

# Solar Power in India Opportunities & Challenges

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# Agenda

- Indian Power Sector at a Glance
- Jawaharlal Nehru National Solar Mission
- State Governments Solar Policies



# ABOUT US

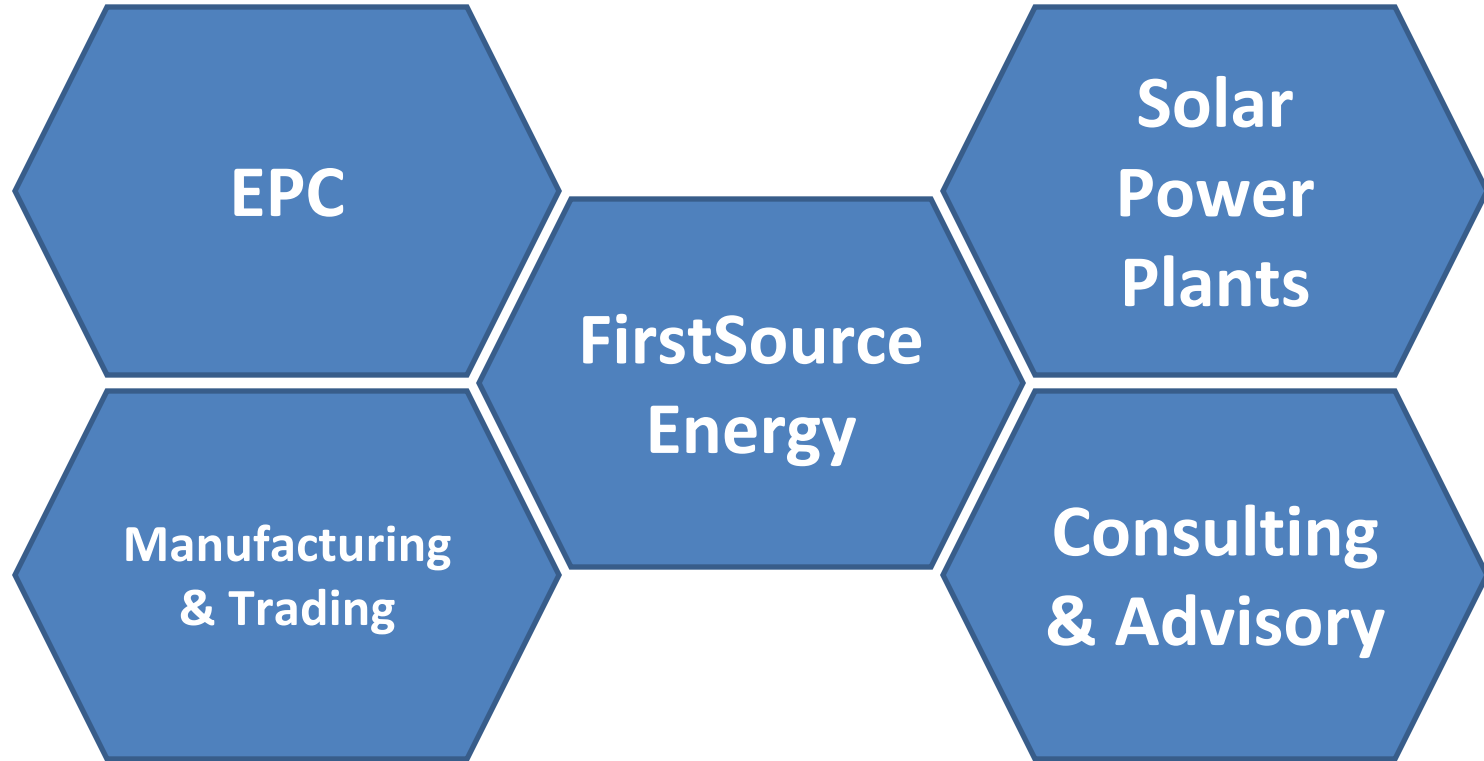
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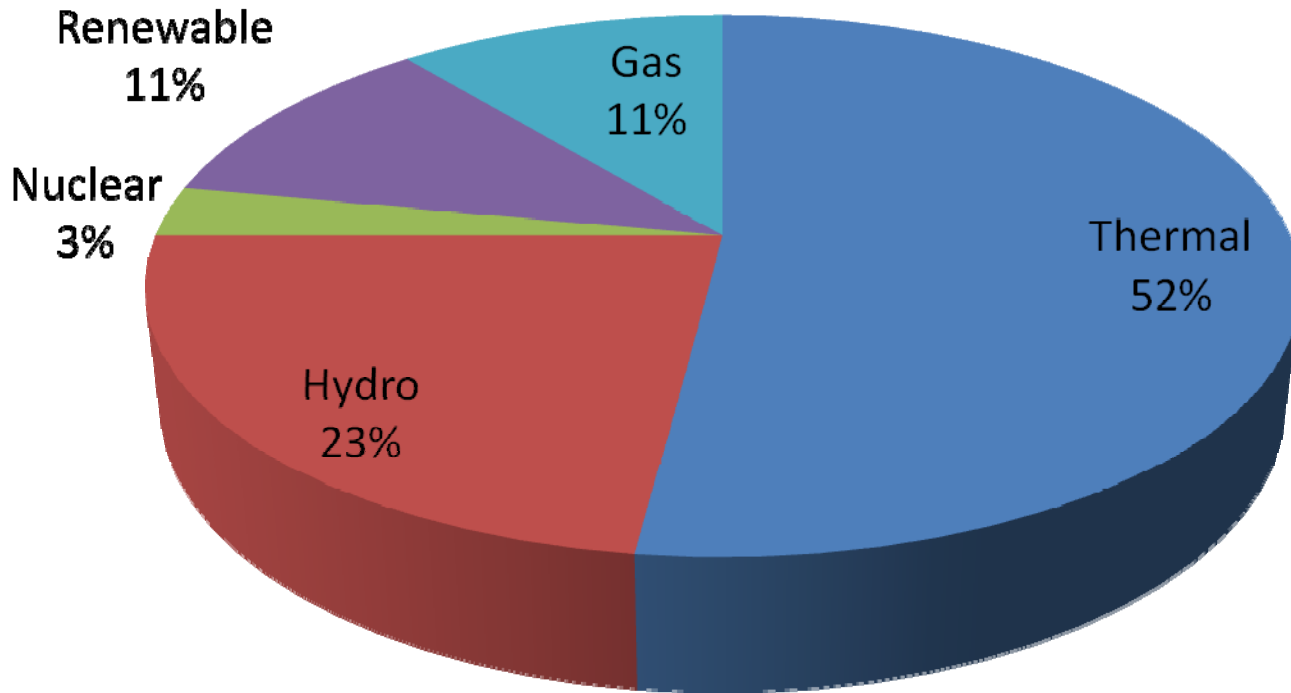
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# Indian Power Sector Snapshot

