Natural Group

Driving Green Value

SOLAR BUSINESS IN INDIA - AUGUST, 2013

8th August 2013

Grid parity and how will it impact the projects on pipeline, Implementation of JNNSM Phase I & Experience So far

About Us

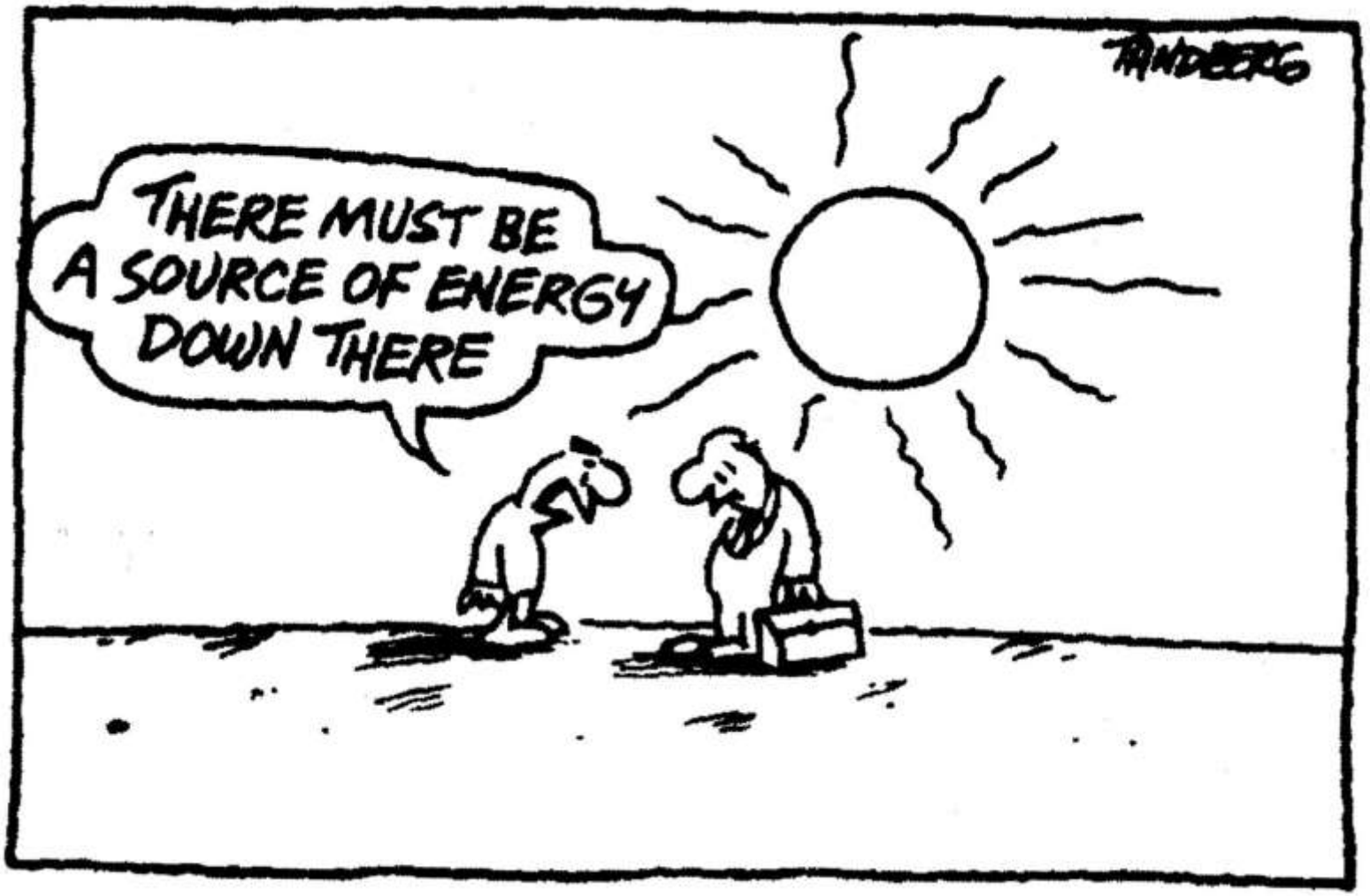
A Safer, Better and Healthier Planet

Delivering Green Value

Innovative, Sustainable, Enhanced

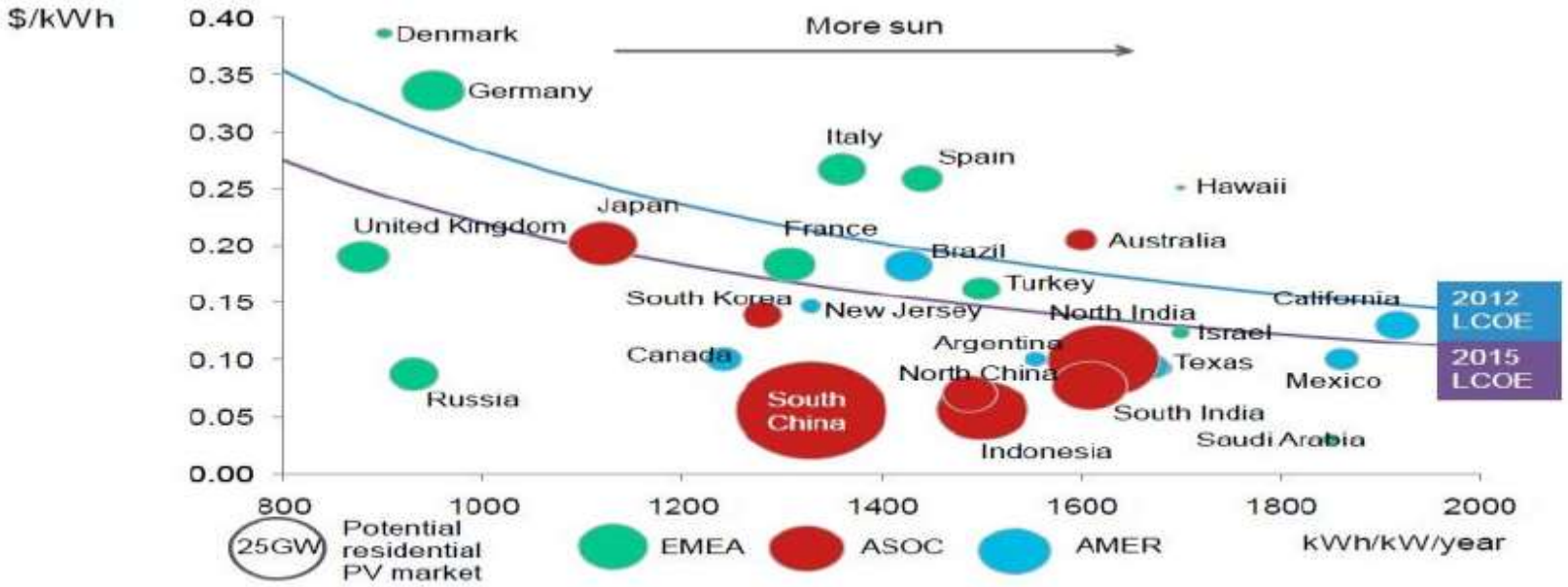
- India focused Renewable Energy Advisory
- NG sustainable value added business models - Solar, Biomass, Green projects
- Concept to Commissioning – Advisory, Consulting, Project Management, PPA Sourcing, Project Structuring, EPC, Finance….
- Largest India focused renewable and solar energy forums on LinkedIn
  - Renewable Energy and Cleantech – India
  - Solar Energy Professionals – India
- Published across varied global Industry leading journals, websites and magazines – Energy Next, Solar Business Focus, Renewable Energy Magazine, Infraline…….
- Natgrp.Org - most widely read analysis and knowledge repository on Solar and Renewable Energy in India

