

## ***Initiatives by CERC and critical issues concerning mainstreaming of RE***

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### Renewable Energy India: Sunrise sector

- One of the oldest, developed & matured renewable energy market in the world
  - Initiated in late '80s
  - Installations of more than 14,000 MW +
    - 9.2% of total installed capacity in MW terms
    - 6.2% of total generation capacity in kWh terms
      - Dependant on 'nature' leading to lower capacity utilisation
    - CAGR of **20%** (from 2002-03) against **6%** overall for power generating sector
  - Generating more than the total nuclear power installations in the country
    - *More than 90% in the private sector domain*
- Policy for captive utilisation benefited many process industries
- With EA 2003, newer options have opened up and also challenges

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## Renewable Energy Technology Options



- Wind Energy : Represent 70% of total RE capacity, most matured/commercialised, backed with highly organised industry, low gestation period
  - All major players are in India
- Bagasse cogeneration /Biomass – Slow, but very promising
- Solar (PV/thermal) – Sunrise sector in RE, ridden with high costs, big players, lack of organised industry, but very promising in the coming years, second only to wind
- Small hydro – limited resource and high gestation period

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## Contribution of Renewables in India



Total Installed Capacity (MW)			
5 year plan	Projected	Actual	%
8 <sup>th</sup>	30540	16420	54%
9 <sup>th</sup>	40250	19015	47%
10 <sup>th</sup>	41110	19010	46%

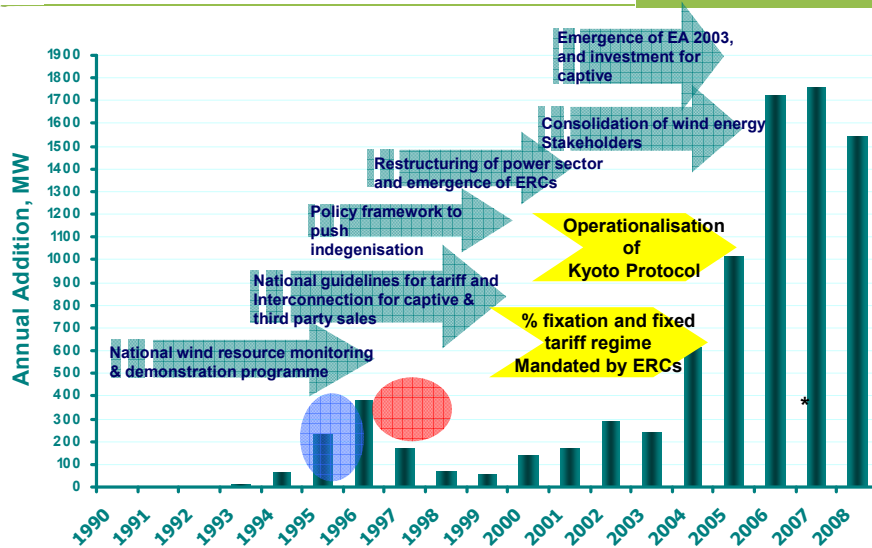
RE Capacity Addition 10 <sup>th</sup> Five Year Plan (MW)			
	Projected	Actual	%
Wind	2200	5426	246%
Other RE	1184	1369	115%
Total RE	3584	6795	190%

Today RE Installed Capacity (MW)		
Total RE	Wind	Rest
14000	10000	4000
100%	71%	29%

- Power Sector capacity addition vs target less than 50%
- However RE plan achievement almost twice of plan.
- Within installed RE, Wind contributes over 70%.
- Today, RE is 9% of installed capacity and about 6% of energy.

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## Wind Energy Development in India



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## Market framework

- Captive utilisation
  - After paying wheeling/transmission charges, investor gets a set-off in their monthly electricity bills
- Procurement by DISCOMs
  - RPO framework put up by various State Electricity Regulatory Commission, makes it mandatory for DISCOMs to procure a certain percentage from renewables, at a tariff fixed by the Commission
- OA/Merchant Generation
  - Investor has an option to sell electricity to any open access consumer (having a load of more than 1 MVA) after paying OA charges – a bit of a complex set-up (except for few states)

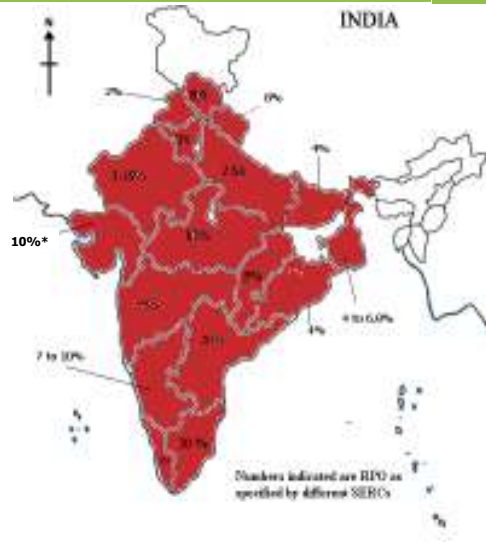
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## Shift in Policy & Regulatory to mainstream RE sources in India

## Shift in market models

- **Old market model**
  - Captive utilisation
  - Feed-in tariff fixed by state government based on guidelines by central government
  - Fiscal incentives (viz. accelerated depreciation)
- **New market model**
  - Fixing of RPO by various state governments
  - Procurement tariff by State Electricity Regulatory Commissions to achieve the %age procurement
- **New initiatives**
  - NAPCC targets – 5% by 2010 to 15% by 2020
    - Nationwide tradable REC market mechanism
  - CERC tariff regulations
  - Feed-in tariff in form of Generation Based Incentives (GBI)
    - As an alternative to accelerated depreciation
  - National solar mission
    - 20 GW by 2020

