Regulations for the Evolving "Green Grid "of the 21st Century

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India's Commitment towards Net-Zero

INDIA'S 'PANCHAMRIT' AT COP26 IN GLASGOW

1. India will increase its non-fossil energy capacity to 500GW by 2030
2. India will meet 50%of its energy requirements from renewable energy by 2030
3. India will reduce the total projected carbon emissions by one billion tonnes from now to 2030
4. By 2030, India will reduce the carbon intensity of its economy by 45% (from a previous target of 35%)
5. By 2070, India will achieve the target of net zero

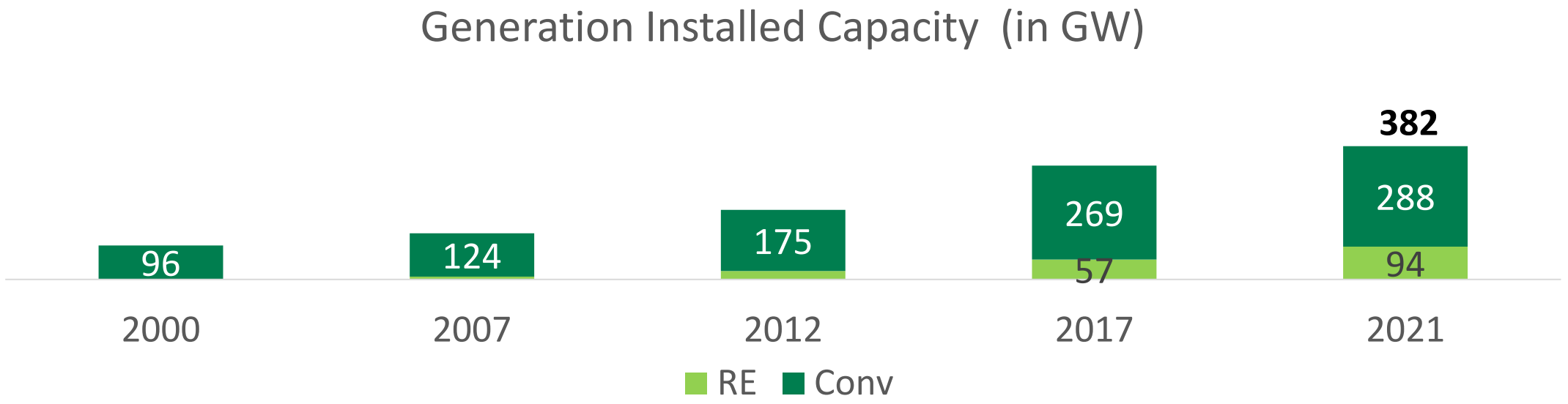
WHAT IS NET ZERO?

Net zero refers to a balance where emissions of greenhouse gases are offset by the absorption of an equivalent amount from the atmosphere. Experts see net zero targets as a critical measure to successfully tackle climate change and its devastating consequences

PLEDGES BY TOP THREE EMITTERS

- CHINA: Beijing announced no new pledges on Monday. It previously pledged net zero by 2060.
- UNITED STATES: The US touted domestic legislation to spend $555bn to boost renewable power and electric vehicles. It has pledged net zero by 2050.
- INDIA: The country's economy will become carbon neutral by the year 2070

