

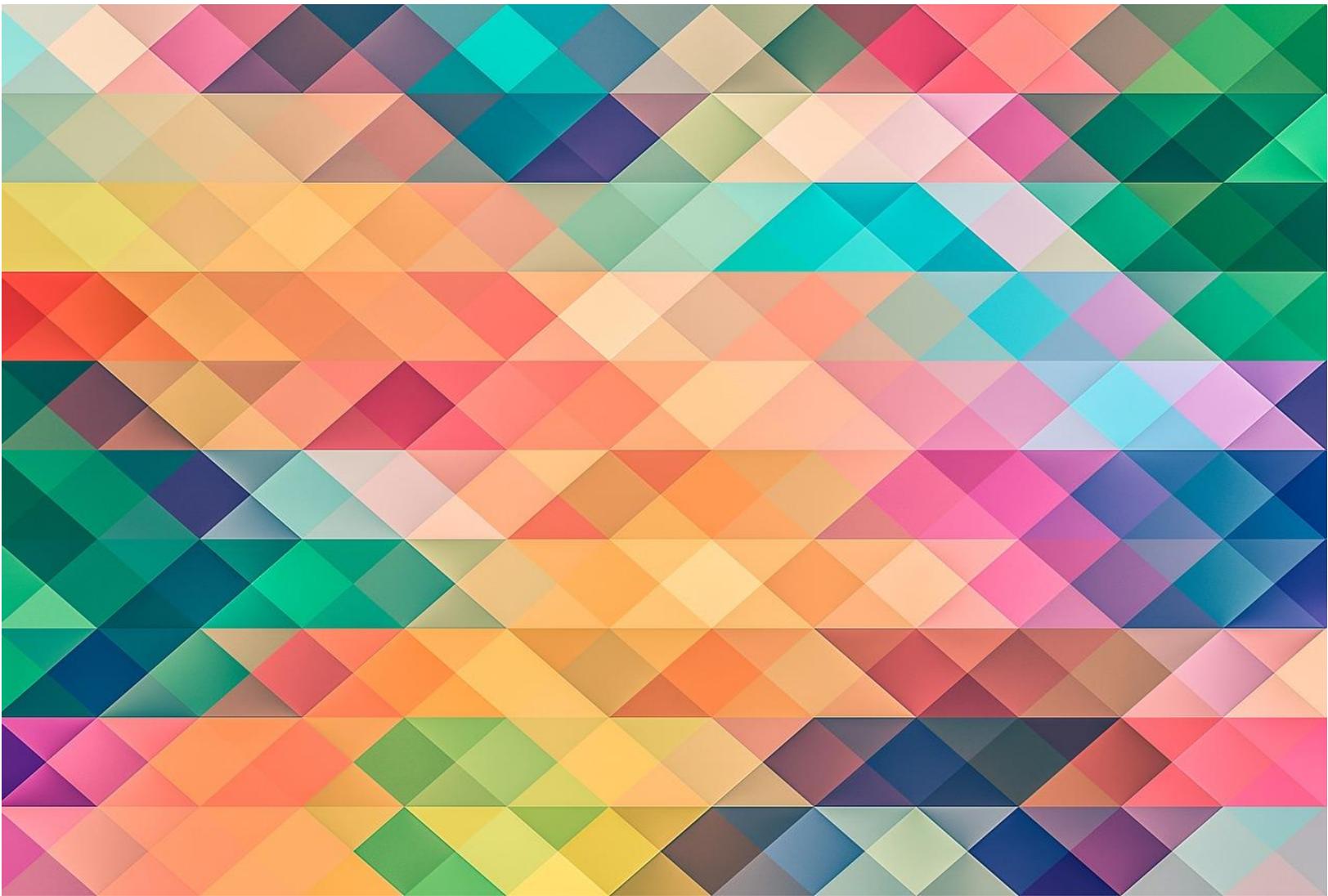


Mini-Grids in India

Evaluating Investment - Policy Interaction

November 2017





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About Shakti Sustainable Energy Foundation

Shakti Sustainable Energy Foundation works to strengthen the energy security of India by aiding the design and implementation of policies that support renewable energy, energy efficiency and sustainable transport solutions.

Table of Contents

Outlook for micro-/mini-grids evolve from basic access to complement “24x7 Power for All” 5

Increasing recognition of mini-grids in financing and policy landscape in India..... 5

Lack of policy targets and structural bottlenecks impeding market momentum..... 6

Innovation and risk-adjusted capital to improve absorbability and suitability of accessible capital and capture market opportunity 8

Investor perception improved, but segment-specific challenges prevail 9

Micro-/mini-grids continue to present high risk for investors 10

Policy developments encouraging but lacking implementation 11

Scale, viability and alignment to grid expansion: Key for leveraging current and likely capital commitments..... 12

Integrated models, technical assistance, policy tracker and targets – key for deployment of capital..... 13

Annexure 1: Methodology adopted for this study 14

Annexure 2: List of FIs interviewed for the purpose of this study 15



Objective

This study aims to present a holistic view on the evolving capital landscape with a specific lens of linkage to policy measures and enhancements needed therein to fully leverage the global capital interest in Micro-/mini-grids segment of DRE energy access sector in India, and thus drive growth in the segment as also the sector.

