



Areas for Intervention for the large scale deployment of rooftop solar power plants

*Workshop on Promising Technologies and Business Models
for Grid-connected Rooftop Photo Voltaic in India
Mumbai, 20-10-2016*



Content

- **Opportunities in the Indian rooftop solar segment**
- **Need to the study : Approach & methodology**
- **Areas for intervention & Recommendations**



Availability of finance

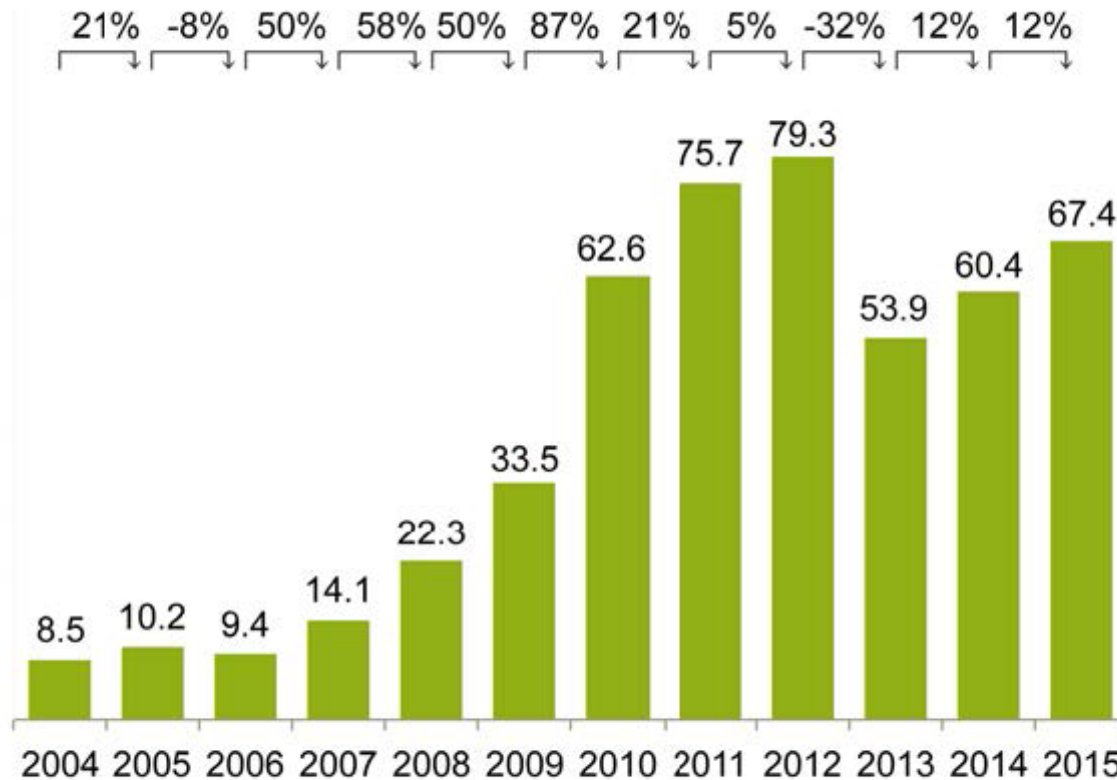
Available Sources	Own Currency (million)	normalised to € (million)	normalised to INR (Crore)	Capacity (MW)
KFW Development Bank	1,000 €	1,000	7,200	1700
The World Bank	625\$	569	4,188	1000
Asian Development Bank	500\$	455	3,350	800
Domestic Bank/FI (for all RE)	30,60,000 INR	42,500	3,06,000	7290

- Current level of commitments are sufficient to implement 10500 MW rooftop solar plants
- 10% of the current commitment from domestic banks/FIs translates to 7300 MW
- With the maturity of market more finance shall be allocated to the rooftop solar plants



Investment in small distributed systems (\$ billion)

Growth:



Represents investments in solar PV projects with capacities below 1MW

Source: Bloomberg New Energy Finance

Investment in small distributed systems shared 25% of the total investment in RE



Ample market to exploit

Particular	Target	Exhausted
Size of the market (MW)	40,000	350
Size of the market (INR Cr)	2,40,000	2,100
Available market (INR Cr)	2,37,900	

Market Components	Share	Market Size (RsCr)
Module	47%	1,12,800
Mounting Structure	13%	31,200
Civil Works	10%	24,000
Inverters	19%	45,600
Electricals	3%	7,200
Consulting/PMC	4%	9,600
Others	4%	9,600
Total	100%	2,40,000
O&M	1%	2,400

40 GW is offering a total market of 33 billion euro



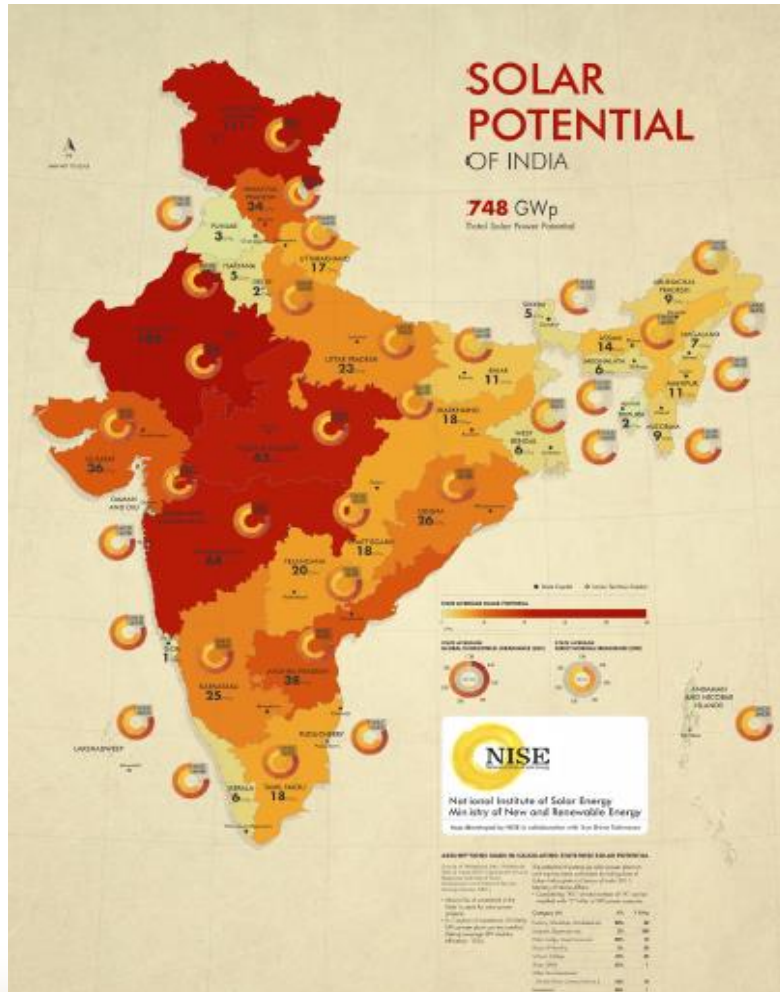
Distribution losses converted into green electricity

Description	Parameter
Consumption of Electricity (MU)	11,50,000
Energy Requirement (MU)	14,00,000
D-Losses (%)	18%
D-Losses (MU)	2,50,000
5% of D-Losses converted to Green Electricity (MU)	12500
5% of D-Losses converted to Green Electricity (MW)	8900

- Distributed generation plants offers saving in the distribution losses – *not technical losses inherent in the equipment but due to less electricity flow in the wires/equipment*
- The conversion of 5% of the current level of distribution losses shall translate to almost 9000 MW each year → saving of electricity worth 2500 RsCr per annum (*computed at 2 Rs/kWh*)
- The electricity generation from 40 GW (~63000 MU) is merely 4.5% of the total electricity requirement at *national level*



