Rooftop Solar Development in India

Policies, Trends & Issues

Current Status of Solar PV rooftop projects under RPSSGP

State	PPA signed (MW)	Commissioned (MW)	Balance (MW)
Andhra Pradesh	10.5	9.5	0.75
Chhattisgarh	4.0	4.0	0
Haryana	8.8	7.8	1.0
Maharashtra	5.0	5.0	0
Odisha	8.0	7.0	1.0
Punjab	8.5	6.0	2.5
Rajasthan	12.0	10.0	2.0
Tamil Nadu	7.0	5.0	2.0
Uttarakhand	5.0	5.0	0
Uttar Pradesh	8.0	7.0	1.0
Jharkhand	16.0	16.0	0
Madhya Pradesh	5.25	5.25	0
Total	**98.05**	**87.80**	**10.25**

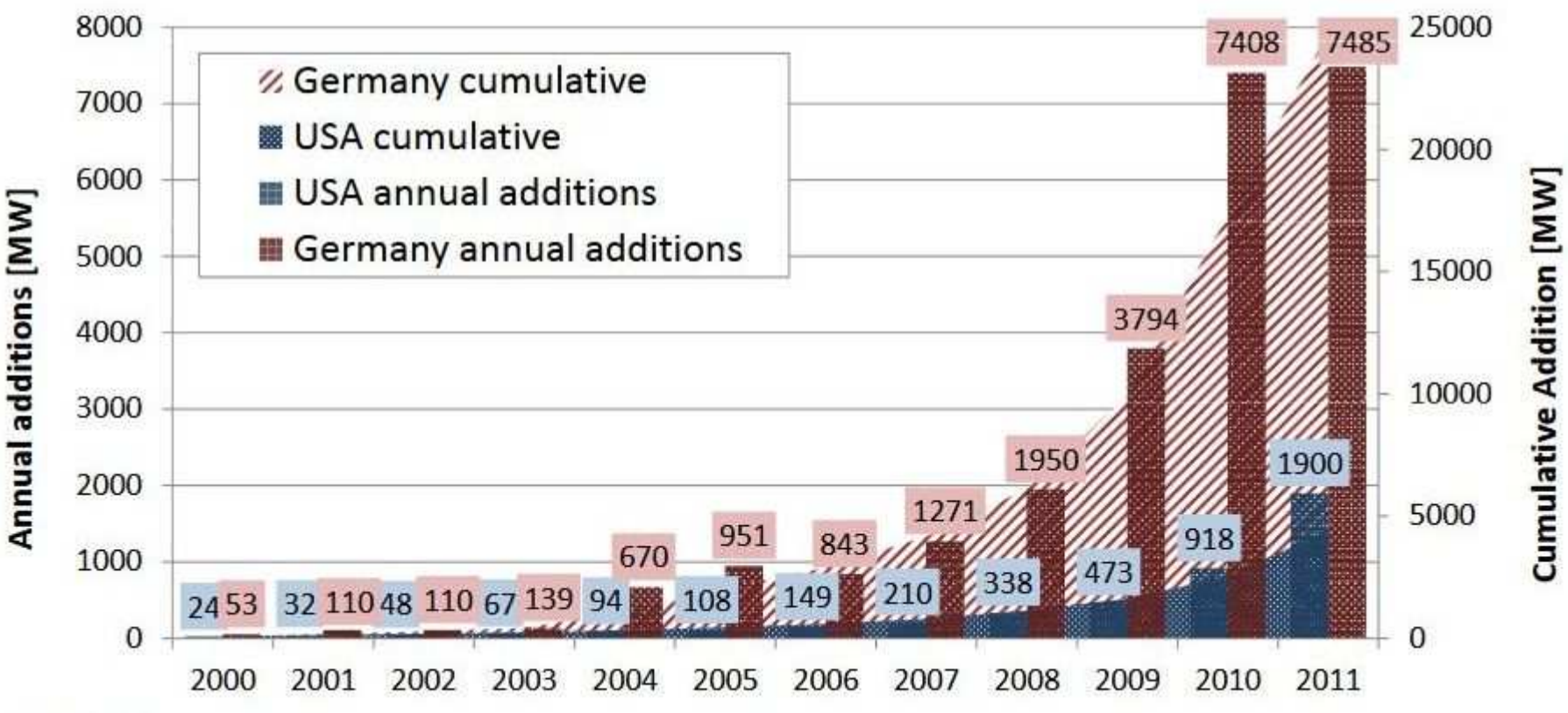
State Rooftop Solar Policies

State	Target	Initiatives
Tamil Nadu	350 MW	• GBI (Generation Based Incentives) which are Rs. 2/kWh for first two years and Rs 1 per kWh for next two years, and there after Rs. 0.5 per kWh for subsequent two years. • Net metering allowed at multiple voltage levels
Kerala	10 MW	• Central financial assistance from state would be minimum of either 30% cost of the project or Rs. 81,000/ per system • State subsidy of Rs. 39000/per system is also available for the approximate cost of the plant of Rs. 2.5 lakh
Chhatisgarh	Not decided	• Incentives provided by MNRE will be made available to project developers

