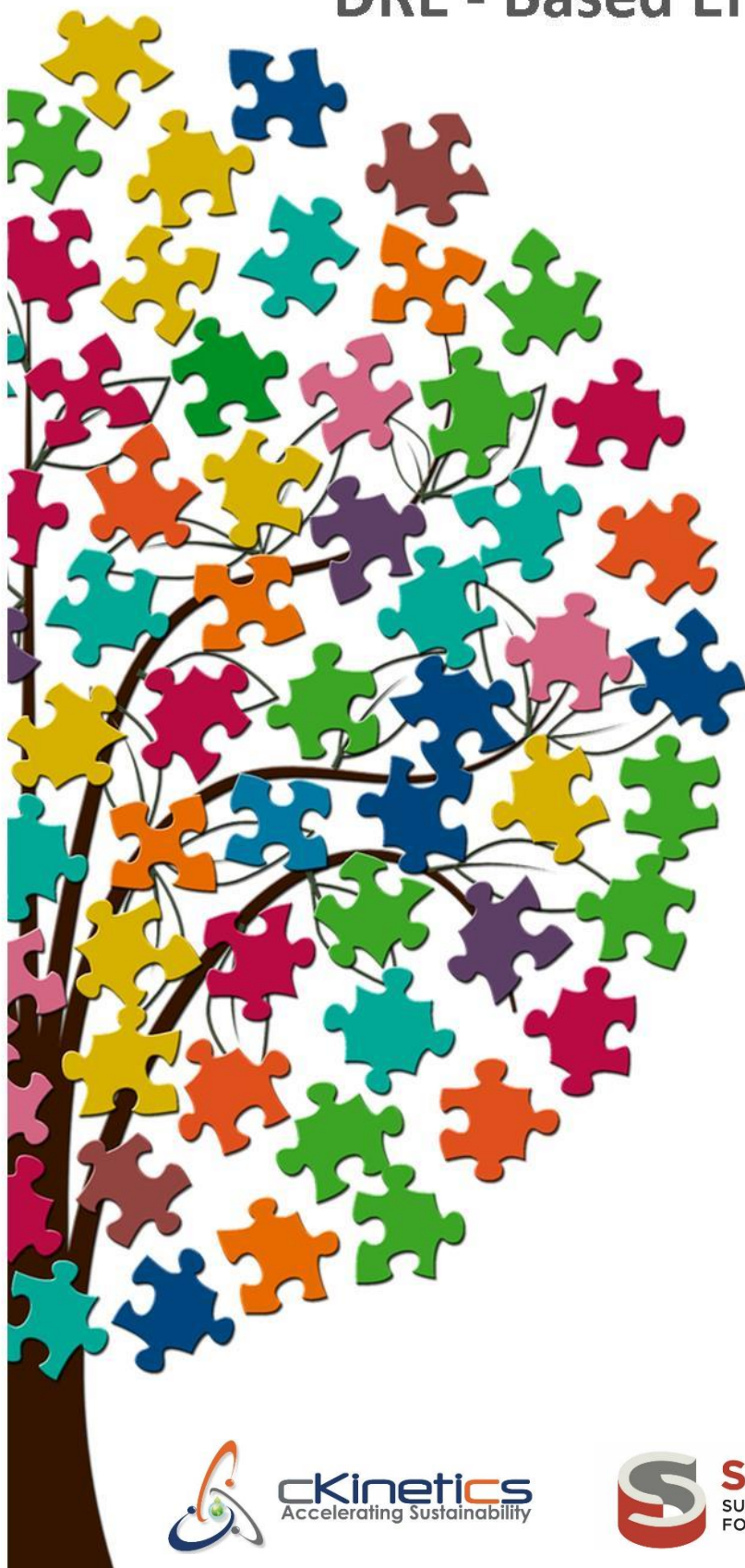


Evaluating Investment - Policy Interaction

DRE - Based Energy Access in India

November 2017



With support from



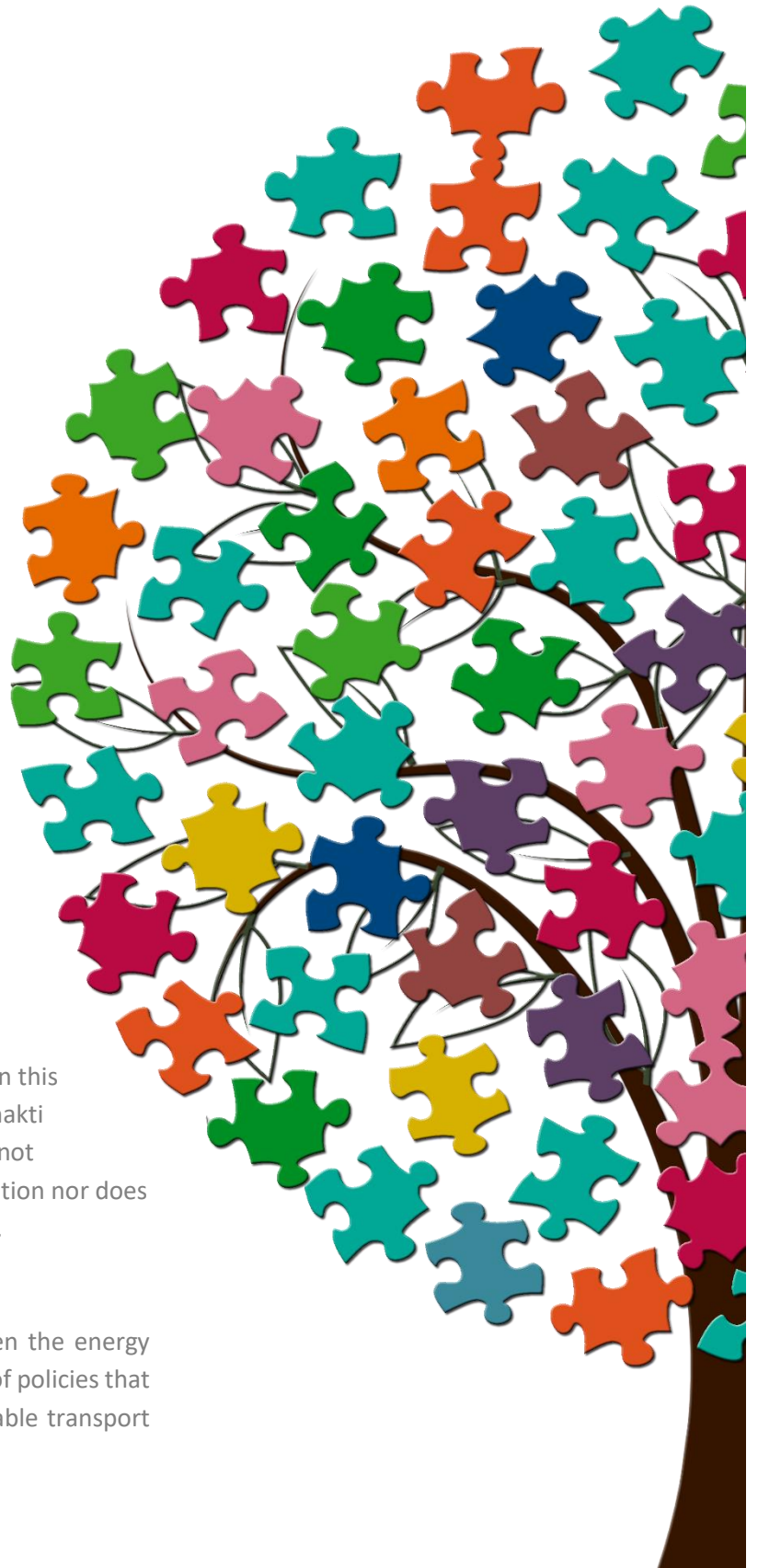
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About Shakti Sustainable Energy Foundation