The Irony



Grid Parity

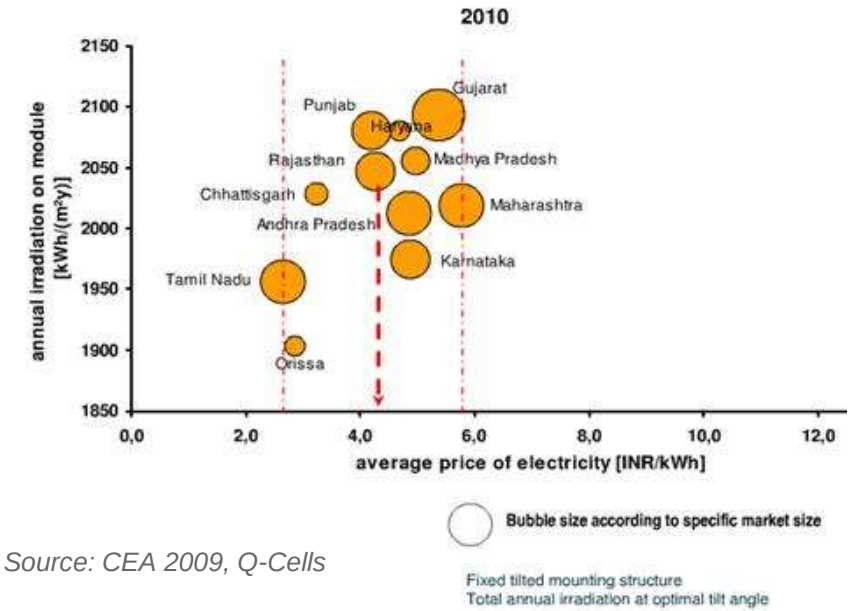
- **Grid parity** (or **socket parity**) occurs when an alternative energy source can generate electricity at a levelized cost (LCoE) that is less than or equal to the price of purchasing power from the electricity grid. The term is most commonly used when discussing renewable energy sources, notably solar power and wind power. Reaching grid parity is considered to be the point at which an energy source becomes a contender for widespread development without subsidies or government support. It is widely believed that a wholesale shift in generation to these forms of energy will take place when they reach grid parity.



Residential PV price parity (size of bubbles refers to market size) (BNEF, 2012a).
Note: LCOE based on 6% weighted average cost of capital, 0.7%/year module degradation, 1% capex as O&M annually, $3.01/W capex assumed for 2012, $2.00/W for 2015.

Consumer Power Rates

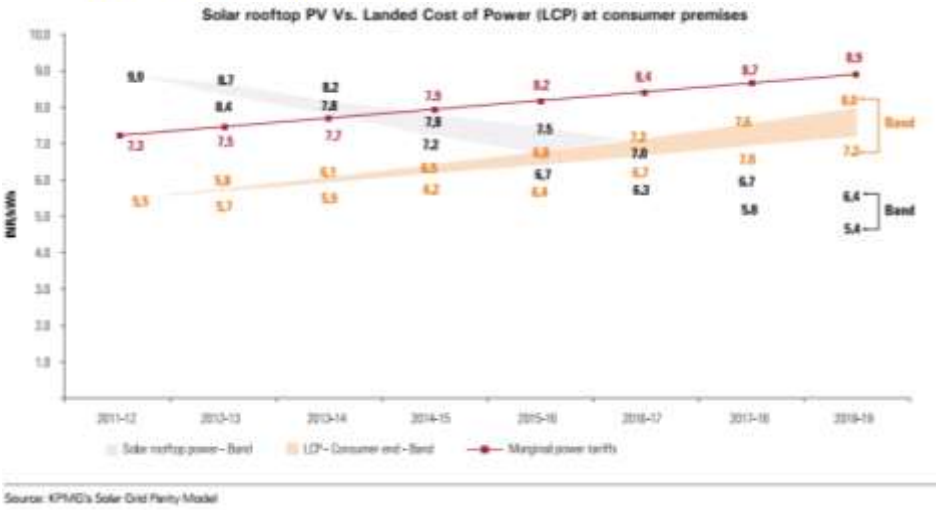
S.No.	State	Regulatory Commission	Effective Date	Power Price per unit (Rs/kwh)
1	Andhra Pradesh	APERC	30.03.2011	3.10
2	Assam	AERC	16.05.2011	3.82
3	Bihar	BERC	15.03.2013	3.53
4	Chhattisgarh	CSERC	28.04.2012	2.40
5	Delhi	DERC	13.07.2012	2.90
6	Goa	JERC	27.06.2012	1.53
7	Gujarat	GERC	02.06.2012	3.43
8	Gujarat	GERC	02.06.2012	3.65
9	Haryana	HERC	01.04.2013	4.90
10	Himachal Pradesh	HPERC	01.04.2011	3.01
11	J&K	J&KERC	16.04.2012	2.07
12	Jhakhand	JSERC	01.08.2012	2.60
13	Karnataka	KERC	30.04.2012	6.53
14	Kerala	KSERC	01.07.2012	3.20
15	Kolkata (West Bengal)	WBERC	05.12.2012	5.69
16	Madhya Pradesh	MPERC		4.78
17	Maharashtra	MERC	01.08.2012	4.91
18	Odisha	OERC	23.03.2012	3.73
19	Punjab	PERC	01.04.2013	5.80
20	Rajasthan	RERC	07.06.2013	5.42
21	Sikkim		22.05.2012	4.34
22	Tamil Nadu	TNERC	30.03.2012	3.33
23	Tripura	JERC	28.03.2012	3.92
24	Uttar Pradesh	UPERC	31.05.2013	4.75
25	Uttrakhand	UERC	11.04.2012	2.60