State Rooftop Solar Policies

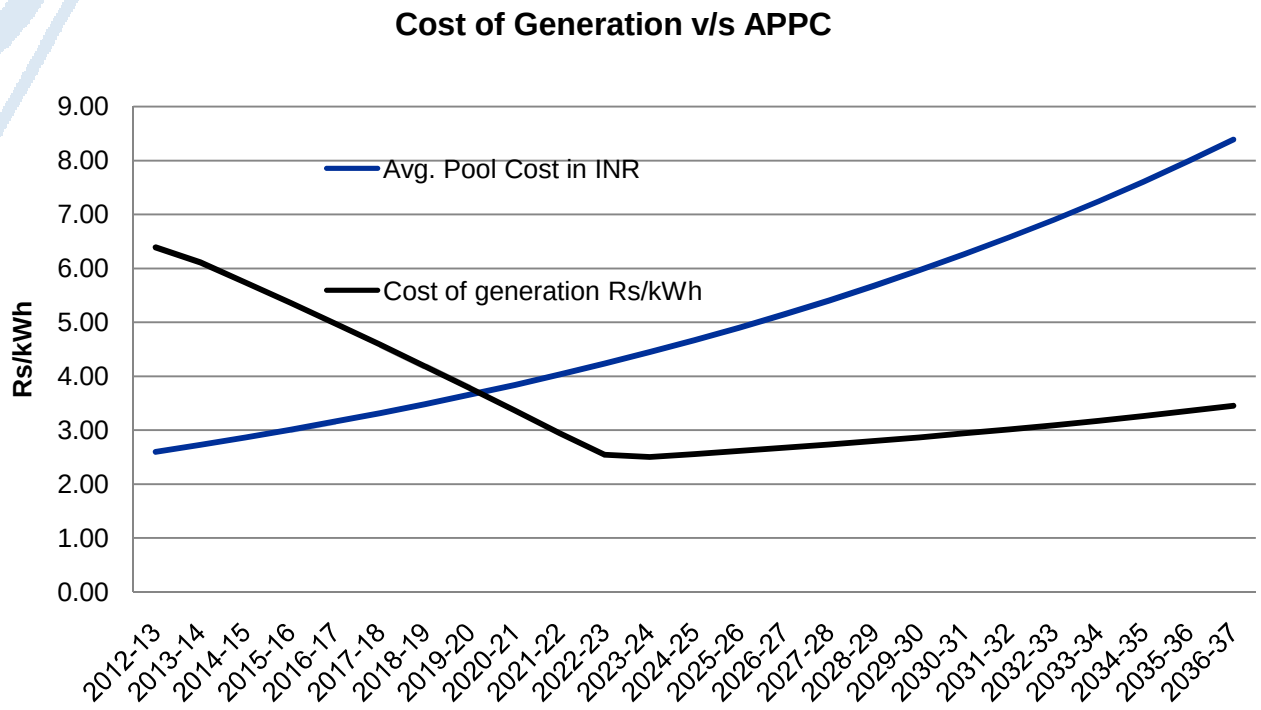
State	Target	Incentives
Karnataka	250 MW	• Tariff of Rs 3.40 per KWh along with Net Metering facility
Maharashtra	Not decided	• Levelized tariff Rs.11.66/kWh for projects commissioned during 2012-13 for 25 years
Gujarat	Plans to introduce rooftop policy	• 5 MW rooftop programme on the PPP model in the capital which is now extended to about 5 more cities and towns
Haryana	Yet to be announced	• 2 demonstration projects of 100 kW each approved • Financial assistance of Rs.75 lakhs for each project
Rajasthan	50 MW	• Tariff-based competitive bidding