In a previous study - “Financing Decentralized Renewable Energy Mini-grids in India” - in 2013¹, cKinetics had mapped the available and accessible capital specifically for DRE mini-grids segment in India. This study is an update to the 2013 study; however, it goes beyond the financing landscape assessment to include the role of policies in increasing investability of the sector.



¹ <http://www.ckinetics.com/DRE-Financing/Financing%20DRE%20Minigrids.pdf>

Outlook for micro-/mini-grids evolve from basic access to complement “24x7 Power for All”

Decentralised Renewable Energy (DRE)-based Energy Access solutions – both grid-based (pico-/micro-/mini-grids), and devices and systems (solar home systems, solar lanterns, solar pumps and biomass cookstoves) - have witnessed an increasing interest and uptake over the past few years primarily owing to continued levels of significant under-electrification, need for clean cooking and decline in cost of DRE technology.

Despite increasing thrust of the government on rural electrification via grid intensification under policies/schemes such as DDUGJY, there is a need for an alternate source of ~1.2GW other at basic lifeline consumption to address the needs of ~44 million households that remain unelectrified² across several states and ensure lack of quality supply during peak hours.

Thus, as is evident, DRE solutions remain key to fill the gaps in achieving “24x7 Power for All” goal by 2019. Mini-grids in particular have the potential to fill these gaps by operating as a comprehensive solution for rural communities, operating either as complementary to the grid or as a substitute to the central grid.

Increasing recognition of mini-grids in financing and policy landscape in India

Resultantly, over the past few years central and state governments have announced several policies to protect investments in mini-grids, in addition to grid intensification measures.

There has also been increasing interest for operationalizing DRE-specific lines and investment mandates, particularly from international donors and Development finance institutions (DFIs) – a shift from earlier scenario where it was clubbed under the board RE bucket. Thus, several investors now have specific programs/allocations towards mini-grids.

Key Policies Impacting Micro-/Mini-grids since 2013	
Direct Policy	National Tariff Policy 2016 (NTP)
	Uttar Pradesh Mini Grid Policy 2016
	National policy on Mini/Micro grids (Draft)
	Bihar RE policy 2017
Regulation	UPERC Mini-grid Regulations, 2016
	MPERC Micro-grid Regulations, 2016
Scheme	Off-grid and Decentralized Solar Application Scheme by JNNSM
	DDG scheme
Indirect Policy	DDUGJY Scheme (Deen Dayal Upadhyaya Gram Jyoti Yojana) outside of DDG
	Intended Nationally Determined Contribution (INDC)
	24x7 Power For All
	Kerosene Subsidy DBT
	State policies for HH connections

Though there has been some movement on the financing and policy front, there is lack of clarity on the efficacy of these policies in steering capital flow (quantum and access).