Source: CEA 2009, Q-Cells

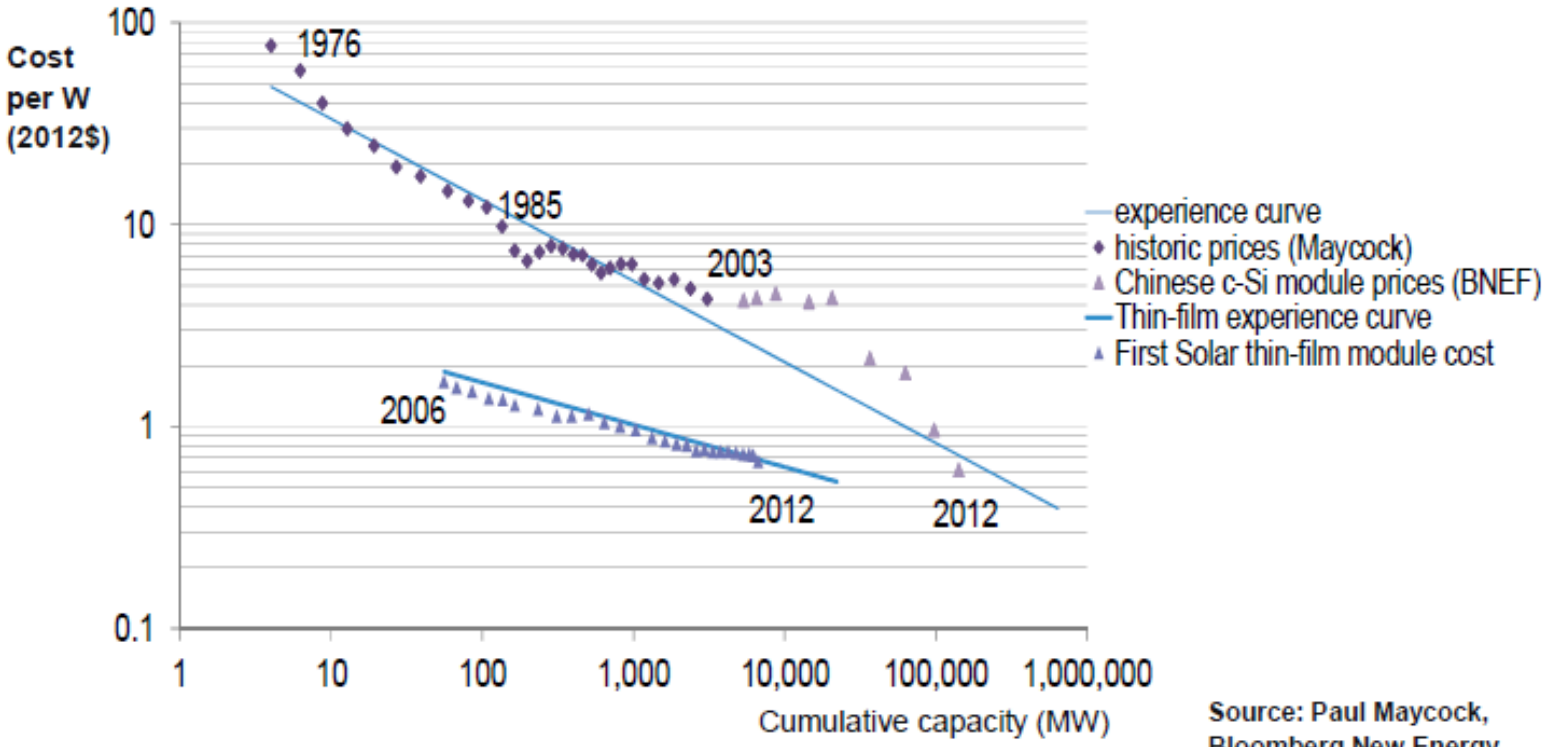
Category	Andhra Pradesh	Karnataka	Maharashtra	Gujarat	Madhya Pradesh	Tamil Nadu
LT - Domestic	7.25	5.50	7.50	4.80	4.80	5.75
LT – Industrial	5.02	5.55	5.17	4.77	6.01	4.92
HT – Industrial	4.24	5.77	5.62	4.88	5.91	7.32
HT - Commercial	5.84	7.69	8.14	7.00	6.45	7.00
LT - Commercial	7.00	7.20	6.45	4.91	6.00	7.00