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.

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Objective

This study aims to present a holistic view on the evolving capital landscape of the DRE-based energy access sector in India with a specific lens of linkage to policy measures and enhancements needed therein to fully leverage the global capital interest in the sector to drive growth.

In a 2013 study titled- "Financing Decentralized Renewable Energy Mini-grids in India"¹, cKinetics had mapped the available and accessible capital specifically for the DRE mini-grids segment in India. This study is an update to the 2013 study, however, it goes beyond mini-grids to demystify the financing landscape for other DRE energy access segments as well, as also assess the role of policies in increasing investability within the sector.

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

DRE emerges as distinct sector in financing and policy landscape in India

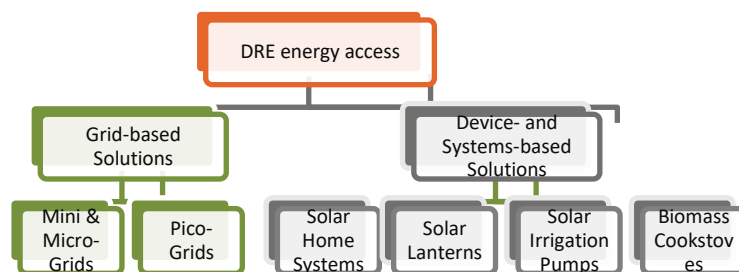
Decentralised Renewable Energy (DRE)-based Energy Access solutions have witnessed an increasing interest and uptake over the past few years primarily owing to continued levels of significant under-electrification

(44 million households remain electrified² - representing need for alternate source for ~1.2 GW at basic lifeline consumption alone) across several states, lack of quality supply during peak hours, and high indoor air pollution due to traditional cooking methods and decline in cost of DRE technology.

There has also been an **increasing interest in**

operationalizing DRE-specific credit lines and investment mandates, particularly from international donors and DFIs – a clear shift from earlier scenario where DRE wasn't seen as an independent segment.

Type of DRE Energy Access Segments



Several rural electrification and energy access programs entail DRE as a core component

Central and State governments have announced various policies and initiatives to catalyse growth of DRE-based energy access and intensify rural electrification

Type	Name	Zone of Impact – by Segment						
		Traditional Models						New Models ³
		Micro/Mini-grids	Pico-grids	Solar Pumps	SHS	Solar Lanterns	Biomass Cookstoves	
Direct Policy	National Tariff Policy 2016 (NTP)	✓						
	Uttar Pradesh Mini Grid Policy 2016	✓						
	National policy on Mini/Micro grids (Draft)	✓						
	GST	✓	✓	✓	✓	✓	✓	✓
	Exemption of VAT/Tax on Solar Devices	✓	✓	✓	✓	✓		
	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	✓	✓	✓	✓	✓		✓#
	Capital Subsidy Scheme through NABARD*			✓	✓	✓		
	DDG scheme	✓			✓			
	Unnat Chulha Abhiyan (UCA)						✓	
	Surya Raitha Scheme			✓				
	State solar pumps subsidy schemes (Punjab; Karnataka; CG; MP; UP; AP; Maharashtra)			✓				
Indirect Policy	DDUGJY Scheme (Deen Dayal Upadhyaya Gram Jyoti Yojana) outside of DDG	✓	✓	✓	✓	✓		
	Intended Nationally Determined Contribution	✓	✓	✓	✓	✓	✓	✓
	24x7 Power For All	✓	✓	✓	✓	✓		
	Kerosene Subsidy DBT	✓	✓		✓	✓		
	Pradhan Mantri Ujjwala Yojana (PMUY)						✓	
	State policies for HH connections	✓	✓		✓	✓		

Note: *Policy/Scheme no longer applicable; #Solar Cold Storage

Though there has been some movement on the policy front, it is unclear whether these policies have led to an increased capital flow (quantum and access) or not.

