



## **Solar power opportunities in India**

Roundtable on Large Scale Rooftop in India  
Hamburg Wind Energy Exhibition  
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## COMPANY OVERVIEW

- Established 2009 in Hamburg, Germany  
2011 in New Delhi, India

International team with experienced engineers and managers from Germany, Spain, Brazil, Chile, Colombia, India, Kenya, Mexico and Southern Africa

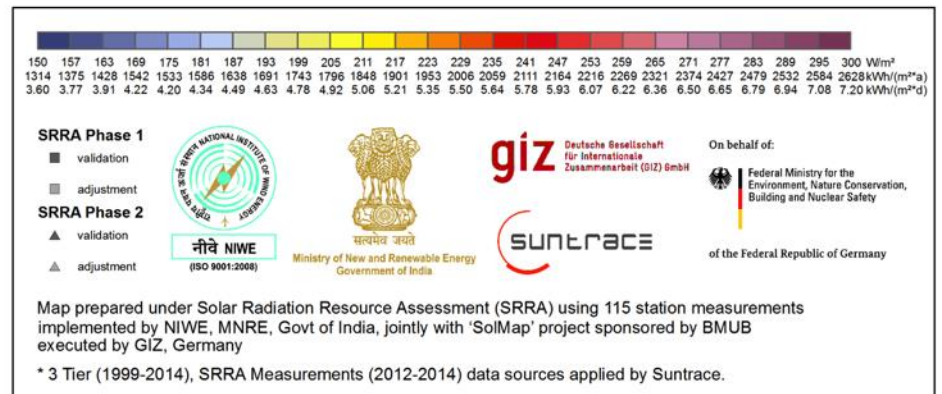
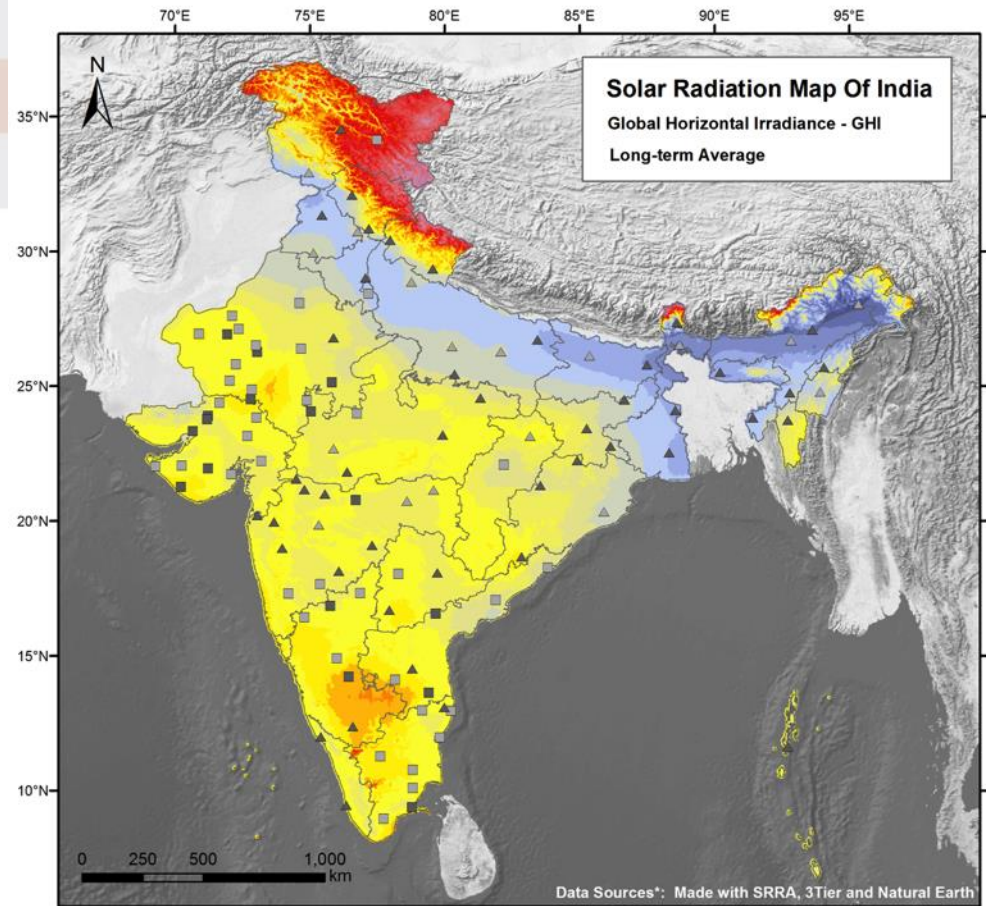
- Covering photovoltaic (PV), concentrating solar power (CSP), solar research, independent power producers (IPP) & utilities

