



Workshop
on
“Addressing Barriers to Scaling-Up Renewable Energy”

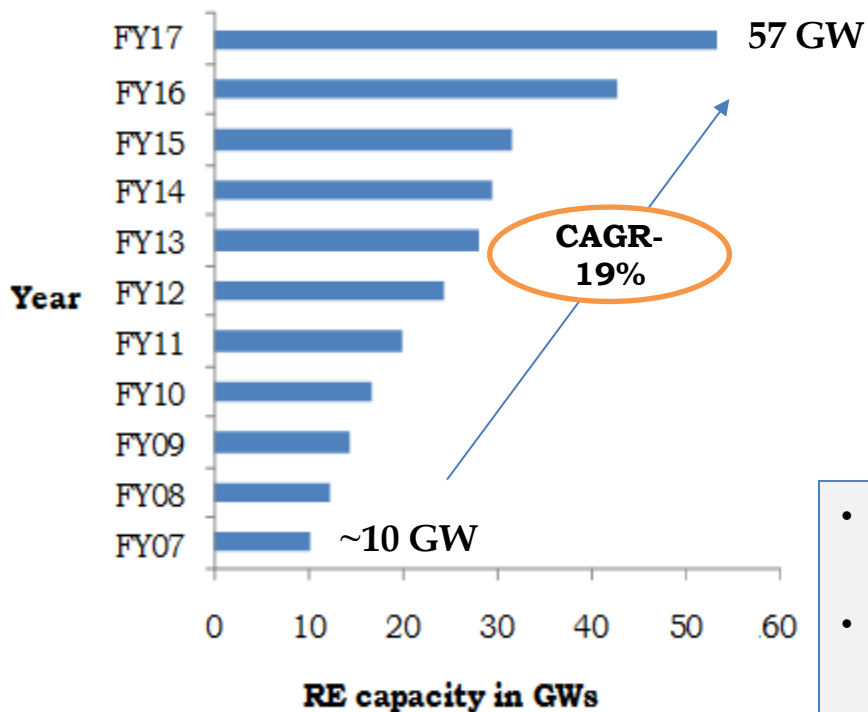
Session 2:
Theme Presentation
On
“Issues in Scaling-Up of RE Deployment”

9 May, 2017
Mumbai

- Renewable Energy – Growth so far
- Renewable Energy – Capacity Addition Target
- The Task Ahead
- Objective of the workshop
- Key Issues for Deliberation
 - Changing modalities of RE Procurement
 - Implementation of RPO
 - Project Financing
 - Project development
 - Evacuation Planning & Connectivity Issues
 - Addressing Variability Risk - Implementation of F&S, Ancillary services
 - Innovative technology options & support systems
- Action plan for RE scale up

Renewable Energy- Growth so far

Year Wise RE Capacity in GWs



RE Capacity Mix (Apr 17)