## RPO status in India



## *Initiatives for transforming RE market (Centre & State)*

## Initiatives at central level

- Introduction of GBI (Generation Based Incentive) in parallel to markets based on Accelerated Depreciation based investments
  - 4,000 MW (end of current Five Year Plan) or implementation of DTC : whichever is earlier
- Tariff regulations by CERC for different RE Technology
  - For Central Generating Stations
  - Procurement from inter-state gencos
  - Guideline for state commission to arrive to a common approach
- Notification of REC mechanism to implement targets under NAPCC

## CERC Tariff Regulations : Wind Energy

- Wind resource segregated into four different zones based on WPD

WPD (Watts/ m <sup>2</sup> )	PLF/CUF	Remarks
200-250	20%	Most wind farm sites now fall under this category
250-300	23%	Some places in Maharashtra, Karnataka, AP & TN
300-400	27%	Some places in Karnataka & TN, AP (VERY LESS)
>400	30%	Almost nil !! (such sites are already utilised)

- Based on assumptions (viz. Capex & PLF) under the regulations, the following is specific investment costs considered for tariff computation

WPD (Watts/ m <sup>2</sup> )	PLF/CUF	E.gen (lacs per MW/yr)	Specific Investment cost at Rs 5.15 crores per MW (Rs/kWh)	Levelised tariff as per CERC regulations & format prescribed (Rs/kWh) <sup>[1]</sup>
200-250	20%	17.52	<b>29.39</b>	5.63 (US 12 cents/kWh)
250-300	23%	20.14	25.56	4.90 (US 11 cents/kWh)
300-400	27%	23.65	21.77	4.17 (US 9.5 cents/kWh)
>400	30%	26.28	19.59	3.75 (US 8 cents/kWh)

<sup>[1]</sup> Range is shown, as RoE is pre-tax, and hence two extreme scenarios have been worked hypothetically as tax and non-tax efficient structures, on a stand alone basis (i.e. without factoring in tax shelter due to accelerated depreciation)

## *Framework for tradeable RE certificates*

### Context

- To implement NAPCC targets
  - 15% by 2020 (5% by 2010) : Procurement of renewable energy
  - Separate RPS target for solar (reservation)
    - 0.25%
  - RE resources are not evenly spread in India
  - States like TN, Gujarat etc. would have a surplus
- REC framework allows states that are not blessed with enough RE resources
- Deviation from the contract path method
  - Cumbersome for multiple transactions
    - RE targets may get imposed also on captive & OA (merchant) transactions

## Current status

- FoR on 4<sup>th</sup> September, 2009 unanimously agreed for proceeding on REC framework to be operationalised by April 2010
  - Assessment of RE potential : to modify the targets under NAPCC
  - To bring out a draft regulations on REC framework in Oct, 2009
    - Central regulation
    - Model for state regulation : Every state needs to adapt it, and pass it in their respective states
  - 19 states have already announced RPS order/regulations
- Regulation finalised for REC framework by CERC (inter-state) and SERC (intra-state) has already been released for comments
  - Gujarat is the first state to put this comments

## Price discovery of REC

- In reference to Wind tariff (low wind zone)
  - Tariff at Rs 5.00 - 5.60 per kWh as per CERC regulations
    - Average of Rs 5.25 per kWh
- In REC framework
  - Average procurement price would be Rs 2.80 – Rs 3.10 per kWh
  - Wind energy is going to be chief REC suppliers in the market, hence, market price for REC would be
    - Rs (5.25 – 3.10) = Rs 2.15 per kWh (low band)

## Revenue streams: may it may look like ?

- Multiple revenue stream : IPP
  - De-risking of revenue streams (win-win situation)

Revenue stream	In Rs/kWh	
	Minimum	Maximum
Average Procurement Tariff#	2.80	3.10
REC##	2.25	2.50
CDM***	0.20	0.75
<b>Total</b>	<b>5.25</b>	<b>6.35</b>

#Average procurement tariff would at-least have an inflationary rise of 2%-3%  
 ## REC cap may get removed, and would then truly reflect the market rate  
 \*\*\*for 10 years, and for new projects

## India – Growth of Renewables

Year	MU Needed (as per CEA Survey)	RE MU (15% as per NAPCC Target)	Derived RE Capacity (@33% PLF)	Perspective Plan 2022 RE Capacity
2011-12	969659	145449	50314	14000
2016-17	1392066	208810	72233	25000
2021-22	1914508	287176	99341	54000
Wind@50%			50000	27000

- 17th Power Survey by CEA estimates demand of 1.91 trillion units.
- To meet NAPCC target of 15%, installed capacity of renewables will need to reach 100,000MW (at 33% PLF)
- Even if contribution from Wind is considered @50%, the year wise capacity addition in the Wind sector ranges from 2500 to 4500 MW for next 10 years. Huge opportunity.

## Important things

- Large market would drive towards investment by
  - Utilities
  - Funds
- Constraints will be removed on
  - Market size & viability
- Intermittency
  - Forecasting protocols
    - Adopting approaches by Spain and Australia
- Constraints will be now on
  - Deliveries
    - Land, PE & WTGs
    - Finance
      - Equity
      - Debt

## Thank you

### For further information

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