we have to follow MNRE. See, in a project is being donated by someone else, they have their own way, their own specifications and we have to follow them. (ENT23)
		Moving to areas with favorable policy	1. I think that one of the reasons that that [ENT24] has very big plans to scale up in Bihar, but looking at the posture of the state government, and a more positive posture from the UP government, plans have shifted towards UP, they're neighboring states, so plans have shifted that we'll scale it up in UP, and they are now forming a Memorandum of Understanding with the UP government. (ENT24)
			2. Earlier there was a scheme, under which central government were making, they were giving sort of encouragement to start on these solar shops. So that time, many people got engaged, but again I think challenge was the basket was not sufficient. So most of them now stopped. (ENT12)

Leveraging Policy (cont.)		*Moving towards grid connection areas*	1. No, we ugh, it is a combination of both. You see, why we are gravitating to commercial hubs. (ENT24)
			2. I would say, strategy has to factor in the changing reality of time. The changing reality of time is that every village is going to be grid connected, so you switch over to commercial hubs who are in need of reliable and good quality power, 24 by 7. And this is our focus now. (ENT23)
		Working in deregulated space	1. He wants a playing field where he can legally go and charge a market based tariff and he need concession and capital because it's expensive to set up mini grids - each one costs 100,000 dollars for a 30kW type of plant - so he needs a subsidy on one hand and he needs a playing ground that has minimal regulations on tariffs, so that he can make a viable model out of that (ENT21)
			2. Yes, you can find that in the census, you can get a - So whenever we do sit assessments based on our ESCOs requirements, based on our ESCOs product plans, the first thing to check is are these rural notified areas. (ENT21)
	Hedging policy risk	*Hedging risk through partnerships*	1. And finance - we used a very innovative method of financing and we got the apex rural bank - called the NABARD - the National Bank for Rural Development in India. They sort of adopted these groups and said that there is a financial - something called the Joint Liability Group Financial Instrument. So we would turn them into a group and we would give them a loan for the capex of the equipment and they would pay us back in easy installments. (ENT32)
			2. Yeah of course! A lot of people, we have a lot of companies that have been built up in association with ENT and now they have grown big. (ENT23)
		Hedging risk through manipulation	1. I worked with [redacted] - I know how we got subsidy. It's by throwing millions away, right? How we got accreditation. We got A1 because we are just like, woah, ... want money, just get the rating. (ENT31)
			2. Now the problem is all these companies also take a government subsidy cumbersome?. They get it after five year, three year, four year, so more or less they build it in the price. They think, okay there's only a 20% chance that we collect the subsidies. The prices are anywhere high. (ENT14)
	Negotiating	*Negotiating with government*	1. Yeah, that is how it is. We give them the - I mean, we give to the government, this is what we will do this year. More or less there is a small discussion, negotiation - 90% it is what we tell them. (ENT23)
			2. Every year ENT creates an agreement with the government on its targets and direction, but using a bottom up approach. (ENT23)
		Negotiating with implementing agents	1. At that time we did not have finance. That's when we approached the rural banks. Under the Government of India, the JNNSM Programme, they said we - they were quite excited. They said, we will be willing to partner with ENT considering the reputation the organization has. They agreed to lend to self help groups to procure these lights, but they said to us, you have to take care of the repayments. (ENT27)

