



National Solar Mission

Amit Kumar

TERI

India

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Outline

- **Context**
- **National strategy**
- **Principles of NAPCC**
- **Approach of NAPCC**
- **National Solar Mission**

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Context

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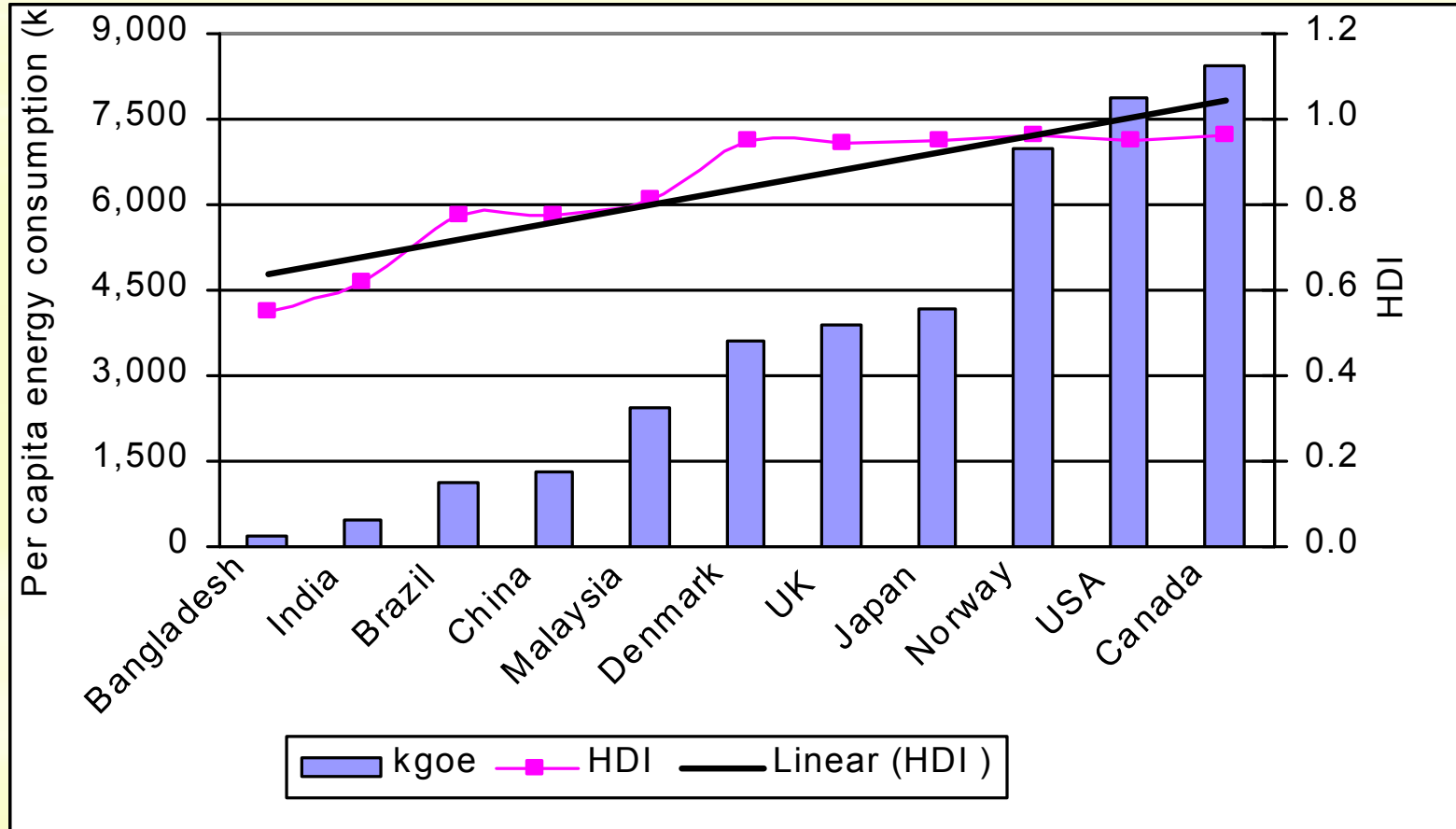
India's GHG emissions

