SmartPowerIndia

MINI-GRID HANDBOOK

A Business Guide for Developers and Investors

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Acknowledgements

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Foreword

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Foreword

The energy deprivation cycle continues to pose a major challenge for governments in emerging economies. Electrification has typically been delivered through centralised generation and distribution that was not always afforded equitable or efficient access. Decentralised solar technologies are fast approaching financial parity and have definitively environmental advantages over grid extension, especially in rural and remote locations. UPNEDA has been pioneer in demonstrating the solar mini-grid technology and issuing a Solar Mini-grid Policy.

Mini-grid technologies and service delivery models hold great promise for easier energy accessibility and catalysing rural enterprise development in India; this Handbook represents another promising step for Smart Power India's leadership in this sector. Uttar Pradesh's forward-looking policy aims to facilitate different types of mini-grid business models.

As highlighted in this Handbook, the Uttar Pradesh, policy has further encouraged long-term investment in the sector by providing guidelines for mini-grids. Combined with Smart Power India's extensive practical experience in deploying renewables-based mini-grids, the Handbook paints a comprehensive picture of mini-grid project development.

I am happy to have witnessed a proliferation of different mini-grid models which both supplement and complement the national grid. Realising the transformative potential of mini-grids, I am certain other states will be encouraged by Uttar Pradesh governments initiative in crafting and enabling policy frameworks.

Bhawani Singh Khangarot
21.11.19 Director

Foreword

Jaideep Mukherji
CEO, Smart Power India

In the year 2015, Smart Power India (SPI) embarked on a journey with a vision to drive socio-economic progress of rural customers by ensuring access to reliable and quality electricity. As of November 2019, we have supported 12 developers in building a portfolio of 241 mini-grids in the states of Uttar Pradesh, Bihar, and Jharkhand. These mini-grids cumulatively serve over 2 lakh customers – from households and shops requiring simple lighting, to commercial enterprises, telecom towers, agri-processing, and schools.

In our quest to develop viable mini-grid models, SPI has been constantly innovating to improve technical performance and consumer services. In parallel, our advocacy efforts have sought to promote mini-grids as a promising last-mile energy service solution, harmoniously complements the government's drive of electrification. Collaborating closely with government agencies, we have highlighted a range of critical issues, and made significant progress on de-risking the mini-grid ecosystem and improving regulatory certainty.

Adequate electricity is an important precursor to economic growth in rural areas. While there has been tremendous progress made in rural electrification, challenges remain in ensuring connections to rural businesses and micro- enterprises.

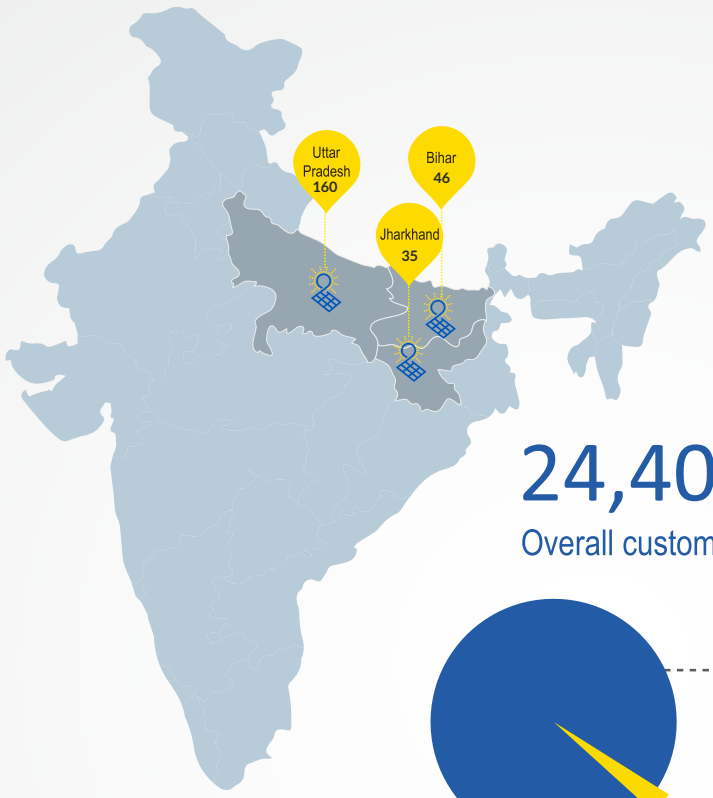
Mini-grid developers, apart from supplying renewables-based electricity to all types of customers, have played an active role in catalysing the use of electricity for productive economic activity, in promoting energy efficiency, and in supporting communities to meet their social goals in sectors of education (e.g. lighting and appliances for schools) and health (e.g. clean drinking water, digital clinics), among others.

The mini-grid ecosystem continues to mature and evolve, in India and around the globe. This Handbook aims to distil some of SPI's experiences and expertise in establishing and running a viable mini-grid. It elaborates upon mini-grid services and capabilities, business and financial considerations, and provides guidance for navigating the regulatory landscape. To new entrants in the mini-grid space, as well as to those with established ventures, not just in India but also for other countries, we hope that this Handbook will serve as a standard and effective guide.

About
Smart Power India

Smart Power India (SPI), a subsidiary of the Rockefeller Foundation is the key agency for implementing the Smart Power initiative of the Foundation. SPI extends power to those without sufficient access to end energy-poverty and transform the livelihoods of the under-served. It is working towards building and nurturing ecosystems to promote sustainable and scalable models to deliver electricity access.