States announced Policy and Regulations



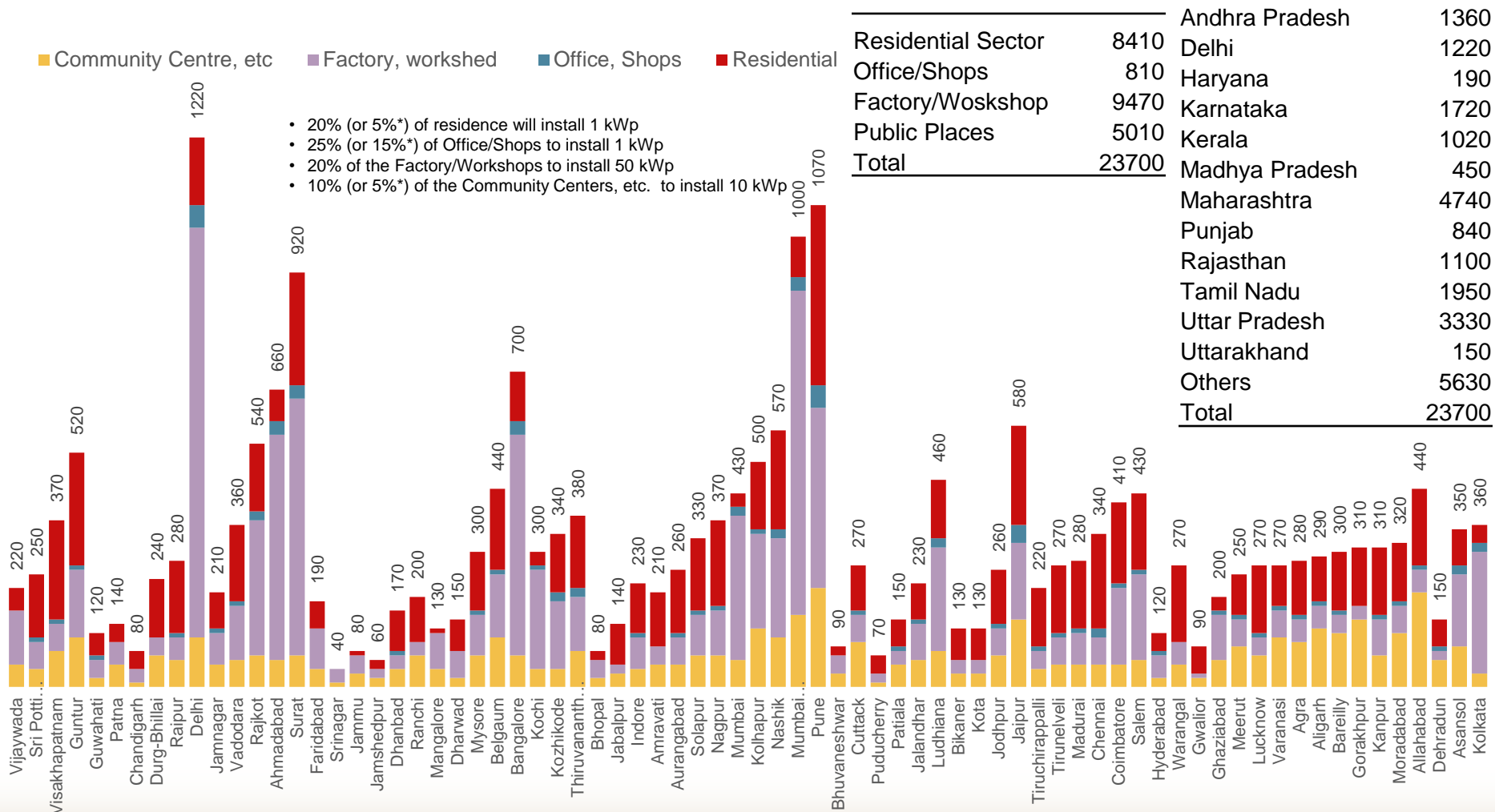
Sl. No.	State/UTs	Solar Policy	Feed-in Tariff	Net Metering Mechanism
1	Andhra Pradesh	✓	✓	✓
2	Assam			✓
3	Bihar	✓	✓	✓
4	Chhattisgarh	✓	✓	
5	Delhi	✓	✓	✓
6	Gujarat	✓	✓	✓
7	Goa		✓	✓
8	Haryana	✓		✓
9	Himachal Pradesh		✓	✓
10	Jharkhand			✓
11	Karnataka	✓	✓	✓
12	Kerala	✓	✓	✓
13	Madhya Pradesh	✓	✓	✓
14	Maharashtra		✓	✓
15	Meghalaya			✓
16	Odisha		✓	✓
17	Punjab	✓	✓	✓
18	Rajasthan	✓	✓	✓
19	Tamil Nadu	✓	✓	✓
20	Telangana			
21	Tripura			✓
22	Uttarakhand	✓	✓	✓
23	Uttar Pradesh	✓	✓	✓
24	West Bengal	✓		✓
25	UTs		✓	✓