Country	Per capita carbon-dioxide emissions (metric tons)
USA	20.01
EU	8.40
Japan	9.87
China	3.69
Russia	11.71
India	1.02
World Average	4.25

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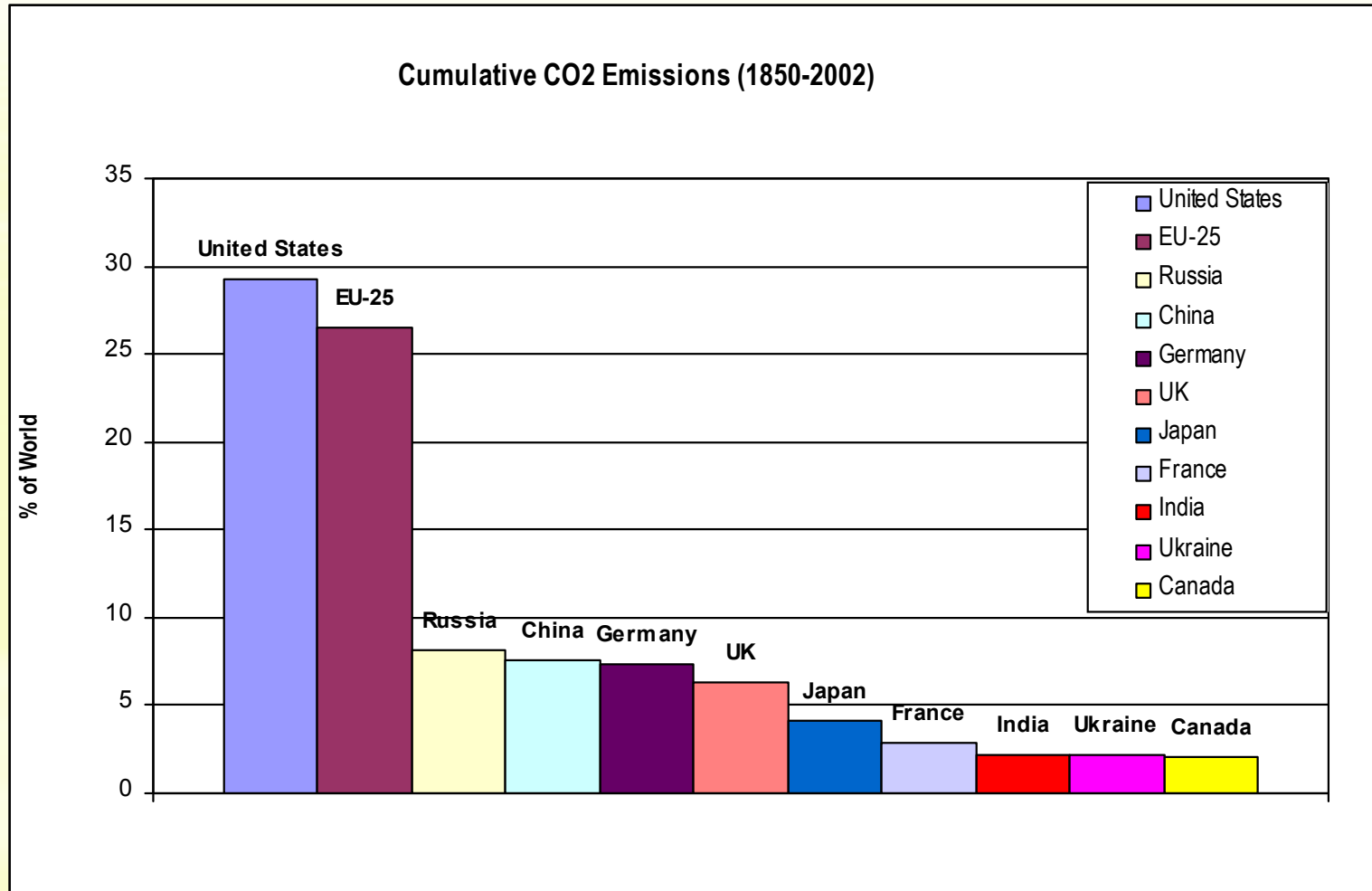
Energy vs. Human Development Index



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Cumulative CO₂ emissions



- Cumulative per capita emissions from 1850 to 2004 for UK and USA is **1100 tonne**
- For India it is **23 tonne**