Consolidated View is Required Across

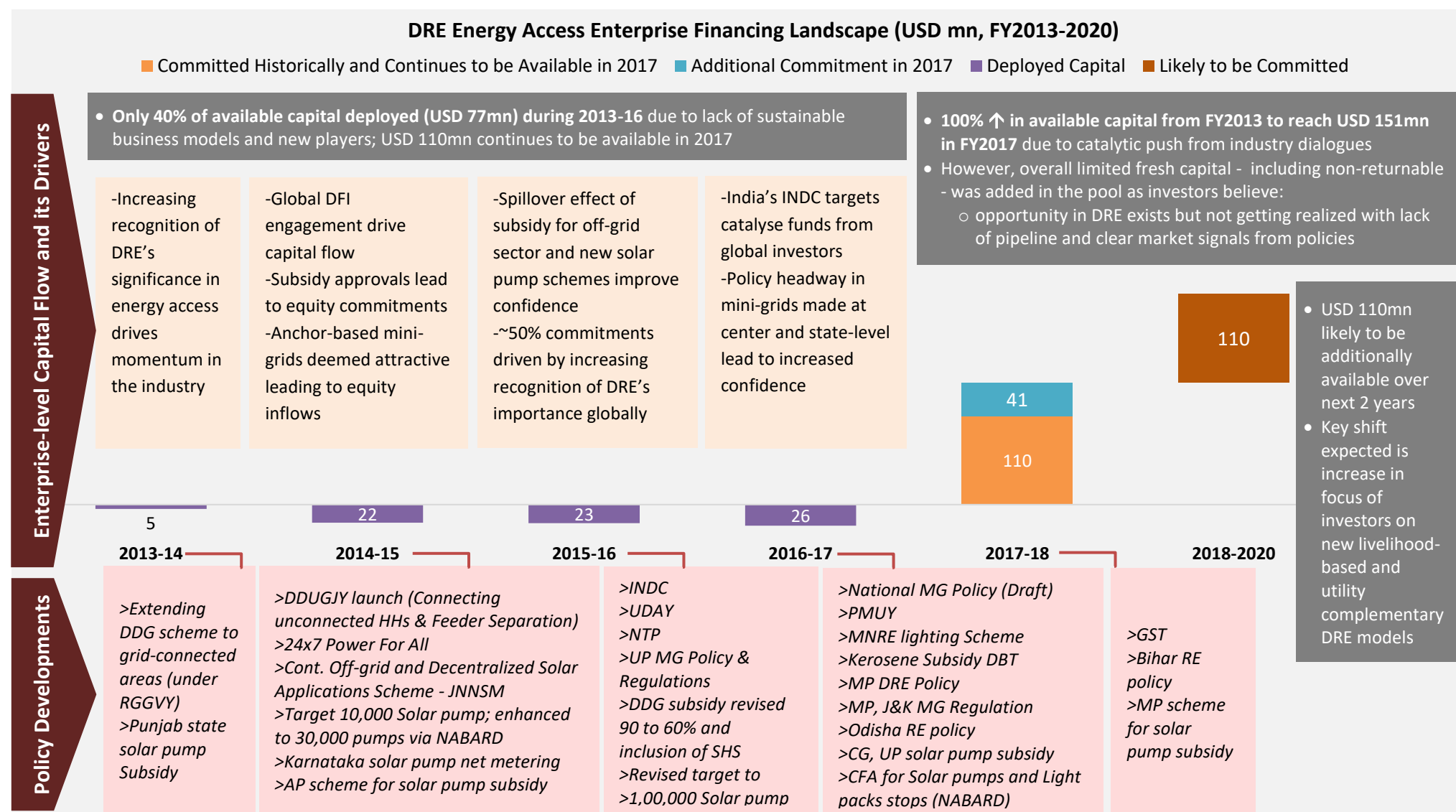
- Efficacy of policies in influencing investor action
- Nature, form and quantum of available capital
- Ease of accessibility and suitability of capital
- Change in risk perception among investor types - affecting willingness to commitment

² Garv Dashboard as of 20/6/2017

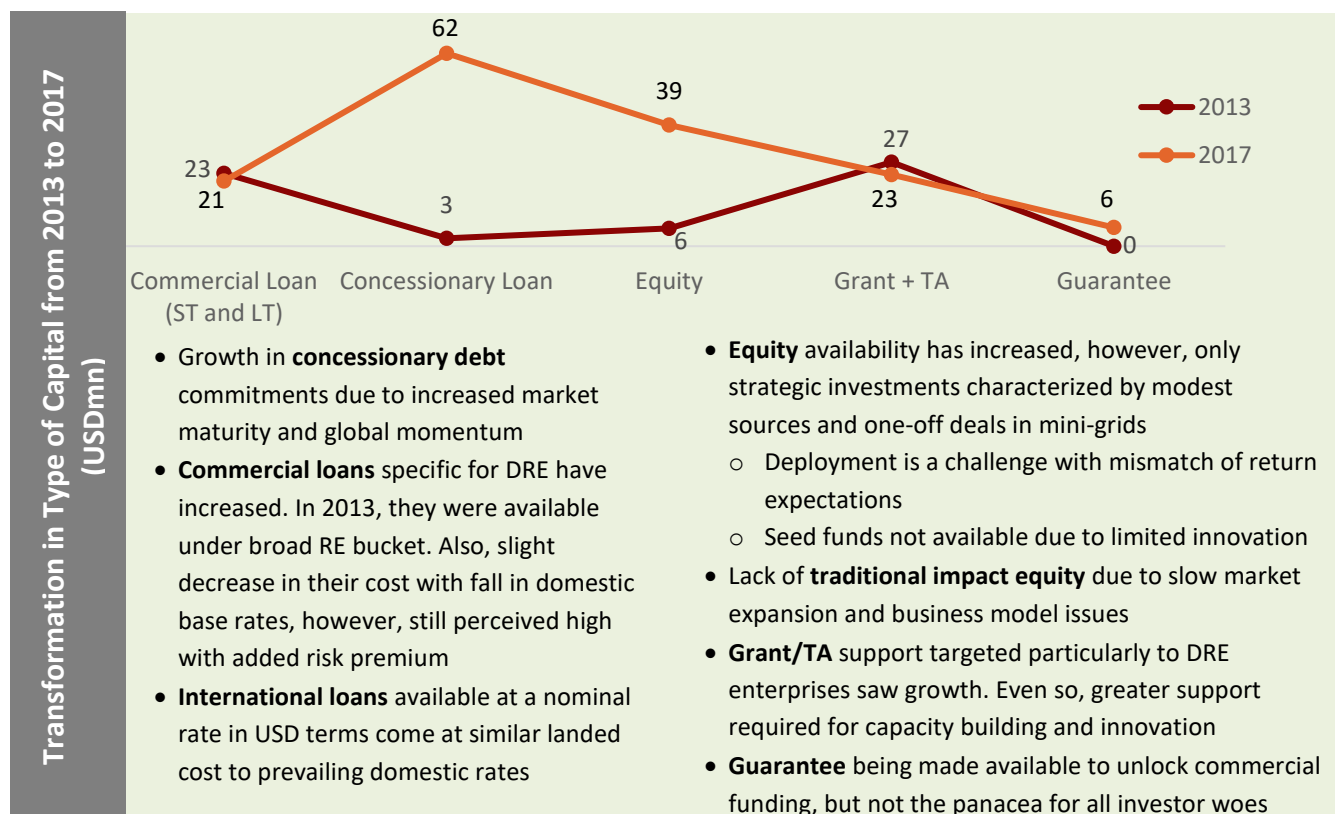
³ This includes new livelihood-based DRE models such as solar cold storage, solar dryers, solar milk chillers, etc.

