Idam Infrastructure Advisory Pvt. Ltd.

Evaluation of solar rooftop policies in India and preparation of risk assessment framework for multi-family housing for solar rooftop projects

EEAP - 2019

Session 6.1 Development in focus: Renewable energy and evaluation

Presented by:
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India one of the fastest growing economies in the World

Sixth largest economy in the world and growing

Rapidly expanding urban population (more than 30%)

Top 10 fastest-growing cities by GDP between 2019 and 2035*

2.4%
of the World Area

~18%
of the World Population

Entered into 37 year demographic dividend period

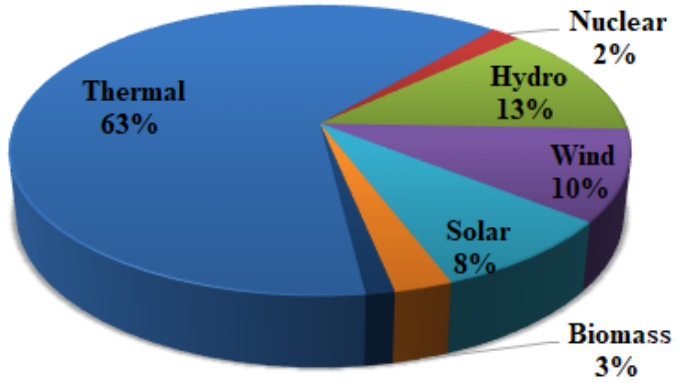
Reduced the emissions intensity of GDP, by 21% below 2005 levels

Ambitious NDCs, plan to reduce emission intensity by 30-35% by 2030

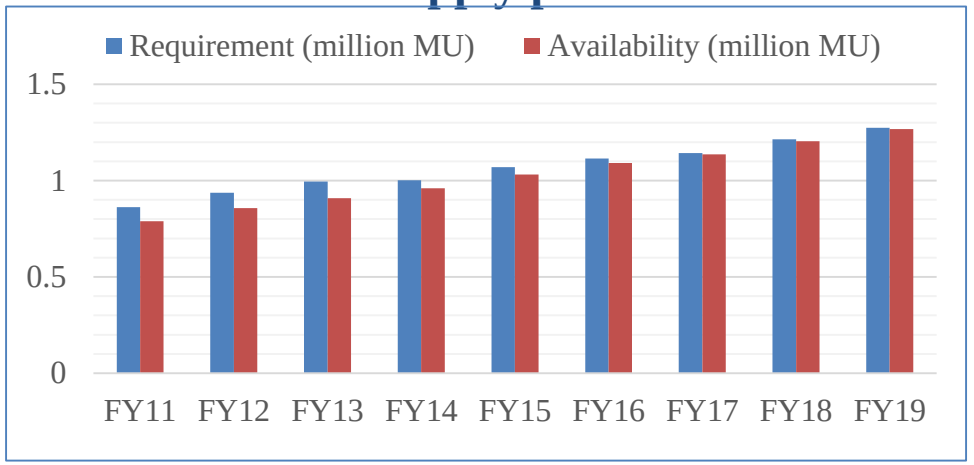
Source: WEF, UKIBC,WRI, CEA

Electricity Sector in India

Total installed capacity (362 GW)



Power supply position



India has submitted ambitious NDCs and taken a pro-active global leadership role

Keep Global warming well below 2C, put all efforts to keep it below 1.5 C

Developed countries to provide financial and technical support

Each member country to submit NDCs and strive to achieve it

Reach global peaking of GHG emissions asap and undertake rapid reductions thereafter

Global review every 5 years to assess the collective progress

PARIS AGREEMENT

INDIA's NDCs

- To **reduce the emissions intensity of its GDP** by **33 to 35 percent by 2030** from **2005 level**.
- To achieve about **40 percent cumulative electric power installed capacity** from **non-fossil fuel based energy resources** by **2030 ….**