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National Strategy on climate change

- ◆ **Adapt to climate change**
- ◆ **Enhance ecological sustainability of India's development path**
- ◆ **Recognize climate change as global challenge**
- ◆ **Participate in globally cooperative actions based on 'Common but differentiated responsibility'**
- ◆ **Ensure that India's per capita GHG emissions do not exceed that of developed countries at any point**
 - **National Action Plan on Climate Change (NAPCC)**
 - **Integrated Energy Policy (IEP)**

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Principles of NAPCC

- ◆ **Inclusive and sustainable development strategy**
- ◆ **Efficient and cost-effective strategies for Demand side management**
- ◆ **Accelerated deployment of appropriate technologies for both, adaptation and mitigation of GHG**
- ◆ **Innovative market, regulatory, and voluntary mechanisms to promote sustainable development**
- ◆ **Effective linkages with civil society and public-private partnerships for implementation**
- ◆ **International cooperation for R&D and technology transfer through additional funding and global IPR regime under UNFCCC**

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Approach of NAPCC

- **NAPCC is based on development and use of new technologies**
- **There are Eight National Missions which form the core of the National Action Plan, representing multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change**



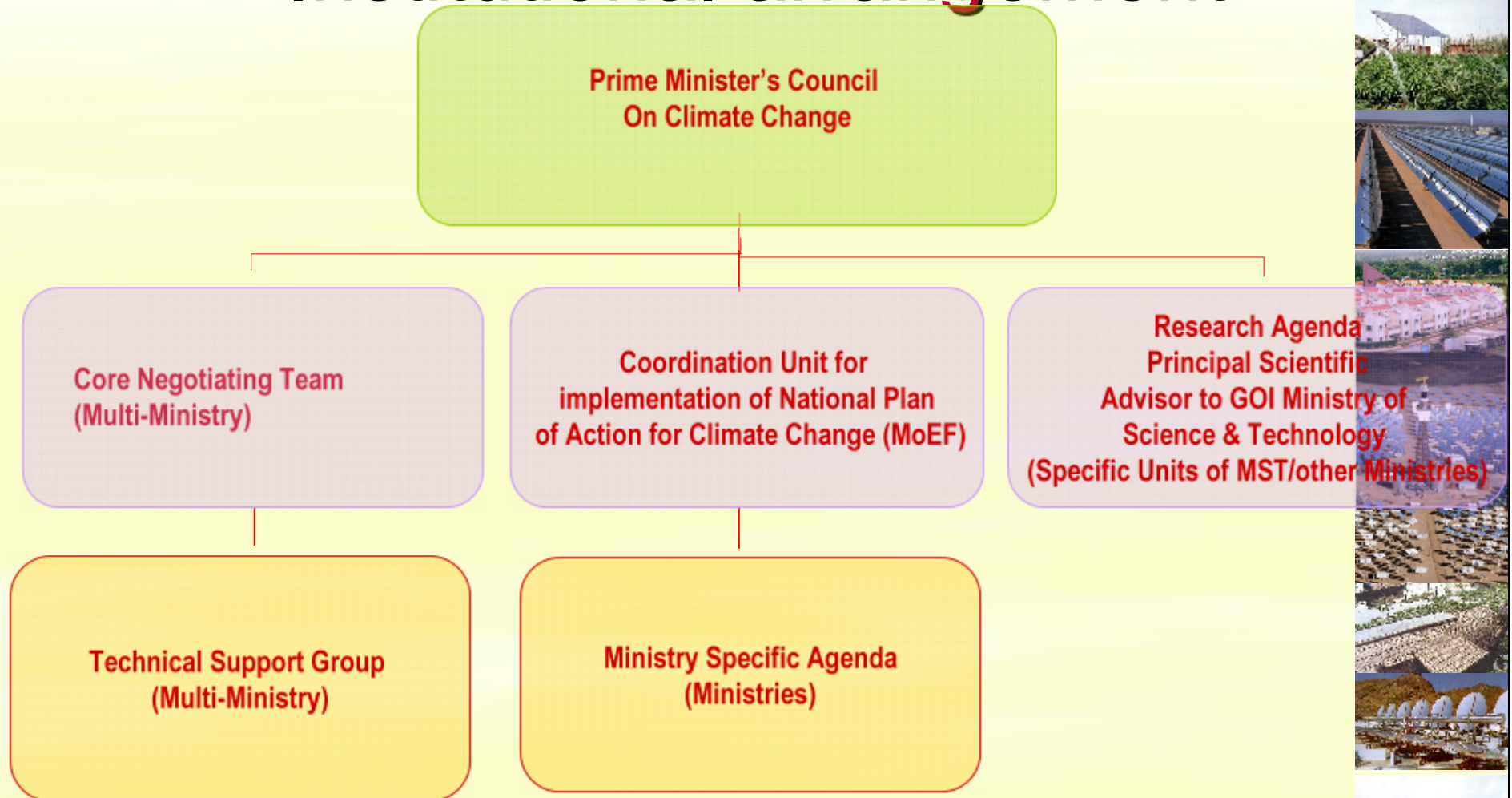
National Missions

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Ecosystem
6. National Mission for a Green India
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change

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Institutional arrangement



Solar energy

- The average intensity of solar radiation received on India is 200 MW/km².
- With a geographical area of 3.287 million km², this amounts to 657.4 million MW.
- Even if 0.05 million km² area is used, the available solar energy would be 8 million MW.
- This is equivalent to 5909 mtoe per year, more than three times the estimated commercial energy consumption in 2031.



Role of solar energy

- Solar energy could be used for meeting country's energy requirements – thermal as well as electricity - of domestic, industrial, and commercial sectors.
- Key markets for solar energy in India comprise:
 - Power generation (distributed generation as well as grid connected)
 - Industrial process heating and cooling
 - Residential/commercial thermal applications (including water heating as DSM option)
 - Rural energy services



... Role of solar energy

