

Leveraging the Rooftops of C&I Sector to Increase Renewable Energy Mix



Image courtesy: Shutterstock

PTC India Limited

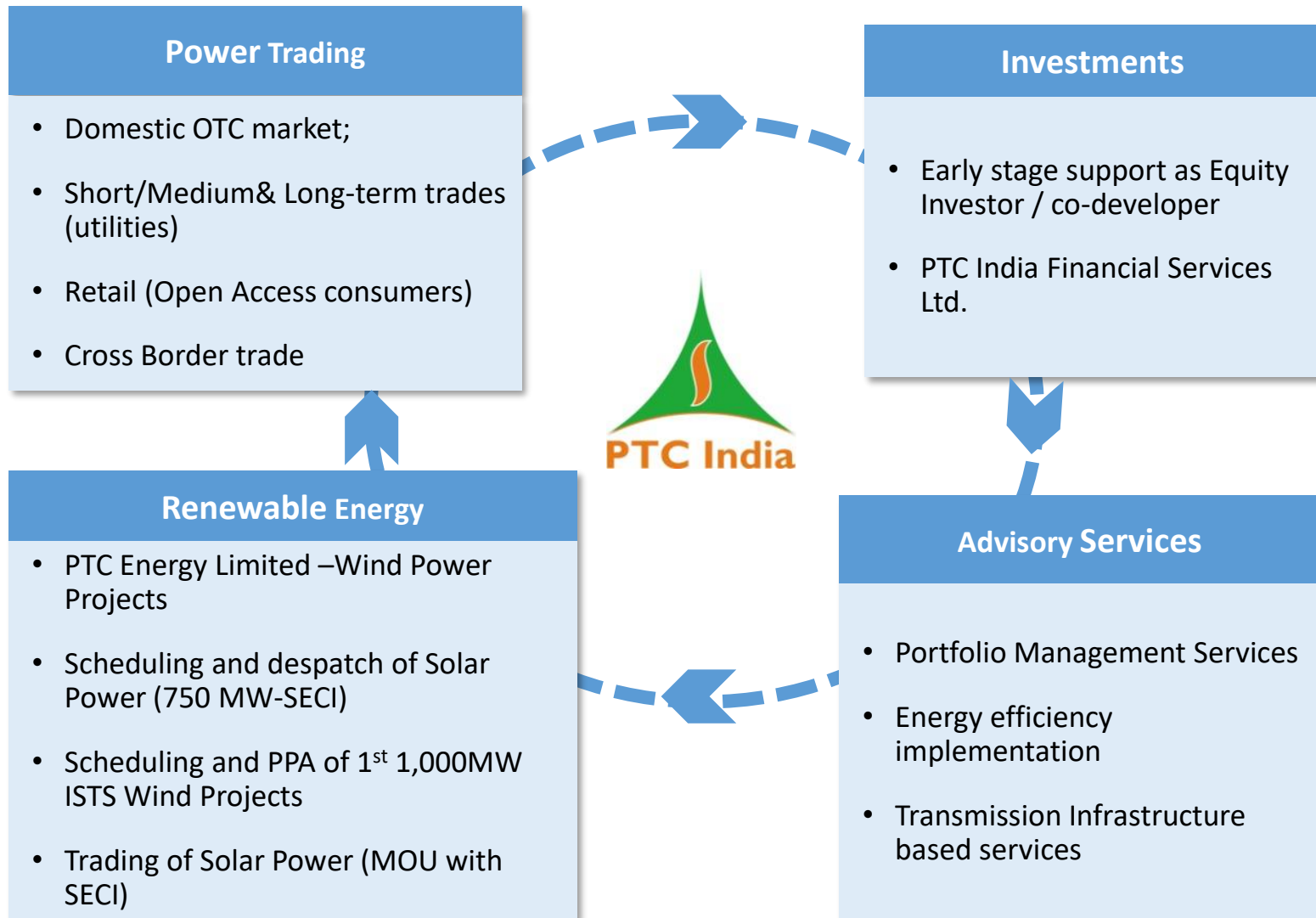


By : Chandra M. Verma
Asth. Vice President,
PTC

PTC: An Integrated Energy Player



PTC India Ltd. (PTC), was established in 1999 by Govt. of India through a Cabinet Decision as a Public-Private Initiative



Wind & Solar Portfolio : Approx. 300 MW operating assets



Project 1 Distt Ratlam, MP

COD	: March 16
Total Installed Capacity	: 30 MW
WTG Supplier	: GAMESA (G97)

Project 2, Distt Mandsaur, MP

COD	: March 16
Total Installed Capacity	: 20 MW
WTG Supplier	: INOX (WT 2000)

Project 3, Distt Vijayapura, KA

COD	: March 17
Total Installed Capacity	: 50 MW
WTG Supplier	: GAMESA (G 114)

Project 4, Distt Kurnool, AP

COD	: March 17
Total Installed Capacity	: 50 MW
WTG Supplier	: GAMESA (G97)