Source: Tariff Orders for States, KPMG in India analysis



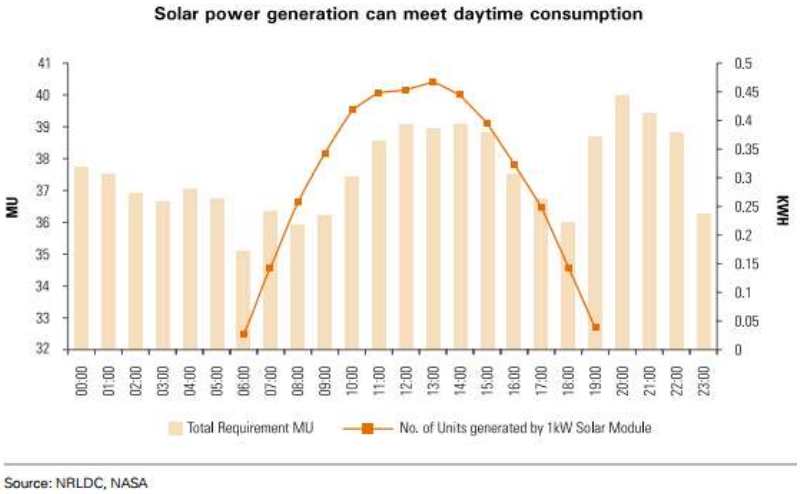
Capital Cost for PV

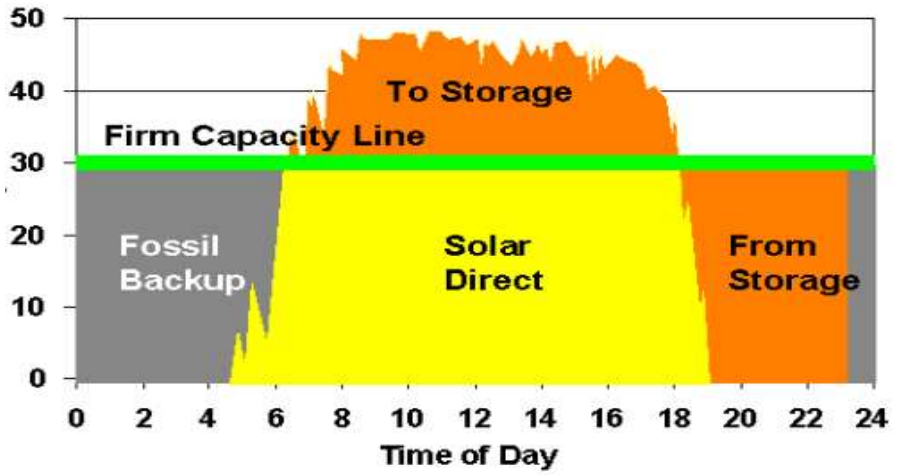
THE PV MODULE EXPERIENCE CURVE, 1976–2012 ($/W)