While policies are encouraging, global momentum key driver for enterprise capital flow

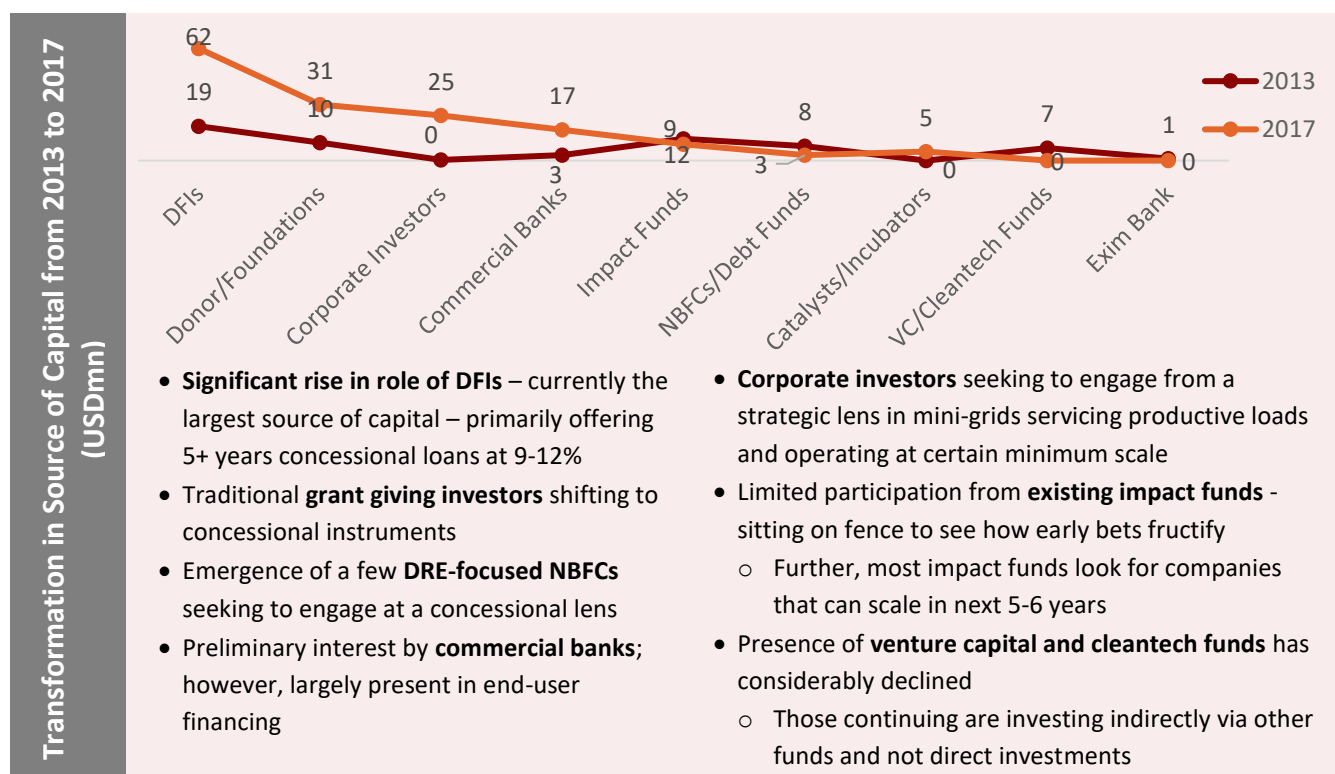
Quantum and access of capital for DRE energy access enterprises have significantly improved in the recent years. While, policies have had some role to play – particularly in segments such as solar pumps – most of the flow is catalyzed by growing industry conversations and momentum across the global landscape (advent of SE4All, Sustainable Development Goals, etc.).



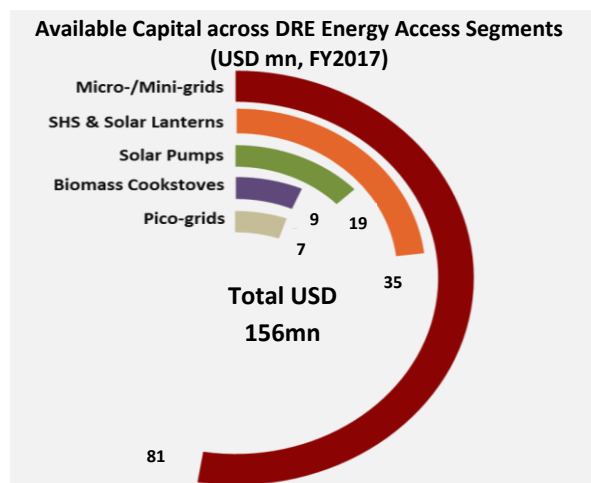
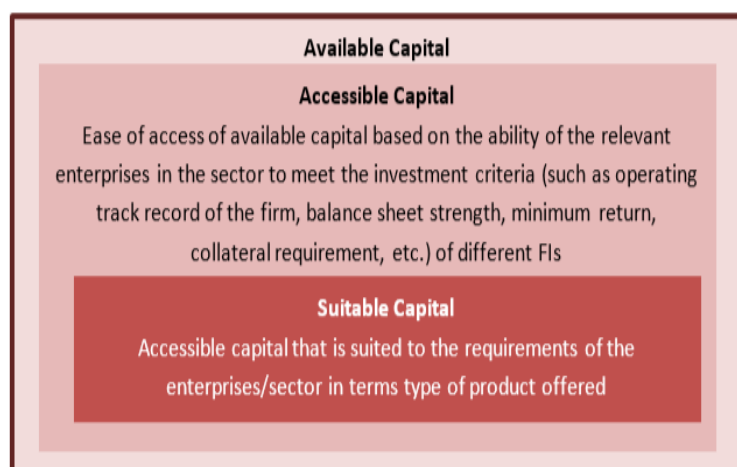
Increased availability of concessionary debt across segments, equity commitments sporadic



DFI and Global Foundations – key sources of capital



Conundrum: Unmet capital demand continues to exist, but available capital not getting deployed



Change in capital landscape across segments		Required ⁴ vs available capital	
Segment	Key Trends	Equity Required	Debt Available
Micro-/Mini-grids	- Increase in availability of concessionary loan from foundations and DFIs – however, not being deployed as investors look for visible path to profitability Equity commitments modest and available only from strategic investors via one-off deals in firms with some minimum scale	21	25
SHS	- Interest displayed by commercial banks mainly in firms offering innovative payment structures to customers – such as the Pay-as-you-go model - Shift to such models increasing needs for asset finance; however, subsidies limiting their scale - Most equity investors who had earlier taken bets, are apprehensive to commit more capital as they do not see their earlier investments perform as planned	12	2
Solar Lanterns	- Investors perceive solar lanterns segment to have matured and believe channel finance and end-user financing to be key drivers - Available funds insufficient to meet bridge finance and working capital needs	5	2
Solar Pumps	Considerable traction in past two years via capital commitments from several DFIs, NBFCs and commercial banks due to government's backing, though quantum limited when compared to the total requirement Subsidies leading to role of private sector being limited to that of EPC – leading to need for working capital; available capital is in the form of asset finance – thus not getting deployed	166	1
Biomass Cookstove	Perceived to be of high risk by the investors – primarily debt providers – due to lack of sustained demand and insufficient consumer financing - Distributors operating in the sector are not able to attract funding due to limited ability to offer guarantee/collateral	24	5
Pico-grids	- Few investors with clear commitments due to lack of momentum in the segment - Market expected to decline as majority of lighting demand will increasingly get satisfied by grid, SHS and solar lanterns	56	1

