

Facing The Sun

Policy for sustainable
grid-connected solar energy

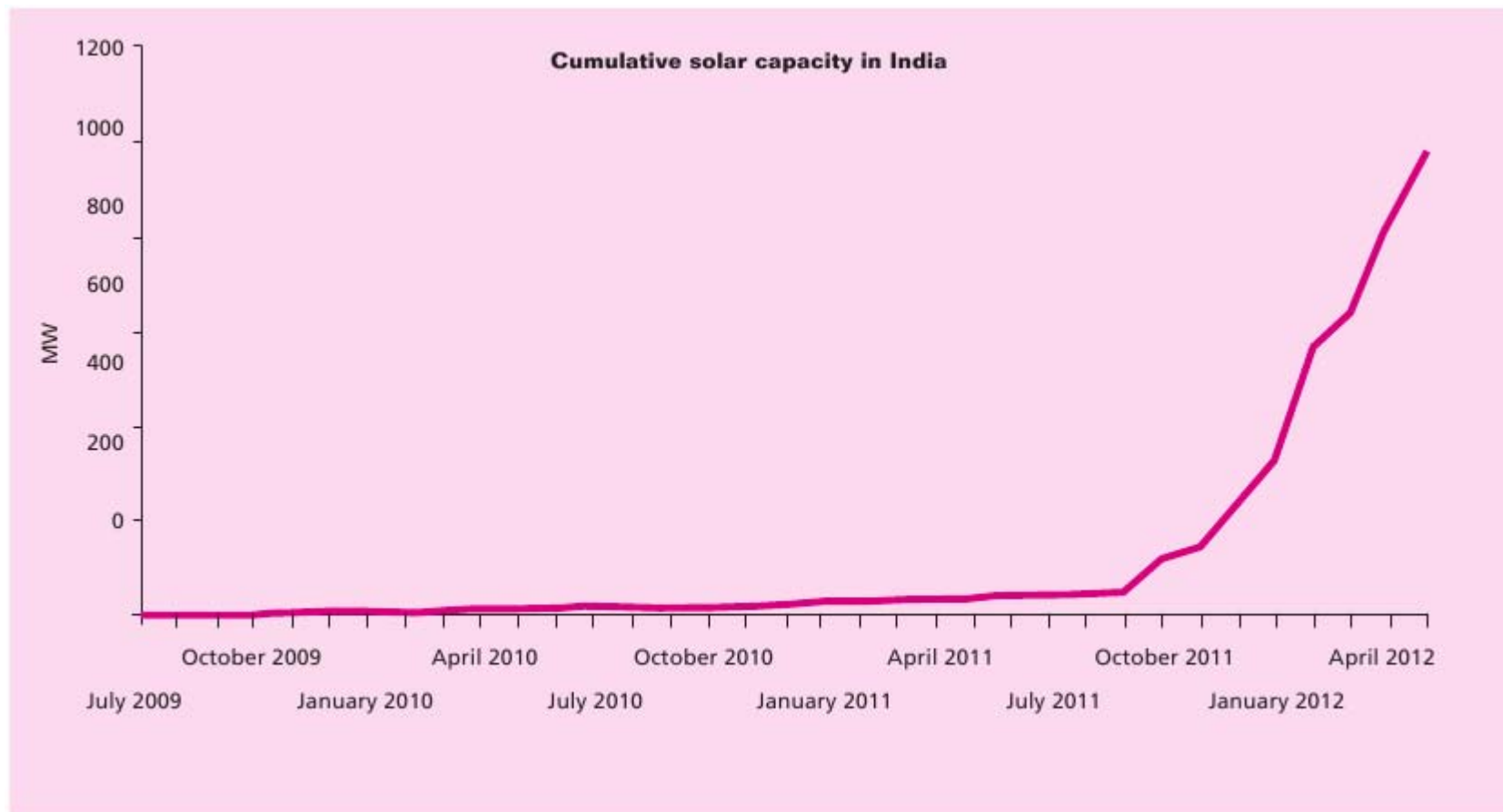




Presentation layout

- Status of solar in India
- Community, Land and Water – CSE's Experience
- Funding the 2nd phase
- Solar Manufacturing - Made in India
- Our recommendations