International Experiences – Rooftop systems

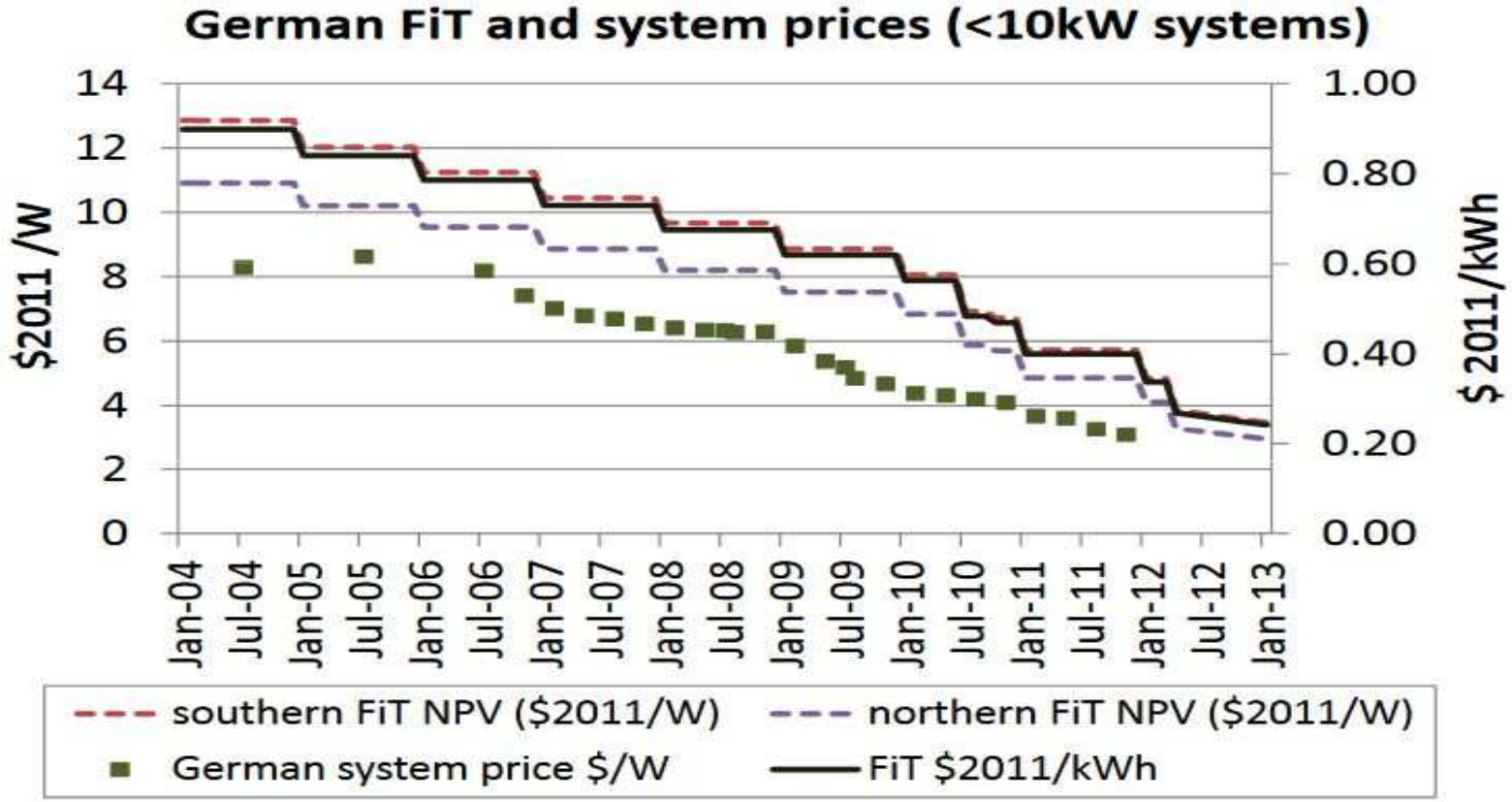


The price differential can be attributed to economies of scale.

Solar PV –Reaching towards Grid parity



International Experiences – Rooftop Systems



FiTs are reducing every year, thereby forcing developers to reduce installation costs