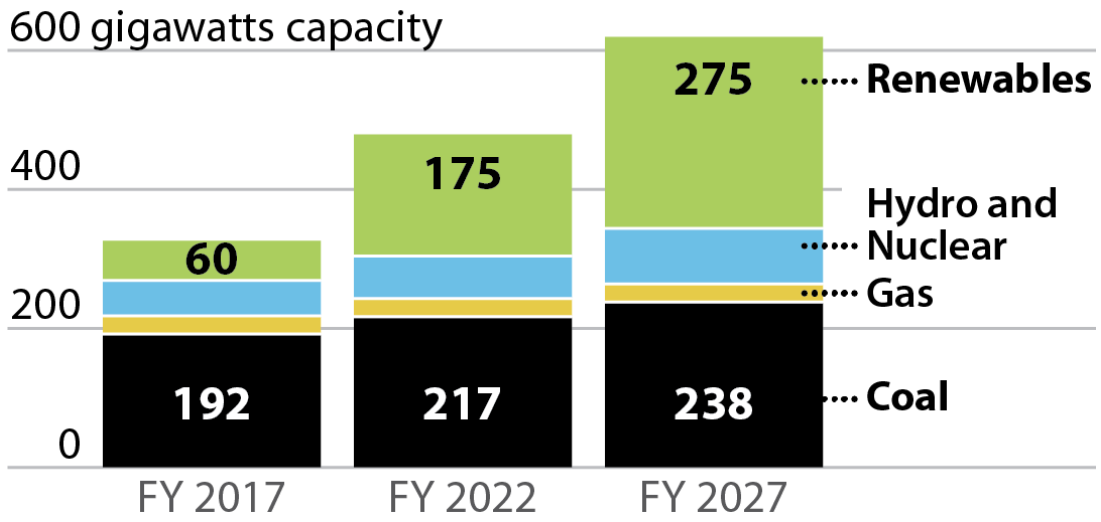
India and France jointly launch International solar alliance

- Alliance of 121 solar resource rich countries.
- Provide a dedicated platform for cooperation among solar resource rich countries

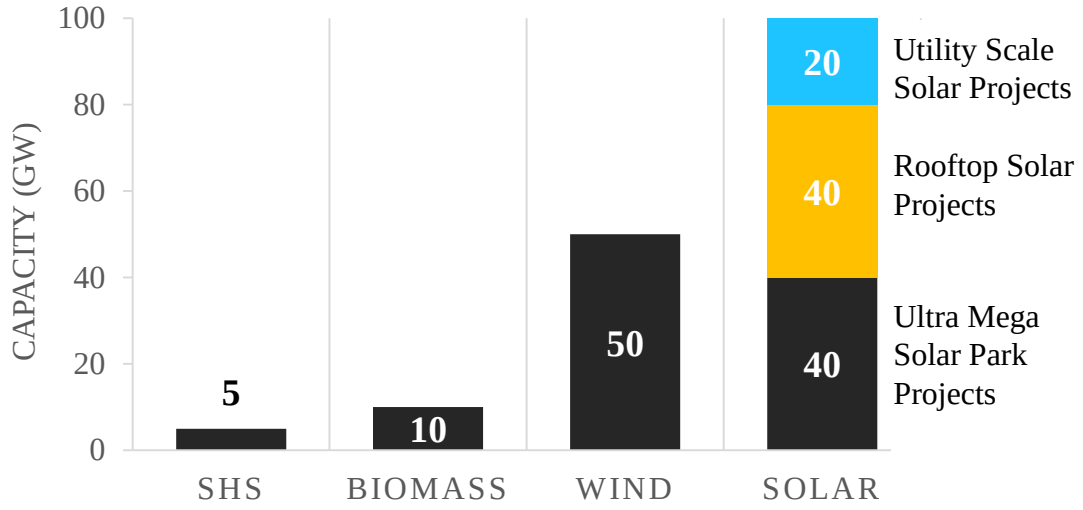
India running one of the largest renewable energy expansion mission – 175 GW by 2022

Renewable to form more than 40% share by 2022 through ambitious renewables expansion plan