Rapid Deployment





Solar supplying millions



Gujarat generation enough to supply 1.3 million Indians in April 2012

Status of Solar in India



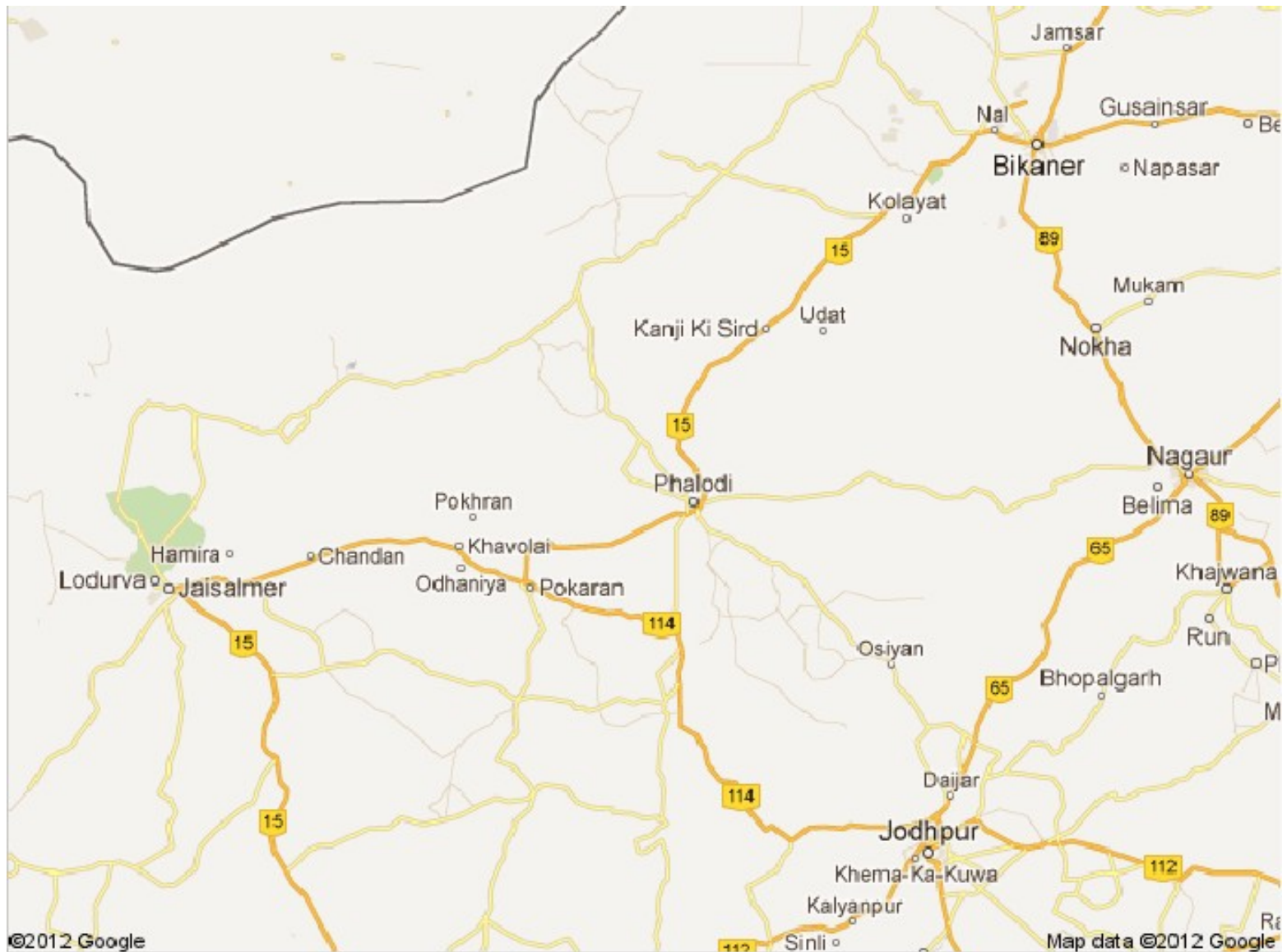


Solar in India - Data

- 979.4 MW installed in May (MNRE)
- Majority in Gujarat (655 MW)
- About 1550 MW contracted for but not completed (JNNSM, Gujarat, MP, Karnataka, Odisha)
- Most of 1st phase of JNNSM finished (with delays)
- RPSSGP over 50% done – but none on rooftop
- Still only 2.5 MW of solar thermal installed (but 500 MW under construction)
- First Solar RECs sold

Community, Land and Water – CSE's experience









On the ground

- The 'normal' plant – A 5-25 MW Solar PV plant with fixed thin-film (U.S.) or polycrystalline (China) modules built on semi-desertous land.
- Plants are far from consumption centres, the 'standard' community are cattle-herders or subsistent farmers, poor and often lack sufficient access to electricity and water.











Charanka and Askandra

- Situated north of Phalodi, in Rajasthan and in Patan district, Gujarat
- Next to the largest clusters of solar in India – The 235 MW Lanco-managed cluster and the 214 MW Charanka Solar Park.
- Mainly cattle-herders who have for centuries used surroundings for grazing, foraging and fire-wood gathering.
- Developments have created issues with water access, wild-life preservation, access to land for grazing cattle, foraging for cattle-feed and firewood. Issues with traditional beliefs have occurred with the cutting of Khejiri trees and usage of 'holy' land.