Project 5, Distt Kurnool, AP

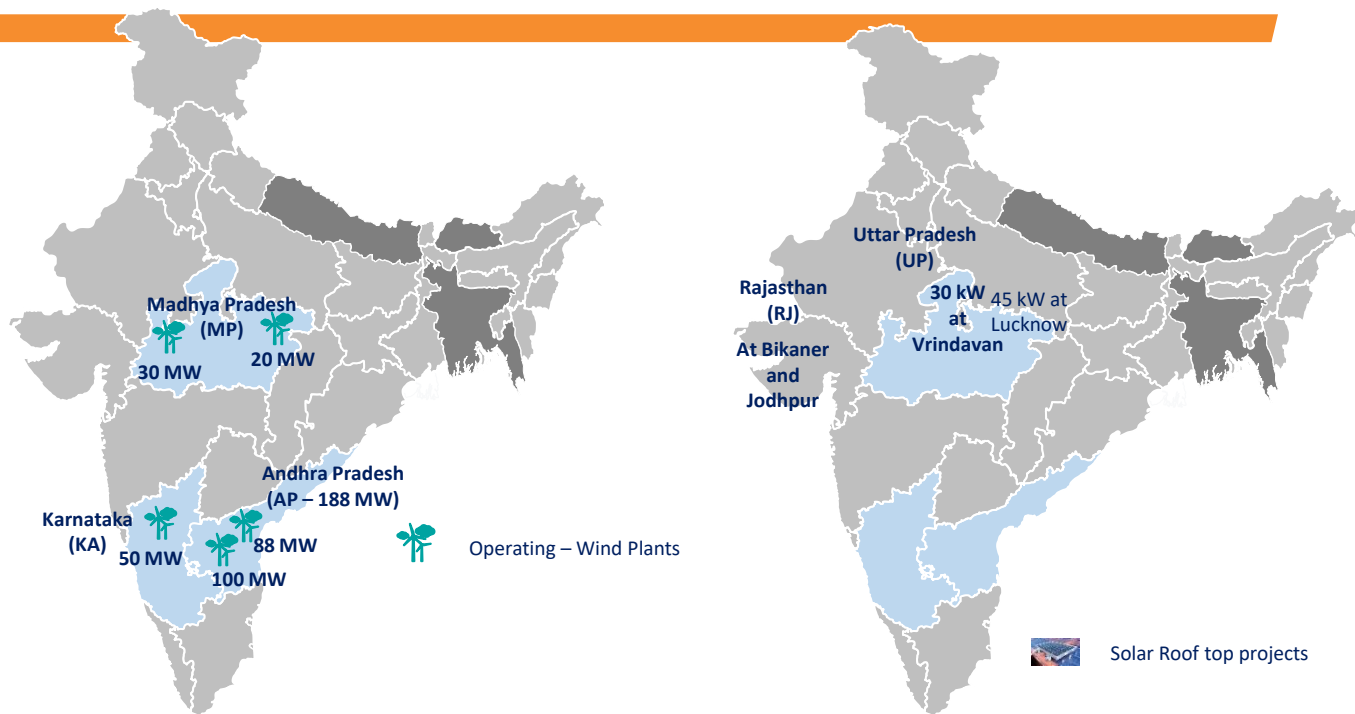
COD	: March 17
Total Installed Capacity	49.5 MW
WTG Supplier	: REGEN (v87)

Project 6, Distt. Kadapa, AP

COD	: March 17
Total Installed Capacity	: 49.3 MW
WTG Supplier	: GE

Project 7, Distt. Kadapa, AP

COD	: March 17
Total Installed Capacity	: 40 MW
WTG Supplier	: INOX



Project: 1 45kW Solar PV Roof top at Akshaypatra Foundation, Lucknow, Uttar Pradesh

Project: 2 30kW Solar PV Roof top at Akshaypatra Foundation, Vrindavan, Uttar Pradesh

Project: 3 & 4 60 kW Solar PV Roof top at Akshaypatra Foundation, Bikaner and Jodhpur premises