India's National Electricity Plan, 2018 estimates



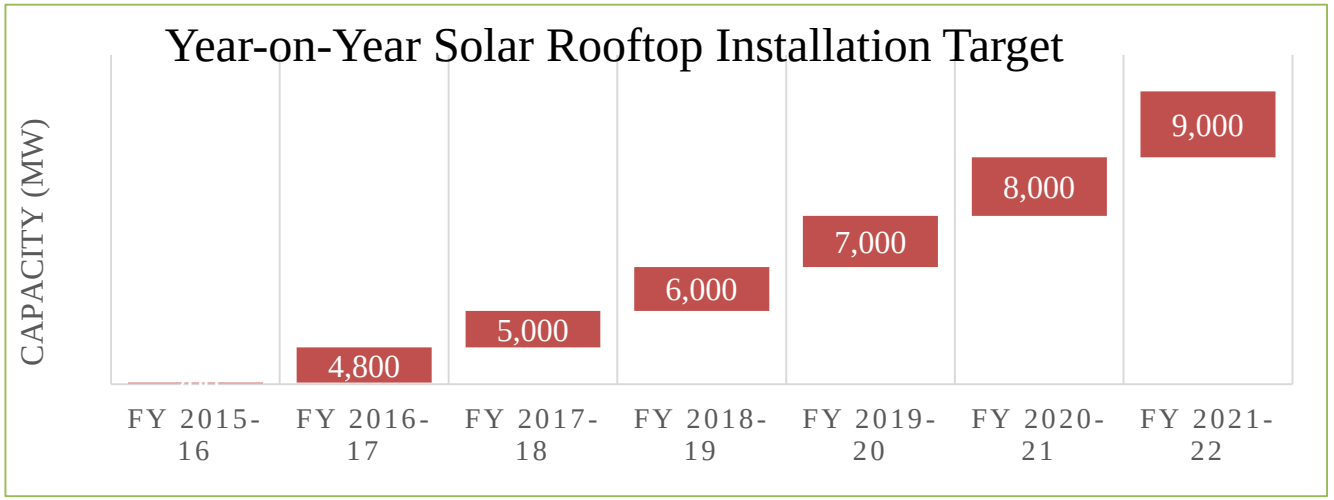
India's 2022 Renewable Energy Targets

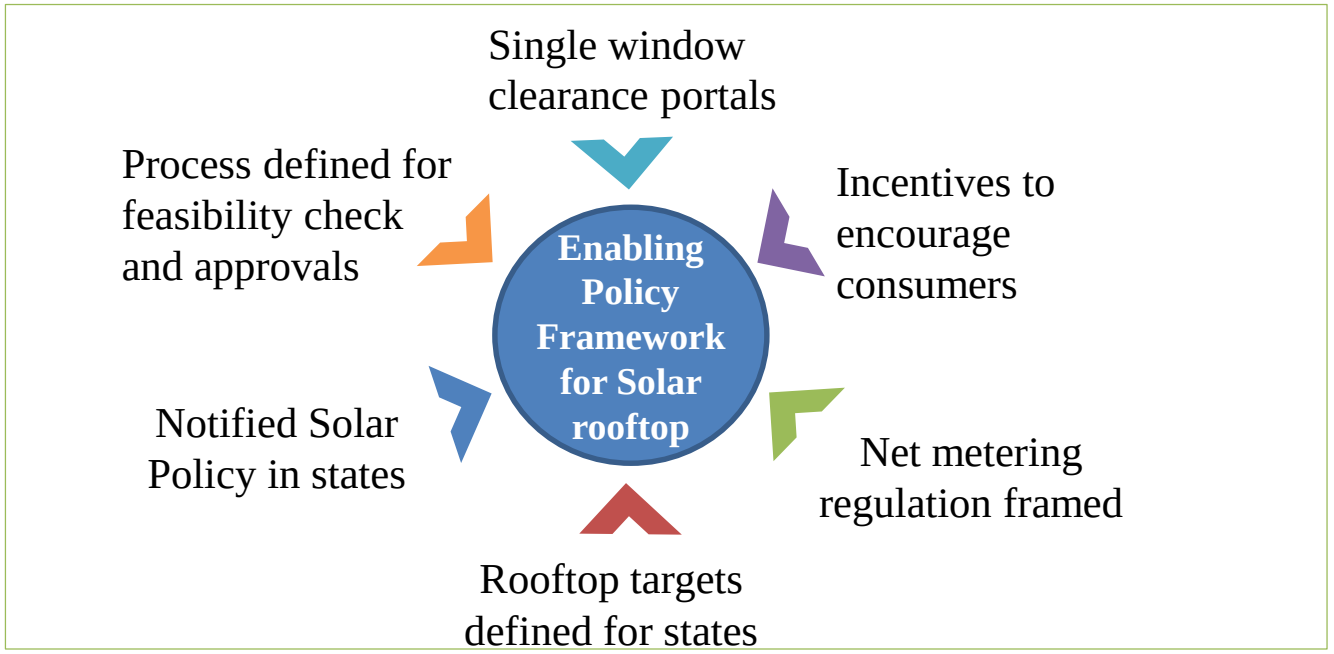


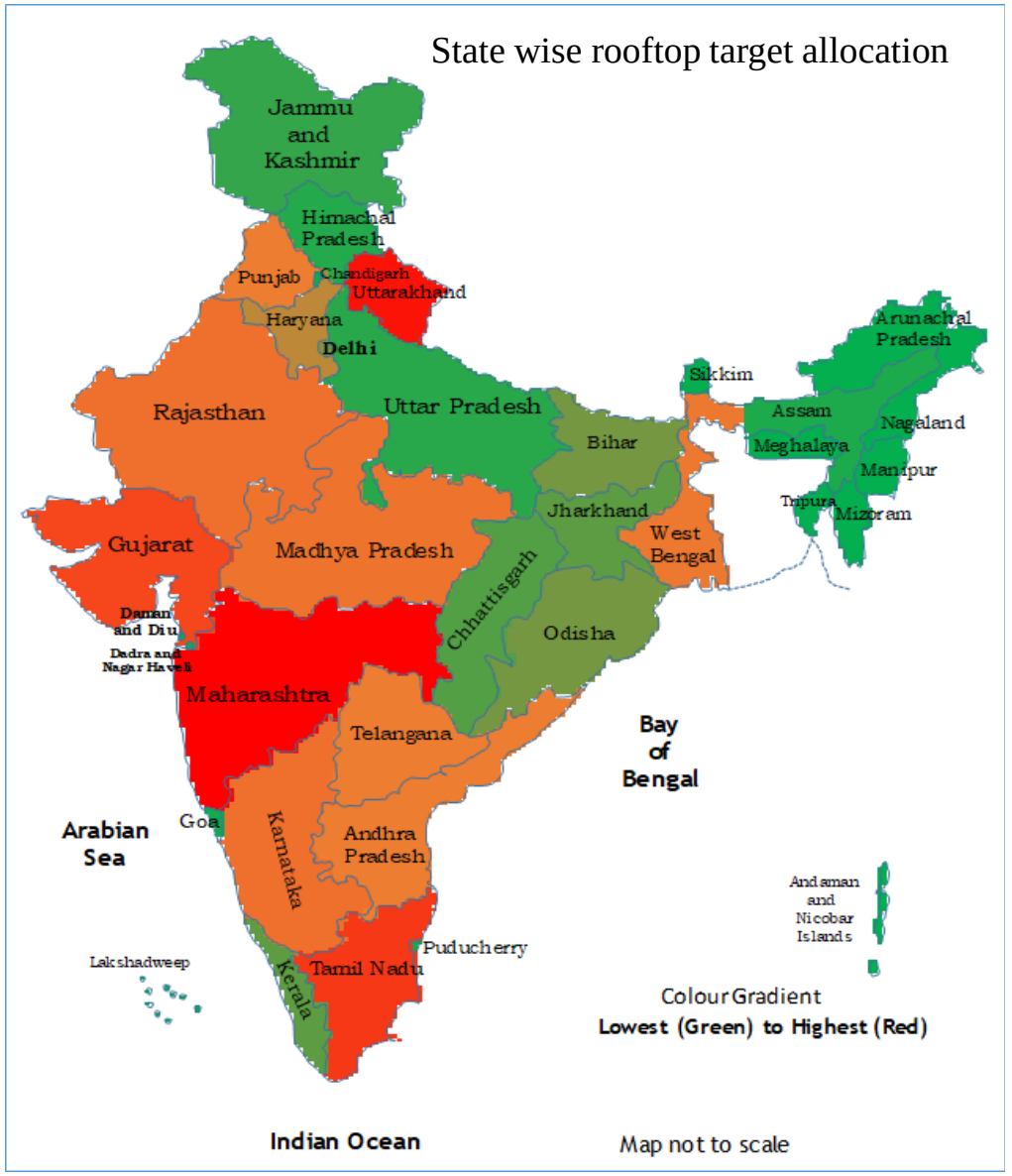
Tall Solar rooftop target, offer several benefits in comparison with large scale projects

- Reduced technical losses, local generation and consumption
- Low land requirement
- Consumer can become prosumers
- Financially viable

Rooftop solar deployment has a strong implementation framework







GoI has provided sovereign guarantees to provide concessional loans to rooftop solar projects