- Resentment towards losing land that they considered theirs.
- Minimal employment given.
- some CSR efforts but far from enough to satisfy the loss to the community.





Mujo ki Dhani, Govindpura etc.

- With smaller projects, community impact is lessened.
- The 'standard' response from communities near 5-25 MW projects is of indifference or slightly positive.
- Few gains from nearby communities who still lack electricity access.
- Employment for locals limited.
- Mujo ki Dhani – un-electrified (OPG Energy 5 MW in Bap)
- Govindpura (Solar Canal Project)





Land uptake varies widely

Land use of different solar technologies	Hectares of land needed per MW according to CERC	Hectares of land needed per MW in Indian projects
Mono-Crystalline PV	2.2	1.39 - 2.02
Poly-Crystalline PV	2.2	2.14 (with tracker) - 3.5
CdTe	2.5-3.2	2.5 - 3.4
CIGS/CIS	2.5-3.2	3.64
A-Si	2.5-3.2	5.34
Solar thermal - trough	2.6	2.86 to 6
Solar thermal - tower	2.6	2 to 2.4
Roof-top installation	0	0
Solar home-lighting system	0	0

Actual land use of Indian plants varies from 1.36 hectare per MW to 6 hectare per MW.





Water impact – an Unknown

- Water needed for cooling and cleaning in solar thermal and for cleaning PV modules
- In Rajasthan water has been allotted from Indira Gandhi Canal.
- Water usage in CSP comparable to Lignite plants
- Water usage for PV completely unknown. Water brought by tankers or through borewells.
- With large clusters of plants, dusty conditions and low water availability the impact could be considerable.