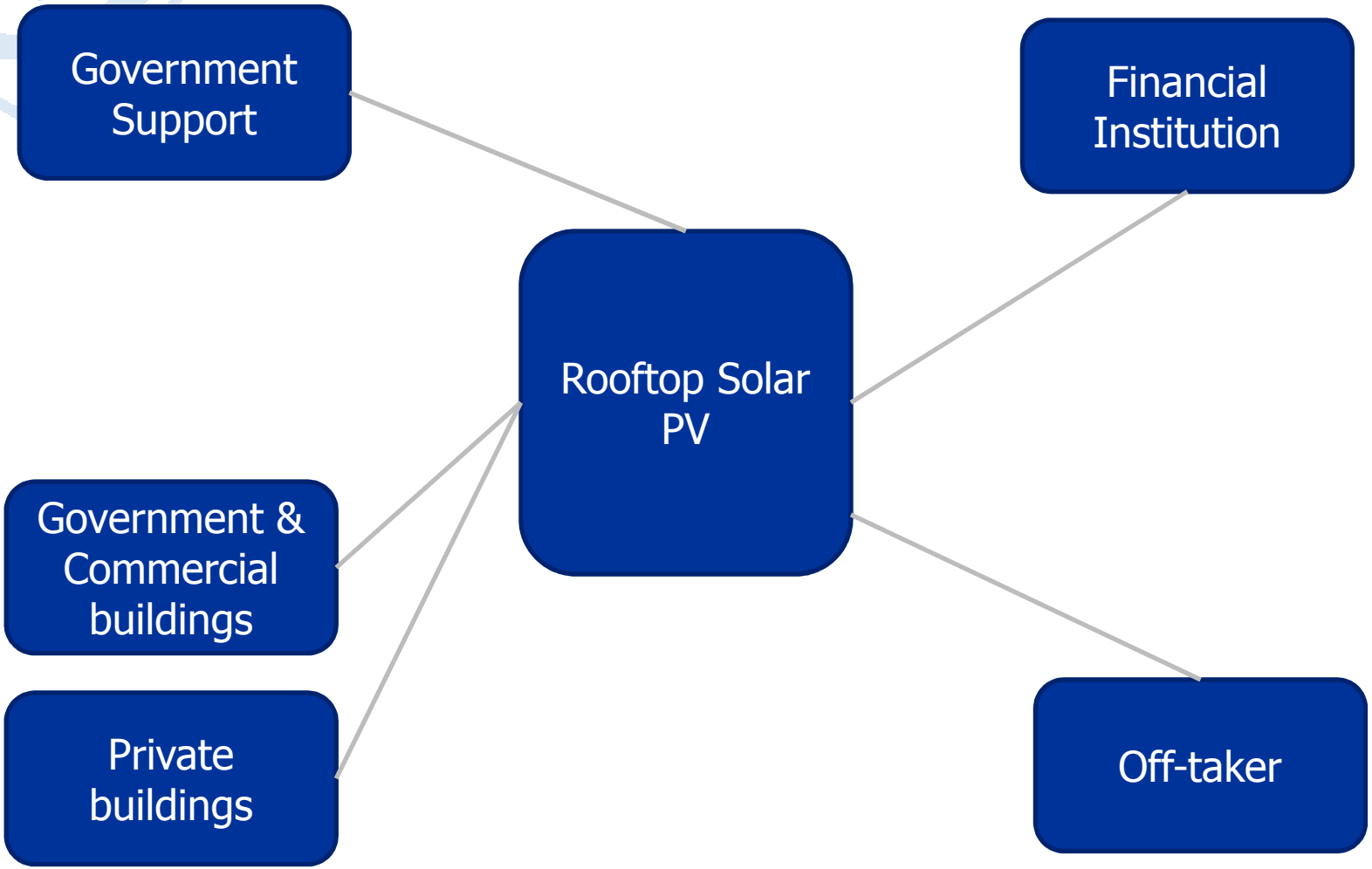
Comparison of Indian installation costs for solar rooftop

FIGURE 4.6: INSTALLED PV SYSTEM PRICES FOR RESIDENTIAL APPLICATIONS IN DIFFERENT COUNTRIES, 2011

Source: IRENA

The price range in India is much stiffer and higher compared to developed markets such as Germany and Japan

Typical business models for rooftop systems - Contractual Arrangements



Issues in Rooftop Systems

- **Connectivity**
- Present regulations on connectivity do not recognize rooftop connectivity at low voltage (say 230/415V)
- No clarification on the appropriate voltage level for connectivity, capacity (kWp) restrictions for connectivity at each voltage level, connectivity at LT level when consumer connection is at HT level
- **Metering**
- No regulations for metering arrangements of rooftop solar PV.
- There should be clarification on meter location, accuracy class, type, sealing, reading, requirements for main meter/check meter/standby meter, separate metering arrangement or single meter with separate registry for export/import.

Issues in Rooftop Systems

- **Energy Accounting**

There is a need to specify responsibilities of Discom w.r.t joint meter reading, issuance of energy credit notes etc. as well as standardization of transformer and line losses. SERCs need to direct Discoms for energy accounting as well as net metering policy.

- **Examples**

EVI filed a petition for connectivity and metering for solar rooftop under REC mechanism in Haryana on 13.02.2012

1. Discom did not agree to provide connectivity at 415 V
2. Discom did not provide clarification on connectivity and metering
3. SLDC still to come up with procedure for metering captive power projects (including solar rooftop)

Issues in Rooftop Systems

- **Examples**

Tata Power Renewable Energy Limited (TPREL) developing a 500 kWp rooftop at Tata Motors plant in Pimpri, Pune. The plant is having a connection at 220 kV.

Various options of connectivity were available:-

1. Inter-connection at 220 kV (transmission system) costing Rs.615 lakhs
2. Inter-connection at 22 kV Akurdi substation (Distribution system) costing 215 lakhs
3. Inter-connection at 440 V internal distribution system of Tata motors costing 35 lakhs (preferred)

However, Option-3 required addressing issues of grid connectivity, metering arrangement and energy accounting. A working group has been formed comprising CEA and MNRE to study the policy frameworks

Thanks

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