Agenda



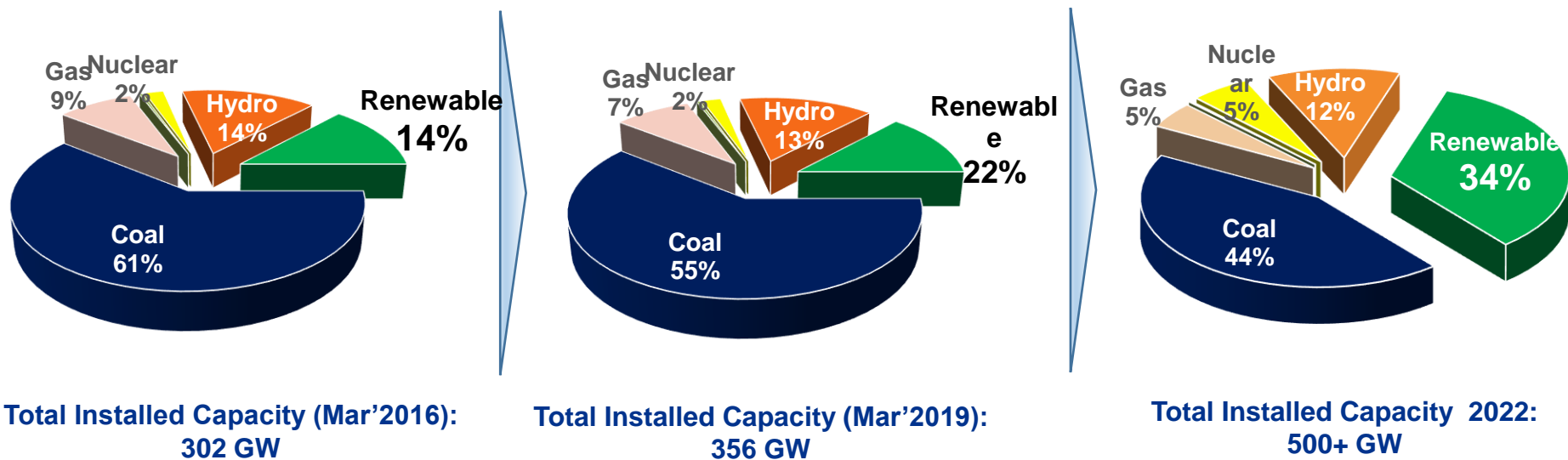
Image courtesy: Shutterstock

About PTC

Presentation Guiding Points

Change in India's Energy Mix

• Change in RE Mix of India : Opportunities and Challenges



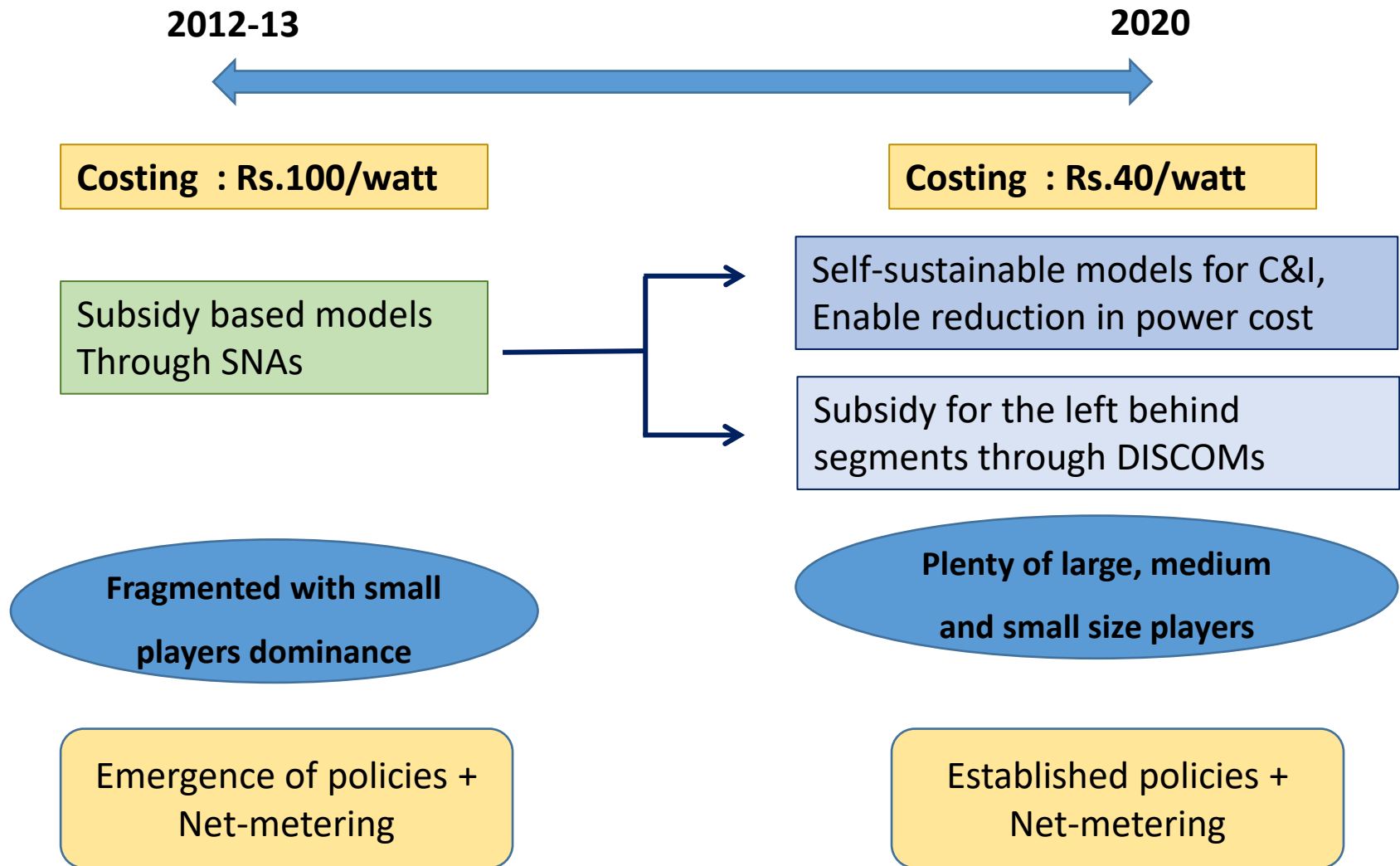
Renewable Energy portfolio increases from 14% (in 2016) to 23% (at present in Dec'2019) and expected to increase to 34% (in 2022) in total energy mix

- Recent policy and Govt. targets as well as focus in renewable sector gives a change in energy mix of the country
- Govt. has continued focus on Renewable Energy Implementation – Continuous reforms
- Renewable energy remains the most favorable choice of capacity addition

- **Why to take leverage of roof top** implementation for C&I segment ?
- **Key aspects, policy framework and opportunities in roof top implementations**
- **Key issues** in operationalizing and O&M

- **Why to be a part of** renewable energy adoption in C&I segment?
 - Opportunity to adopt and be part of change in India's Power Generation scenario
 - Social Responsibility to shift from Fossil based fuel systems to Renewable based system
 - **Conducive policy framework in place** for easy adoption
 - **Continuous reform** and addressing the pain areas of the system
 - **Financial benefits to the corporates and industry**