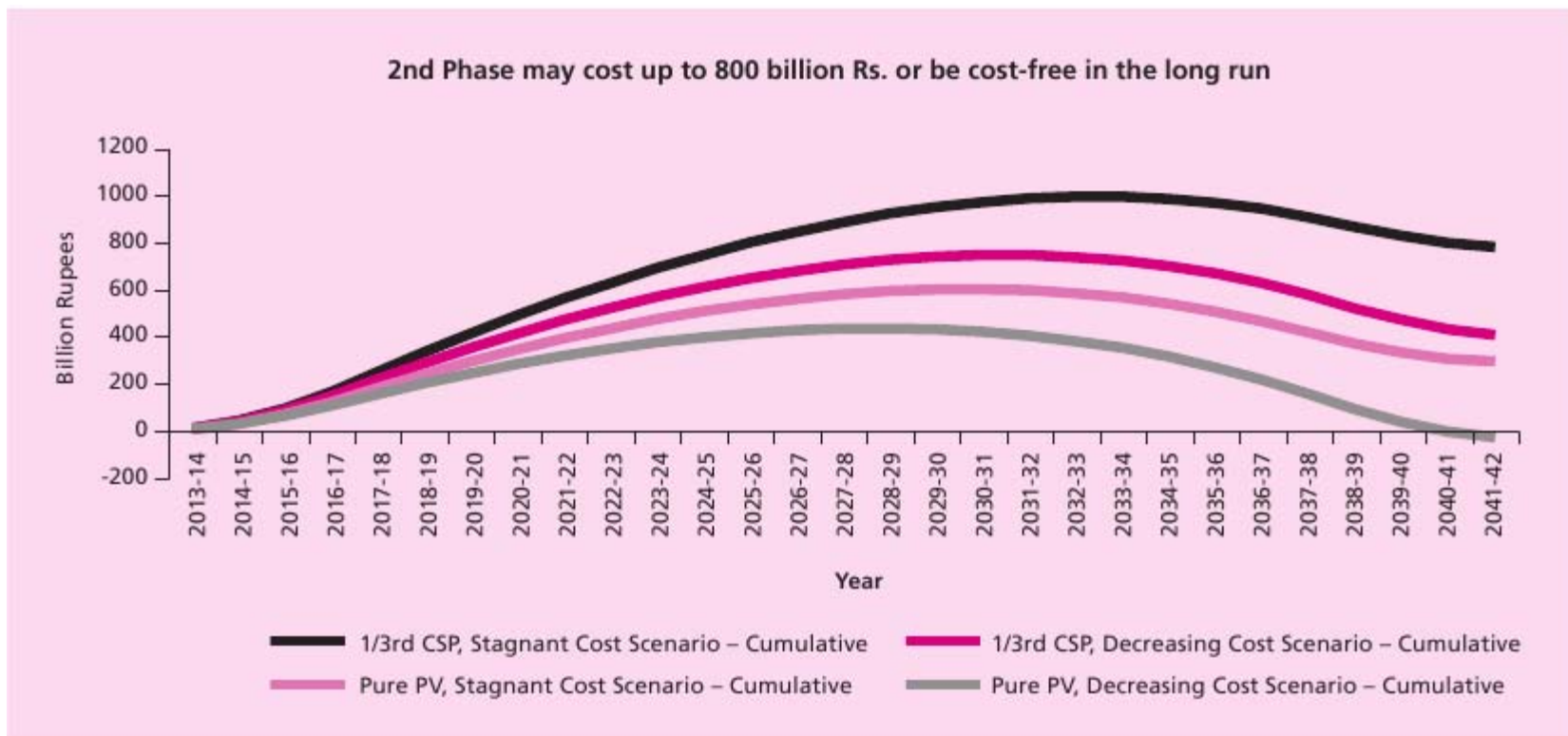
Funding the 2nd Phase



Assumptions

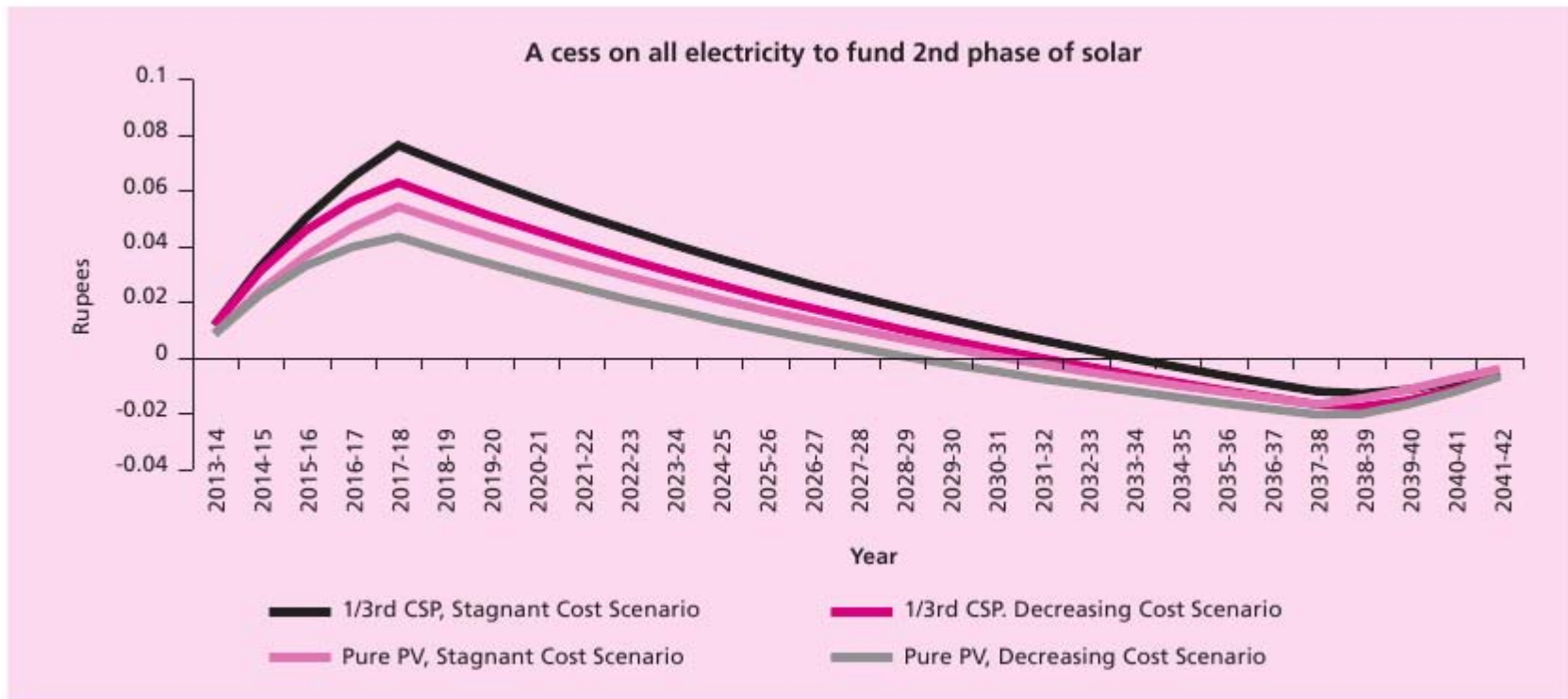
- No bundling available for 2nd Phase
- 9000 MW in 2nd phase
- Even if MNRE only funds 3000 MW, someone will have to pay for the rest
- Comparing power purchase cost to solar purchase cost
- Continued upward power purchase cost at 5.86 %
- Either only PV or 2/3rds PV and 1/3rd CSP
- Decreasing solar cost (5%) or stagnant cost
- 2nd phase solar reaches purchase parity in 15 to 19 years

How much funds are needed?



- Extra cost of 2nd Phase is between -2800 and 78200 crore.
- If ignoring the years solar is cheaper than average power purchase cost
The funds needed would be between 2900 and 5200 crore

A Solar Cess



- As with Gujarat and Chhattisgarh Green Cess a National cess on electricity can be introduced to fund the solar mission.
- If years when solar is cheaper is ignored then average cess needs to be between 2.3 and 3.8 paise per kWh consumed in India.