Minimum Potential in (MW) Tier – 1 & Tier – 2 Cities

■ Community Centre, etc
 ■ Factory, workshed
 ■ Office, Shops
 ■ Residential

- 20% (or 5%*) of residence will install 1 kWp
- 25% (or 15%*) of Office/Shops to install 1 kWp
- 20% of the Factory/Workshops to install 50 kWp
- 10% (or 5%*) of the Community Centers, etc. to install 10 kWp



Residential Sector	8410	Andhra Pradesh	1360
Office/Shops	810	Delhi	1220
Factory/Workshop	9470	Haryana	190
Public Places	5010	Karnataka	1720
Total	23700	Kerala	1020
		Madhya Pradesh	450
		Maharashtra	4740
		Punjab	840
		Rajasthan	1100
		Tamil Nadu	1950
		Uttar Pradesh	3330
		Uttarakhand	150
		Others	5630
		Total	23700



Initiative & Incentives

Central Government	Central Electricity Regulatory Commission	State Government	State Electricity Regulatory Commission
<ul style="list-style-type: none">• CFA to select consumers• Benefits under Section 32 & 80 I(A) of IT Act, 1961• Exemption from the payment of excise duty & custom duty• RE sector under priority sector lending• Loan for rooftop solar plant as a part of home loan or home improvement loan• Separate % to be procured from solar energy• Regulations for the technical connectivity• Notified Model Building Bye-laws 2016 with suitable provision of Solar Energy Utilization	<ul style="list-style-type: none">• Notified framework for the development of solar renewable energy certificates (REC)• Announcement of Model Net Metering Regulations	<ul style="list-style-type: none">• Exemption from the payment of or reduced stamp duty fee• Exemption from the payment or reduction in VAT• Exemption from the payment or reduction in Entry Tax• Exemption from the payment in Electricity Duty/Tax for self-consumption• Waiver of Wheeling charges• Waiver of Cross Subsidy Surcharge	<ul style="list-style-type: none">• Framework for feed-in tariff mechanism• Framework for net metering mechanism• Separate solar purchase obligations to the obligated entities• Notification for installing solar photovoltaic plant for different category of building/are in few states