Leveraging Policy (cont.)			2. And once the person within the Ministry saying, I really don't know what to do about it, you're hopeless. But I think what we had to do then as CLEAN and ENT was really bring together a group, bring together the bankers, the practitioners and MNRE, because practitioners ended up becoming the go-to between MNRE and bankers, saying, okay I promise that they say they're releasing the subsidies very soon, and the bank is saying, I will not finance until I get the subsidies. And then you have to go back and tell MNRE, okay, send out the message that it's okay to finance, but there won't be a subsidy component to the new finance, right? Yes, MNRE will clear the dues for all previous loans given, but starting April 2015 you're still allowed to give financing for energy systems. And unfortunately, that was communicated, but banks were still wary, because they said, 'tomorrow if you come back and say this was not the right loan to give out...' (ENT33)
Building and Leveraging Relationships	Maintaining relationships	*Maintaining relationships*	1.And we don't have a civil government option coming there and when I have to take them for inspection, I actually escort them to those places because they feel safer with us. (ENT32)
			2. The system works well for ENT because it requires a lot of face time to get through the system and they're based in Jaipur, but it doesn't work well for out of state companies (ENT13)
		Talking to government	1. I was in touch with a few of the government officers over the summer (ENT25)
			2. We are still talking to government agencies to, so that we get traction somewhere - that's the point. (ENT25)
	Working with local actors	*Working with local actors*	1. it was very well received and we got the entire Sundurbans islands to switch over to this. I mean, I got them to design the resolution to what's called the administrative body called the Panchayats, and they gave us permission to serve - replace those vehicles with electric vehicles. (ENT32)
			2. We speak to the village, because these are difficult areas where the government grid does not run. So instead of permission to take, we speak to the villagers arriving once - even if in a normal areas which is not a conflict area. I think that we will still take the okay from the local village Panchayat - the village head man and the village committee. (ENT32)
	Partnering with government	*Partnering with government*	1. Yes, we are - we have relationship with the Government of Bihar for training, and like the Ministry of New and Renewable Energy they have the Surya Programme, that is for solar technicians, we have run one post and we have government, (ENT24)
			2. So that is part of the government programme, improving livelihoods of poor women in Bihar, so their focus is mainly on the livelihoods side. We actually tried to provide these women a better environment through lighting services. So that is how we have connected with the government programme. It's going really good, and we are into 7th years of our partnership. It's continuing, and we are reaching about 50,000 households there. (ENT28)
	Integrating government into supply	*Integrating government into supply chain*	1. So if the government... government wants to come off and help us, so instead of subsidy we will ask, give us reach. Give us your distribution channel, give us your public welfare distribution thingy, and we'll work on it. (ENT25)

	chain		2. So as a company we decide that we won't get into distribution, we will have distribution partners, like micro finance institution, or government institutions, or NGOs, and there are other companies, like, other... companies who have foothold in rural areas. We ultimately use their services. So we'll have distribution partners across. They will distribute the kit for us, that is how we'll get the reach. (ENT25)
Lobbying Lobbying (cont.)	Offering information	*Offering information*	1. So that point, we are trying to raise with the government agencies to make sure - and the government officials - to tell them there are five segments, you cannot ignore any of them. (ENT25)
			2. They are responsive, yes, because we make a lot of sense when we talk things. We also have a - not a habit per say, but whatever we say, we make sure that we back it up with data. So if the government - anyone can come to us and ask us, why do have three lights, three more than lights? We have data for it. Why do have it? Why do we have 16 ports? We have data for it. (ENT25)
	Giving feedback	*Giving feedback through formal channels*	1. So they, for who to electrify this country they conduct a 1/2, 1 and 1/2 meeting with entrepreneurs they said everything, in one year. And that conference, nobody got to speak other than the consultant who had organized this conference. Representative of this UP policy for one hour, that was all of it. (ENT31)
			2. Not for any support to the...but I need them, you know, to just give them a feedback of what we feel, and also there. So there's a committee they have formed, right? So we have been sometimes in committee meeting when they have called some of the manufacturers, us and all. So it was more of a best practices and a feedback sharing, right? (ENT14)
		Giving individual feedback	1. And we have given our representation, hopefully they should take care of those areas. (ENT24)
			2. From, we gave a lot of developers' perspective of how it should be, but the reason that that policy and what is now, what we would want (ENT31)
		Giving collective feedback	1. the micro grids players should put up a strong case in government that these people do not need grid connectivity, because your grid connectivity is bad (ENT31)
			2. And we have made representations and our broader stakeholder group, even ESCOs, do it with us or even independently, because it's ultimately going to benefit them, whether we do it or they do it, so they also make independent representations. But collectively everyone has sourced still at that level - their perspective is different, these new bureaucrats, their perspective is different from what the previous generation of bureaucrats had (ENT21)
	Championin g policy	*Championing policy*	1. So this is a very unique institution, where you will find people working on policy side, working at the grassroots level, so we have people working from grassroots to government. (ENT28)
			2. But in Rajasthan, where we've been championing, we say 'open the funnel as much as you can, let more entrepreneurs come in, let more consultants come in, let more people with technologies come in (ENT11)
	Being a member of	*Being a member of an industry*	1. At central level also, there are many organizations also, we are a member of CLEAN - CLEAN - that we are a member of, we are not member but there's a cookstove, energy efficient cookstove, smokeless cookstove, some