**Total Installed Capacity : 1,61,350 MW as on April 2010**





# Indian Power Sector Challenges

- Country of 600,000 villages – 1/3<sup>rd</sup> of which doesn't have access to grid
- Nearly 600 million Indians do not have access to electricity grid
- Peak deficit of 12% and Energy Deficit of 11%
- One-third of power generated lost before getting utilized (30% AT&C Losses)
- High use of Fossil Fuel for Generation, extensive use of diesel for back up and captive power units, kerosene lamps
- Per Capita Energy consumption of 704 kWh\*
- Government Policy allows 100% FDI in all segments
- Yet share of power sector in FDI to infrastructure sectors increased only marginally from 16% to 18% over 2006-9. By contrast FDI to Telecommunications is more than 47%



# Jawaharlal Nehru National Solar Mission (JNNSM)

<b>Application Segment</b>	<b>Target for Phase I (2010-13)</b>	<b>Cumulative Target for Phase 2 (2013-17)</b>	<b>Cumulative Target for Phase 3 (2017-22)</b>
<b>Grid solar power incl. roof top &amp; small solar projects</b>	<b>1100 MW</b>	<b>4000 MW</b>	<b>20000 MW</b>
<b>Off-grid solar applications (incl. rural solar lights)</b>	<b>200 MW</b>	<b>1000 MW</b>	<b>2000 MW</b>
<b>Solar collectors</b>	<b>7 million sq meters</b>	<b>15 million sq meters</b>	<b>20 million sq meters</b>



# JNNSM – KEY FEATURES

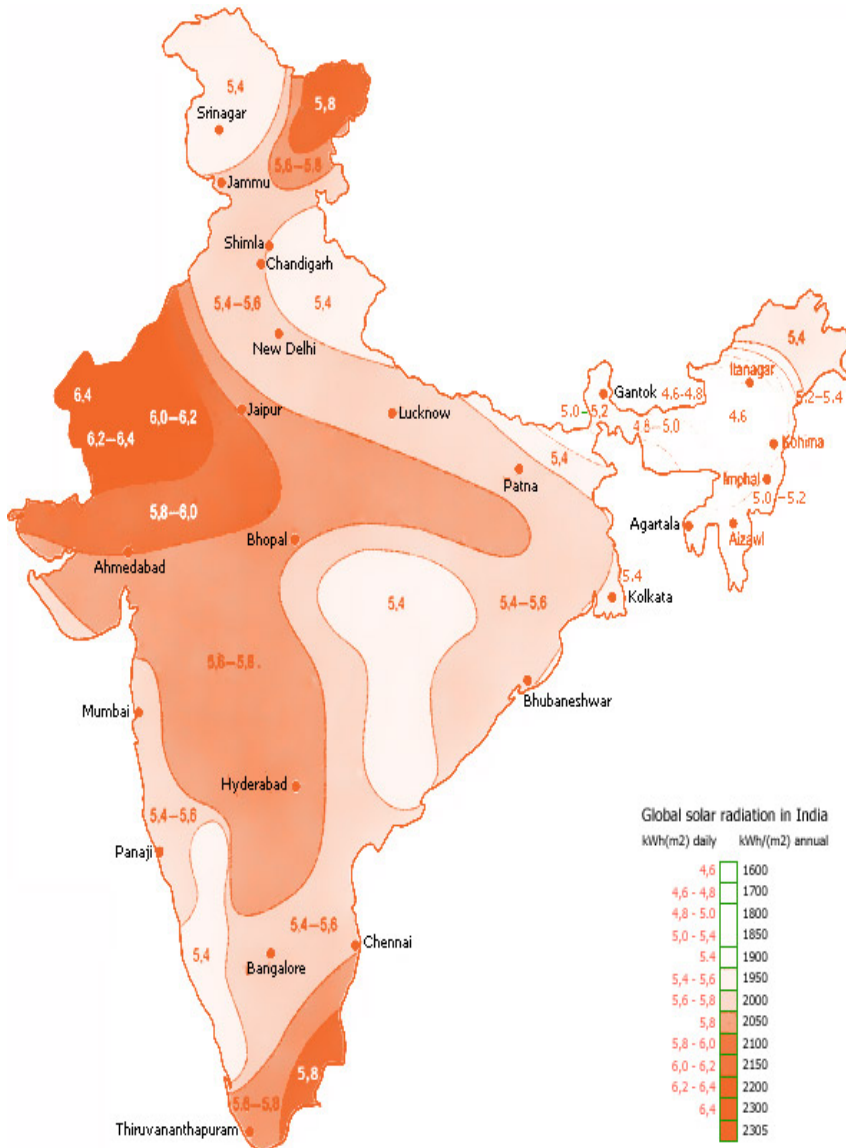
- NVVN appointed the Nodal Agency for sale and purchase of 33 kV and above Grid connected 1 GW Solar Power under Phase -I of the JNNSM by Ministry of Power
- CERC has announced tariff for 2010-11 : [www.cercind.gov.in](http://www.cercind.gov.in)
  - PV Rs. 17.91 per unit
  - CSP Rs. 15.31 per unit
- Power Purchase Agreement (PPA) duration 25 years and tariff will remain unchanged.
- Domestic Content Requirements
- The ratio of Solar PV to Solar Thermal is proposed to be in the ratio of 50 : 50
- Solar PV Project Size 5MW and Solar Thermal 5MW-100MW
- Evacuation at 33KV & Above Grid
- The key driver to be through a Renewable Purchase Obligation (RPO) mandated for power utilities, with a specific solar component.
- This could be complemented with a solar specific Renewable Energy Certificate (REC) mechanism to allow utilities and solar power generation companies to buy and sell certificates to meet their solar power purchase obligations.
- Fiscal Benefits : 10 Years Tax Holiday u/s 80IA, Customs & Excise Exemptions





