


National Review of Implementation of ERC Orders

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Why Renewable Energy

- Industrial & Economic growth creating a ever increasing demand for energy along with burgeoning population worldwide
- Heavy dependence on conventional energy sources like oil, coal coupled with ever increasing demand created international markets and market linked pricing structures leading to accelerated exploitation of conventional energy sources
- High Volatility in these primary energy markets create untenable pricing and balance of payment crisis for many governments
- Abnormal increase in Oil prices in the 1970s was the first wake up call for many governments
- Depleting natural sources unable to meet demand growth in both developed as well as developing economies creating demand supply shortages
- Increasingly evident impact of fossil fuel usage on climatic conditions around the globe

Alternative Energy Sources are not an option but a necessity

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Renewable Energy In India.... Historical review



Subsequent to the two oil shocks in the 1970s, Energy 'self-sufficiency' was identified as the major driver for new and renewable energy in the country. Various initiatives on this front led to establishment of

- *Commission for Additional Sources of Energy (CASE) in 1981*
- *Department of Non-Conventional Energy Sources (DNES) in 1982*
- *Ministry of Non-Conventional Energy Sources (MNES) in 1992*
- *Ministry of Non-Conventional Energy Sources (MNES) renamed as Ministry of New and Renewable Energy (MNRE) in 2006*
- *Electricity Act 2003 provided a mandate for Electricity Regulatory Commissions for promoting renewable energy generation as well as enforcing its usage by Distribution licensees, Captive generators and Open access Users*



Approaches for Promoting of RE ... a worldwide experience



There are various approaches by which Renewable Energy generation has been or is being promoted. The various policies may be classified into various categories

- Price Setting and Quantity forcing Policies
- Cost Reduction Policies
- Public Investment or Market Facilitation Policies
- Power Grid Access Policies



Important Orders by SERCs



The Electricity Act 2003 has specific provisions for development of Renewable Energy Sources

- Section 86(1)(e) and Section 61(h) are key sections providing promotional measures for RE
- Several Regulators have determined 'Feed-in' tariffs for purchase of renewable energy by distribution licensees
- More than 20 Regulators have also determined percentage of energy to be procured by distribution licensees from renewable energy sources
- These percentages popularly referred to as RPS or Section 86(1)(e) obligation have proved successful for promotion of RE in India.

Many States like Maharashtra, Gujarat, Karnataka, Tamil Nadu Rajasthan have issued tariff orders and defining the Feed –in tariffs for various types of Renewable Energy projects as also the minimum quantum to be sourced by the respective distribution utilities in the form of RPS (Renewable Purchase Specification)



Important Orders by SERCs



Maharashtra

- | | | |
|--|---|---------------|
| •Tariff for Bagasse based co-generation projects | - | August 2002 |
| ➢ Tariff revised through Interim Order | - | January 2010 |
| •Tariff for Wind Projects (Gr.I, II and III projects) | - | November 2003 |
| ➢ Interim Tariff for Gr II Projects on expiry of Tariff validity Period 2008 | - | December |
| •Tariff for Bio mass Projects (incl. Tariff structure & EPA principles) | - | August 2005 |
| ➢ Reviewed in December 2009 | | |
| • RPS Order | - | August 2006 |
| • Orders with respect to Grid connectivity and Wheeling | | |
| ➢ Dedicated Transmission lines for wind projects | - | November 2007 |
| ➢ Applicability of wheeling charges /losses | - | April 2008 |
| ▪ Exemption for Utilities connected to InSTS | | |
| •Suo Motu Draft Order for Solar | - | November 2008 |



Important Orders by SERCs



Gujarat

•RPS Regulations	-	October 2005
•Tariff for Wind Projects	-	August 2006/ Jan 2010
•Tariff for Bagasse based projects	-	January 2007
•Tariff for Bio mass Projects	-	August 2007
•Tariff for Solar Projects	-	January 2010

Rajasthan

• RPO Regulations	-	March 2007
•Tariff for Solar Projects (Under Gol's GBI scheme)	-	April 2008
•Tariff for Wind Projects	-	July 2009
•Tariff for Bio mass Projects ()	-	August 2009