	an industry organization	*organization*	organization like that. So there're 4, 5 organizations which keep some annual meetings (ENT12)
			2. But I think what we had to do then as CLEAN and ENT was really bring together a group, bring together the bankers, the practitioners and MNRE, because practitioners ended up becoming the go-to between MNRE and bankers (ENT33)
Monitoring	Anticipating	*Anticipating government action*	1. And then as we get bigger, maybe also 100 villages, somebody will look up and they will either try to emulate our model or they will try to regulate our model. And yeah, surely they will, because right now the tariff is something that we never shared with the communities. (ENT32)
			2. See, there are two ways to look at that. One is of course government planning, government says in 3 years every village will be electrified. But in reality it may take some more time (ENT23)
		Anticipating integration/non-integration	1. At some point we, I think, reason dictates that we integrate these two, but it will be some time before we do that. (ENT32)
			2. My perspective on this is that not every entrepreneur is looking at it from the perspective of interconnecting with a DISCOM. It might be a nightmare for them to do something like that and collect their money from the government. That's a certain nightmare. So everyone would want to work over a certain period of number of years with as minimum regulations as possible and as minimum competition as possible (ENT21)
	Having awareness	*Being aware of government vision*	1. the government, when it - the government policy is far more likely keeping a view those areas where there is no possibility of grid reach, like you have the faster transmission line becomes so corrupted that it is not economically viable to put up the transmission network to put up, say, 20 households. (ENT24)
			2. They had a mandate from Prime Minister Modi to do it, like all the villages needed to be electrified in the next three years, right? But they know that it's not going to be able to do it, so now they are thinking, they're going to put in infrastructure if not 3 years, 7 years, right? (ENT14)
		Being aware of policy	1. Well, obviously. Government policy, especially in the UP, in case people have government, because it's basically competitive politics which comes into play, at the time of, I would say, elections - in case you have the chance to do the same. So you're doomed, okay. So that is the, as of now in Bihar, the only government which is got priority on off grid or mini grids is UP. They have brought very good policy, and Bihar is still in draft stage, so that is the status as of just now. There are not very many - state governments that have set out a clear cut policy - UP was the first one - and Bihar is following suit, but still in the draft stage, they have sought inputs from all the stakeholders, and still the policy, it is not out. (ENT24)
			2. We didn't because, you know, the policies operated for a specific period. So when these sites are being put up, that policy was, I would say, the time was gone. So for the next set of sites, we're looking for government directive, on government circular, the government circular is out with, you put, the application online, and you see the government will never honor your post- post processing applications. (ENT24)

	Waiting	*Waiting to know government approach*	1. Everybody says, let' see what government is deciding, government is still learning the ropes, ... years back. (ENT31)
			2. Well, it may not create as much chaos as if these people had gotten certified, because now, it's like, okay - people can still wait and see if a new certification rule comes in, or if something changes.(ENT33)