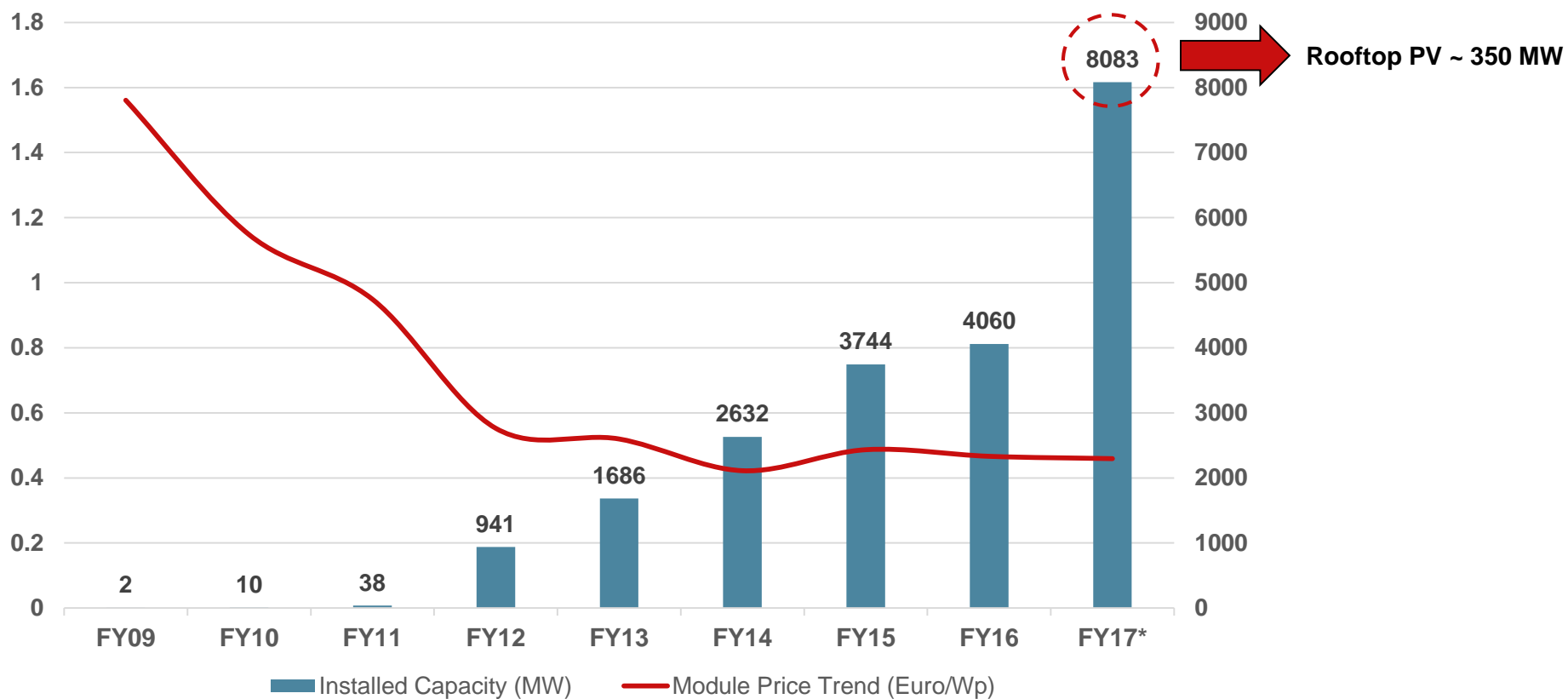


Content

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- **Need to the study : Approach & methodology**
- Areas for intervention & Recommendations



Y-o-Y Installed capacity → Solar energy segment





Approach & Methodology

Final Recommendations

Literature Review	Stakeholder Consultation		Brain Storming	Capacity building workshop
	Interview	Online Survey		
<ul style="list-style-type: none">• Electricity Act 2003• Schemes notified by MNRE• Regulations, orders, guidelines notified by respective SERCs/CERC/FOR• Policies document of the State Governments'• Technical connectivity Regulations by CEA	<ul style="list-style-type: none">• project developers,• system integrators,• financial institutions,• distribution licensees,• beneficiaries amongst others	<ul style="list-style-type: none">• industry experts,• consultants,• investors,• system integrators,• developers,• government representatives• consumers	<ul style="list-style-type: none">• Internal activity along with the consultant	<ul style="list-style-type: none">• Validation of arguments with the distribution licensee