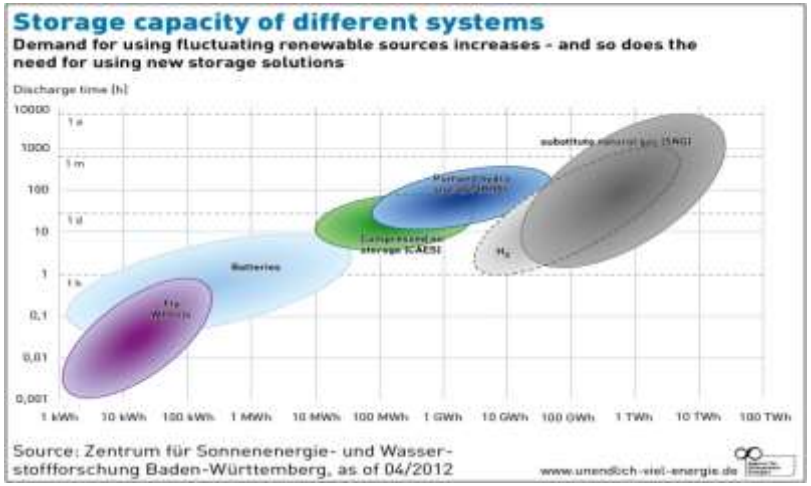


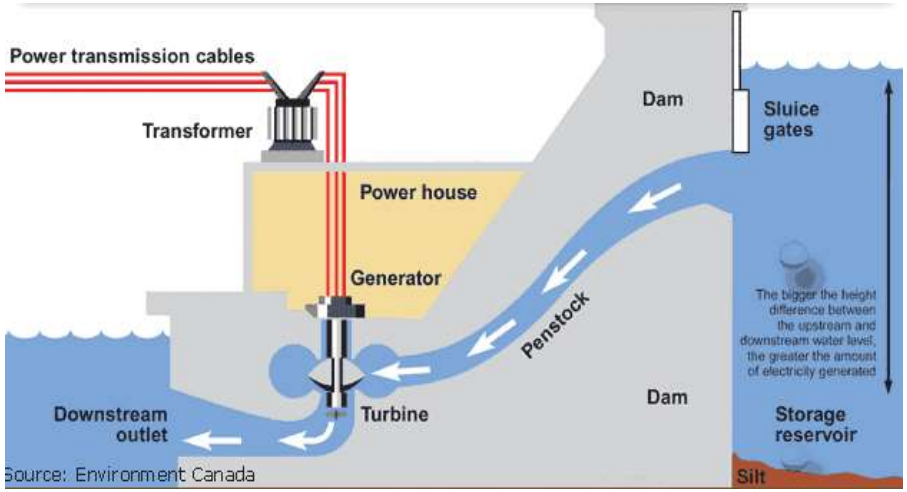
Source: Paul Maycock, Bloomberg New Energy Finance