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Important Orders by SERCs



Tamil Nadu

•RPS Regulations (quantum specified from time to time)	-	February 2008
•Tariff for Wind Projects (Second Order)	-	March 2009
•Tariff for Bio mass based projects	-	April 2009
•Tariff for Bagasse Projects	-	May 2009

Andhra Pradesh

APERC had defined the tariffs for various types of renewables through its Order in March 2004. Subsequently

• RPO Regulations	-	March 2009
•Tariff for Wind Projects (Second Order)	-	March 2009
•Tariff for Bio mass Projects (Second Order)	-	March 2009
•Tariff for Bagasse Projects (Second Order)	-	March 2009

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Renewable Purchase Obligations for various States



Sl. No.	State	Reference	Renewable Purchase Obligation (%)				Remarks
			FY 2009-10	FY 2010-11	FY 2011-12	FY 2012-13	
1	Andhra Pradesh	RPO order dt: 27.08.05	5%				5% upto Jan 2009, From Feb 2009 to Mar 2011 RPO determination in process
2	Chattisgarh	RE Reg dt: 14.7.06 (Pg 2)	Biomass-5%, Hydro-3%, Solar, Wind, Biogas-2%	Biomass-5%, Hydro-3%, Solar, Wind, Biogas-2%	Biomass-5%, Hydro-3%, Solar, Wind, Biogas-2%	Biomass-5%, Hydro-3%, Solar, Wind, Biogas-2%	Overall RPO of 10% and applicable till Commission further revises
3	Gujarat	RE Reg dt: 29.10.05 (Pg 4)	2%				RPO determined upto FY 2008-09 only
4	Haryana	RE Order dt: 15.5.07 (Pg 7)	5%	10%	10%	10%	RE Order upto 2012-13
5	Karnataka	RE Reg dt: 21.10.04	5%				Maximum 10% RPO. Commission shall revise once in every 3 year
6	Kerala	RE Reg dt: 24.6.06 (Pg 4)	Wind-2%, Hydro-2% & others-1%				Overall RPO of 5% and Commission shall revise once in every 3 year
7	Madhya Pradesh	NCE Reg dt: 22.10.05 (Pg 7)	Wind-5%, Biomass-2%, Co-gen & others-3%	Wind-6%, Biomass-2%, Co-gen & others-2%	Wind-6%, Biomass-2%, Co-gen & others-2%	Wind-6%, Biomass-2%, Co-gen & others-2%	Co-generation and others include Hydro, Solar, MSW, Tidal etc
8	Maharashtra	RPS order dt: 16.08.06	5%	6%			
9	Punjab	NRSE order dt: 13.12.07	1%	3%	3%	4%	Policy applicable till 2011-12. Further PSEB can purchase power from Projects outside the State in Northern Region at same tariffs applicable for RE sources within State
10	Rajasthan	Order dt: 23.3.07	8.25%	7.45%	8.50%	8.50%	For short fall of obligation, RE surcharge @Rs. 3.28/kWh shall be payable. The order is applicable for a control period of 3 years only.
11	Tamilnadu	NCE Order dt: 15.5.06 (Pg 91)	10%				
12	Uttar Pradesh	NCE Reg dt: 23.03.06	7.50%	7.50%	7.50%	7.50%	
13	West Bengal	NCE Reg dt: 25.03.09 (Pg 1)	WBSEDCL - 4.8% DPL - 2.5%, DSPC 8. DivC - 2.0%	WBSEDCL - 6.8% DPL, DSPC, DivC - 6.0%	WBSEDCL - 6.3% DPL, DSPC, DivC - 7.0%	WBSEDCL - 10% DPL, DSPC, DivC - 10.5%	Commission has determined different RPO for different licensees

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Wind....Promotional Policies by SERCs/State Govts



2009

Policies Introduced by State Governments for Wind Power Projects (as on 31.03.2009)

