



Energy Conclave – 2010, IIT Kanpur
International Symposium on
New Paradigms for Energy Policy and Regulation
8th January 2010

Implementing a Market for Renewable
Energy Certificates in India

Anoop Singh
Dept of Industrial and Management Engg.
IIT Kanpur
(anoops@iitk.ac.in)

Per Capita Electricity Consumption

Year	Per Capita Consumption (kWh (As per U. N. methodology)
2002-03	566.7
2003-04	592.0
2004-05	612.5
2005-06	631.5
2006-07	671.9
2007-08	704.2



Rural Electrification (30.09.2009)

1. Total No. of Villages		593732
2. No. of villages Electrified		497339
3. % of Villages Electrified		83.8%
4. Potential of Energ. of Pumps		19594000
5. No. of Pumpsets Energised		16062299
6. % of Pumpsets Energised		81.5%



Generation Capacity (All India) (Oct. 2009)

Ownership Sector	Modewise breakup				Nuclear	Hydro (Renewable)	RES** (MNRE)	Grand Total
	Thermal			Total Thermal				
	Coal	Gas	Diesel					
State	44054.50	4046.12	602.61	48703.23	0.00	27087.00	2315.48	78105.71
Private	7126.38	6074.50	597.14	13798.02	0.00	1233.00	10994.73	26025.75
Central	30175.00	6702.23	0.00	36877.23	4120.00	8565.40	0.00	49562.63
Total	81355.88	16822.85	1199.75	99378.48	4120.00	36885.40	13310.21	153694.09

Wind Farm



A Large Solar farm



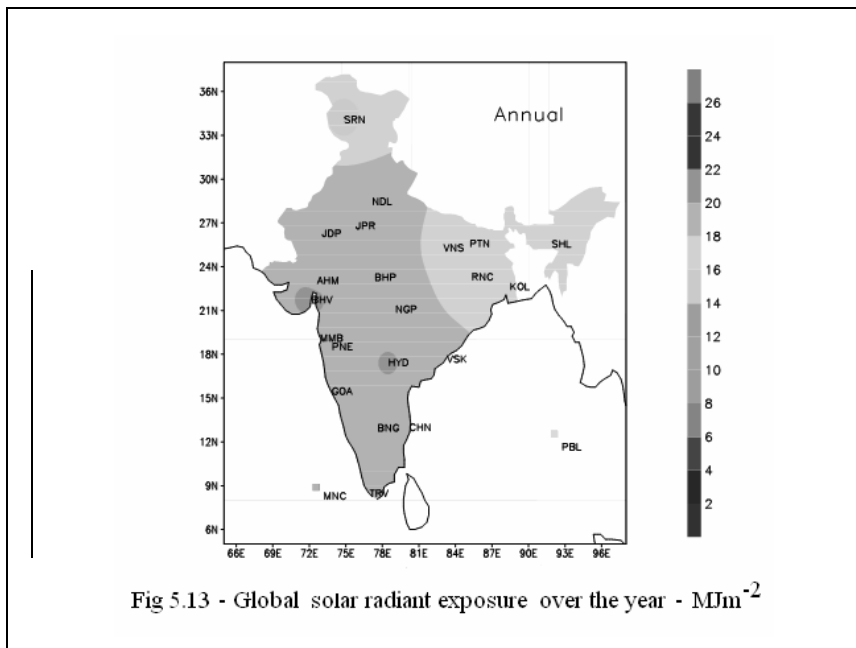
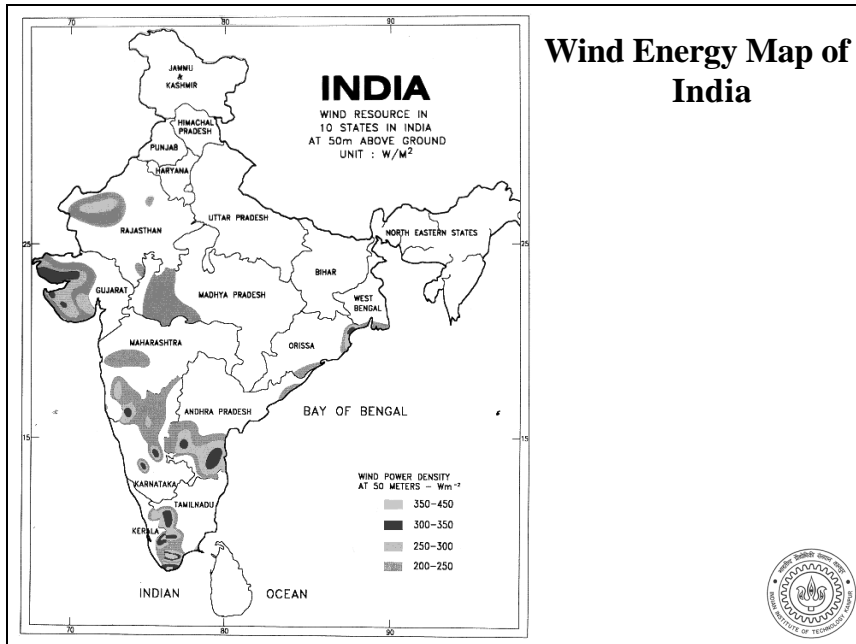
Why Renewable Energy?