- Holistic approach: solution for all steps of the project development chain from the conceptual phase, (pre-)feasibility, project qualification to finance and investment



# Suntrace' experience in India

- Solar resource information for India very good with low uncertainties
- World's largest network of highest quality solar radiation stations installed
  - Solar Radiation Resource Assessment (SRRRA) project of MNRE, India
  - SolMap project funded by GIZ, Germany
  - Suntrace provided valuable inputs
- High resolution, high accuracy solar radiation atlas of India is prepared
- Bankable solar resource data available



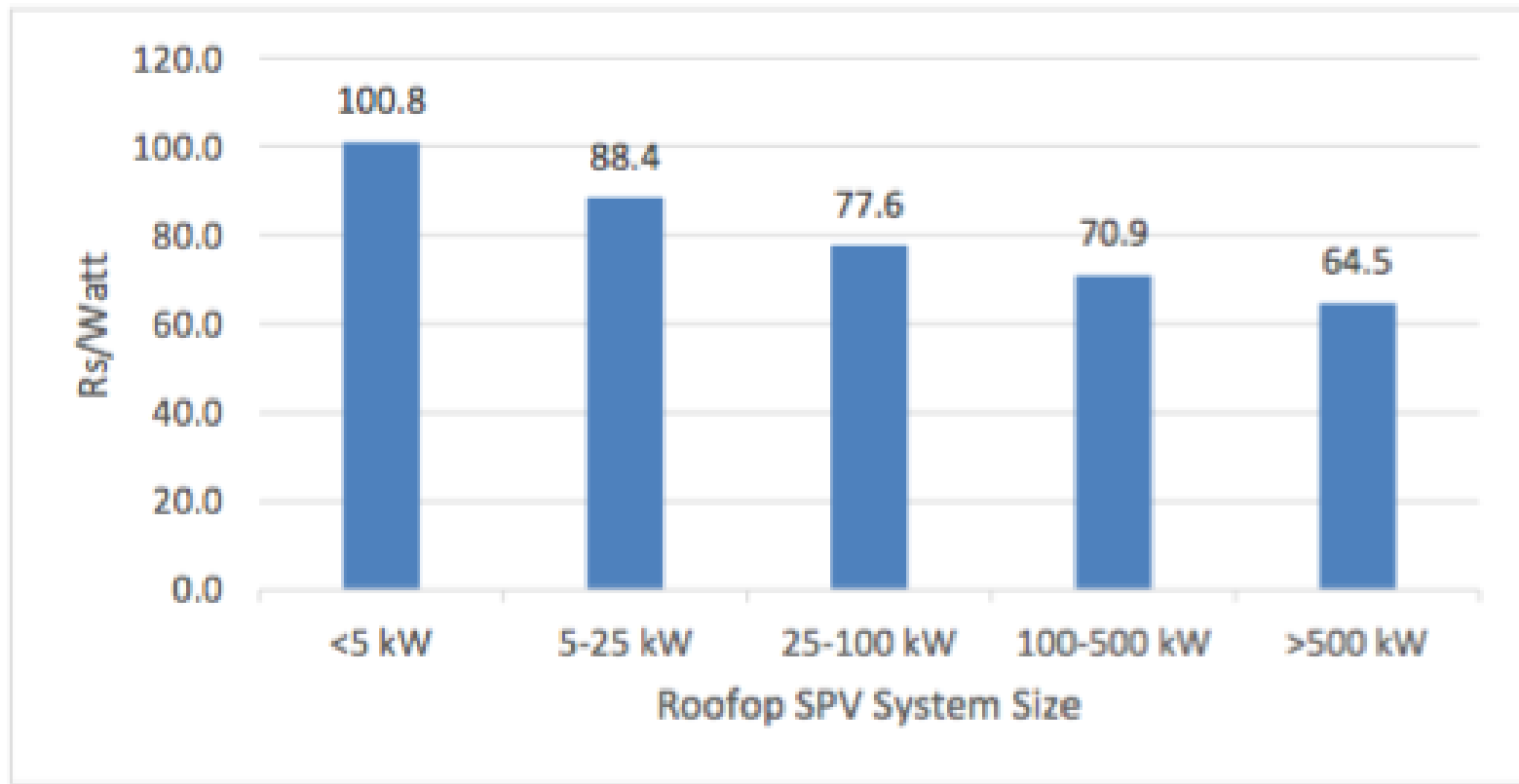
## Rooftop Solar Market in India

### STUDY ON SMALL-SCALE PV SYSTEMS FOR ON-SITE ELECTRICITY CONSUMPTION FINANCED BY KFW

- an assessment of the policy, technical and regulatory regimes to support implementation of rooftop solar,
- regulations limit the system size to 80%-100% of the facility connected load.
- regulations limit the rooftop solar sizes within the range of 1 kW to 1 MW.
- self-consumption of solar power at the end use is encouraged.
- financial viability of solar PV for the commercial and industrial sectors assessed in 10 states across India.
  - small (25 kW),
  - medium (150 kW), and
  - large sized (1000 kW) rooftop solar PV projects.
- Delhi, West Bengal and Maharashtra offer high tariffs, both in industrial and commercial sectors, which could potentially be beneficial for rooftop solar power deployment.
- significant additional capital costs associated with the PV + Battery configuration make PV + Diesel systems a significantly more cost effective option during power outages;
- use of capital subsidy may be effective at bringing forward PV projects within an earlier time scale, with the PV + Battery system particularly benefiting due to its higher capital costs;

# Rooftop Solar Market in India

LARGE SCALE SYSTEM MORE COST EFFECTIVE



- 35% cost differential owing to the variation in system size, from small to large rooftop solar systems.