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Area 1 : Incentive from the Government

Central Financial Assistance and Benefit under Income Tax Act, 1961 has emerged at key motivators

- ***Dependency of Schemes announced by the States on availability of Central Financial Assistance***
 - Removal of Central Financial Assistance from amounts to revision in the schemes at the State level
 - One scheme for a definite term shall allow the stakeholders to reap maximum benefits
- ***Procedure for the disbursement of Central Financial Assistance***
 - The implementing agencies had to go for the discovery of price through competitive bidding
 - It takes somewhere between two to six months to finalise the benchmark capital cost
 - Multiple implementing agencies in a State have to undergo competitive bidding process for the discovery of the benchmark capital cost
 - The Benchmark Capital Cost may be fixed by MNRE through a consultation process
- ***Common benchmark capital cost for all size of the plant***
 - Capital cost must be fixed considering different size of the projects
 - UP, AP, Kerala has fixed the capital cost considering the size of the project



Area 2 : Framework towards ease of implementation

Requirement

- an easy and simple implementation framework designed by the state agencies
- a framework that allows banks/financial institutions to feel comfortable about making financing

Status

- in several States the distribution licensees have still not announced the procedures to grant connectivity to rooftop solar photovoltaic power plants
- procedures are yet to be fully operationalised
- in some cases, the distribution licensee is unable to generate a net metered electricity bill
- consumer intends to implement a rooftop solar plant but does not know from where to begin

Recommendations

- Provide user-friendly platform to support stakeholders in implementing the rooftop solar plant
- Policy/regulatory assistance cell at Central level to support and guide the state agencies
- Capacity building & orientation programmes for focused group



Area 3 : DG and concern of Distributed Licensee

Main concerns

- Loss of revenue and under recovery of the network cost
- Loss of cross subsidising consumers
- Increased administrative expenses
- Safety of the lineman during planned or unplanned outage

Recommendations

- Intervention by the Regulatory Commission may dissolve all the concerns of a distribution licensee
 - Regulator may allow the full recovery of the infrastructure cost through tariff
 - Implementation of 2200 MW of rooftop solar translated to raise of consumer tariff 7 paisa/kWh
 - if utility is able to trade the electricity then impact would be around 3 paisa/kWh
 - Distribution licensee may be provided the access to control the inverter of the consumer with a defined rules

In addition,

- Power trading cell at each distribution licensee to trade the electricity at reasonable price



Area 4 : Mechanisms to promote rooftop solar plants

Merits of Feed-in Mechanism

The mechanism is easy to understand and implement

The buildings with larger roof area may be effectively utilized with gross metering mechanism

No loss of revenue due to flee of cross-subsidizing consumers

Ease in the settlement of electricity

Long term availability of feed-in tariff trajectory shall ensure availability of financing

Merits of Net Metering Mechanism

The consumer is permitted to manage its consumption of electricity – partly or fully

The financial health of the distribution licensee is no concern as there is commercial transaction involved

Net metering mechanism provide the consumers with an opportunity to hedge any future rise in electricity tariffs