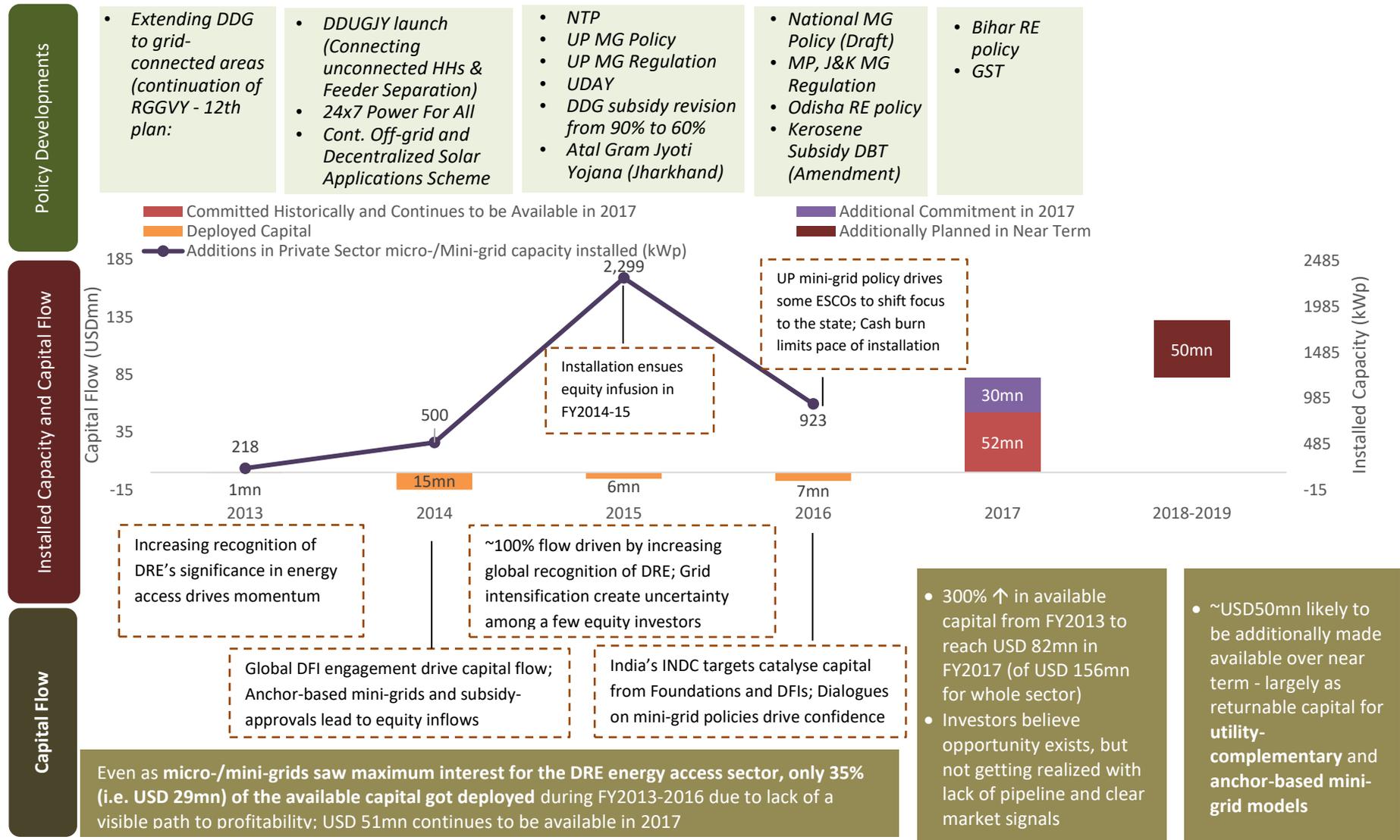
Consolidated view is required across:

- Change in nature, form and quantum of capital flow over the past few years
- Ease of accessibility and suitability of such capital
- Efficacy of policies in influencing investor action
- Change in risk perception among various investor types – affecting willingness to commit additional capital

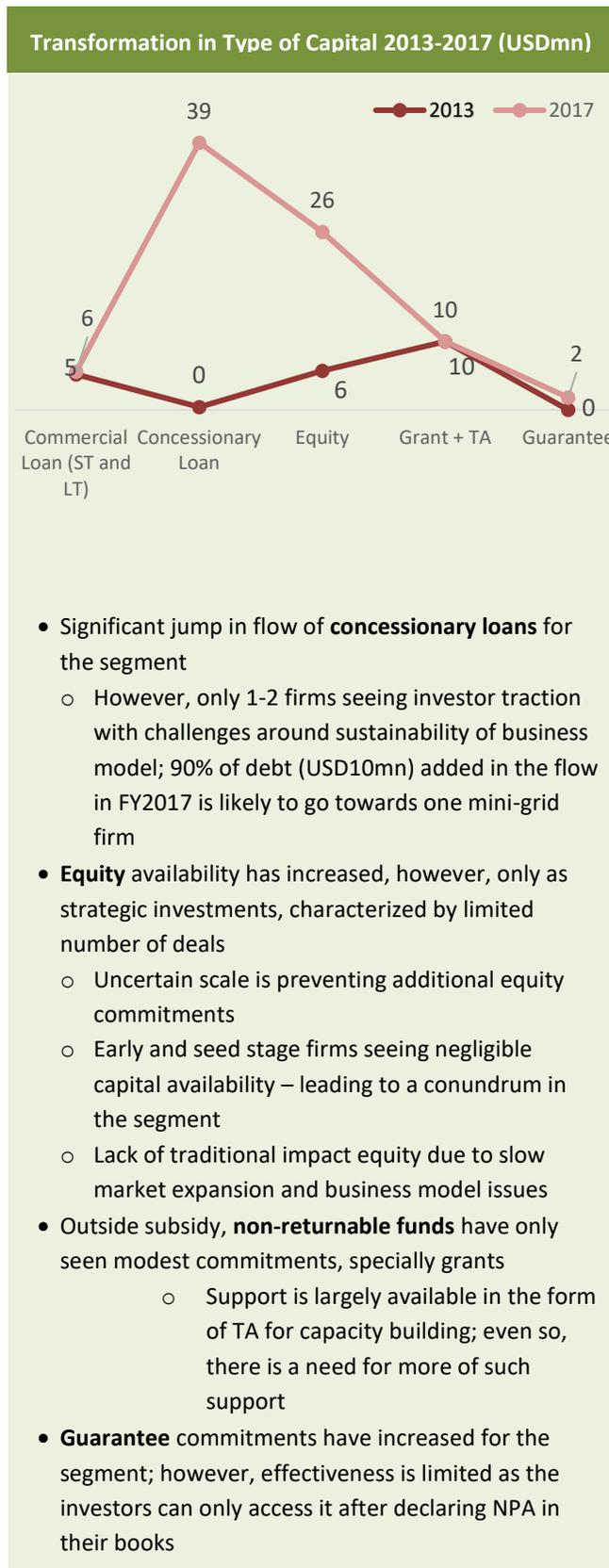
² Garv Dashboard as of 20/6/2017 <http://garv.gov.in/garv2/dashboard/garv>