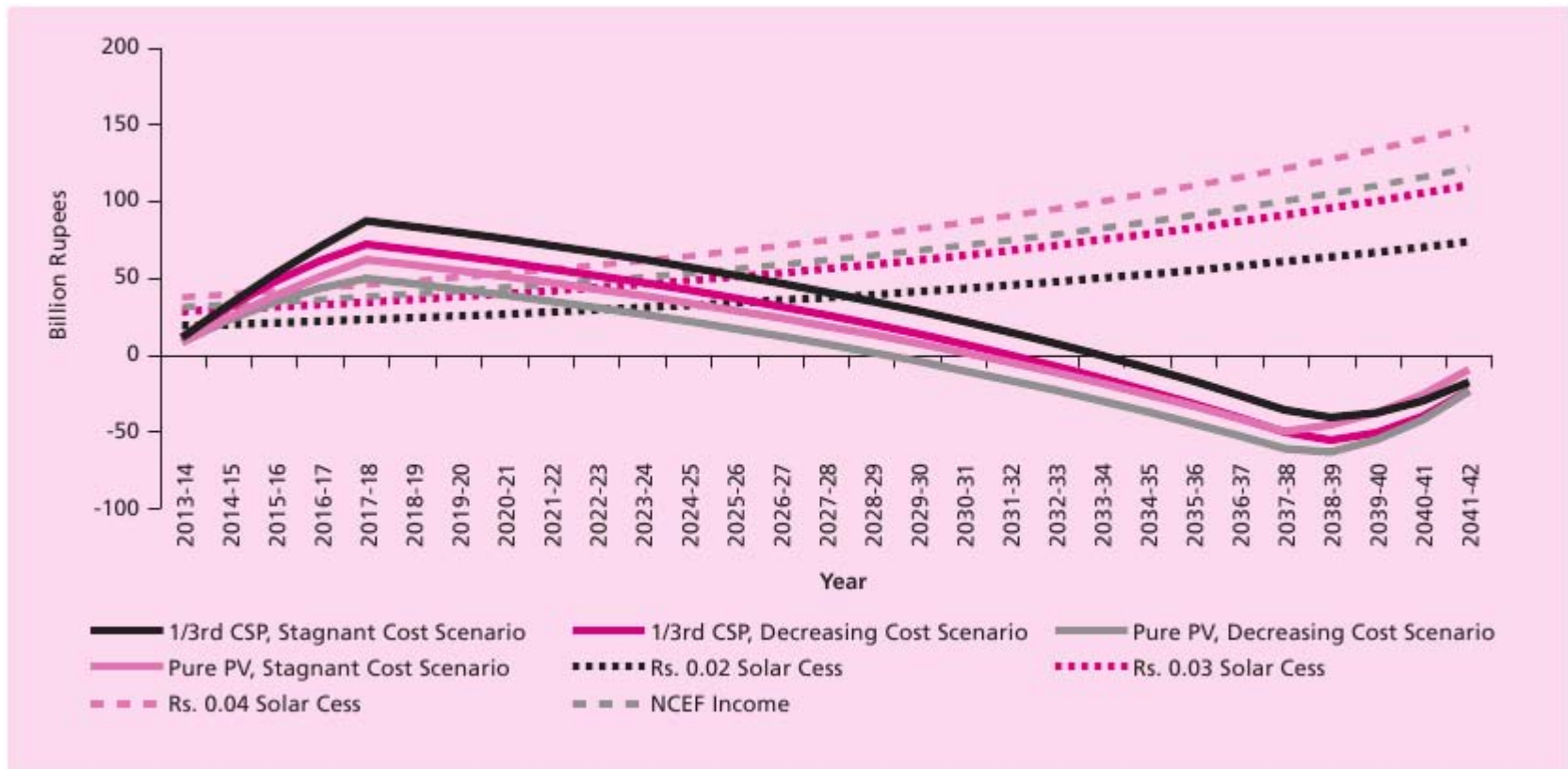


National Clean Energy Fund

- 50 rupee cess per tonne of coal or lignite
- 3486 crore in by FY 2012-13, mostly unused
- Aimed specifically for 'Clean Energy'
- Funding grid-connected solar fits under 4 out of 9 targets for funding of the NCEF
- With coal and lignite output and import increasing the NCEF may bring in 5000 crore per year by end of 12th 5 year plan



Cost of 2nd phase vs. NCEF, Solar Cess



Other Sources of Funding

- CDM – 50/50 sharing with government but far from enough to fund. Around Rs 40 crore to gov.
- An international feed-in tariff?