Key changes in renewable energy implementation



**Increase Discom participation and Discom Integration at all stages not only net-metering:
SRISTI (“ Sustainable Rooftop Implementation for Solar Transfiguration in India”)**

On Going Programme on Rooftop Solar (RTS) Implementation :

- Central Financial Assistance (CFA) of 5,000 Cr. for Grid Connected Rooftop up to FY 2019-20
- 4,200MW Implementation (out of a total target of 10,000MW) was planned through CFA by the year FY 2019-20
- Implemented by State Nodal Agencies (SNA’s), Solar Energy Corporation of India (SECI), Public Sector Undertakings (PSUs) and other Government Agencies (GAs).
- **The total installed capacity of grid-connected rooftop solar panels in India is 2.3 gigawatts (GW), well short of the 2022 target of 40GW.**
- There is a gap in RTS implementation.

Issues in Implementation of the scheme :

- Multiple tenders by different agencies and subsequently considerable delay in tendering.
- Involvement of multiple stakeholder viz. SNAs, DisComs, PSUs, Developers etc.
- **Reluctance of DisComs due to revenue loss; availability of net meter; CEIG inspection etc.**

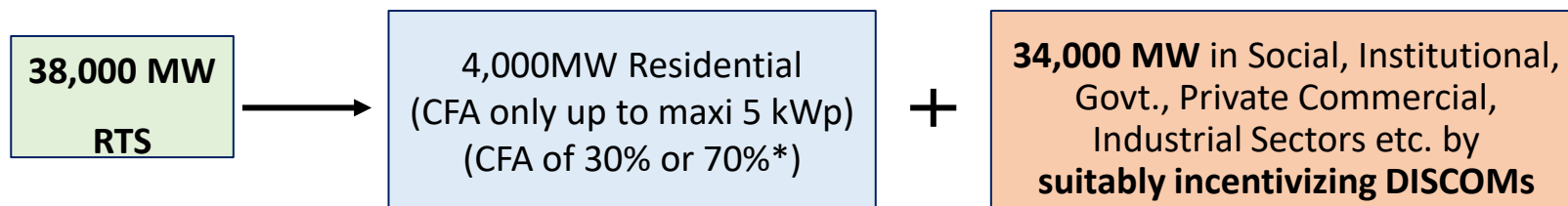
On Going Programme - renewable energy implementation plan

Proposed Concept on Rooftop Implementation Scheme - SRISTI

Two type of incentives are proposed:

- 1) Central Financial Assistance for Residential Sector
- 2) Scheme to Incentivize DisComs

- DISCOMs at forefront as key drivers for rapid deployment of RTS
- Incentives to enable DISCOMs to create an enabling ecosystem for expeditious implementation of RTS projects in their area.



- CFA to be provided to capacity of maximum 5kW in residential building.
- CFA to be provided directly to the installation agencies (enlisted by Discom via competitive bidding)

34,000 MW in Social, Institutional, Govt., Private Commercial, Industrial Sectors etc. by suitably incentivizing DISCOMs

Incentive for Dis-Coms in the scheme :

- Incentives planned to enable DisComs to create an enabling ecosystem for expeditious implementation of RTS projects in their area.
- Participating DisComs to submit the cumulative capacity of grid connected RTS plants (in MWp) installed in their jurisdictional area as on 31st March 2019. This shall be taken as **installed base capacity**.
- **Incentives will be given on incremental RTS capacity installed by the DisComs from the installed base capacity** as per parameters listed in Table-1

Table-1 (Incentive proposed for Discom in SRISTI)

S. No.	Parameter	Incentive to be Provided
1.	For installed capacity achieved above 10 % and up to 15 % over and above of the installed base capacity* within a financial year	5% of the applicable cost** for capacity achieved above 10 % of the installed base capacity
2.	For installed capacity achieved beyond 15 % over and above of the installed base capacity* within one financial year	5% of the applicable cost** for capacity achieved above 10 % and up to 15 % of the installed base capacity PLUS 10 % of the applicable cost** for capacity achieved beyond 15 % of the installed base capacity

Tasks to be taken by Discom: The tasks taken by DisCom shall include but not be limited to :

1. Providing dedicated manpower for RTS implementation,
2. Rooftop assessment,
3. Bid process management, technical studies,
4. Upgradation in ERP system/components,
5. Providing time bound services to RTS consumers,
6. Inspection and monitoring of RTS plants,
7. Online database management of commissioned capacity,
8. Consumer awareness and publicity,
9. Ensuring availability of net-meters,
10. Empanelled vendors along with rates, Providing grid connectivity etc.

- **Few states policies :**

- **State Policies (exy. Rajasthan Net Metering Policy) :**

Grid connectivity subject to the following conditions

1) Maximum Rooftop PV Solar Power Plant capacity shall not be more than 80% of the sanctioned connected load/contract demand of the consumer

2) Cumulative capacity shall not exceed 30% of the capacity of the distribution transformer

Detailed net-metering procedure, guidelines including Standards and Safety related to Interconnection with the Grid are in place - islanding condition.