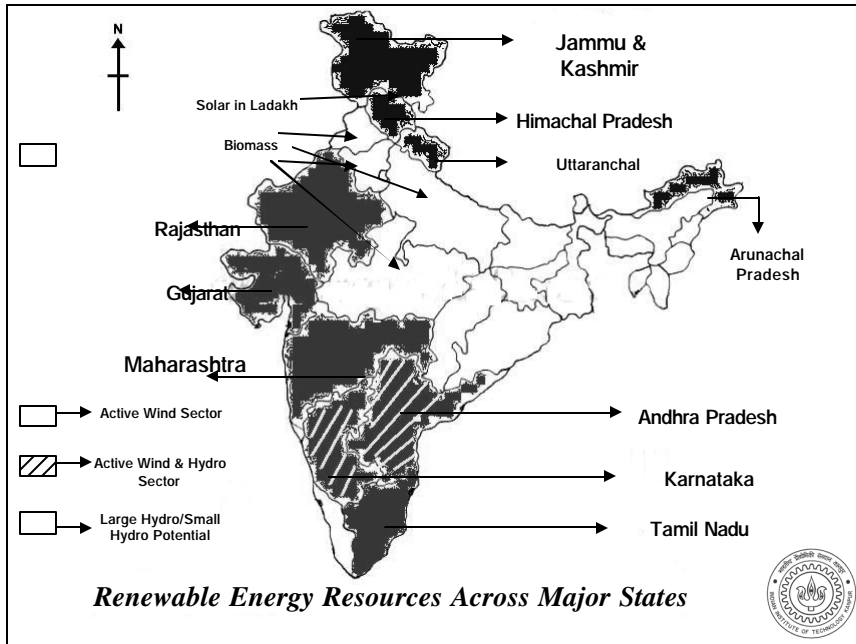
- Nature 'renews' it
 - Wind, Solar, Biomass, Ocean,.....
- Lower local & global environmental impact
- Reduces dependence on imported energy
- Generates local employment



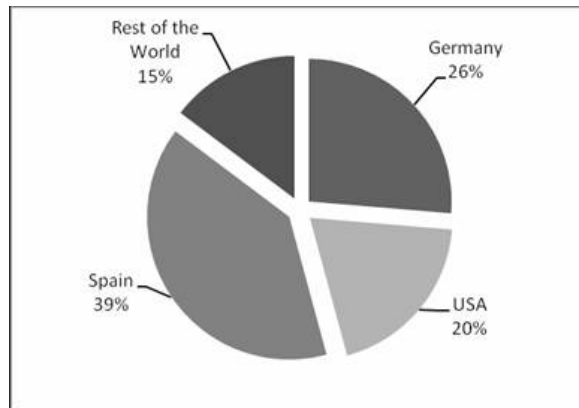
Estimated renewable energy potential and cumulative achievements (as on 31.3.2009)

S. No.	Renewable Energy Type	Cumulative Achievement	Estimated Potential
1	Bio Power (Agro residues & Plantations)	703.30 MW	16,881 MW
2	Wind Power	45,195 MW	10,242.50 MW
3	Small Hydro Power (<25 MW)	2,429.67 MW	15,000
4	Cogeneration-bagasse	1,048.73 MW	5,000
5	Waste to Energy (Urban & Industrial)	58.91 MW	2,700
6	Solar power	2.12 MW	50 MW/sq.km





Country-wise distribution of large-scale PV plants capacity (>200 kWp)



Can we have large size solar farms in India?

Challenge for Harnessing Renewable Energy

- Resources
- Technology
- Financing
- Policy & Regulation



How to make RE story a success?

- We have technology, but
 - Resources are limited
(or difficult to harness)
 - It is expensive
 - It is difficult to get investors to put money into it



Need some Carrots (and small sticks)

Carrots

- Subsidies
- Feed-in Tariffs
- Tax Breaks

Sticks!

- Obligation to buy electricity generated from renewable energy resources, Renewable Portfolio Obligation (RPO)



Electricity Act 2003 and Policy Framework for Renewable Energy

- State Electricity Regulatory Commissions (SERCs) to specify a percentage of the total consumption of electricity in the area of a distribution licensee, for purchase of electricity from co-generation and renewable energy sources (renewable portfolio obligation).
- SERCs to promote co-generation and generation of electricity through renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any persons.
- Terms and conditions for the determination of tariff to be prescribed by the SERCs to promote co-generation and generation of electricity from renewable sources of energy.