- The solar energy applications could range from megawatt level solar power plants to domestic appliances such as solar cooker, solar water heater, and PV lanterns.
- In about 70 million households that rely on kerosene for lighting, solar energy could:
 - Enhance the quality of life
 - Reducing the drudgery of women and children associated with fuel-wood collection
 - Mitigate smoke related health hazards.



... Role of solar energy

- **Solar power plants in un-electrified villages could ensure the reliable supply of electricity.**
 - For basic needs
 - For community applications like education, irrigation, and health-care.
 - For livelihood activities.



... Role of solar energy

- Wherever diesel generators are being used for captive power generation solar roof-top systems could minimize the diesel consumption during the day time with surplus electricity fed to the grid.
- In rolling out cellular telecom services in rural/peri-urban areas, solar energy could:
 - Provide uninterrupted power supply
 - Reduce the consumption of diesel
- Solar energy utilization in the industrial sector could bring down the consumption of furnace oil as well as electricity substantially.





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Objectives

- To achieve grid tariff parity by 2022.
- 20,000 MW of installed solar generation capacity by 2022.
- 20 million sq. m. solar thermal collector area and 20 million solar lights by 2022.
- 4-5 GW equivalent of installed solar manufacturing capability by 2020.



Strategy

- **Renewable Purchase Obligation (RPO) with a specific solar component.**
 - The solar power purchase obligation may start with 0.25% for a capacity addition up to 1,000 MW by 2013
 - go up to 3% by 2022 to achieve the over all target for solar power generation
- **A Generation Based Incentive (GBI), with a pre-determined rate of digression will be instituted to promote rapid scaling up of capacity while reducing the overall impact on power tariff.**
- **To promote solar power to augment generation capacity and also partially replacing higher cost peak load power and diesel generator based capacity.**



... Strategy

- Rapid expansion of manufacturing capability across the value chain, including through the setting up of dedicated solar park(s).
- A major R&D initiative to focus on:
 - improvement of efficiencies
 - reducing costs
 - developing cost-effective storage technologies
- Strategic international collaborations and partnerships along with effective technology transfer mechanisms and strong IPR protection.



... Strategy

- An ambitious human resource development programme, across the skill-chain.
- Setting up an autonomous Solar Energy Authority.