# Opportunities and Challenges

## Challenges

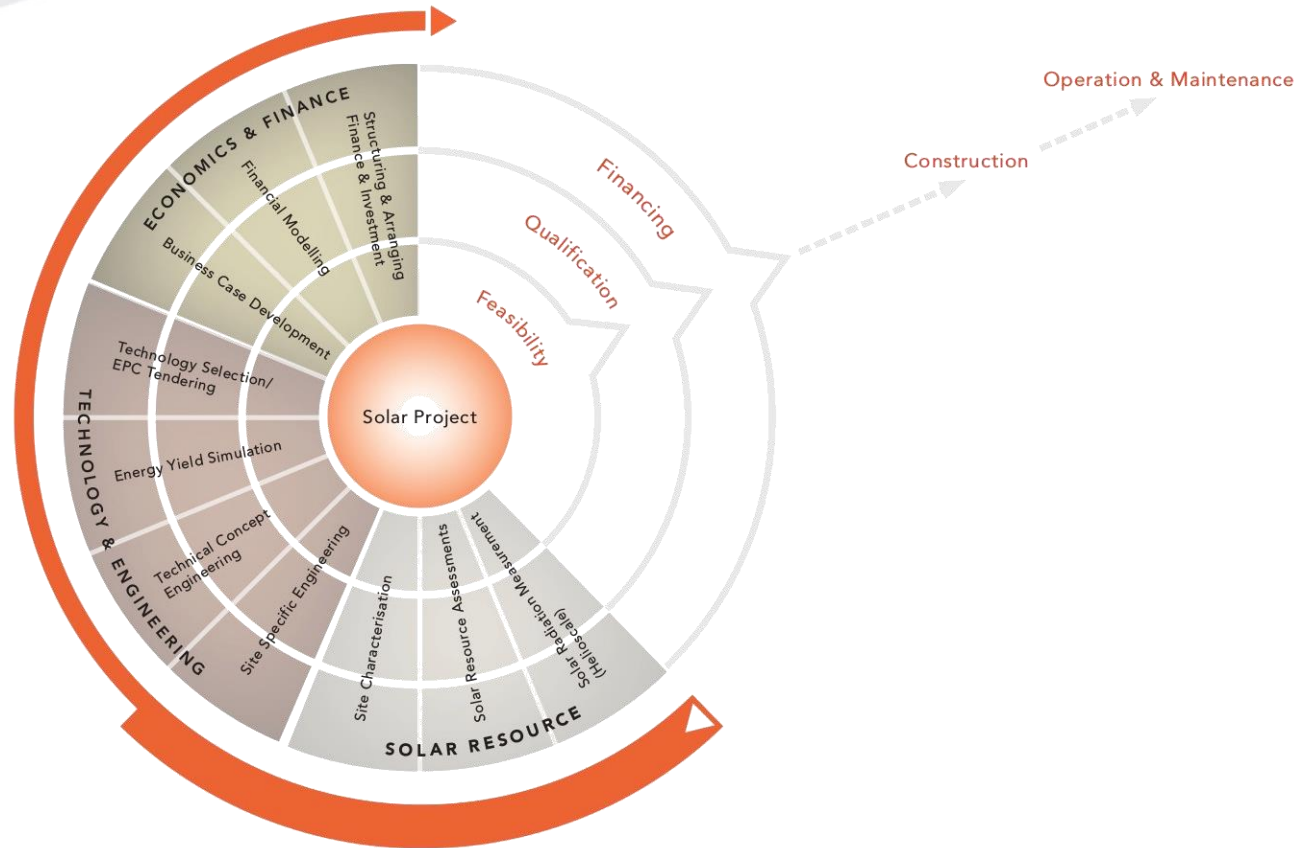
- Tariffs without escalation
- Low cost financing
- Operation and Maintenance of assets over a long-term

## Opportunities

- PV Rooftop
  - Rooftop solar market: expected new capacity of 700 MW in 2016 – 15% of total solar capacity addition this year
  - growing at 300% over last year.
  - Private sector, primarily commercial and industrial customers, are leading the demand growth but government sector is also looking very promising
  - MNRE and various state renewable agencies are finally beginning to address key market challenges helping to unlock the market potential
- Concentrating Solar Thermal Power (CSP) for industrial heating

Thanks!

SUNTRACE SERVICE RANGE



We assist in all phases of the project development chain: origination, feasibility, project qualification, finance and construction.

Our services cover the areas of solar resource, technology and engineering as well as economics and finance.