Lack of policy targets and structural bottlenecks impeding market momentum

Quantum of capital for Micro-/mini-grids enterprises have significantly improved over the past 5 years. While, policies have had some role to play, most of the flow is catalyzed by growing industry conversations and momentum in the global market.



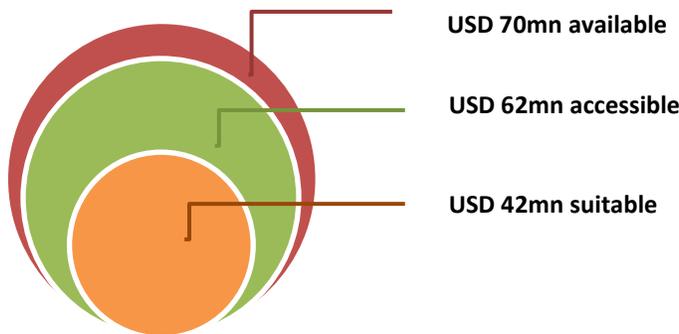
DFIs and Foundations drive capital flow via concessionary debt; equity only emerging from strategic corporate investors



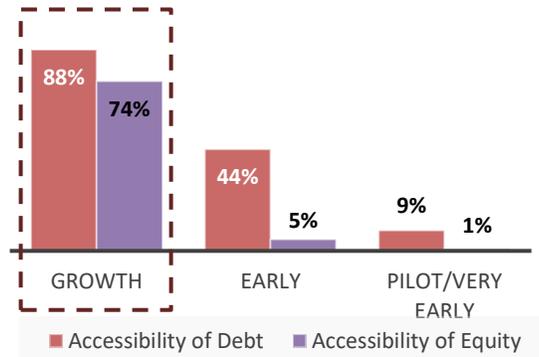
Innovation and risk-adjusted capital to improve absorbability and suitability of accessible capital and capture market opportunity

The segment **requires innovation – both business model and product** - to not only catalyse further financing but also ensure that scale is achieved and new players emerge so that the existing capital can get deployed.

Accessibility and Suitability of Available Returnable Capital in Mini-grids



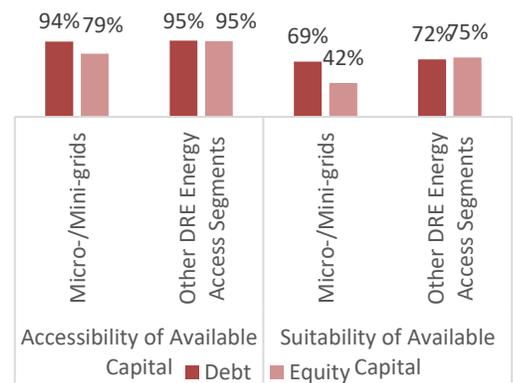
Accessibility of Available Capital by Stage of Operations



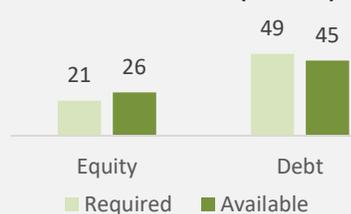
~90% of the overall returnable capital is accessible², of that only 70% is suitable³ to the needs of the enterprises

- Compared to other DRE energy access segments, accessibility and suitability is particularly low for equity in micro-/mini-grids than other segments
 - Even as debt is largely accessible, **key challenge lies in securing equity** as investors require path to financial viability and scale
- Accessibility is only 35% for early and pilot/very early stage firms**
 - Only 5-7% equity can be accessed by early and pilot stage enterprises compared to 75% accessibility for growth stage enterprises
- Limited risk appetite affecting suitability of capital

Accessibility and Suitability of Available Capital in Mini-grids v/s Other DRE Energy Access Segments



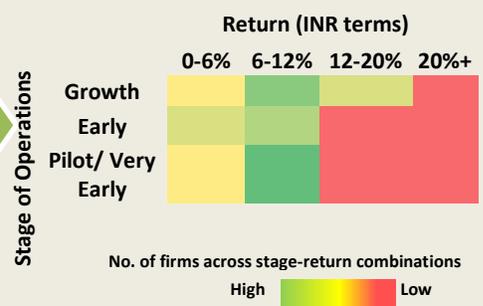
Required⁴ v/s Available Capital for Micro-/Mini-grids (USDmn)