# High Solar Radiation in India

India receives solar energy equivalent to **5,000 trillion kWh/year**  
Daily average solar energy incident varies from **4 -7 kWh per sqm** with about **2,300–3,200** sunshine hrs/year  
**Rajasthan - highest intensity of radiation (6.4 – 6.6 kWh/m<sup>2</sup>/day)**





# Financing Solar Projects

- Project Finance or Balance Sheet Finance
- Term Loan from Indian banks 10-12% p.a. Limited Knowledge on Solar with Banks
- Foreign Currency Loans subject to currency fluctuation risks
- Typically 8-10 years Term Loan
- Local EPC expertise mostly limited to small / rural solar lighting systems and a few international MW scale projects
- Bankability of PPA's and Issue of Payment Security
- Typically 30:70 Equity : Debt Equity Ratio
- 100% FDI allowed
- Right of way for power evacuation is time consuming

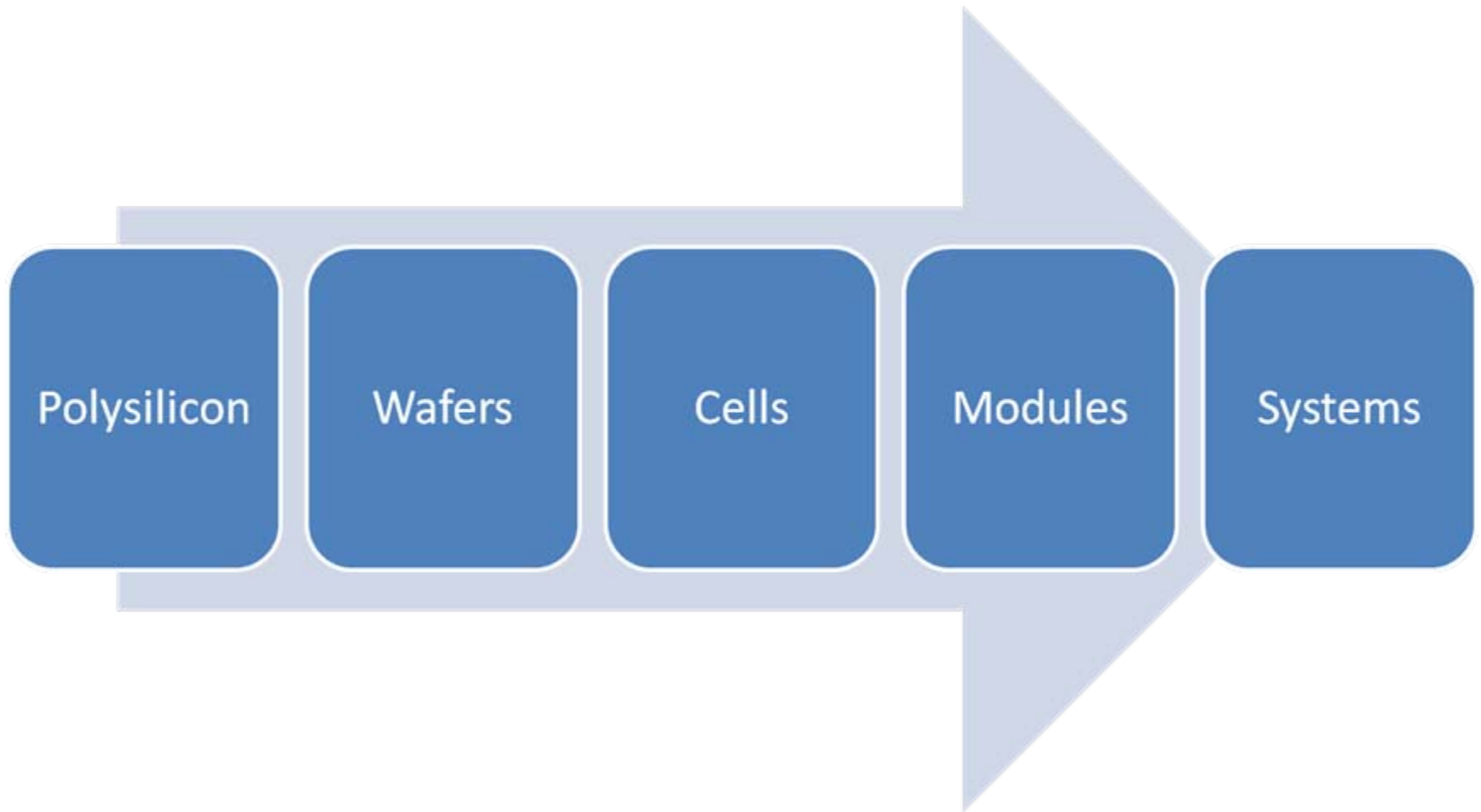


# Domestic Content & Solar Manufacturing Opportunities

- GOI Mandates use of “Made in India” Solar Panels for the 1<sup>st</sup> sub phase of 150 MW in 2010-11 and Cells & Modules both from 2011-12 onwards
- 30% Domestic Content mandate for Solar Thermal Project
- Various Taxation & Fiscal incentives for Manufacturing in SEZ’s
- Currently around 1 GW of Module Manufacturing and 0.5 GW of Cells Manufacturing Capacity