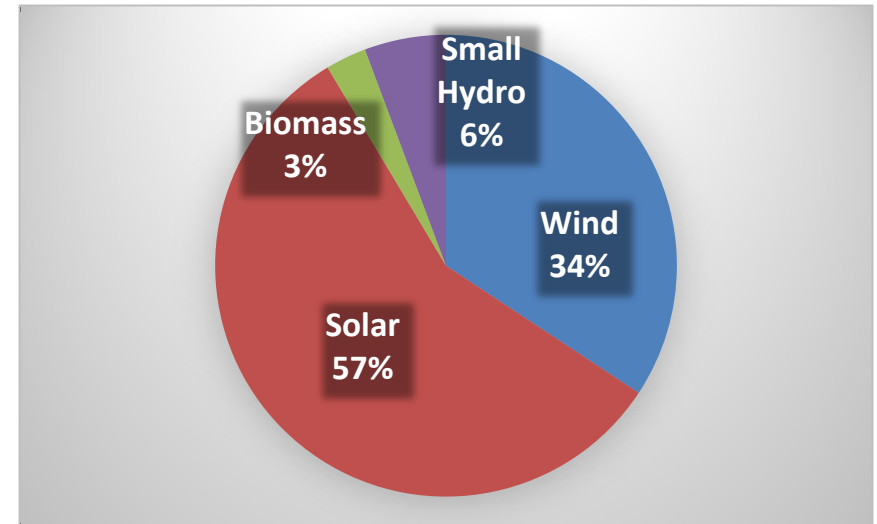
Key Statistics and Drivers

- Cumulative capacity of **57,260 MW** of Grid connected RE installed as on **April 2017**
- Wind capacity has the lion's share among RE technologies (around 56%)
- RE capacity comprises **17.5%** of total generation capacity of India
- Current level of RE Penetration is only 7.5% but the RE Penetration expected to happen by 2022 is between 15% to 20%.

Renewable Energy – Capacity Addition Target

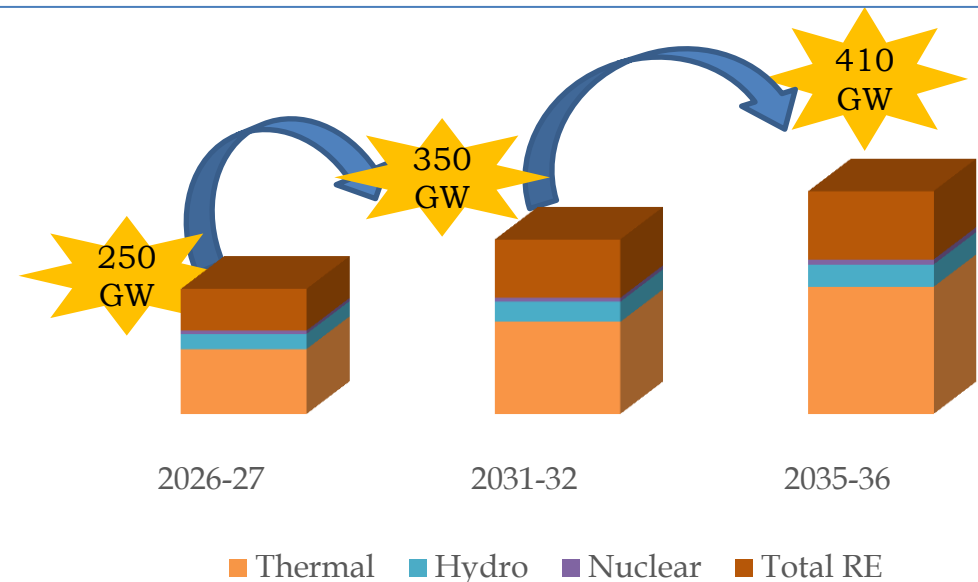
MNRE Target by 2022

- Targets 175 GW by 2022
- Includes 100 GW from Solar, 60 GW from Wind, 10 from Biomass & 5 GW from SHP
- **90%** of the targeted RE capacity addition planned from Wind and Solar source which are inherently **variable in nature**



CEA perspective plan for FY 2032

- CEA has projected RE capacity additions till 2036
- Transmission capacity planned commensurate with RE capacity addition of
 - 250 GW by 2026-27,
 - 350 GW by 2031-32,
 - 410 GW by 2035-36.



Task appreciation & Gearing up



- 175 GW by 2022 translates to 23 GW per annum of RE capacity addition over the coming years
- Considering the past trend of capacity addition, the task ahead is challenging
- Collaborative and concerted efforts need to be taken to achieve the targets set.
- Challenges and issues faced by the sector to be resolved and clear roadmap to be set.
- Short, medium and long term solutions to be discussed and implemented

Objective of the Workshop

- The present workshop aims to identify the barriers to implement renewable energy technologies in the Western Region and discuss policy, regulatory and technical issues, both at the Central and State level.