Electricity Act 2003 and Policy Framework for Renewable Energy (Contd.)

- National Electricity Policy to be formulated by the central government.
- Central Government to prepare a national policy, in consultation with the State Governments, permitting stand alone systems (including those based on renewable sources of energy and other non-conventional sources of energy) for rural areas.

Renewable Portfolio Obligation (09-10)

percentage of total procurement of the Distribution Licensee (from cogeneration and renewable)

	Mah.	Orissa	M.P.	Gujarat	Kar.	Rajasthan	TN	U.P	A.P.
RPO	6	4	0.5	2 (08-09)	Min .5 Max .10	Wind \$ 3.6 Bio-mass 1.43 Solar & Oth. Upto 75 MW	10	7.5	5 (07-08) Wind 0.5

Challenge!

- Objective: To meet obligations to increase contribution of renewable energy sources in electricity supply to consumers.
- Constraints: States have different resource endowments and some have very limited ones (e.g. Delhi, except domestic solar PV)
- What if consumers in Delhi wish to increase share of renewables in their electricity supply?

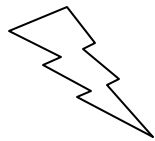


100 kW Solar PV plan in Tangtse, Ladakh

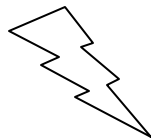


Solution?

What differentiates electricity from renewable energy sources?



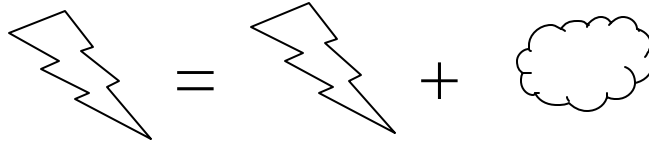
- Electricity from Conventional energy Sources



- Electricity from Renewable energy Sources



What is Renewable Energy Certificates?



‘Green electricity’ ‘electricity’ ‘green certificates’

- Sell ‘electricity’ and ‘green certificates’ in different markets



A Market for Nationally Tradable Renewable Energy Credits/Certificates

- Renewable portfolio standard with cost based feed-in-tariffs disregard economic efficiency
- One of the market related approach would be to unbundle ‘Greenness’ from ‘electricity’.
- Nationally tradable renewable energy credits, which could be sold separately from ‘electricity’ addresses these issues effectively.
- Separation of ‘energy’ and ‘renewable credit’ market promises a high degree of economic efficiency

A Market for Nationally Tradable Renewable Energy Credits (Contd.)

- Cost of compliance for renewable obligation can be reduced through adoption of nationally tradable renewable energy credits.
- This would also be instrumental in promoting investment in the renewable energy in the country.

Objectives of Renewable Energy Certificates/Credits (RECs)

- Provide flexibility in meeting RPO of discoms (Compliance market)
- Expand greater participation in promotion of RE (incl. common public) (Voluntary market)
- Promote efficiency in investment
- Assist choice of appropriate technology
- Provide incentives for cost reduction



Objectives of Renewable Energy Certificates/Credits (RECs) (Contd.)

- Provide benchmarks for innovation in RE applications
- Avoid transmission of electricity generated through RE sources
- Assist efficient implementation of promotional policies by the government. (esp. off-grid RE based rural electrification)



Advantages of Nationally Tradable Renewable Energy Credits/Certificates

- Transmission Cost and Congestion Management
- Promotion of stand-alone systems based on renewable energy
- Participation in Competitive Electricity Market
- Widening Participation beyond Distribution Licensees
- Flexibility to Meet Renewable Portfolio Obligation
- Investment Barometer
- Effective Utilisation of Government Public Support
- Support to Various Technologies
- Reduced Exposure to Regulatory Risk
- Implementing Sunset Clause
- Effective Compliance

Thank You

www.iitk.ac.in/ime/anoops

anoops@iitk.ac.in

Courses, Workshops and Conferences

- Short Term Course “Challenges and Implementation Issues post Electricity Act 2003: Regulatory, Policy & Technical Solutions”, 10-14 April, 2004
- International Conference on “Power Market Development in India: Reflections from International Experience”, 19-21 April, 2005
- National Workshop on “Project Financing for Energy and Infrastructure Sector”, April 19-22, 2007



Courses, Workshops and Conferences (contd.)

- 2nd National Workshop on ‘Project Financing for Energy and Infrastructure Sector’, April 24-27, 2008
- Capacity Building Programme for Officers of Electricity Regulatory Commissions, 30th June - 5th July, 2008
- 2nd Capacity Building Programme for Officers of Electricity Regulatory Commissions, 3-8 August, 2009
- Energy Conclave 2010, 8-15 Jan. 2010