Items	Andhra Pradesh*	Haryana*	Karnataka*	West Bengal	Madhya Pradesh*	Maharashtra*	Rajasthan*	Tamil Nadu*	Gujarat*	Kerala*	Punjab*
Wheeling	5% of energy.	2% of energy	5% of energy	Rs. 0.30/u or 7.5% whichever is higher	Allowed 2% of energy + transmission charges as per ERC	As per Open Access Regulation	10% of energy	5% of energy	4% of energy	5% of energy	2% of energy
Banking	Not allowed	Allowed for 1 year	2% per month for 12 Months	6 Months	Allowed	12 Months	3 Months	5% (12 months)	Monthly settlement (Jan.-Feb.)	9 Months	Allowed
Buy-back	Rs. 3.37/kwh fixed for 10 years	Rs. 4.08/ unit escalation 1.5% base year 07-08	Rs. 3.40/kwh Fixed for 10 years	To be decided on case to case with a cap of Rs. 4/kwh	Rs. 4.03 - 3.36 (constant) reducing @ 17 paise per year for first four years.	Rs. 3.50/kwh Escalation of Rs 0.15/u per year for 13 years from DOC of the project	Rs. 3.75/unit for Jaisalmer and Rs. 3.67/unit for other districts (base year 08-09)	Rs. 3.39/ kwh (Levelled)	Rs. 3.127 kwh fixed for 20 yrs.	Rs. 3.14/ kwh fixed for 20 years	Rs. 3.66/unit with five annual escalation @ 5% upto 2012
Open Access transaction	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed
RPO	5%	08-09: 5%	Min. 10%	08-09: 2-4.8% 09-10: 4-6.8% 10-11: 7-8.3% 11-12: 10.0%	10%	06-07: 3% 07-08: 4% 08-09: 5% 09-10: 6%	07-08: 4.88% 08-09: 6.25% 09-10: 7.65% 10-11: 8.50% 11-12: 9.50%	13%	2%	2%	07-08: 4.88% 08-09: 6.25% 09-10: 7.65% 10-11: 8.50% 11-12: 9.50%

*Policy announced by State Electricity Regulatory Commission in the respective State.

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Small Hydro.....



	Himachal Pradesh	Maharashtra	Karnataka	Andhra Pradesh
Tariff	Rs. 2.87/kWh	Rs. 3.30/kWh	Rs. 2.80/kWh	Rs. 2.69/kWh
Term	40 years	20 years	10 years	
Wheeling	Rs. 0.71/kWh + losses	As applicable for the DISCOM	5%	2%
Transmission	Approx. Rs. 45,000/MW/month + losses	Loss – 4.85% Charges – Rs. 918/MW/day		
Banking	Not permitted	Allowed. Settled on annual basis	Allowed. Settled Annually – 2%	Allowed. Settled Annually – 2%
Third Party Sale	Allowed	Allowed	Allowed	Allowed
Cross Subsidy Surcharge	Nil	Nil	Nil	Nil

Biomass.....



	Gujarat	Maharashtra	Tamil Nadu	Karnataka
Tariff	Rs.3.08/kwh for 20 years	Rs. 4.98/kWh for a FY 2009-10	Avg. Rs. 4.65 for 3 years.	Rs. 2.85/kWh + escalation of Rs. 0.057/kWh
Term	20 years	Upto March 2010	20 years	10 years
Wheeling	4%	As applicable for the DISCOM	3% - 6%	5%
Transmission	As applicable for the DISCOM	As applicable for the DISCOM Rs. 918/MW/day		
Banking	As determined by Commission from time to time	Allowed. To be settled Annually	Not allowed	Allowed. Settled Annually – 2%
Third Party Sale	Allowed	Allowed	Allowed	Allowed
Cross Subsidy Surcharge		Nil	@ 50% depending on inter connection levels	Nil

Solar A evolving scenario



- Generation based Incentive Scheme announced by MNRE with the aim of promoting viability of Solar projects
- Currently, Rajasthan & very recently, Gujarat are the only states to have declared a tariff for Solar projects
- Some States have issued Draft Orders for Solar Project tariffs
- Declaration of '**National Solar Mission**' to promote Solar Energy projects with ambitious targets for both Grid connected as well as Off-Grid projects
- Targeted Grid parity by 2022 and parity with coal based capacity by 2030



Summary of established Policies for Renewables.....