Providing electricity access 241 villages of India

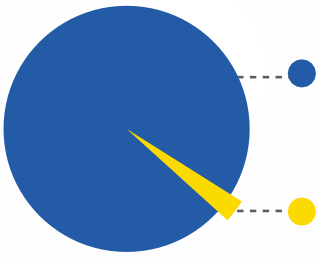


Impacting the lives of **211,892** people

241 plants across Uttar Pradesh, Bihar and Jharkhand

24,401
Overall customers

7.3 MW
Overall installed capacity



97% plants use solar energy

3% use biomass or solar/biomass hybrid technology

Households	Shops	Commercial users & micro-enterprises	Telecom towers	Institutions
15,554	6,747	1,912	132	56

As of October 2019

*1912 includes 1730 commercial and 182 micro-enterprises

Table of Contents

1. Introduction **09**

2. Mini-grids in India **13**
- 2.1. Basics of Mini-grids 14
- 2.2. Benefits of Mini-grids 14
  - Box 1: Why Customers Choose Mini-grids 15
- 2.3. Customer Profiles 15
- 2.4. Operating Models 16

3. Project Development **19**
- 3.1. Phases of Planning and Operation 20
- 3.2. Selection of Villages 20
  - 3.2.1. Selection Criteria 21
  - 3.2.2. Detailed Energy Assessment 21
- 3.3. Selection of Technology 22
  - 3.3.1. Hybrid Generation 23

4. Business Viability **25**
- 4.1. Cost Assessment 26
  - 4.1.1. Capital Expenditure 26
  - 4.1.2. Operational Expenditure 27
  - Box 2: Mini-grid Cost Break-down 28
- 4.2. Revenue Potential Maximisation 28
  - 4.2.1. Levels of Service 29
  - 4.2.2. Connection Types and Metering Strategies 29
  - Box 3: Smart Meters 30
  - 4.2.3. Tariff Models 31
  - 4.2.4. Collecting Payments 31
  - Box 4: Tara Urja's Customer Management Platform 32
  - Box 5: Solar Mini-grids and Supply Timings 32
- 4.3. Load Acquisition 32
  - 4.3.1. Customer Acquisition 33
  - 4.3.2. Demand Conversion 34
  - 4.3.3. Demand Enhancement 34
  - Box 6: Energy Efficient Appliance Schemes 35
  - 4.3.4. New Demand Creation 35
  - Box 7: Water Treatment Units 36
  - Box 8: Oil Expeller Units 36
- 4.4. Key Considerations 36

5. Financing Mini-grids **39**
5.1. Mechanisms and Sources of Finance 40
Box 9: Grant-Funded Mini-grids 40
Box 10: IREDA Loan Scheme for Mini-grids 41
Box 11: Debt Funding from the Rockefeller Foundation 42
Box 12: Major Equity Deals in the Mini-grid Sector 42
5.2. Evolving Funding Strategies 43
Box 13: Crowdfunding 43

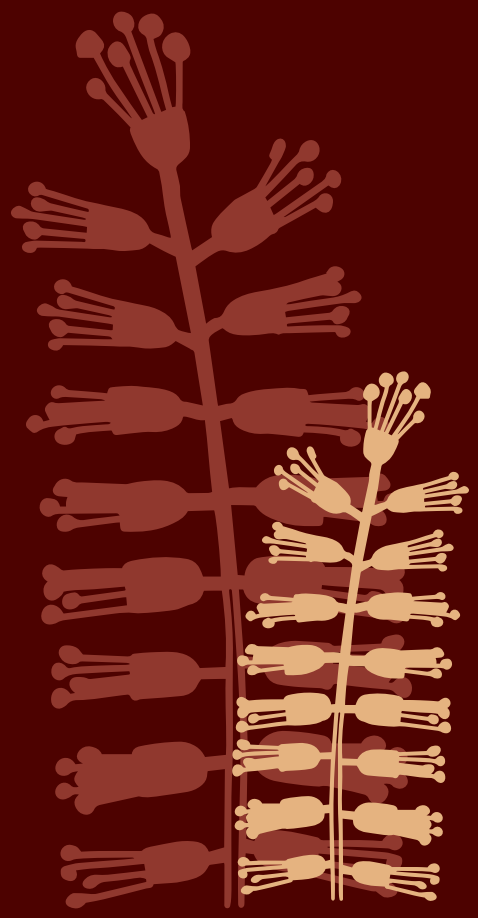
6. Policy and Regulatory Landscape **45**
6.1. An Enabling Environment for Mini-grids 46
6.2. Central Government Measures 46
6.3. State Government Measures 47
6.3.1. Uttar Pradesh 47
6.3.2. Bihar 48
6.4. Approvals Required 49

7. Business Risks **51**
7.1. Challenges, Impacts, and Mitigation Measures 52
Box 14: Technology Risks and Warranties 55

8. Impact of Mini-grids **57**

Annexure **61**
A. Legislation, Policy, and Regulation 62
B. Policies and Regulations in Uttar Pradesh and Bihar 63
C. Approvals and Clearances 66
Box 15 - Waiver of Approvals and Clearances 66
D. Funding Agencies 67

Glossary **69**



1 Introduction

Transforming last-mile electricity delivery with mini-grids