- To deliberate issues/problems being faced in implementing renewable energy projects
- Address gaps in the policy and regulatory framework at the State and Central level
- Identify challenges in scale-up of solar rooftop projects
- Frame a feasible plan of action

Scaling Up RE Deployment

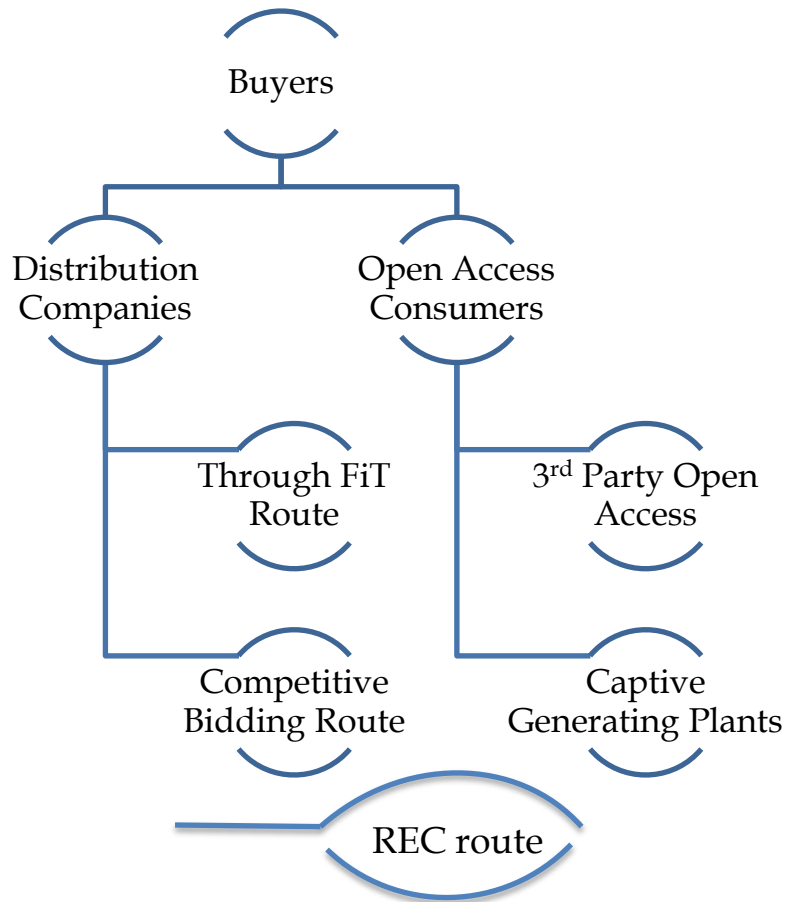
- Key Issues for deliberation



- Changing RE Procurement models
- Implementation of RPO
- Evacuation Planning & Connectivity Issues
- Project Financing
- Project development
- Addressing Variability Risk - Implementation of F&S, Ancillary services
- Support system for Emerging Technologies

Changing RE Procurement models

RE Off-take options in India



Competitive bidding Vs FIT

- FIT has worked well in the RE sector. However ERC determined FITs to be benchmark for reverse auctions.
- Competitive bidding in RE introduced in 2012 which has resulted in low Solar & Wind tariff discovery
- Recently held Competitive bidding in solar & wind has resulted in tariff plummeting to 3.33 Rs/Unit and 3.46 Rs/Unit respectively.
- How can sustainability of Competitive off-take be ensured?

Alternate Market Mechanism (REC)

- REC inventory piling up owing to lack of adequate RPO monitoring & enforcement
- Uncertainty prevails on future REC prices and APPC
- Lenders are cautious while lending to REC projects

OA/Captive Route

- OA charges tend to be prohibitive - affecting the viability of such options
- Captive Rules getting amended
- RE captive transactions under scanner in various States and Discoms denying captive transactions?