# Bonus Track





<b>Rooftop SPV System Size</b>	<b>60 kW</b>	<b>100 kW</b>	<b>180 kW</b>	<b>200 kW</b>	<b>250 kW</b>	<b>500 kW</b>	<b>Average</b>	<b>Average</b>
<b>Components</b>	<b>Price (Rs/W)</b>	<b>Price (Rs/W)</b>	<b>Price (Rs/W)</b>	<b>Price (Rs/W)</b>	<b>Price (Rs/W)</b>	<b>Price (Rs/W)</b>	<b>Price (Rs/W)</b>	<b>%</b>
Solar Modules including freight	36.5	36.5	36.5	36.5	36.5	36.5	36.5	54%
Inverters (String Inverters)	10.0	9.5	8.5	8.0	8.0	7.0	8.5	13%
Mounting Structure	6.0	5.5	5.5	5.5	5.5	4.5	5.4	8%
Cables, Wire Ties, Accessories	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4%
Balance of System including meter, data monitoring	7.0	6.5	6.0	6.0	5.5	5.5	6.1	9%
Design, Project Management, Installation, Loading, Unloading, Civil	8.0	8.0	7.0	6.5	6.5	6.0	7.0	10%
Project Insurances	0.4	0.7	1.2	1.3	1.6	3.1	1.4	2%
<b>Total</b>	<b>71</b>	<b>70</b>	<b>68</b>	<b>67</b>	<b>67</b>	<b>66</b>	<b>68</b>	<b>100%</b>