- No Polysilicon and Wafers Manufacturing as yet



# India's Position in Solar Value Chain



Polysilicon

Wafers

Cells

Modules

Systems



# Solar Manufacturing Challenges

- Dependent on Imported Wafers for Cell Manufacturing
- High cost of Financing/Capital
- Competition from China & Taiwan
- Low demand in India
- Lack of Technical Knowhow especially in the upstream segment



# STATE GOVERNMENT PROGRAMS

- Government of Gujarat – PPA's of 365 MW + 500MW
- Tariff – Solar PV Rs.15 for 1<sup>st</sup> 12 years and Rs.5 for next 13 Years
- Solar Thermal Rs.13 for 1<sup>st</sup> 12 years and Rs.3 for next 13 years
- No Domestic Content Mandate
- Investor Friendly State, Utility Enjoy good credit rating and high investor confidence
- Other state policies underway
- Gujarat : Challenges in Procurement of Land



# JNNSM Phase 1 - Update

- Solar Thermal – Target 500 MW by 2013 – NVVN Received around 3 GW of applications
- Solar PV – Sub-Phase 1 – 150 MW (2010-11) (Each Project of 5 MW) – NVVN Received Applications for 1750 MW
- 84 MW Solar PV Project cleared in Migration
- Bidding Round to start



Thank You  
Wishing Very Happy Diwali &  
Prosperous New Year

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