- **Few states policies :**

- **RPO Obligations**

- Requirement posed by Central/State agencies
- Stringent enforcement by MNRE/MOP – Single tracking window

- **Launch of SARAL**

- Launched the State Rooftop Solar Attractiveness Index- SARAL on 21 August 2019.
- To assess the initiatives taken so far and what state it can do to improve its solar rooftop ecosystem
- incentivize rooftop solar by creating healthy competition among the States.
- Designed collaboratively by the MNRE, Shakti Sustainable Energy Foundation (SSEF), Associated Chambers of Commerce and Industry of India (ASSOCHAM) and Ernst & Young (EY)

State Rank	Name
1	Karnataka
2	Telangana,
3	Gujarat
4	Andhra Pradesh

SARAL currently captures five key aspects:

1. Robustness of policy framework
2. Implementation environment
3. Investment climate
4. Consumer experience
5. Business ecosystem

- **Few states policies :**

- **Evolution of RE Encouraging State Policies :**

- **HERC Policy** on exemption of open access charges for 3rd party sale and captive power consumers : As per Haryana Solar Policy, the electricity taxes and cess, wheeling charges, CSS, transmission and distribution charges are totally waived off for Solar projects.
- **Maharashtra analysis** of purchase of RE power through open access compared to purchasing power on HT Express Feeders
- **Karnataka** – Solar power generators in the State achieving CoD between 1st April 2013 and 31st March 2018 and selling power to consumers **within the State on open access or wheeling shall be exempted from payment of wheeling and banking charges and cross subsidy surcharge for a period of ten years** from the date of commissioning
- **DERC Regulation (RPO and REC Framework Implementation 2012):** Open access consumers receiving electricity from renewable energy sources shall be exempted from the cross subsidy surcharge (CSS) to the extents of RPO. However, no banking facility shall be provided for supply of electricity from renewable energy sources through open access.
- The renewable energy system under net metering system shall be exempted from wheeling, banking, cross subsidy and other charges for a period of Five years

- **Key consideration in renewable energy implementation :**

- **Evolution of RE Encouraging State Policies :**

- **Maharashtra analysis** of purchase of RE power through open access compared to purchasing power on HT Express Feeders

Charges	Amount (in Rs./Unit)	Remarks
Rooftop Solar / Solar tariff (A)	4.5/unit (for a Solar plant installed in Maharashtra)	
Open access charges (B)	3.85/unit (for HT consumers at 33kV)	includes transmission losses, transmission charges, wheeling losses, wheeling charges, cross subsidy surcharge, additional surcharge
Solar Tariff including open access charges (A+B)	8.35 /unit	

Tariff charges by Discoms in MH:

- HT-I Commercial Express feeder Tariff = **11.40/unit**

The Solar generation and electricity sale to third party still seems offering a cost advantage of **Rs. 3.05/unit** (i.e. 11.40-8.35) in ongoing scenario.

Emerging trends : in renewable energy procurement

RE commitment :

- **RE procurement / branding : DMRC**
 - **First metro to avail CDM benefits,**
 - **Procuring 250MW Solar power from Rewa, MP**
 - **Zero carbon emission**

The Best **CDM** Award was given to **DMRC** for its Modal Shift Project under which category, it has become the **first Metro** Rail and Rail based system in the world to be certified by the United Nations (UN), which will get carbon Credits for reducing Green House Gas Emissions as it has helped to reduce pollution levels in the ...

www.delhimetrorail.com › whatnew_details

[Delhi Metro Wins Award For Best Clean Development ...](#)

www.delhimetrorail.com › press_reldetails ▼

[United Nations registers DMRC's Project to ... - Delhi Metro](#)

Delhi Metro has earned Rs 9.5 crs (9,55,27,441 INR) through earlier **Clean Development**

Mechanism (CDM) projects i.e Regenerative braking and modal shift projects, between January, 2004 and 2012. The Gold Standard registration has helped **DMRC** to earn 7000-7500 amount of VERs (credits) per annum for next ten years.

www.eqmagpro.com › dmrc-to-run-on-100-percent-solar-energy-by-... ▼

[DMRC to run on 100 percent Solar Energy by 2021 – The ...](#)

Apr 22, 2019 - **DMRC** to run on 100 percent **Solar Energy** by 2021 ... **Power purchase** agreement between the Madhya Pradesh **Power Management Company** and **DMRC** ... Rewa will give 345 Million units of **power** to the **DMRC** every year.

Emerging trends : in renewable energy procurement

RE commitment :

- RE procurement / branding : DMRC



DMRC has rooftop solar project at its **53 stations and 12 depots** producing a total of 28 MWp or 22.6 million units of electricity. DMRC aims to power all its **271 stations in the next two years**.

In addition to the rooftop solar power, DMRC is getting 250 MWp of solar power from Rewa Ultra Mega Solar Limited in Madhya Pradesh at a **cost of INR 2.97 per unit for 25 years**.

PTC supplying power through exchange

Emerging trends : in renewable energy procurement

RE commitment :

- RE procurement / branding : Infosys.... Branding advantages..

Key Facts. Through its **energy** efficiency programs, **Infosys** has reduced 55.05% of its per capita **energy** consumption since 2008. 44% of Infosys' electricity requirements are met through renewable sources. The company aims to transition to 100% **renewable energy** by 2020.

[unfccc.int](#) › [momentum-for-change](#) › [climate-neutral-now](#) › [infosys](#)

[Infosys' Journey to Carbon Neutrality | India | UNFCCC](#)

[www.infosys.com](#) › [Newsroom](#) › [Press Releases](#) ▼

Infosys Becomes the First Indian Company to Join RE100 ...

Infosys Becomes the First Indian Company to Join RE100 Renewable Energy Campaign.