Need for ~USD70mn to capture market opportunity

As bulk of the capital lacks sufficient risk appetite, there is a need for **capital with low return expectations and amenability to asset financing models** for project developers in pilot/very early and early stages

Landscape of Mini-grid Project Developers



There are **limited number of firms in growth stage** with mid-high return categories – leading to challenges in deployment of available capital

Even though capital is accessible, there are **not sufficient number of firms that can absorb** this capital

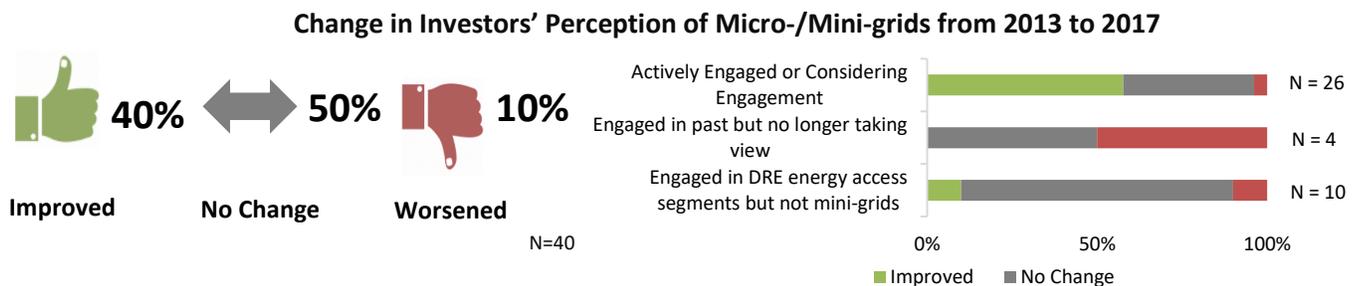
³Ease of access of available capital per the ability of the relevant enterprises in the segment to meet the investment criteria (such as operating track record, balance sheet strength, minimum return, collateral, etc.) of different FIs

⁴ Accessible capital that is suited to the requirements of the enterprises/segment in terms type of product offered

⁵ Required capital refers to the capital demand that is likely to emerge annually over the next few years per government targets and market opportunity

Investor perception improved, but segment-specific challenges prevail

Compared to 2013, investors largely believe that there is an increased opportunity for the segment, especially anchor-based mini-grids. They believe that role of mini-grids will be essential in maintaining a reliable supply for power and support governments outlook for 24x7 Power for All. However, **lack of pace and targeted push from policy makers have limited ability to fully utilize this positive outlook.**

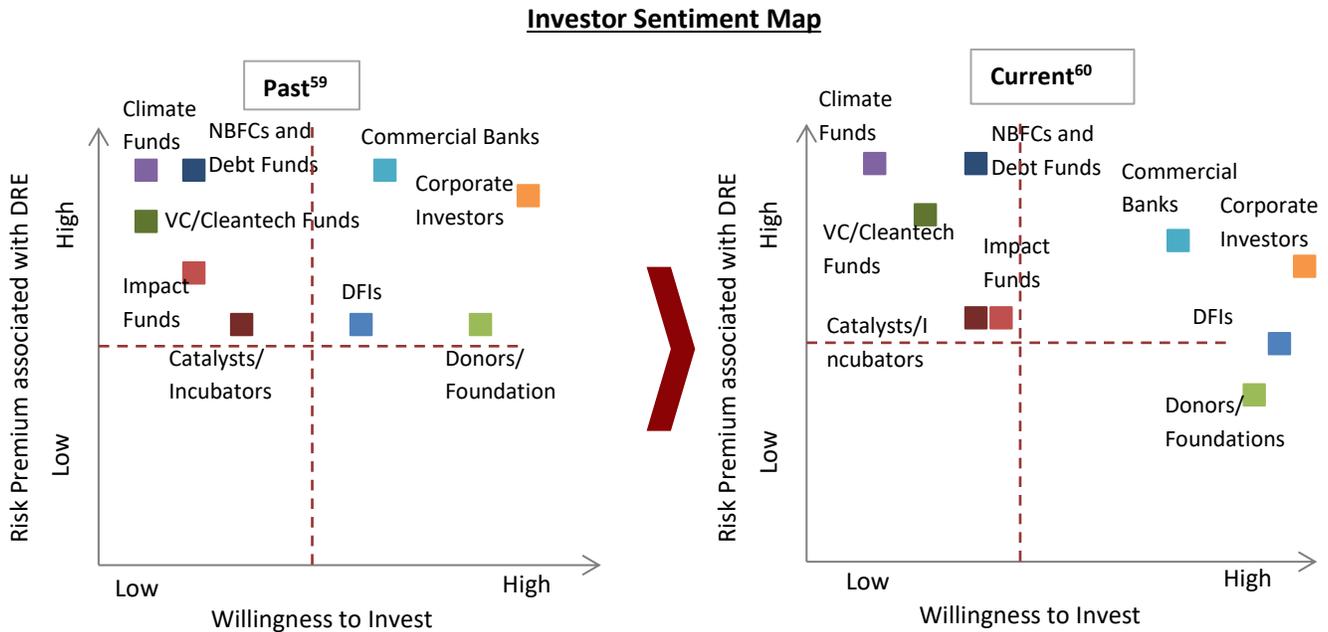


Several investors have stated difference in perception when looking at standalone micro-/mini-grids segment compared to the larger DRE energy access sector. Some of the views are shared below:

Organisation	Change in Perception DRE Energy Access	Change in Perception Mini-grids	Perception regarding micro-/mini-grids
An international development agency			Not looking to invest in mini-grids due to uncertainty created by increasing central grid infrastructure; mini-grid policies are quite recent and not sure if they will lead to a turnaround
A domestic commercial bank			Not keen to invest in mini-/micro-grid segment (barring the exposure to OMC) because even with exit options to mini-grid providers - taking risk on DISCOMs is itself a risk
A global foundation with a mission to move capital to social and environmental areas			There is lack of pipeline in mini-grids; there are organisations that have got grant money and have track record but not operating to the point that they can absorb the debt capital investor provides (via indirect investments)
An impact fund focused on low-income communities in Africa and Asia			Financial viability in mini-grids is a challenge; unless addressed, won't invest in mini-grids
A global foundation working towards social, environmental and cultural change			Focus has shifted to only mini-grids and on-grid rooftop with increasing grid presence
A social enterprise Incubator			Viability of mini-grids has decreased with the government's focus on Power for All; the focus shifts to supply of equipment that can be used by people in the villages for end-use applications (cold storage, packaging machinery, sewing machinery, etc.) providing livelihood

Micro-/mini-grids continue to present high risk for investors

Investors continue to attach high risk premium to micro-/mini-grids. Risk perception of most investors has remained the same, while willingness to invest for some has improved. Donors/Foundations, DFIs and corporate investors display the highest willingness to invest, however they have not stated a significant change in risk outlook. Those with high willingness to invest, also lie in the high-risk perception quadrant.



Factors Affecting Change in Investor Sentiment (2013-2017)

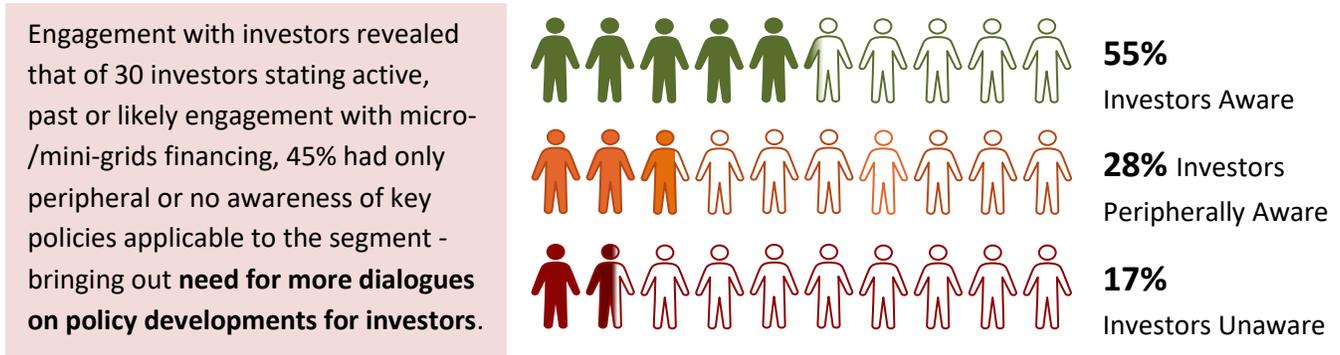
Factors Affecting Sentiment	Market Evolution	Policy Changes	Social Impact	Climate Change/ Environmental impact	Supporting Ecosystem	Demonstration effect
Type of Investor						
DFI	Green	Green	Green	Green	Orange	Red
Impact fund	Red	Orange	Green	Green	Red	Red
Donor/Foundations	Green	Green	Green	Green	Orange	Orange
Climate Funds	Red	Red	Green	Green	Orange	Orange
Commercial Banks	Green	Green	Orange	Green	Orange	Orange
NBFCs and Debt Funds	Green	Orange	Orange	Orange	Green	Orange
Corporate Investors	Green	Orange	Green	Green	Orange	Green
Catalyst Incubators	Red	Green	Green	Green	Orange	Orange

Effect of Factors on Investor Sentiment
Largely Positive
Somewhat Positive
Neutral
Somewhat Negative
Largely Negative

- Slower than anticipated progress by the current lot of enterprises leading to concerns on even project returns to **equity providers**
- **Interest from International donors/foundations and DFIs driven by** government thrust on RE and social impact objectives
- Supporting ecosystem and lack of demonstration effect – key challenges perceived by **impact funds**
- Market evolution in terms of number of new entrants limiting interest from catalyst/incubators

Policy developments encouraging but lacking implementation

Investors primarily perceive central and state-level mini-grids policies to be a step in the positive direction, however, they have witnessed limited on-ground action based on them. Lack of effective implementation – unlike the solar rooftop sector – and clear market targets have made them cautious towards more commitments.