⁴ Required capital refers to the capital demand that is likely to emerge annually over the next few years based on estimated size of the sector – per government targets and market opportunity

Challenge more on suitability than accessibility of available capital

Accessibility⁵ of Capital

Accessibility of capital has improved with DRE-specific lines and allocations, as investors are more aware of sector's dynamics and accordingly structure capital

Overall **USD110mn** of USD121mn accessible

However, bulk of capital lacks sufficient risk appetite; capital is mostly accessible for enterprises in the growth stage

Only ~40% of potentially returnable capital available can be accessed by **early stage and pilot/very early stage** enterprises

Table 1: Ease of Accessibility of Available Debt and Equity

Segments	Accessibility of Available Debt	Accessibility of Available Equity
Micro-/Mini-grids		
SHS		
Solar Lanterns		
Solar Pumps		
Biomass Cookstoves		
Pico-grids		

Degree of Accessibility		
<85%	85-100%	100%

Suitability⁶ of Capital

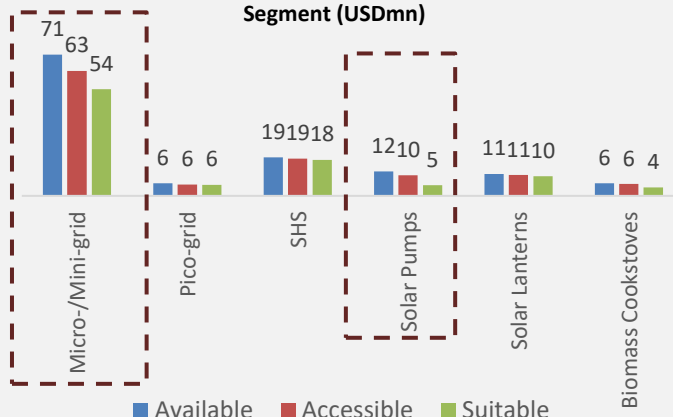
>**Only 74% accessible debt** for enterprises suits their needs as it does not lend itself to asset financing and/or working capital requirements (varying by segment)

>Suitability of accessible debt as low as 50% for solar pumps

> **Further, only 50% equity suitable** due to high return expectations of investors (many 25%+)

Overall only **USD80mn** available returnable capital suitable

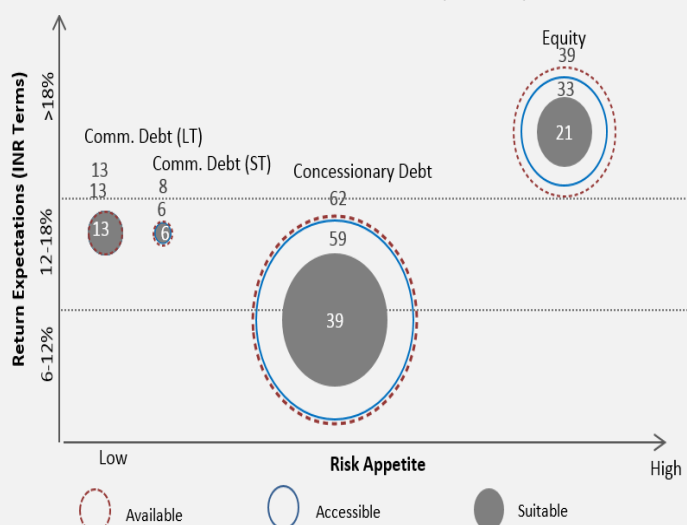
Figure 1: Accessibility and Suitability of Available Capital - by Segment (USDmn)



Even though capital is accessible, it is not suitable and there are **not sufficient number of firms that can absorb** this capital due to lack of scale and perseverance of business model

USD32mn funds that are accessible but not suitable for traditional DRE solutions are likely to go towards financing **new livelihood-based DRE applications** (such as solar cold storage and solar dryers) as productive applications are likely to have a business case and market potential in the near future

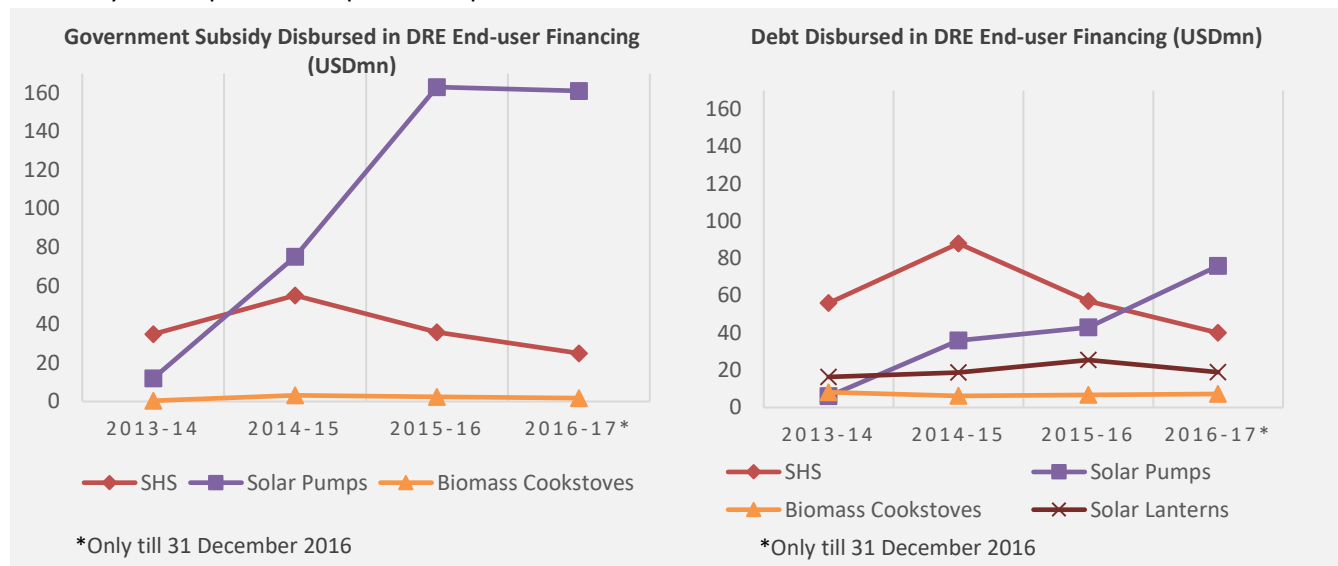
Figure 2: Accessibility and Suitability of Available Capital - by Type of Instrument (USDmn)