Bangalore, May 18, 2015. The Climate Group today announced that ...

Leveraging the Rooftops

A larger perspective to be a true international
committed to environment

KFW – Commitment in 2,000MW Pavagoda Solar Park - Karnataka

RE commitment :

- RE procurement / branding : Facebook.... Branding advantages..

www.cnbc.com › 2018/08/29 › facebook-just-made-a-huge-commitm... ▼

[Facebook just made a huge commitment on renewable energy](#)

Aug 29, 2018 - **Facebook** just made a huge commitment on renewable energy ... global operations with 100 percent renewable energy by the end of 2020. ... many more companies stepping up to adopt aggressive renewable energy and ...

www.greenbiz.com › article › facebook-gets-specific-about-its-100-pe... ▼

[Facebook gets specific about its 100 percent renewables target](#)

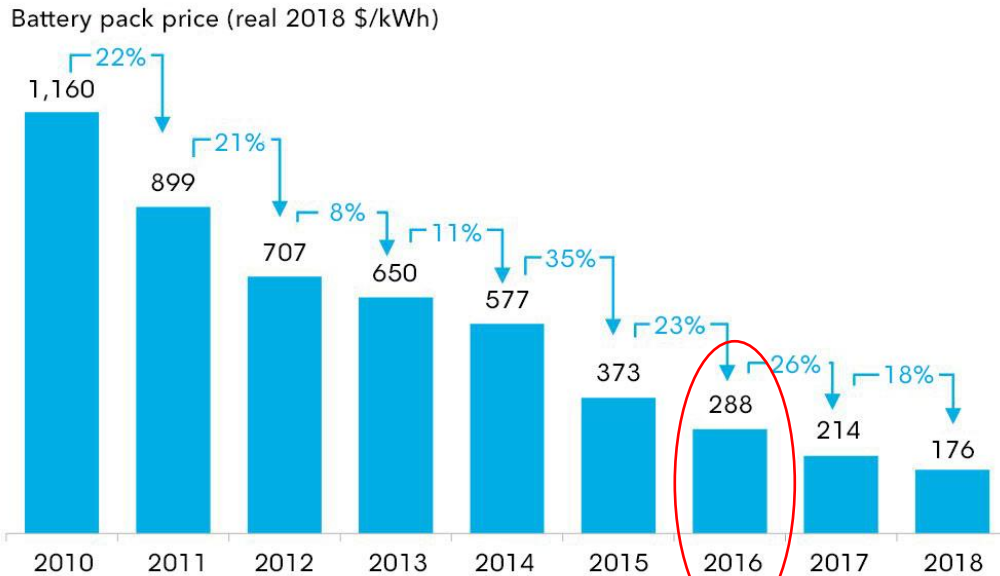
Aug 30, 2018 - **Facebook** gets specific about its 100 percent renewables target ... than anticipated), which was **adopted** after reaching the 25-percent mark. ... "We are proud of the impact our **renewable energy** program is having on local ...

Emerging trends : in renewable energy procurement

- **Key issues in operationalizing the selected renewable energy plan :**

- **Emergence of battery storage systems:**
 - Price trend of battery storage system

Lithium-ion battery price survey results: volume-weighted average

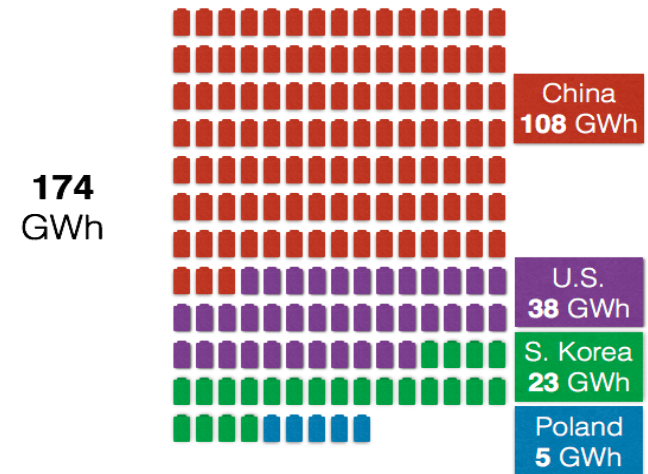


Source: BloombergNEF

Average battery pack price (in \$ per kWh)