Proposed roadmap

Application Segment	Likely Capacities (by 2022)
Utility (grid) power	12000 MW
Rooftop and other distributed solar power systems	3000 MW 1 million solar roofs
Rural Installations (rural grid plants + stand-alone applications)	3000 MW
Other distributed solar power applications (e.g.: telecom towers)	2000 MW
Solar lighting, heating & other applications	Solar lighting for 20 million households Solar collector area of 20 million square metres for heating applications;

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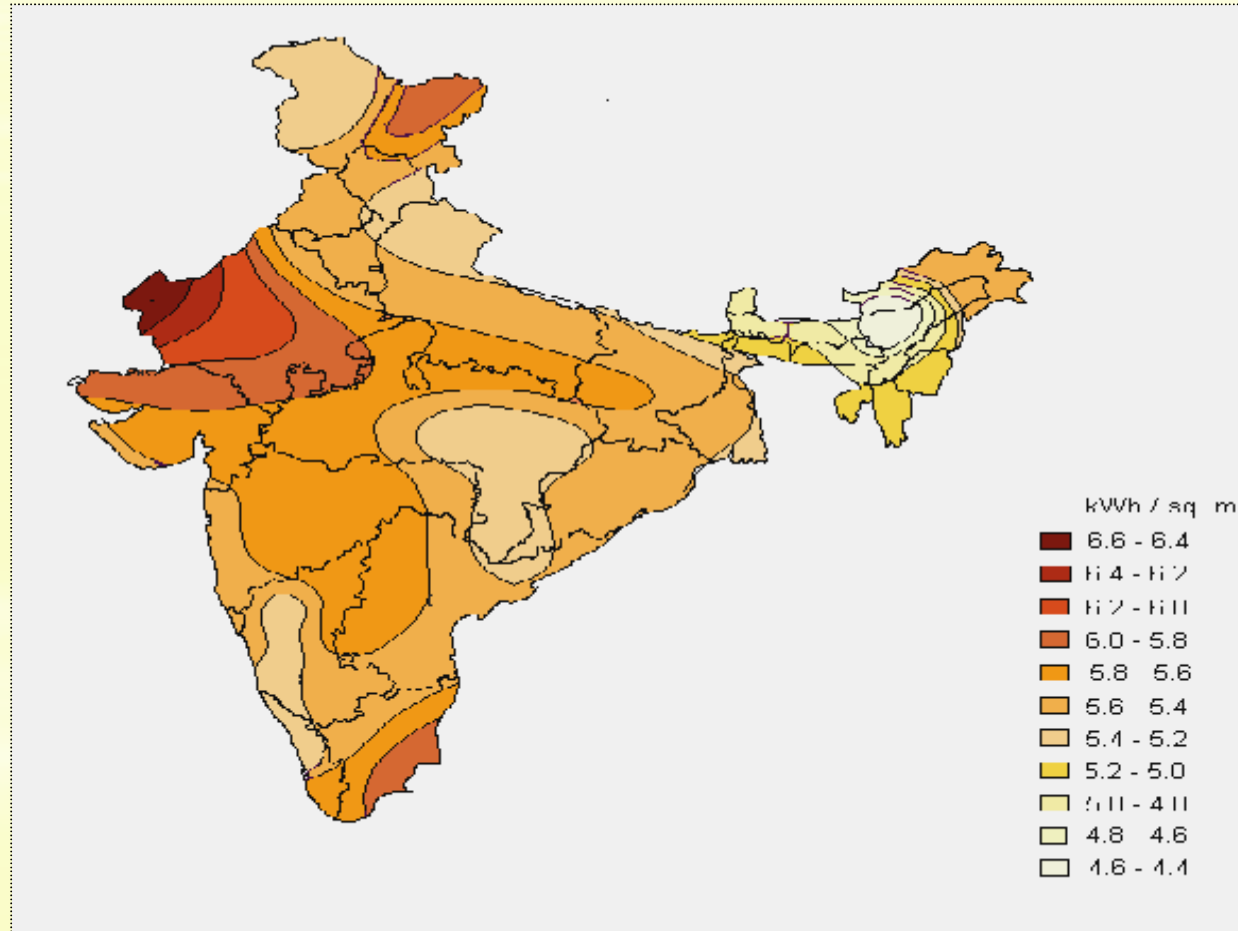
Thank You!

akumar@teri.res.in
www.teriin.org

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Global solar radiation over India



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