- Specified % of renewable energy every utility need to purchase
 - *Single target for overall renewable energy purchase, usually close to existing purchase levels,*
 - *In some cases Y-o-Y targets*
 - *No technology specific targets for most States*
 - *Period is generally upto five years*
- Applicable to OA/Captive in only some States
- Purchase of RE from outside the State has not been envisaged
- Silent on mode of procurement, competitive or cost based
- RPO Implementation mechanisms need further refinement
- Weak on enforcement methodology, although penalty mechanism has been defined



Impact of SERC Policies ... Wind Generation Capacity



2002 State-wise & Year-wise Wind Power Installed Capacity (MW)
(As on 31.12.2002)

State	Upto Mar '02	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Andhra Pradesh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goa	14.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.1
Karnataka	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kerala	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Madhya Pradesh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Madhya Pradesh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Orissa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rajasthan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tamil Nadu	22.3	11.1	90.1	180.9	181.7	198.8	10.1	17.8	45.6	11.9	44.9	17.3	661.1
West Bengal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Others	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	41.3	12.7	90.1	180.9	181.7	198.8	10.1	17.8	45.6	11.9	44.9	17.3	661.1

2009 State-wise Wind Power Installed Capacity (MW) (Upto 31.03.2009)

STATE	INSTALLED CAPACITY (MW)
Andhra Pradesh	122.5
Gujarat	1566.5
Karnataka	1327.4
Kerala	27.0
Madhya Pradesh	212.8
Maharashtra	1938.9
Rajasthan	738.4
Tamil Nadu	4304.5
West Bengal	1.1
Others	3.2
TOTAL	60042.3



Small Hydos.....gaining momentum



2009 State Wise Numbers and Aggregate Capacity of SHP Projects (Upto 25 MW Potential, Installed & Under Implementation) (As on 31.03.2009)

Sl. No.	State	Potential		Projects Installed		Projects under Implementation	
		Nos.	Total Capacity	Nos.	Capacity (MW)	Nos.	Capacity (MW)
1	Andhra Pradesh	489	552	99	180,830	12	21.50
2	Assam	566	1333	81	61,320	43	25.94
3	Assam	60	213	4	27,190	4	15.00
4	Bihar	94	213	12	54,600	4	3.40
5	Chattisgarh	164	706	5	18,050	1	1.00
6	Goa	9	9	1	0,050	-	-
7	Gujarat	292	196	2	7,000	2	5.60
8	Haryana	33	110	5	62,700	1	6.00
9	Himachal Pradesh	547	2260	79	230,915	9	26.75
10	Jammu & Kashmir	246	9411	32	111,830	5	5.91
11	Jharkhand	103	208	6	4,050	8	34.85
12	Karnataka	128	643	83	563,450	14	85.25
13	Kerala	347	708	19	133,870	2	3.20
14	Madhya Pradesh	199	400	10	71,160	4	19.90
15	Maharashtra	253	762	29	211,325	3	31.30
16	Manipur	113	100	8	5,400	3	2.75
17	Meghalaya	102	229	4	31,000	3	1.70
18	Mizoram	75	166	18	24,470	1	8.50
19	Nagaland	99	196	10	28,670	4	4.20
20	Orissa	222	295	8	44,300	6	23.93
21	Punjab	234	390	29	123,900	2	18.75
22	Rajasthan	67	63	10	23,850	-	-
23	Sikkim	91	265	16	47,110	2	5.20
24	Tamil Nadu	176	499	15	90,050	4	13.00
25	Tripura	12	46	3	16,050	-	-
26	Uttarakhand	458	1609	93	127,900	33	48.35
27	Uttar Pradesh	320	252	9	35,100	-	-
28	West Bengal	303	393	23	96,400	16	79.25
29	Andaman & Nicobar Islands	12	8	1	5,250	-	-
	TOTAL	5415	14,292	674	2,429,770	188	483.33

India's Renewable Energy Portfolio2002



2002

New and Renewable Sources of Energy Potential and Achievement

	POTENTIAL	ACHIEVEMENT AS ON 31.12.2002
Biogas Plants	120 lakh	33.70 lakh
Improved Chulhas	1,200 lakh	339 lakh
Wind	45,000 MW	1,702 MW
Small Hydro	15,000 MW	1,463 MW
Biomass Power/Cogeneration	19,500 MW	468 MW
Biomass Gasifiers		53 MW
Solar PV	20 MW/sq.km	107 MW _p *
Waste-to-Energy	2,500 MW	25 MW _p
Solar Water Heating	1,400 lakh sq.m Collector Area	6.80 lakh sq.m Collector Area

* Of this 46 MW_p SPV products have been exported.