Among the various policies impacting micro-/mini-grids, **the investors who are actively engaged believe that DDUGJY and UP Mini-grid Policy have shaped perception** about the segment. On the contrary, **state policies – such as UP Mini-grid Policy or Bihar RE policy – have not been able to shape perception of those investors who are not investing in mini-grids** but other DRE energy access segments.

Key Policies	Investors' Perception		Status of Investor		
	Views post-announcement of policies	Current perspective	Actively engaged or considering engagement	Engaged in Past but not building a further view	Engaged in other DRE segments not mini-grids
India's INDC Targets	Improved risk outlook of RE as a whole by displaying greater government support		↑	↔	↑
National Mini-grid Policy (Draft)	> Increased focus/dialogue on exit options for mini-grid developers > Investability of mini-grids segment will improve once the policy is implemented		↑	↔	↔
DDUGJY	Focus on grid expansion created uncertainty over outlook of mini-grids; most mini-grids not grid compatible	Opportunity for utility-complementary mini-grids; many vary of committing additional capital until certainty on co-existence structures emerges	↔	↓	↓
UP Mini-grid Policy	> Generated interest with improved long-term viability of mini-grids > However, most adopted wait-and-watch approach due to lack of clarity on tariff and implementation nuances	> Believe intention of policy positive by lack of clarity continues to exist > Little action spurred on-ground with advent of policy	↔	↔	↔

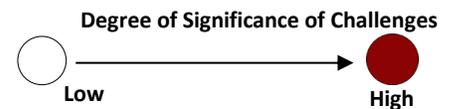
Scale, viability and alignment to grid expansion: Key for leveraging current and likely capital commitments

Challenges around lack of pace (expected or required by investors) and visible roadmap to achieve viability even in the next 3-4 years, coupled with governments increasing efforts towards grid intensification, is limiting the opportunity available for micro-/mini-grids in India. Dependence on subsidy is not perceived as a key issue since investors believe that given other concerns are resolved, this will also get taken care of.

The degree of significance of challenges varies by type of investors. While DFIs and commercial banks are more concerned about grid intensification, impact funds perceive low returns to be the biggest challenge.

Degree of Significance of Challenges Expressed by Investors

Key Challenges Perceived by Investors	DFIs	Corporate Investors	Donors/ Foundations	Commercial Banks	Impact Funds	NBFCs/ Debt Funds	Catalyst and Incubators	VC/ Cleantech Funds
Increasing infrastructure of central grid								
Lack of visible path to financial viability								
Success emerging at a slower than desired/needed pace								
Mismatch between return expectations of investors and actual returns								
Slow emergence of new entrants								



Integrated models, technical assistance, policy tracker and targets – key for deployment of capital

As government targets “24x7 Power for All”, **significant potential exists for micro-/mini-grids** by operating complementary to the central grid and providing reliability of power. The segment has witnessed increasing recognition – both in government and in investor community since 2013. Central and state governments have launched a few policies with a view to protect private sector mini-grid investments. Capital is increasingly available from international donors and DFIs. A few commercial banks have also started to evince interest. However, even as opportunity and capital both exist, the potential is not getting delivered as **challenge has shifted from access to absorbability of capital**. Policy developments have not been able to give a clear market direction, lacking effective implementation.

220mn people without access to electricity

Government targets electrifying 169 million HHs by Aug 2018 and Power for All by 2019



Interventions	Stakeholder
Setting-up of mini-grid capacity targets via policies to give clear market direction to investors and enterprises and thereby help segment achieve potential	
Policies to support operationalisation of mini-grids as integrated electrification models for functioning complementary to the central electrification grid	
Policy tracker to improve investor awareness by keeping them up-to-date with nuances of policy developments as large percentage of investors are unaware of key policies impacting the segment	
Project development and business advisory support to address business model concerns via TA across areas such financial advisory, transaction advisory, demand estimation, identification of partnerships, etc.	
Early stage investors to provide concessional equity which can be operationalised with support from impact investors diverting funds from grant funding to equity with greater risk capacity	