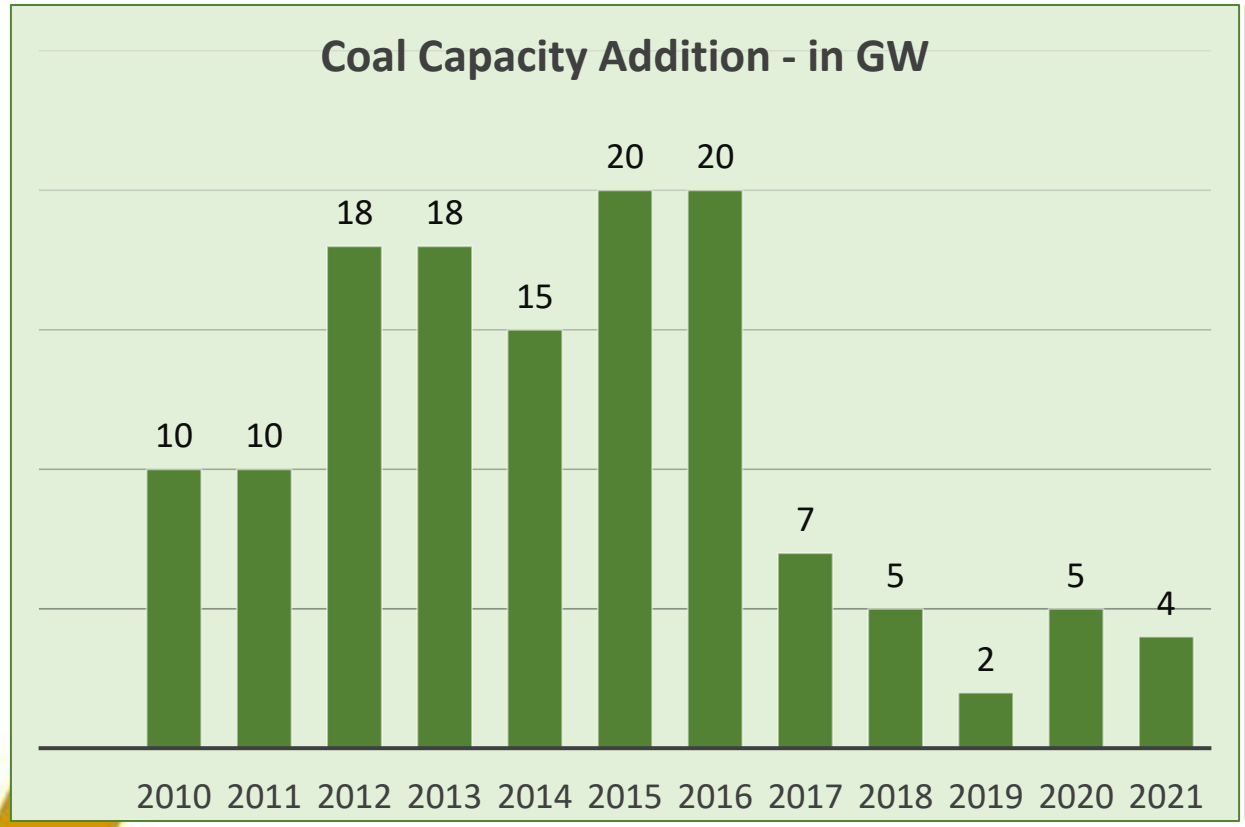
The Grid of the 21st Century …

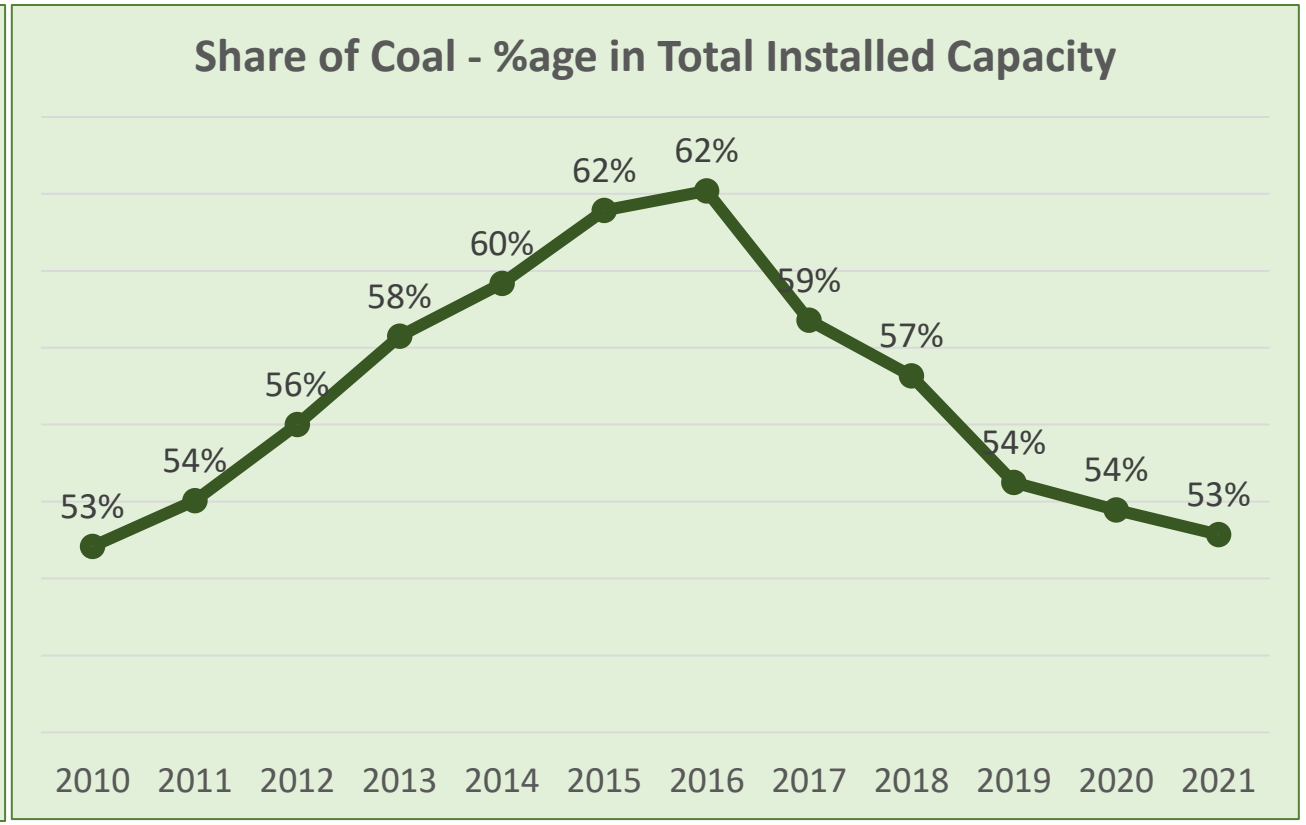


Source: Ministry of Power website

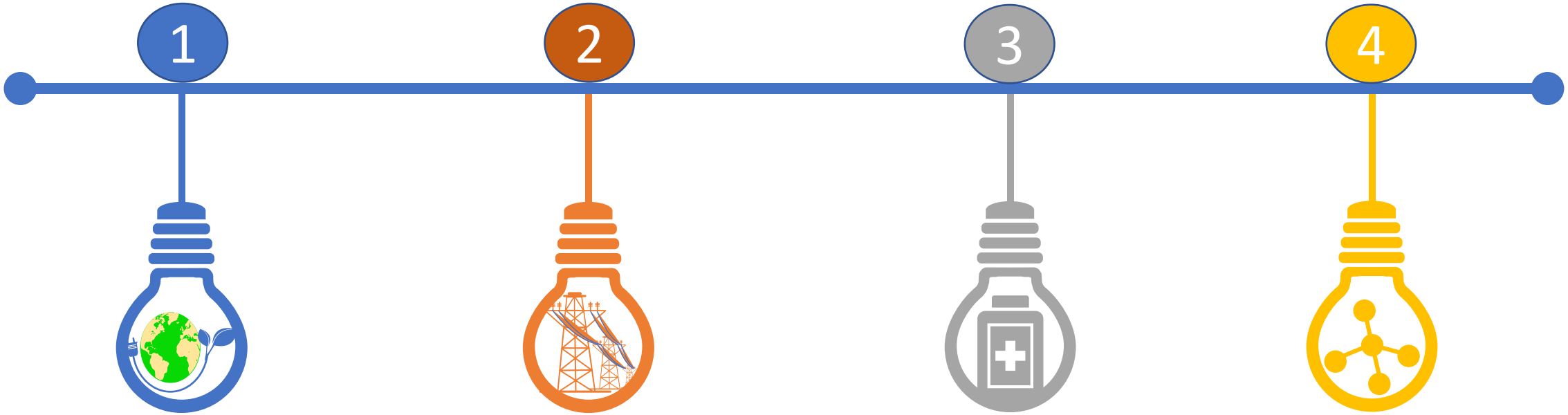
- As of H1-FY22, India had **102 GW of RE capacity** - ~40% of installed capacity and ~150 MW of Clean Capacity (including Large Hydro)
- Targeting ~**500 GW** of **RE capacity by 2030 - ~65-70% of installed capacity**

Change in power mix





Key Implications for the Green Grid of the 21st century



Supply – Generation

Demand – Distribution

Technology

Grid Flexibility

1. Demand from Discoms & Customers

- Fiscal Health of the Discoms – Regulatory Assets and Lack of Cost-Reflective Tariff - Elephant in the Room!
- Long term Trajectory for RPO (currently most states have visibility till FY23) in line with targets set at National Level
- Stricter penalties and enforcement for non-adherence of RPO

- Stability & longer term clarity in Open access – Fair to all Customer Categories – Subsidized & Subsidizing (Full, RTC vs. Partial Open access)
- Green Energy Tariffs to encourage customers < 1 MW to also avail RE (as done by Hon'ble MERC)

Fiscal Health – Indian Power sector

National Avg. AT&C Loss – **20.9%**

ACS-ARR Gap **0.51 Rs./Unit**

DISCOMs Overdue – **1.22 Lakh Cr.**

Regulatory Asset – **~80,000+ Cr.**

2. Supply – Generation

- Enforcement/ Adherence to PPA conditions w.r.t. curtailment, attempts to renege PPAs, etc.