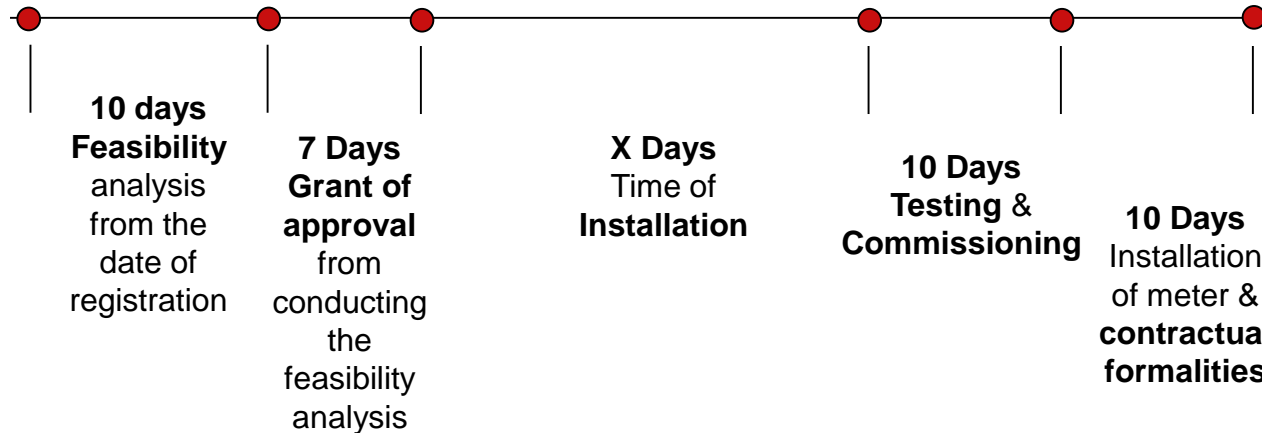
Recommendations

- ➔ In several countries including Germany, Japan feed-in tariff mechanism has seen success
- ➔ Equal opportunity to be given to feed-in tariff mechanism, net metering mechanism and REC Mechanism
- ➔ Regulator may approve the power purchase agreement while finalising the framework for feed-in tariff mechanism



Area 5 : Simplify the procedure for connectivity

Time mapping



Recommendation

- While formulating the procedures, the time taken for conducting formalities and time from one step to another should be specified reasonably & avoided where possible
- Some steps may be avoided for project below certain capacity
 - In Japan, no inspection is required for rooftop plants up to 50 kW



Area 6 : Formulate mechanism to safeguard the interests

Main concern

*“The consumer/ Rooftop Solar PV Energy Generator **shall be solely responsible for any accident to human being/ animals** whatsoever (fatal / nonfatal / departmental / non-departmental) **that may occur due to back feeding from the Rooftop Solar PV System** when the grid supply is off, based on the issue decided by the Chief Electrical Inspector. The distribution licensee reserves the right to disconnect the consumer’s installation at any time in the event of such exigencies to prevent accident or damage to men and materials.” [Emphasis added]*

Recommendation

- The Act, 2003 talks about protecting the interest of consumers through constitution of relevant bodies
 - Disallow certain act, instead of permitting it with a disclaimer, to safeguard the interest of a consumer
 - Consumers fear that if anything goes wrong, they might be penalised/prosecuted
 - The relevant clauses should necessarily be mentioned in the agreement to be entered into between the consumer and the third party



Area 7 : Connectivity with the network

Main concern

- ➔ Difference in the provisions as laid by Regulatory Commissions and Central Electricity Authority on connectivity of the rooftop plant with the network of licensee

Recommendation

- ➔ Provisions of the Electricity Act, 2003 empowers Central Electricity Authority to specify norms for connectivity of the 'facility' under Section 73 (b)
- ➔ The Authority specifies the connectivity with the electricity system whereas some Regulatory Commissions do allow connectivity with consumer network
- ➔ The Act obligates the generator to comply with the norm any non compliance shall amount to penalty under Section 142 (Violation of the Regulation)



Area 8 : Enabling easy access to finance

Main concern

- Banks and financial institutions perceive rooftop solar segment as risky compared to other infra sectors
- Current widely promoted net metering scheme which does not provide a clear revenue stream to banks
- Non – existence of a refurbished market for the sale of the solar plants from defaulters

Recommendation

- Formulate and promote/advertise loans for rooftop solar plants
- Develop risk fund to safeguard the banks from defaulters



Thank you!!

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