Year	Lender	Borrower	Line of credit
2015	KfW	IREDA	340 million USD
2016	World Bank and CTF	SBI	625 million USD
2017	Asian Development Bank and CTF	PNB	500 million USD
2018	Green Climate Fund	Tata Cleantech Capital through NABARD	100 million USD

MNRE gave sovereign guarantee for three nationalized banks; State Bank of India (SBI), Canara Bank and Punjab National Bank (PNB) to set up debt funds with the low-cost funding from 4 development banks (ADB, KfW and WB)

Subsidy program for residential consumers

Principles	• Residential sector receives subsidised electricity and hence a financial mechanism is essential to reduce the cost of rooftop solar • Telescopic tariff applicable for residential sector hence restricting of CFA also required

Category	Capacity	CFA#
Residential (GHS/RWA)	<=3 kW	40%
	10=>capacity (kW)=>3	40% for first 3 kW + 20% for system >3 kW and <=10 kW
	Common facilities <500 kWp (@ 10 kWp per house)*	20%

With improving access to finance, GoI is also providing capacity building support to states

Activities Supported

01 Policy and regulatory framework

02 Media and Outreach Programs

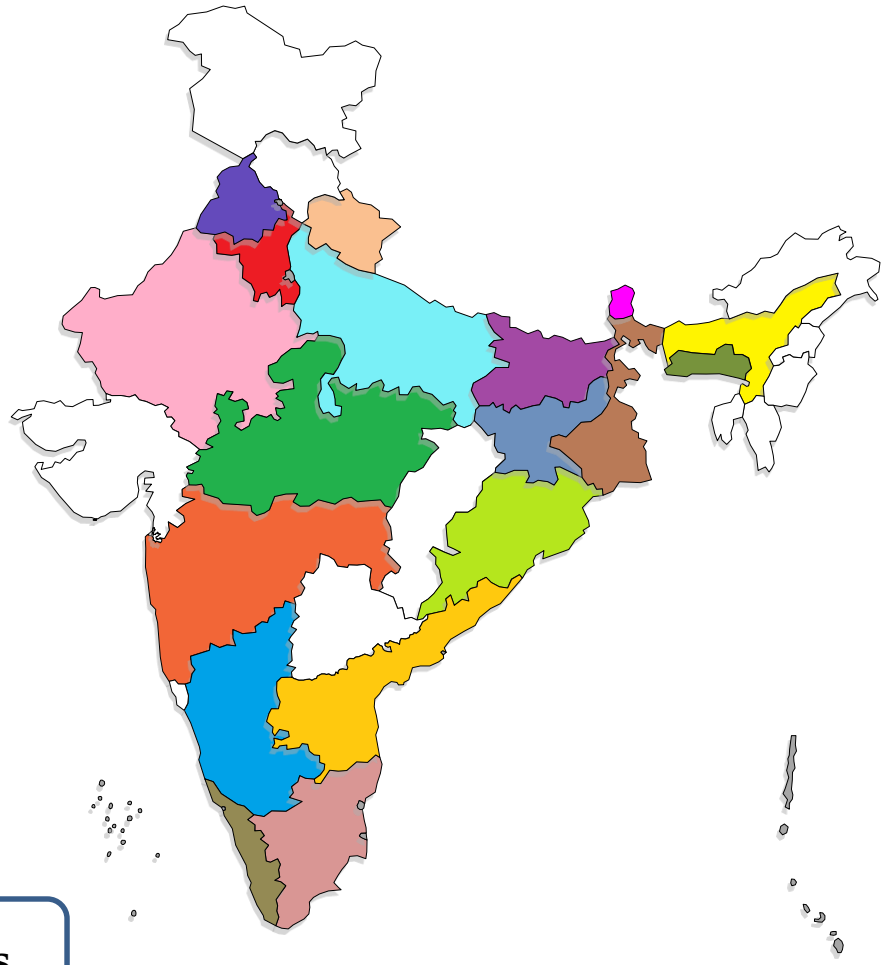
03 IT Support and transaction portals

04 Training & Capacity building

05 Demand Aggregation & bid support

06 Process streamlining frameworks

States Supported



Stakeholders engaged

- State Electricity Regulators
- Local Governments
- Electricity Distribution Companies
- Electricity Consumers
- Financing Institutes
- Project Developers