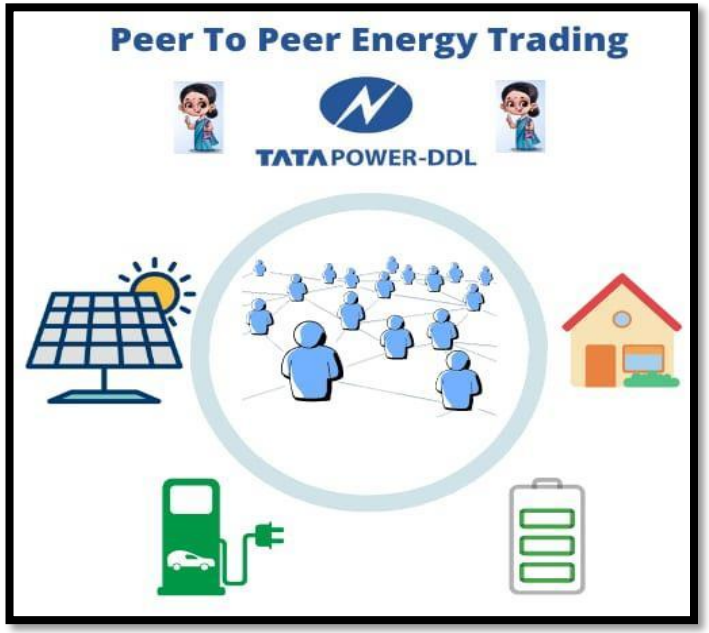
- New RE capacities not signed up by States – due to expectation of lower tariffs in future *(as opposed to increasing commodity prices & impact of customs duty levied on cells & modules to encourage Domestic manufacturing)*

- Rooftop- Peer to Peer Trading can increase the scale of rooftop solar as it makes rooftop attractive for both Prosumers and Consumers

Peer-to-Peer Energy Trading

Pilot Demonstration – Jan to Oct 21

Different Trading Models – Fixed Price, Dynamic Price



Total Participants - 117 (55 Prosumers + 62 Consumers)

Total Energy Traded in Pilot Period of 10 Months – 0.23 MU

Mix of Consumers – Domestic / Non domestic

Average Tariff Rate kept for Selling/Buying – 7.5 Rs/Unit.

TATA POWER-DDL Powerledger ISGF India Smart Grid Forum

Technological interventions

- Battery Storage essential for Energy Transition - Central Electricity Authority (CEA) has modelled that ~27GW/108GWh of energy storage is needed by 2030.

- **Power System Development Fund with SLDC and RLDCs** can be utilized for **setting up of the ESS** as it's the integral part of the power system and behaves as **ancillary / critical backup service – Need for a system view**

- **Mandatory Storage –** Each RE project/ Substation in Transmission/ Distribution should have mandatory storage component to create energy reserves; especially targeting the projects with constrained Transmission Capacities

- **Green Hydrogen policy** is a good starting point as it is a cleaner substitute for natural gas & fits the purpose of storage –

Flexibility

- **Flexibilities** in the regulations to operate under the **intermittent nature** of wind and solar power generation.

- Currently, RE **generators** are allowed to change their **real time schedule** with in **4-5 time blocks** whereas **DISCOMs are bound to operate** or can revise their schedule after **8th time block**. As the scale of RE grows, better and more accurate forecasting mechanisms are needed.

- **Distributed Energy Resource (DER)** – Regulators to enable Discoms to deal with intermittent energy (Supply and Demand)
  - Critical Peak Pricing / Rebate
  - Meaning Time of Use/ Time of Day (to shift evening peak)

Demand Response

Collaboration with AutoGrid (Tech.) & Shakti Foundation (Fin.)

AI based Incentive linked program (July – Oct 21)

TATA POWER-DDL

AutoGrid

SHAKTI SUSTAINABLE ENERGY FOUNDATION

Total Customers connected: 4449; Enrolled: 2044; Participated: 1990

Total Load Shed 7.69 MW in 16 events (11 Day & 5 Night)

Regulations needs to encourage…

- Dealing with infirm nature of renewables
- Scaling up of Storage technologies – Batteries, Hydrogen, etc.
- Alternatives to reliable Base load power source – as Coal based power phases out in the next 2 decades
- Managing increased variability of demand (Electric Vehicles)
- Managing Distributed Energy Resources (Rooftop Solar, Behind-the-meter Batteries, Vehicle to Grid, etc.)

Thank You

For discussions/suggestions/queries email: www.indiasmartgrid.org
www.isgw.in
Links/References (If any)

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