Case study of NTPC-Andaman projects

2020 Lithium-ion capacities



China seems a dominating market leader in Li-ion Battery Production worldwide

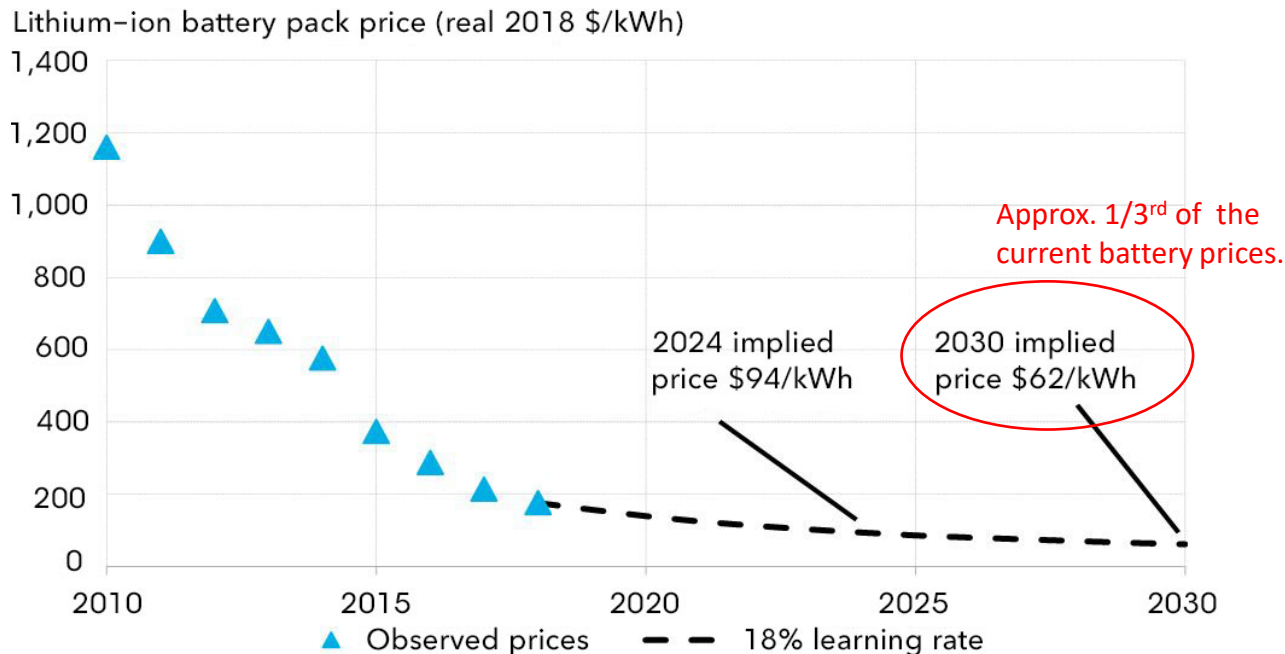
Force Majeure

- **Key issues in operationalizing the selected renewable energy plan :**

- **Emergence of battery storage systems:**

- **Price trend of battery storage system : Future ahead and link with rooftop installations**

Lithium-ion battery price outlook



Source: BloombergNEF

Source: BloombergNEF

- **Re-negotiation of Renewable PPAs**
- **Smooth O&M of roof-top installation esp. during breakdown periods**
- **Grid Integration challenges :**
 - Low usage of transmission network implemented for RE projects
 - Hybrid Solutions
 - Balancing Power requirements : Forecasting & Scheduling challenges
 - Green Corridors part : Transfer of power from rich RE potential states to low RE potential states with exemption of ISTS charges
 - Change in RE Mix of India in generation capacity
- **Large size ground mounted solar PV projects:**
 - Availability of large size land parcels
 - Most of the solar rich states have completed their RPOs. The States with low solar radiation to buy from Inter-State transmission system

- **RPOs and to reduce cost of power:**

- **DISCOMs short term power procurement to meet their RPOs:**

- TPDDL has awarded a contract to PTC for supplying renewable solar power up to 300MW (from May 2020 to Sept 2020).
- These short term RE power transaction are emerging for Discoms. Upcoming products in exchange would further enable these kind of contracts.

Tata Power-Delhi Distribution Limited (TPDDL) : Procurement Of Renewable Power (Non-Solar) On Short-Term Basis

Period	Time Block (hrs.)	Qauntum (MW)	Minimum Bid Quantity (MW)	Delivery Point
May-20	00:00 to 24:00	Upto 150	4	Delhi Periphery i.e the interconnection point of Central Transmission Utility (CTU) system with State Transmission Utility (STU) system of Delhi.
Jun-20	00:00 to 24:00	Upto 150	4	
Jul-20	00:00 to 24:00	Upto 150	4	
Aug-20	00:00 to 24:00	Upto 150	4	
Sep-20	00:00 to 24:00	Upto 150	4	
1-15 Oct-20	00:00 to 24:00	Upto 150	4	

Source: TPDDL Mercom India Research

- Procuring of renewable (non-solar) power on a short-term basis for meeting its renewable purchase obligation (RPO).
- Vendor shall also be responsible for booking the open access transmission corridor to the regional load dispatch center (RLDC)

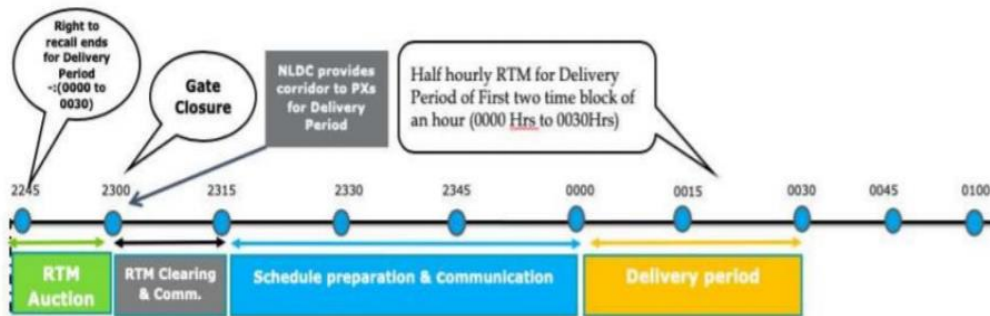
- **PTC Nodal agency in signing PPAs of first 1,000MW ISTS Wind Power Projects**

Emerging trends : in renewable energy procurement

- Opportunities available in procuring RE power to meet RPOs and to reduce cost of power:

- Energy Exchanges operating in India
 - Real Time Market benefits – RE Products

Day-Ahead Market	• <i>Delivery for next day, Price discovery: Closed , Double-sided Auction</i>
Term-Ahead Contracts	• <i>For delivery up to 11 days, Daily Contracts, Weekly Contracts</i>
Renewable Energy Certificates	<ul style="list-style-type: none">• <i>Green Attributes as Certificates</i>• <i>Sellers : RE generators not under feed in tariffs</i>• <i>Buyers: Obligated entities; 1MWh equivalent to 1 REC</i>



Emergence of Real Time Market and RE based products

Opportunities to join upcoming power exchanges

- **Emerging opportunities in enhancing RE penetration :**

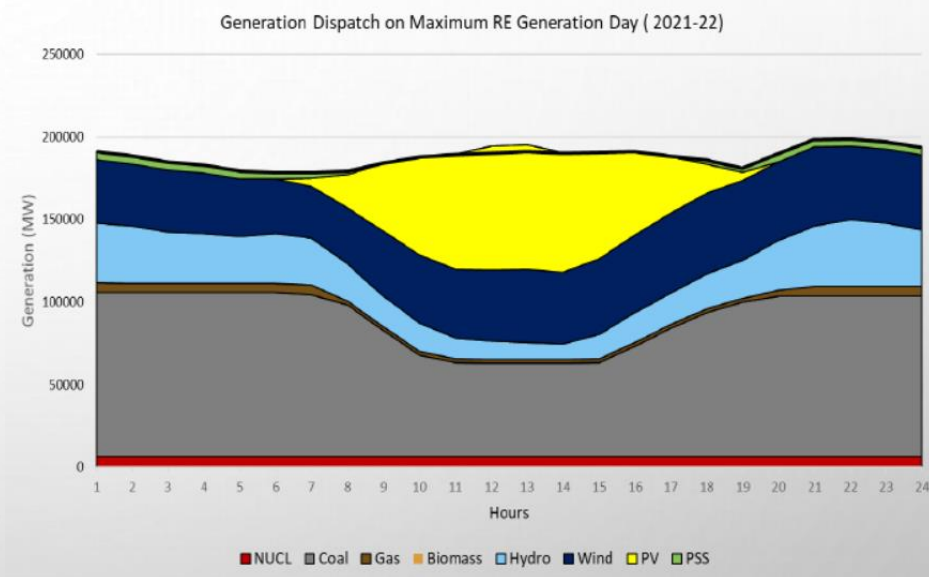
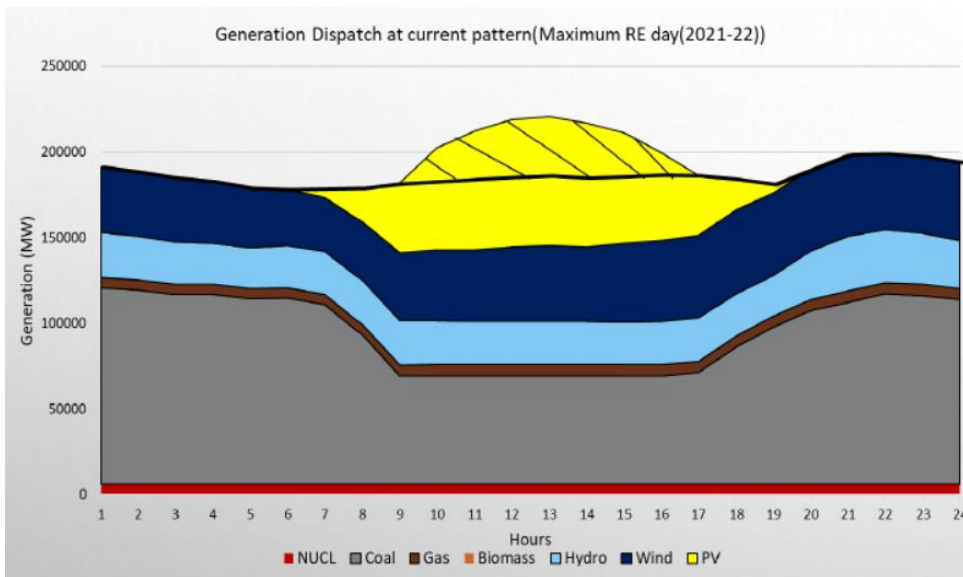
- **Exemption/reduction of GST on Solar items (There has been 5% to 18% on various items)**
- **Exemption/reduction of duties on Solar panel import to bring down the tariff**
- **Introduction of compensation on grid outage in solar tenders / Concept of deemed Generation**
 - Introduced in recent and upcoming tenders
 - Must run status to be maintained by States
 - Curtailment issues in RE potential states
- **Focus on Green Financing to encourage projects**
- **Incentives to companies having a rising trend of green energy usage in their overall consumptions**

Key Issues & considerations for drafting a renewable energy implementation plan

• Key issues in operationalizing the selected renewable energy plan :

Generation Dispatch at Current Pattern (2022)

Generation Dispatch on Maximum RE generation day (2022)



Renewable Energy portfolio increases from 14% (in 2016) to 34% (in 2022) in total energy mix in six years period

- Loss in efficiency at partial loading , Also requires retrofitting in existing thermal stations
- Investment towards retrofitting to run plants at low loads
- Hydro projects are run off river and multipurpose projects – but have to be operated during off peak hours

Thank You



Image courtesy: Shutterstock