Section 86(1): The State Commission shall discharge the following functions, namely:

➤(e) *promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee;*

Renewable Purchase Obligation

- RPO Regulations formulated by almost all SERCs
- Despite Regulations, only few States comply fully
- Not many states have robust institutional mechanisms for monitoring & verification of RPO
- Mechanism lacks stringent enforcement
- In case of non-compliance, penal provisions are unclear

RPO & Tariff Policy 2016

- RPO trajectory to be fixed such that RE to reach **17%** in the total energy mix by 2022 including minimum **8%** from Solar
- SERCs are yet to revise RPO target on the lines of tariff policy

RPO for OA/Captive consumers

- RPO enforcement on Captive and OA consumers – and need for RPO repository – few States initiated process
- Web based tool required so as to Monitor, Record & Report RPO compliance status of OEs to SERC

Issues for Discussion

Aligning grid planning
for RE

Uniform Interconnection
Process

Funding for
Infrastructure

Technical Standards for
grid integration

Renewable Energy
Management Centers

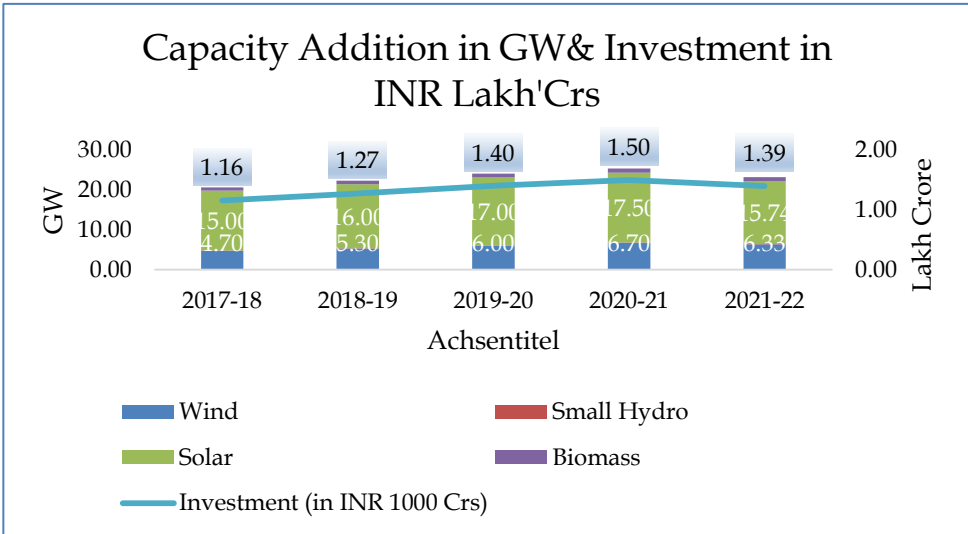
- Need for devising separate planning standards for RE evacuation & the required institutional arrangement?
- Standardization of interconnection procedures at national level at similar voltage levels?
- Uniform and just model for sharing the responsibility and cost of evacuation infrastructure for RE generators?
- Mobilizing fund for setting up transmission infrastructure; Provisions for encouraging private participation
- Applicability of new technical standards by CEA irrespective of age, make & size - CEA to provide adequate clarity
- Roles and responsibilities & Operational protocol for REMCs to be defined ; State Level Vs Regional level

- Debt tenure
- Interest Rate
- Non-recourse debt
- Innovative Funding Mechanism

Issues for Discussion

- Unavailability of longer tenure debt
- High interest rate environment in India
- Debt is not strictly non-recourse
- Allocation of funds from the NCEF to meet critical viability gaps
- Priority sector lending status for RE Financing
- Earmarking at least 20% for RE by Banks & FIs
- Avenues for encouraging retail investors in the sector – SMEs interested in setting up captive RE to be supported with interest rebates

Total Investment requirement of ~7 Lakh Cr by 2022 (estd)