⁶ Accessible capital that is suited to the requirements of the enterprises/sector in terms type of product offered

End-user financing witnesses increasing interest from MFIs and commercial banks

Several government subsidy schemes have been launched over the past few years for DRE devices and systems. Commercial Banks and RRBs started several schemes during 2013-2016 to finance these products. MFI channel also saw early developments via partnership with manufacturers



Central and State Government subsidy drives **solar pumps** financing

End-user financing of products servicing electricity needs have seen uptake, financing for **cooking devices has not scaled** due to perception on product quality and value proposition

Type of Investors offering end-user financing for DRE devices and systems

	Role (2013-2017)	Size and Interest Rate	Segments Financed
Commercial Banks	Increased confidence with government's push via subsidy for solar pumps Many aim to expand market reach for other consumer products via DRE financing Some partnered with DRE enterprises	Ticket size: SHS INR 17-75k; solar pumps INR 4-5lk Interest Rate: 11-15%; some provide at <10% for solar pumps as bundled loans	 
RRBs	Most offered financing only under NABARD subsidy schemes With closure of NABARD subsidy (March 2017), few have withdrawn from the sector while those continuing state low uptake	Margin: 15-20% Interest rate: 10-15%	  
MFIs	Presence catalyzed by capacity building support Typically provide top-up loan to existing customers of microfinance income-generation loans to mitigate risks of non-payment	Ticket size: Solar lanterns INR 1.8-3k; SHS INR 10-20k; Biomass cookstoves INR 2-3k Interest rate: 18-26%	  



Solar Pump



SHS



Solar Lanterns

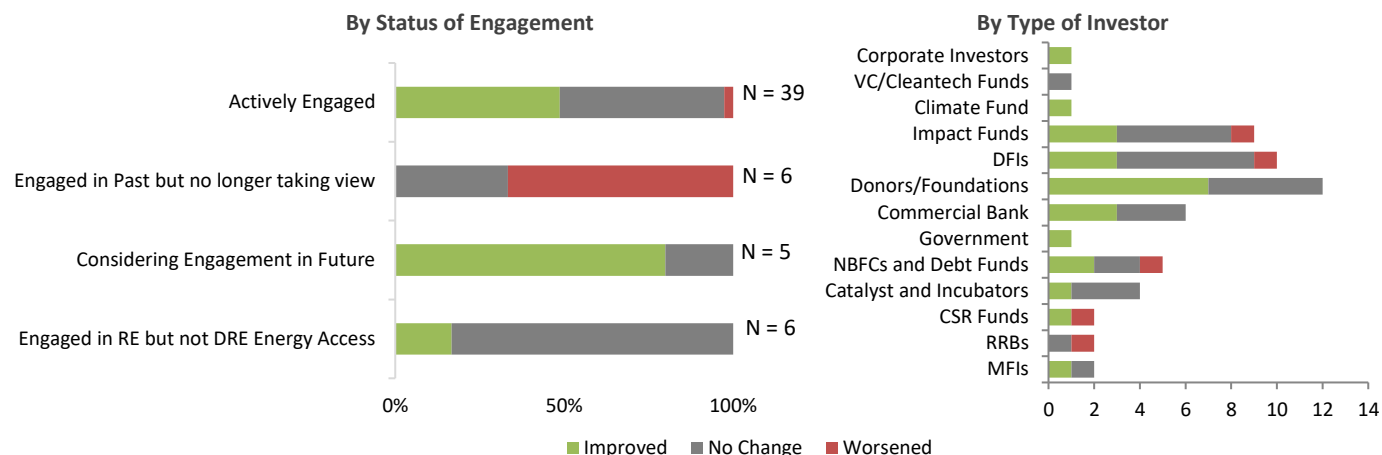


Biomass Cookstoves

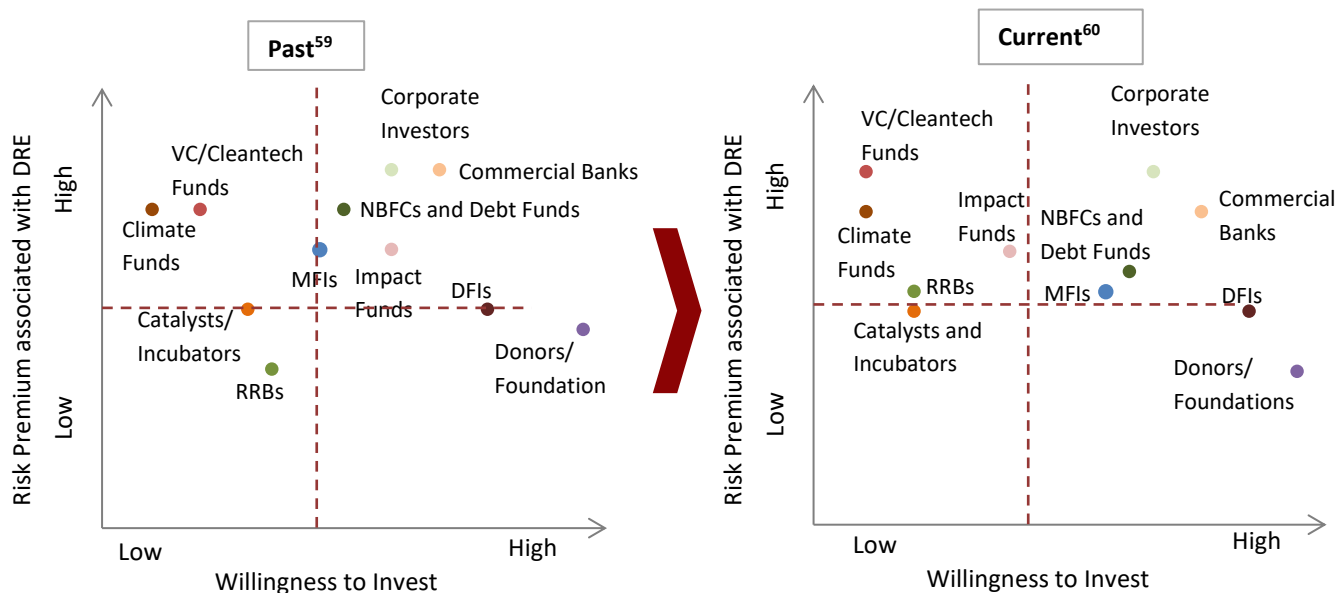
Investors' speak: Significant headroom for growth, but clear market signals needed

Most investors continue to believe that significant opportunity for DRE exists via a complementary role to the grid and greater livelihood generation. However, the **sector's lack of pace and policy inconsistency have limited ability to fully utilize this positive outlook.**

Change in Investors' Perception of DRE Sector from 2013 to 2017



Investors continue to attach high risk premium with the sector. While risk perception of the sector has improved for some investors, for others – specially RRBs and equity investors – it seems to have slightly worsened.