APPENDIX 4: DISENGAGEMENT STRATEGY WORD TABLE

Tactics	Sub-Tactics	S2 Codes	Examples
Avoiding	Avoiding grid	*Avoiding grid*	1. Only one has grid access, and that's a cluster model in which I built one micro grid which was powering - giving power to at least two neighboring schools, schools.... So I did not have to interfere with the grid or anything like that. They simply look at it, it's for school. One other two, three micro grids happening are totally grid devoid areas. (ENT31)
			2. After [the grid arrives], we withdraw the system, if we see that it is not being used, and we shift it to some other locations. (ENT28)
	Stepping in where the government in not	*Stepping in where the government in not*	1. And therefore the government was not able to penetrate those areas. So we started work there in about 25 villages, and then expanded to 30 villages. (ENT32)
			2. Maintenance is an issue - these pumps are to be shared, they're not good with groups. That's where we step in. (ENT32)
Not engaging	Not engaging in policy	*Not applying*	1. There are certain reasons, but the procedure is so winding, that we do not avail of that subsidy (ENT24)
			2. We didn't [apply] because, you know, the policies operated for a specific period. So when these sites are being put up, that policy was, I would say, the time was gone. (ENT24)
		Not bidding	1. The off grid space in Jharkhand is really good vis a vis Bihar, because the area, the Naxal affected areas and the population is sparse, spread out. So there the off grid solution is much more in demand unlike Bihar so we thought that we will fill the bid and win the contract but it got rejected, so now we are disappointed that the ninth, that responding to Bihar tender is foolhardy, there's not point in wasting and dropping your money for six months and they keep postponing tenders, and for one year you keep looking and you relax, because there's no point (ENT24)
			2. Their experience with tenders is not that great they are "designed to fail" so they don't really go for them (ENT26)
		Disengaging from policy	1. I think the biggest support they could give me is to just stay out of my way at this point. (ENT32)
			2. We were expecting [the subsidy] to happen, you know we even collected the money but in the end it didn't happen. Same thing with the solar heater]. If you remember, earlier they were giving out these solar heater also, subsidy. Suddenly one particular day they decided we're not giving it. So many of the manufacturers had a lot issues. Just the availability of this... It's not trustworthy, it can change. (ENT14)
	Not considering	*Not taking grid expansion into*	1. No actually, when we do our campaigns, even til now, we do focus - we try to find areas which are completely off grid - those are very rare actually. To find areas which has not been connected with grid - like, the connections

Not engaging (cont.)	policy	*account*	are there but there is no power, that is a different thing - few people, few of the households, they just anticipate that if the powers have been set, probably the power will comes in a couple of years. So they're still reluctant to get it. So finding off grid, completely off grid hamlets. Some of the hamlets we are able to identify, but mostly we work in grid areas also. (ENT27)
			2. We have to pay attention, especially if we are installing micro grid. But we do not pay attention when we are expanding the solar home systems (ENT28)
		Not waiting for policy changes	1. Whenever policy comes, I will work. Other way I work something else. I have an organization which I intend to grow, so we work, have to work [...] So I cannot wait that when government policy will come, what policy will come, when it will get implemented, when actually I will get money. I cannot wait for that. (ENT12)
	Not working with government	*Not interacting with government*	1. State level, [feedback is] not happening. (ENT12)
			2. We have no interactions with the state government. (ENT12)
		Not partnering with government	1. There are no partnerships. Tender participation only. (ENT23)
			2. No we don't. We did try to speak to BREDA people, which is - yeah. But they were interested more in micro grids and they want - they said, we had a couple of discussions - they wanted us to identify these hamlets where grids could be set up, and they could take forward everything. So they just wanted our help in the identification of villages, so I did not find anything useful in that, the discussions. This was long time back, but after that we have not discussed. (ENT27)
		Not working with government	1. We haven't, but we - We did not have, we never got the opportunity where the needs were aligned. But we never had the - yeah, so we should be trying to do something… (ENT27)
			2. Because government also got thousands of number of pounds, home light systems, whatever. So some people work with them. We are not working. ENT is not working. But there're many many people are. (ENT12)