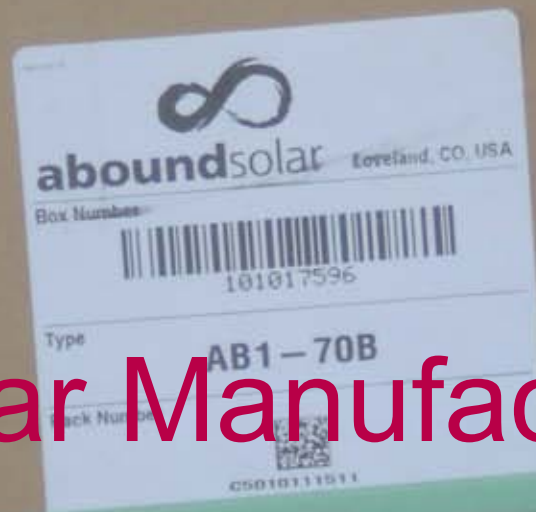
Fast Start Financing and the U.S. State Department's triple accounting

- Copenhagen Accord established US\$ 30 billion for financing Climate Change mitigation in 2010-12
- Most of U.S. Contribution to India so far through Exim bank and OPIC loans to solar projects
- Counts full sum of loan as aid, against aid principle
- The loans are given only if developer buys modules or other technology from the U.S.
- What the U.S. Is claiming as 'aid' is actually unfairly competing out Indian manufacturing which cannot offer loans lower than the market price



Projects claimed as climate change aid in 2010-11

Project	Financer	Amount (million USD)	Year	US company providing panels
Azure Power 10 MW Gujarat PV Plant	OPIC	26.8	2010	"significant initial U.S. procurement associated with the project, supporting U.S. jobs."
Azure 3 MW PV Plant in Punjab	OPIC	7.7	2010	Unknown
Reliance Dhanu 40 MW PV plant in Dhursar, Rajasthan	Ex-Im Bank	84.3	2011	First Solar
Dalmia Solar Thermal 10 MW Plant in Bap, Rajasthan	Ex-Im Bank	30	2011	Infinia (This project is highly unlikely to materialize according to RREC)
Tatith Solar Plant in Gujarat	Ex-Im Bank	18.9	2011	Solarworld Industries
ACME Solar 15 MW PV plant in Gujarat	Ex-Im Bank	18	2011	First Solar
Azure 5 MW Solar PV plant in Rajasthan	Ex-Im Bank	15.8	2011	First Solar
Punj Lloyd 5 MW Solar PV plant in Rajasthan	Ex-Im Bank	9.2	2011	Abound Solar
Unknown 5 MW PV plant in Surendarnagar, Gujarat	OPIC	19.1	2011	Unknown
Universal Solar System 2 MW PV plant in Ahmedabad, Gujarat	Ex-Im Bank	3.7	2011	Abound Solar (modules) and SMA America (inverters)
Unknown 5 MW PV plant in Surendarnagar, Gujarat	OPIC	14.8	2011	"that will use advanced U.S. power generation technology"



Solar Manufacturing –
Made in India



Developers shun Indian modules

- Almost no large-scale power plant visited use Indian produced modules.
- Only in cases where developer is also manufacturer are Indian modules used.
- Not even when developers are producers do they always buy from themselves (Moser Baer)
- Poly-crystalline and Wafer production does still not exist in India.





Buy American, Buy Chinese

- Technology specific indigenization policy gives U.S. thin-film the edge.
- U.S. Technology supported by cheap American Exim bank loans.
- Chinese producers outcompete India through scale and support from government
- According to industry only 10-20% of manufacturing capacity is utilized and 80% is in loan-restructuring

	2010 - China	2010 - India	2011 - India
Cells	16 GW	0.6 GW	0.7 GW
Modules	20 GW	1.2 GW	1.5-1.8 GW



Time to decide

- Without a technology-neutral indigenization policy under the 2nd Phase, solar will become a pure import industry with no gains in jobs.
- Indigenous Solar manufacturing may become key to energy security with waning natural gas and coal supplies.