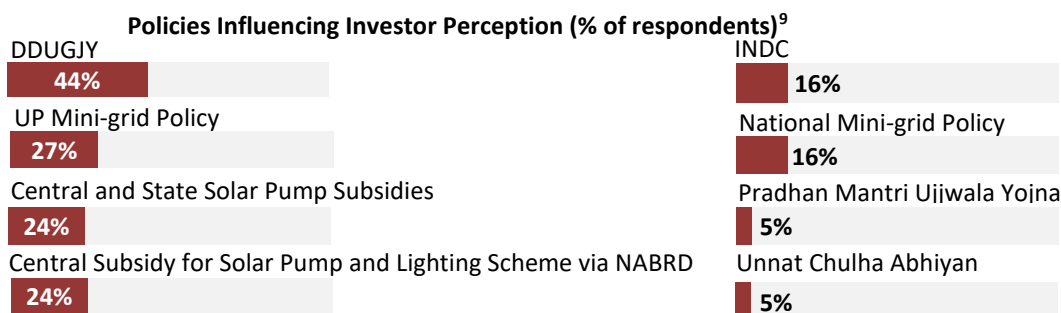
- Extremely slow progress by the current lot of enterprises leading to concerns on even project returns to **equity providers**
- Government thrust on RE and social impact objectives drive funds from **International donors/foundations and DFIs**
- Technical assistance programs have reduced the risk associated by **MFIs** towards the sector
- With closure of the NABARD-channeled subsidy, many **RRBs** have withdrawn; those that continue to operate, see limited uptake
- No. of new enterprises entering the space seems to have plateaued thus limiting the ability of **catalysts/incubators** to appropriately plan or commit fresh capital

⁷ Refers to investor sentiment between 2013 and 2016

⁸ Refers to investor sentiment in 2017

Policy developments perceived to be a mixed bag

Most investors believe that on a broader level, dialogue has been initiated and policies are coming up but they lack clarity and several nitty-gritties still need to be addressed. **Policies are unable to provide a clear market direction.**



Engagement with investors also revealed limited awareness of key policies applicable to the sector; for example, 45% investors interviewed had only peripheral or no awareness of mini-grid policies. This **brings out a need for more dialogues and discussions being**

Based on expectations post-announcement of policies – particularly for mini-grids and solar pumps – most investors stated improved risk outlook of the sector, however, few took specific actions directly based those policies. Government's focus on increasing renewable energy capacity via INDC targets was the key policy that attracted immediate positive actions on the part of investors

Perceptions on policies/schemes linked to rural electrification and cooking needs

Investor perceptions	Impact on investor confidence regarding DRE-led energy access
India's INDC targets to increase renewable energy capacity	↑
Increased focus/dialogue on exit options for mini-grid developers	↑
Initiatives to promote LPG in rural areas displays greater focus on clean cooking	↑
Subsidies for solar pumps by various state departments	↑
Lack of clarity on tariff for purchase of power from mini-grid operators by DISCOMs	↓
Little action spurred on-ground with advent of mini-grid policies	↓
Focus on grid expansion across the country	↓
Lack of quality assurance under Unnat Chulha Abhiyan	↓
Closure of MNRE subsidy via NABARD for SHS, solar pumps and solar lanterns	↔

Constraints perceived by investors on financing front

- Lack of sector-specific first loss or partial credit guarantee schemes like CGTMSE by the government. Some foreign investors – particularly NBFCs and debt funds – interested in providing working capital loans are unable to do so since per RBI guidelines, non-resident lenders in India cannot provide loans of < 3 years average maturity⁹
- Energy has become a small microcosm of National Clean Energy and Environment Fund that was earlier established as National Clean Energy Fund in 2010-11 with clean energy as primary driver

⁹ The survey was conducted before announcement of Saubhagya scheme

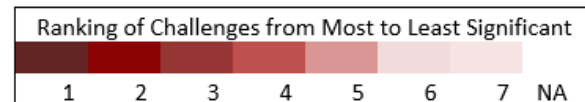
¹⁰ <https://www.rbi.org.in/scripts/NotificationUser.aspx?Id=10153&Mode=0>

Pace, scale and alignment to grid expansion: Key for leveraging current and likely capital commitments

Even as the market potential exists, **challenges** around lack of scale, sustainable business model and innovation; slower than anticipated pace of success; increasing penetration of central grid; mismatched return expectations; and quality of devices continue to **constrict deployment of capital and additional engagement by investors**.

Degree of Significance of Challenges Expressed by Investors

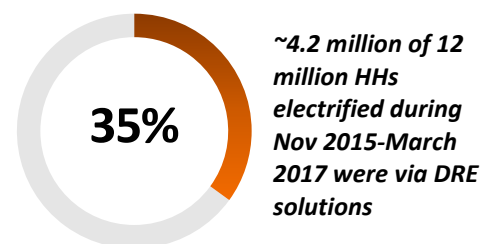
By Segment							By Type of Investor								
Key Challenges Perceived by Investors	Micro-/Mini-grid	Pico-grid	SHS	Solar Lanterns	Solar Pumps	Biomass Cookstoves	DFIs	Corporate Investors	Donors/ Foundations	Commercial Banks	Impact Funds	NBFCs/ Debt Funds	Catalyst/ Incubators	VC/ Cleantech Funds	MFIs
Increasing central grid infrastructure															
Sustainability of business model															
Success emerging at a slower than desired/ needed pace															
Low penetration of suitable consumer financing products															
Mismatch in return expectations															
Slow emergence of new entrants															
High dependence on Government Subsidy															
Frugal innovation inadvertently creating patchy quality															



Way forward to enable deployment of capital

As ~220 million people are without access to electricity and ~66% households (HHs) continue to rely on polluting cooking fuels¹¹, significant potential exists for DRE energy access solutions. Government of India's **Saubhagya Scheme** launched in October 2017 aim to improve last mile connectivity and provide electricity connections to 30 million un-electrified households in the country. This **presents an opportunity for DRE energy access solutions in terms of addressing the increasing energy needs** of these households as they move up the energy ladder.