Grid – Solar + Hydro



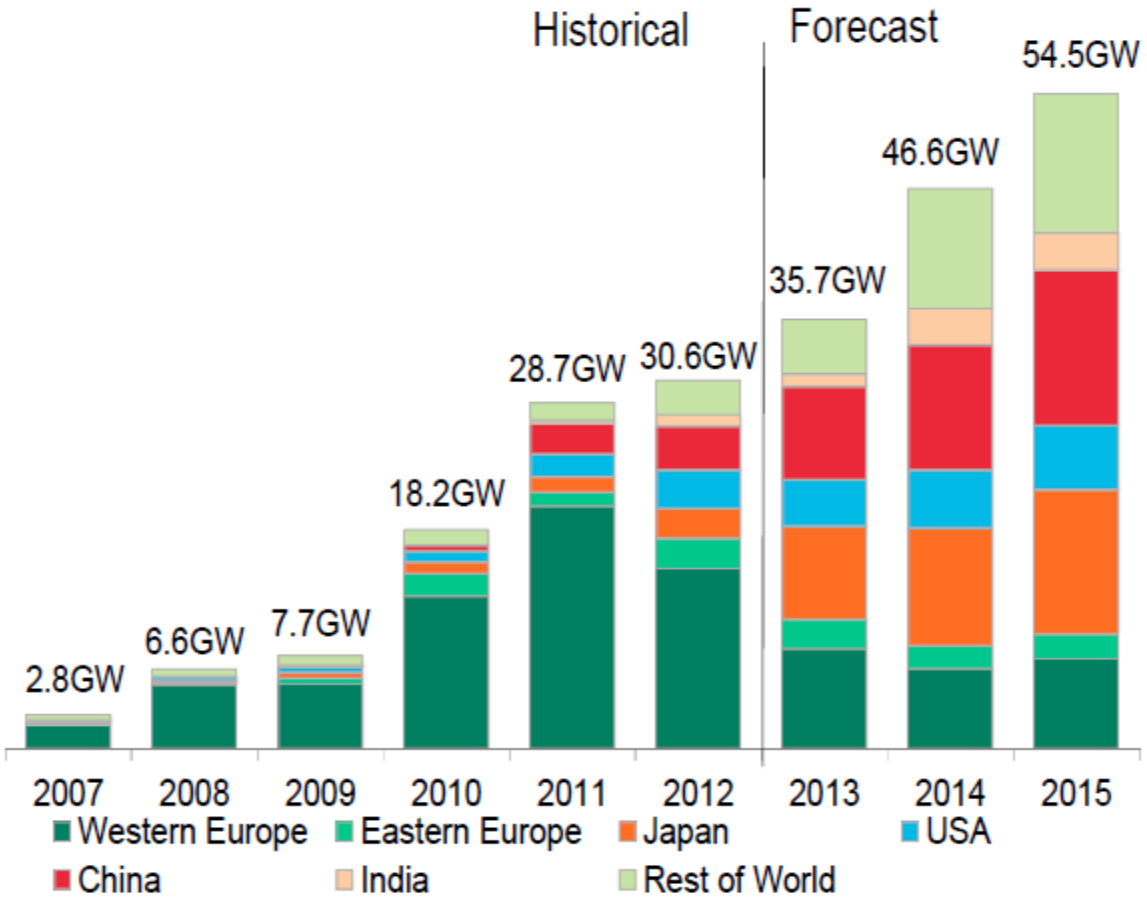






Global PV Deployment - 2015

PV BUILD 2007-2012, CENTRAL FORECAST (MW/YEAR)



Source: Grid operations, incentive programme operators, industry associations, Bloomberg New Energy Finance

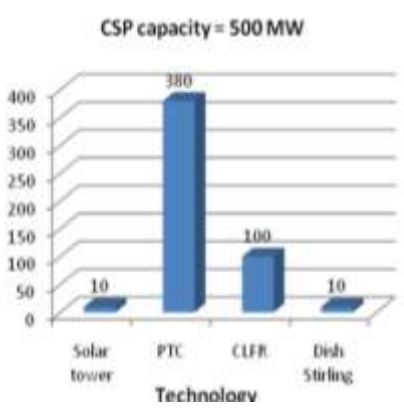
JNNSM – Phase 1

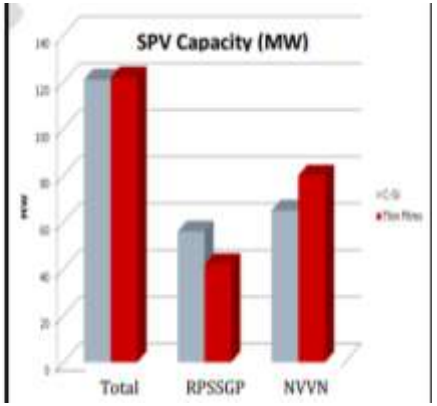
Status of Batch-I							
Schemes		Projects Allotted		Projects Commissioned		CERC tariff (Rs./kWh)	Lowest Tariff discovered (Rs./kWh)
		No	MW	No	MW		
PV projects through NVVN		30	150	25	125	PV – 17.91	PV – 10.95
CSP projects through NVVN		7	470	Schedule to commission by 2013		CSP- 15.31	CSP – 10.49
Migration Scheme	PV	13	54	11	48	-	-
	CSP	3	30	1	2.5		
RPSSGP (PV)		78	98.5	62	76.55	-	-

Status of Batch-II							
Schemes	No	MW	Project Commissioned	Min Rs/KWh	Max Rs/KWh	Avg. tariff Rs/KWh	% Reduction in tariff
PV projects through NVVN	28	350	Schedule to commission by 2013	7.49	9.44	8.77	43%

JNNSM Phase 1 – Learnings

- Aggressive bidding prices surprised everyone
- Raising funding was possible because of fortuitous reduced costs
- Phase 1 –Thin Film due to cost, Exclusion from DCR, funding and temperature conditions
- CUFs range from 18-28%, TF approx 10% greater generation but far more delicate to install
- Plants primarily built due to drop in prices
- Land acquisition consumes 3-6 months minimum
- Cost given precedence over quality
- Sizes of project affected execution
- A large no of EPC vendors joined the fray
- DNI data and irradiation data needs improvements
- CUF of TF and PC similar
- CSP faced a number of hurdles – HTF, Technology, DNI, ….
  Only recently 50MW deployed and more on the way
- CSP delayed with No Energy Storage in CSP defying logic – rectified in Phase II
- Focus needs to be on distributed generation
- Transmission, Evacuation, Grid Availability issues persistent





End State

- Energy Security
- Solar as a mainstay for the next stage of growth
- Grid losses reduced to manageable levels
- Better living conditions and stronger economy
- Lower subsidies on fossil fuel
- Lower impact of grid failures
- Higher grid availability
- Reduced load on the grid
- More efficient technologies given preference
- Increased commercial activity resulting in high standards of living
- Local employment generation
- Rural progress

Contact

Thank You

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