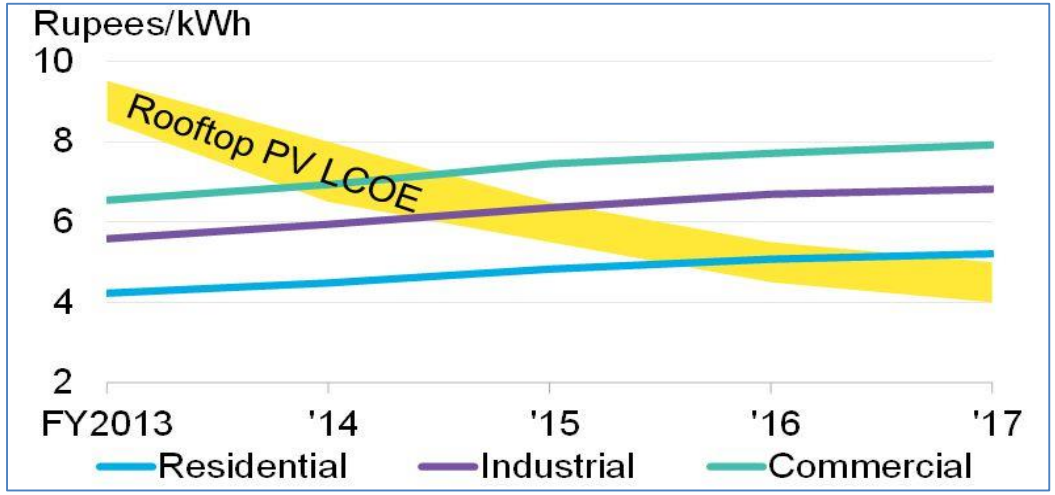
Solar/Rooftop policies have been successful in raising awareness and deployment in select consumer categories – Policy Evaluation

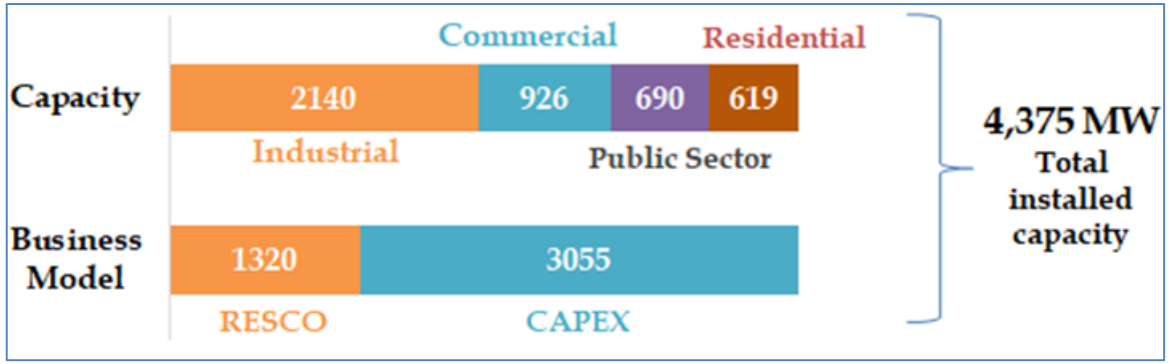
- Technological advancement and reduction in **Cost of Generation** from rooftop solar
- Policies were effective in taking advantage of the price reduction and creating appropriate framework for deployment in largely commercial industrial sector
- Lack of clarity in subsidy disbursal process and involvement of several stakeholders created confusion

- Concessional loan schemes have been beneficial

Parameter	Assessment	
Effectiveness	Effective in creating access to intended beneficiaries.	356 million USD, adding to 575 MW of solar rooftop capacity sanctioned under WB-SBI program
Externalities	Rooftop deployment in high paying consumer categories might impact DISCOM health adversely	Largest capacity additions in Commercial and Industrial sector '**High-paying consumer**'
Cost	Reduced interest rates driving adoption	Interest rates in bracket of '**8.5% - 9.5%**' significantly less than commercial rates
Feasibility	Technological advancement reduced **COG**	Generation costs lower than grid generation cost
Acceptability	High acceptability given social benefits	Associated Environmental benefits drive consumer acceptance

Rooftop solar has become commercially viable for all consumer categories, however the growth has been slow