% of HHs electrified by DRE (Nov 2015- Mar 2017)



Source: cKinetics Analysis

However, even as opportunity and capital both exist, the potential is not getting delivered as **challenge has shifted from access to capital to access to projects**. Further, while there have been several policy developments targeted towards promoting DRE, they have not been as effective in giving a market direction.

Key action items for different stakeholders are as follows:



DRE Enterprises

Prospect in livelihood-based DRE

Opportunity for livelihood-based DRE

Growth prospects for DRE solutions of productive use – such as solar pumps, anchor-based mini-grids, and solar-based equipment (cold storage, dryers, etc). With advent of grid - higher likelihood of HHs shifting to low cost grid power than businesses



Policy

Support for integrated electrification model and market signals

Policies to support mini-grids as integrated electrification models

For mini-grids to play grid-complementary role, policy interventions needed to enable larger scale operation as distributed generation cum distribution franchisees

Consistent view on subsidies and role of private sector

Government needs to take a country-level view on private sector's role – a system integrator or ESCO in SHS and solar pumps; inconsistency in state-level subsidies and shifting role of firms to contractors is confusing investors

Intensification of Policy Targets

For effective scale-up, it is imperative for the government to give clear market signals by strengthening policies in the form of specific targets



Equity Investors

Support for early stage firms

Concessional equity for early stage enterprises

Need for equity with greater risk appetite for early stage firms to enable commercial equity infusion



Catalyst/Incubators

Challenge funds and policy awareness

Challenge funds

Establishment for challenge funds to enable enterprises move from incremental to drastic innovation on products/ business models

Policy tracker

Many investors unaware of key policies impacting the sector; policy tracker to be created to keep investors up-to-date with the developments, including specific nuances



Donors/Foundation

Support on capacity building

Capacity building for early-stage enterprises and MFIs

Grants for handholding of firms to address concerns on business model and absorbability of committed capital; also, soft support to leverage the vast MFI network in the country - they have a good last mile connect and can leverage existing infrastructure/staff

¹¹ World Health Organization, Clean Household Energy for Health, 2016, Page 103

Annexure 1: Methodology for the study

Capital landscape

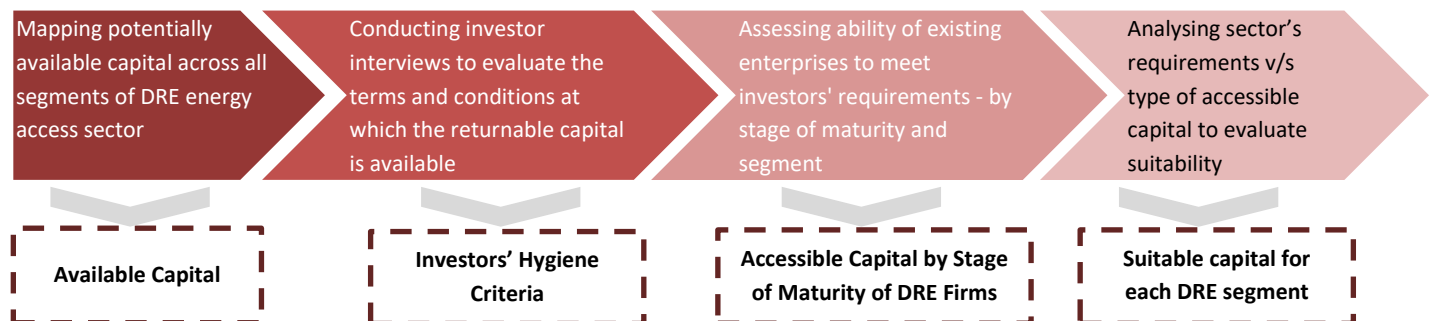
Given the business models associated with different segments, the DRE energy access sector requires both enterprise-level and end user-level financing. The capital across these both types of financing was mapped by leveraging **cKinetics sector tracker**, covering over 150 investors - operating across the risk-return continuum. The findings and trends were validated from **extensive in-depth interviews** of over 50 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 for enterprise financing 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 sector from FY2013 to FY2016. A bottom-up approach was followed for enterprise financing, but a top-down approach was followed for end-user financing. In enterprise financing, direct and enabling investment in enterprises was mapped. In the latter, MNRE's data on deployment of DRE devices/systems was leveraged with stakeholder consultations.

Assessing flow of available and planned capital: Available capital includes direct and enabling capital that are potentially ready to be invested in the sector in the current year (FY2017). Planned capital comprises of funds likely to be committed and/or available for the sector over the next two years (FY2018-2019). For enterprise financing, the capital was quantified by mapping commitments and/or availability from the aforementioned set of investors.

Assessing accessibility and suitability of available capital for DRE enterprises

The figure below captures the methodology used for assessing capital accessibility and suitability



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 further evaluated to capture potential implications on the momentum in the sector and limitations, if any. Their categorization has been done in terms of direct or an indirect impact to the sector - **Direct policies** being those that are directly impacting the DRE energy access sector 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 as per the efficacy of policies in influencing risk outlook and investability of the sector. Capital flow and market movements have been matched across each segment 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 this study

CATEGORY	NAME OF ORGANISATION	CATEGORY	NAME OF ORGANISATION
Development Finance Institutions (DFIs)	ADB	Government	MNRE
	DEG	Corporate Investors	ENGIE Rassembleurs d'Energies S.A.S
	IDFC	Venture Capital/Cleantech Funds	Aloe Private Equity
	IFC		Global Environment Fund
	IREDA		Olympus Capital
	JICA	Commercial Banks	Axis Bank
	SIDBI		Bank of Baroda
	OPIC		Canara Bank
	Proparco		ICICI Bank
	World Bank		RBL Bank
Impact Funds	Aavishkaar		Yes Bank
	Acumen	NBFCs And Debt Funds	cKers Finance
	Caspian Advisors		Intellegrow
	Grassroots Business Fund		ResponsAbility
	ICCO Investments		Symbiotics
	Insitor Fund		Tata Cleantech Capital
	LGT Impact Ventures	Microfinance Institutions (MFIs)	Saija
	Rianta Capital		Swayamshree Micro Credit Services
Donors and Foundations	Calvert Foundation	Regional Rural Banks (RRBs)	Assam Gramin Vikas Bank
	CDKN		Prathama Bank
	Doen Foundation	CSR funds	Cairn Foundation
	Global Alliance for Clean Cookstoves		Tata Power CSR
	Good Energies	Catalyst and Incubators	Miller Center for Social Entrepreneurship
	IKEA Foundation		Sangam Ventures
	MacArthur Foundation		Village Capital
	Packard Foundation		Villgro
	Rockefeller Foundation		
	Shell Foundation		
	UNDP		
	USAID		



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