Annexure 1: Methodology adopted for this study

Capital landscape

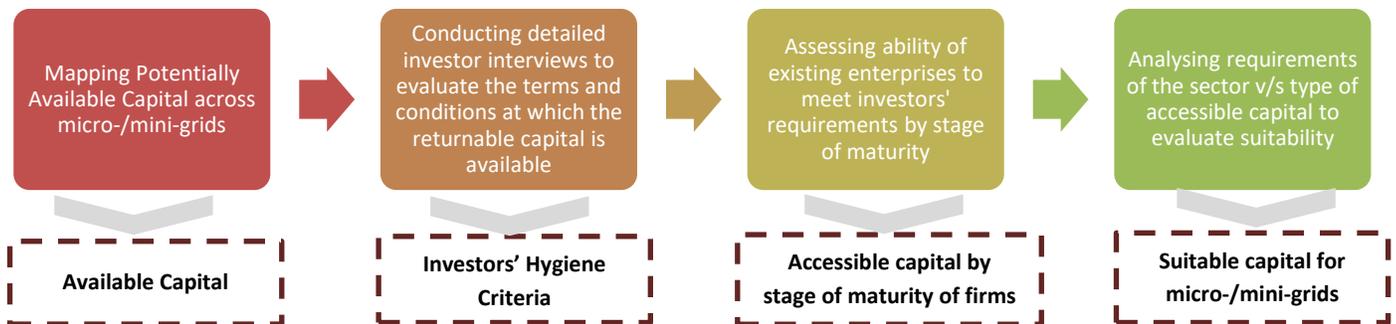
The financing needs for micro-/mini-grids enterprises have been mapped to cover asset financing, working capital financing and pre-operations/project development costs. The capital was mapped by leveraging **cKinetics sector tracker**, covering over 100 investors - operating across the risk-return continuum. The findings and trends were validated from **extensive in-depth interviews** of over 30 investors. Nature and form of capital has been evaluated with a lens to assess flow of funds and dynamics of change from 2013 to present in terms of **deployed, available and planned capital** and the conditions on which they are available. Available capital was further analysed on its accessibility and suitability as also gap from required capital.

Assessing flow of deployed capital: Deployed capital captures returnable and non-returnable capital in the segment from FY2013 to FY2016 via a bottom-up approach. Direct and enabling investments in the micro-/mini-grid enterprises during this period are covered.

Assessing flow of available and planned capital: Available capital includes direct and enabling capital that are potentially ready to be invested in the segment in the current year (FY2017). In quantification of planned capital (FY2018-19), in case the investor had a view on overall DRE energy access funds it is likely to add in the flow with no specific segment-wise allocation, then the composition is assumed to be in the ratio of available capital for micro-/mini-grids and DRE energy access sector by type of instrument.

Assessing accessibility and suitability of available capital for micro-/mini-grid enterprises

Illustrated below is the methodology used to evaluate accessibility and suitability of available returnable capital.



Policy landscape

The study maps policies, regulations and schemes announced by the Central and State Government departments since 2013. These policies/regulations/schemes have been evaluated to capture potential implications on the micro-/mini-grids market momentum and limitations, if any. Their categorization has been done in terms of direct or an indirect impact to the segment - **Direct policies** being those that are directly impacting the segment in contrast to policies (non-specific to DRE) that are pertaining to energy access and rural electrification in general.

Policy-Investment linkages

Interaction between policy and investment has been analysed per the efficacy of policies in influencing risk outlook and investability of the micro-/mini-grids segment. Capital flow and market movements have been matched across each of the segments with policy developments impacting those particular segments to capture correlation between the two. Further in-depth interviews with investors were leveraged to evaluate their perception of policy developments since FY2013 in changing risk outlook of the sector and hence, driving investor confidence.

Annexure 2: List of FIs interviewed for the purpose of this study

CATEGORY	NAME OF ORGANISATION	
Development Finance Institutions (DFIs)	ADB	JICA
	DEG	SIDBI
	IDFC	OPIC
	IFC	Proparco
	IREDA	World Bank
Impact Funds	Aavishkaar	ICCO Investments
	Acumen	Insitor Fund
	Caspian Advisors	LGT Impact Ventures
	Grassroots Business Fund	Rianta Capital
Donors/Foundations	Calvert Foundation	Packard Foundation
	CDKN	Rockefeller Foundation
	Doen Foundation	Shell Foundation
	Good Energies	UNDP
	IKEA Foundation	USAID
	MacArthur Foundation	
Government	MNRE	
Corporate Investors	ENGIE Rassembleurs d'Energies S.A.S	
VC/Cleantech Funds	Global Environment Fund	Olympus Capital
Commercial Banks	Bank of Baroda	RBL Bank
	Canara Bank	Yes Bank
	ICICI Bank	
NBFCs/Debt Funds	cKers Finance	Symbiotics
	Intellegrow	Tata Cleantech Capital
	ResponsAbility	
CSR Funds	Cairn Foundation	Tata Power CSR
Catalyst/Incubators	Miller Center for Social Entrepreneurship	Village Capital
	Sangam Ventures	Villgro



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