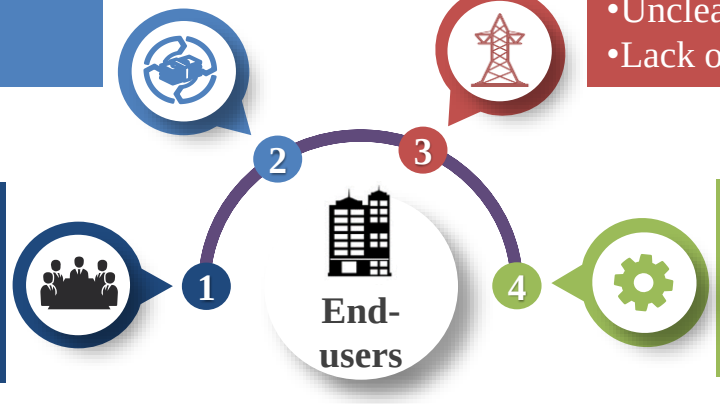


Challenges in rooftop deployment

Financing Institutes
- long due diligence and dispute resolution process
- Customer credit & collateral risks
- No clear standards and KPIs

DISCOM
- No provisions for solar contract dispute resolution
- Unclear contract standards and guidance
- Lack of awareness campaign for end users

Government
- No provisions for solar contract dispute resolution
- Unclear contract standards and guidance
- Lack of awareness campaign for end users



Developers and EPC players
- Difficulty in choosing credible players
- Lack of proper installation benchmarks
- No performance guarantee clause

Rooftop deployment challenges are more prominent for Residential sector

- Co-operative housing (CHS) ownership is the most prevalent model in Indian cities
  - ‘Right to occupy’ given to members
  - Voluntary membership

- Implementation of rooftop solar projects becomes difficult due to shared ownership structure of common assets

Residential societies offer several advantages:

- Constitute a major portion of urban infrastructure (higher roof share)
- Better prospects of shadow-free zones
- Less prone to theft and vandalism
- Better dissemination of knowledge and awareness about solar PV

Perceived challenges in rooftop solar deployment in CHS

Risks	Reasons
Counterparty Risk	• Risk of some of the members reneging on their project commitment. • Willingness of society to service its debt obligations.
Repayment Risk	• Lack of concrete cash flows. • Lack of willingness to lien mark society’s funds for claim on interest income.
Ownership Issues	• Ascertaining future accountability for the repayments • Possibility of change in ownership/society occupants
Project risks	• Getting net metering approvals from the state DISCOMs. • Timely O&M services to ensure optimum performance
Others	• The small scale of projects in societies require relatively small quantum of loans. The skewed risk-return profile with multiple off takers acts as a deterrent

Risk mapping for rooftop solar projects in Societies

Risk Parameter	Low Risk	High Risk
Impact of the surroundings on the generation from solar rooftop	In case of no significant construction envisaged in the vicinity in next few years.	If possibility of construction of higher rise buildings which might cast a shadow on the solar panels.
Warranty Certificates of solar panels and other equipment	If warranty T&C are similar to the prevailing T&C provided by the lead manufacturers/systems suppliers	If warranty T&C are not similar to the prevailing terms and conditions provided by the lead manufacturers/system suppliers
Panel and components **Performance Risk**	If the various components of rooftop solar systems comply with the BIS standards.	If the various components of rooftop solar systems do not comply with the BIS standards.
O&M Responsibility	If the third party/RESCO is responsible for maintenance of the system	If the end user is involved in maintenance of the system
Building Owners **Credibility**	No defaults previously, good credit history of the owners	Any credit default by owners in last 2 years.
No. of years of operation of the systems developer/RESCO	More than 5	Less than 2
No. of projects done by developer/RESCO	More than 5	Less than 2
Credit Rating of the developer/RESCO	Credit rating if available, more than BBB-	Credit default history of promoters/company

Conclusion

- Rooftop targets are very ambitious, need concerted efforts at all levels
- Several challenges were identified in the Phase I of the program
  - Delay in tendering due to involvement of multiple agencies inviting multiple tenders
  - Involvement of multiple stakeholders like SNAs, DISCOMs, PSUs etc
  - Lack of single window clearance
- Phase II of the rooftop program has identified DISCOMs as the implementation agency, will resolve challenges of uniform implementation
- Need to improve access to finance especially to the residential and MSME sector
  - Innovative framework and loan products are required
- Need for utility driven business models, to create win-win situation for all stakeholders
- Targeted capacity building programs and awareness campaigns are needed to achieve the targets

Thank You

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