Project development



Key Issues	Development of Land Bank	Identification of Potential Sites	Land Conversion Issues	Consent to Establish and Operate	Infra Transport and Site Development
	Hoarding of Sites	Monitoring/ Data Analysis	Socio-Political Issues	Non Uniform Clearance across States	State Specific Practices
	Number of Sites/MW Installed	Load Analysis	RoW	Socio-Economic and Enviro Impacts	Lack of Site and Grid Connectivity

Issues for Discussion

- | | |
|---|--|
| <ul style="list-style-type: none"> ➤ Preparation of Land Bank at State level ➤ Availability of Resources Potential Map/ Atlas ➤ Addressing RoW issues & compensation | <ul style="list-style-type: none"> ➤ Single window clearance ➤ Clarity on cost sharing of setting up of grid infra-battery limit of developers |
|---|--|

Addressing Variability Risk

- Implementation of F&S, Ancillary services

Implementation of F&S

Ancillary services

Why RE Forecasting & Scheduling?

1

• Limited ability to back-down thermal generation (limitation due to technical minimum)

2

• Low availability of hydro power for balancing (low share of pumped storage)

3

• Low availability of gas-fired thermal power (low availability, high cost)

4

• Lack of regional balancing (lack of inter-State, inter-regional corridor)

Issues for Discussion

- Grid Stability becomes a major issue especially when there is high penetration of Renewable Energy
- Inter-State F&S Regulations in place - notified by CERC
- FOR has published model state level framework for Forecasting and Scheduling. However, implementation of such mechanism at state level would be quite challenging
- Most states does not have a operational ABT/DSM mechanism in place, which would be prerequisite for implementation of DSM
- Development of ancillary market can be used by system operator as one of the tool for grid management.
- Effective Policy and Regulatory framework are required for developing ancillary market in the Country.

Issues for Discussion

RE Hybrid System

Energy Storage Applications

Repowering

Off-shore Wind

Small Wind Turbines

RE Hybrid systems

- Wind-solar, Biomass/Cogen-Solar, SHP-Solar
- Technical Challenges - viz. interconnection arrangements, metering and energy accounting mechanism
- Commercial Challenges - viz. applicable tariff & regulatory treatment for RPO, framework for commercial settlement, off-take arrangements etc.
- Suitable policy guidance and regulatory framework need to be put in place to encourage RE Hybrid systems.

Energy Storage Application

- Framework to tap estimated market potential for energy storage devices/applications which is in excess of 20 GW in India
- Suitable policy incentives and regulatory framework in terms of pricing signal, creation of ancillary market to encourage investment in storage applications

Issues for Discussion

RE Hybrid System

Energy Storage Applications

Repowering

Off-shore Wind

Small Wind Turbines

Repowering

- Turbine - land Ownership, PPA revision, Interrupting current off-take model - implications, Evacuation facilities, Treatment of additional capital cost
- MNRE through Wind mission aims to repower a capacity of 3000 MW during the period up to 2022

Off-shore Wind

- High initial capital cost (2.5 times than on-shore), High Opex cost (up to 7 % of capital cost)
- Consortium led by Global Wind Energy Council (GWEC) is implementing the Facilitating Offshore Wind in India (FOWIND) project.

Small Wind Turbine (SWT)

- Stand alone SWT may not be economical in comparison with Utility scale projects. Addressing the commercial challenges of SWT through hybridization with other RE projects
- Potential policy and regulatory intervention measures necessary for enabling such Hybrid Solutions?

Expected outcome of the Workshop - Way forward



Issues	Actions Required for scale up of RE			Entity with primary Responsibility
	Immediate (6-9 Months)	Medium Term (9-12 Months)	Long Term (12-15 Months)	
Procurement	(Short term Actions to be taken on each aspects)	(Medium term Actions to be taken on each aspects)	(Long term Actions to be taken on each aspects)	(Entities including Associations, MNRE, CERC, CEA, SERC, SNA etc.)
RPO & REC				
RE evacuation				
Financing				
Development				
RE variability				
New technology support				



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Thank You

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