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India's Renewable Energy Portfolio2009



New & Renewable Energy Cumulative achievements as on 31.10.2009		
No. Sources / Systems	Achievements during 2009-10 (upto 31.10.2009)	Cumulative Achievements (upto 31.10.2009)
I. Power From Renewables		
A. Grid-interactive renewable power		
1 Biomass Power (Agro residues)	113.50 MW	816.50 MW
2 Wind Power	649.00 MW	10891.00 MW
3 Small Hydro Power (up to 25 MW)	91.11 MW	2519.88 MW
4 Cogeneration-bagasse	192.00 MW	1241.00 MW
5 Waste-to-Energy	8.41 MW	67.41 MW
6 Solar Power	3.10 MW	6.00 MW
Sub Total (in MW) (A)	1056.12 MW	15541.79 MW
B. Off-Grid/Distributed Renewable Power (including Captive/CHP Plants)		
7 Biomass Power / Cogen.(non-bagasse)	10.60 MW	181.37 MW
8 Biomass Gasifier	2.91 MW _{eq}	108.37 MW _{eq}
9 Waste-to-Energy	3.91 MW _{eq}	37.97 MW _{eq}
10 Solar PV Power Plants and Street Lights	0.086 MW _p	2.39 MW _p
11 Aero-Generators/Hybrid Systems	MW	0.89 MW
Sub Total (B)	17.506 MW_{eq}	330.99 MW_{eq}
II. Remote Village Electrification		
	184 Villages + 86 Hamlets	4297 villages + 1156 hamlet
III. Decentralized Energy Systems		
12 Family Type Biogas Plants	0.16 lakh	41.42 lakh
13 SPV Home Lighting System	48 nos.	5,10,877 nos.
14 Solar Lantern	58,064 nos.	7,67,350 nos.
15 SPV Street Lighting System	2767 nos.	82,384 nos.
16 SPV Pumps		7,247 nos.
17 Solar Water Heating - Collector Area	0.22 Min. sq.m	3.12 Min. sq.m.
18 Solar Cookers	nos.	6.57 lakh
19 Wind Pumps	nos.	1347 nos.
IV. Other Programmes		
20 Energy Parks	nos.	511 nos.
21 Akshay Urja Shops	nos.	284 nos.

MWeq. = Megawatt equivalent; MW = Megawatt; kW = kilowatt; kWp = kilowatt peak; sq. m. = square meter

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What more is necessary or desirable.....

- Specific targets for RE sources which are not commercial
- Application of RPS to OA/Captive/trading transactions
- Efficient mechanism for purchase of RE
- Enabling mechanism for inter-state sales
- National Mechanism for purchase of RE
 - Sufficient training and Awareness is a must for successful implementation
- Clarity on wheeling/ banking facilities
 - *Preferential Treatment needs to be considered for promotion of Renewables in terms of quantum of charges considering the nature, quantum of generation so that the project viability may be enhanced*
- Stronger enforcement and penalty mechanism
 - **Choice between a Penalty driven policy or a Incentive based mechanism**



Some Recent Developments.....

- Declaration of '**National Solar Mission**' by the Prime Minister of India
 - *Will provide a big boost for the Solar Energy projects*
- Notification by CERC regarding Tariff Regulations for RE Projects in September 2009
 - *Norms for determining Tariff for Technology specific RE projects*
 - *Separate RPO for Solar*
- Notification by CERC regarding Development of Power Market for Renewables
 - *Implementation of REC framework for procurement of RE Power*
 - *Will Promote RE procurement in States that do not have significant RE potential*
 - *Price discovery Through Power Exchange*
- GERCC announces Tariff for Solar and revised tariff for wind (increase from Rs.3.37/kwh to Rs.3.56/kwh fixed for 20 years)





Thank you

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