Country or Province	Domestic Content Requirement
Ontario (Canada) ¹	60% of goods and labour has to come from Ontario to qualify for solar tariff
Italy ²	60% of components sourced from European facilities gives 10% extra on solar tariff
Greece (proposed)	80% of components sourced from European facilities gives 10% extra on solar tariff
France (proposed)	60% of components sourced from European facilities gives 10% extra on solar tariff
Ukraine ³	15% (commissioned before 2013), 30% (between 2013 and 2014) or 50% (commissioned after 2014) of 'total construction volume' from Ukraine.
Malaysia ⁴	Bonus to tariff if local modules (0.01 USD/kWh) and inverters (0.003 USD/kWh) are used.
Turkey ⁵	Up to 50% bonus on tariff if solar components are made in Turkey.
China	See box



CSE's Recommendations





Land, Water and Community

- Solar farms need Solar farmers: Land for solar projects should be leased, not bought.
- Any uptake of land that has been used as communal land to source fire-wood, graze cattle, or for wild animal conservation etc. must be reimbursed as a loss of income to the community.
- 2.5 hectare (6 acre) land ceiling made mandatory for ANY solar technology.
- Extra land can be allowed when using technologies such as trackers or storage that increase efficiency.
- Continued Roof-top programme MUST mandate roof-top placement.



Land, Water and Community cont.

- A large-scale deployment of solar on canal-tops and degraded mining land should be encouraged.
- Solar thermal using hybrid cooling, dry cooling and desalination (costal plant) should be encouraged.
- Large solar projects over 50 MW capacity should require a Environment Management Plan as it affects water-resources.
- A government report needs to be prepared on how much water is used at PV plants.
- Local employment and training should be encouraged.
- Government regulation is needed on who is responsible for disposal of Cadmium Telluride modules.



Funding

- A 3 Paise cess on electricity (for approx. 18 years) could fund all 9000 MW of the 2nd phase of the solar mission.
- The National Clean Energy Fund may also fund the 2nd Phase but only if full amount is used (not fair towards Off-grid solar and other renewables).
- India should push for an international feed-in tariff where historically polluting nations fund renewable energy in developing countries.
- The funds gathered from encashing bid bonds and penalties (estimated 100 crore in Gujarat and 90 crore in JNNSM need to be clearly accounted for and should support Solar R&D.
- It should be made clear that U.S. Exim bank funding is a disruptive trade tool that hinders Indian manufacturers to compete in the Indian market. India should not accept these funds as 'aid'.
- RPO strictly enforced



Manufacturing

- Indigenization policy should be technology neutral – including thin-film.
- State policies and other schemes such as Renewable Energy Certificates should follow the same indigenisation requirements.
- Trade measures may have to be imposed against China if it is found to be dumping solar equipment in the Indian market.
- The other opinion to indigenisation requirement is to give a 10% extra tariff to projects whose Indian manufactured cells and modules.
- Clarification is needed on what the 30% of technology (excluding land) of solar thermal project indigenization requirement means and how it will be calculated.
- A second Special Incentive Package to encourage large-scale poly-silicon, wafer and cell production in India.



Guidelines and Policy

- Adopt the Karnataka guidelines on corruption
- Definition of commissioning should be made crystal-clear.
- There should be no ceiling on the amount of electricity that can be sold.
- Controlling ownership of projects should be defined under all policies and missions as 51 % of total shareholding and kept for at least 3 years
- Time given for commissioning should be dependant on size of the project
- In general the time to commission should be extended by at least 2 months. Land acquisition takes time.
- Third-party verifiers could double-check plant commissioning at randomly selected sites.
- Remove Accelerated Depreciation as an alternative



Transparency

- Real-time, and monthly, data should be provided on-line for JNNISM through MNRE or NLDC
- Any further contracts should exclude any type of agreement circumscribes the Right to Information Act such as non-disclosure agreements.
- Increase information available from publicly subsidized projects to show details such as project land-use, technology used, water usage and generation data.

Thank you

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