

## India added 521 MW of rooftop solar in Q2 2021'

The target set for installed solar energy capacity is 100 GW by March 2023 – 40 GW rooftop solar and 60 GW ground-mounted utility scale.

- However, according to data by the Central Electricity Authority (CEA) under the Union Ministry of Power, India has managed to install only 43.94 GW by July 2021.
- The rooftop solar installation has been particularly dismal.

According to Mercom India Research's newly released Mercom India Rooftop Solar Market Report Q2 2021, India has added 521 MW of rooftop solar capacity in the second quarter of the calendar year 2021, which is the highest capacity installed in a quarter.

## 'Lockdowns slowed green energy push'

According to a report by the Institute for Energy Economics and Financial Analysis (IEEFA), lockdowns slowed renewable energy installations in the country.

### Key Highlights of the Report:

- India has said that it would install 175 gigawatts (GW) of green energy by 2022 and 450 GW by 2030 but only 7 GW of such capacity was added in the financial year 2020-21.

- The pace of renewable energy installation is lagging behind India's 2022 target.

- In its analysis of monthly volumes and prices at the Indian Energy Exchange (IEX) (the largest power exchange in India), the IEEFA study found that the amount of power traded increased by 20% over 2020,

by 37% from the 2019 figure and by 30% over 2018.

- This led to prices on average increasing by 38% from the 2020 rates.

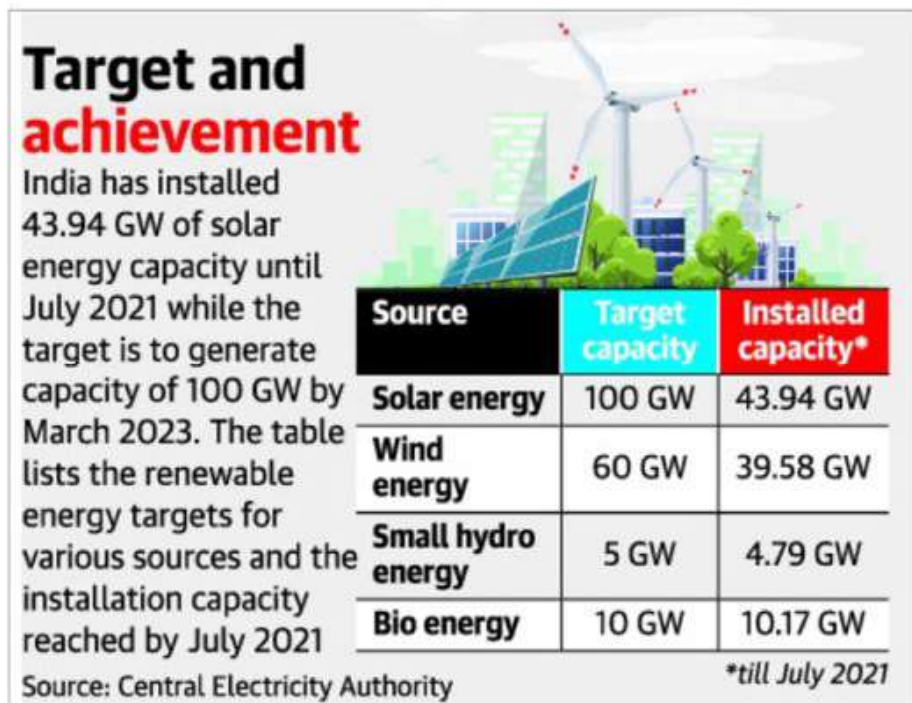
- Had there been more access to renewable energy, particularly wind and hydropower, it could have contributed to lower energy prices.

- Coal stocks hit a new record high at the end of 2020-21 and exceeded the monthly averages of the previous five years.

- Greater reliance on coal imports will increase thermal power prices in India, leading to higher prices for the ultimate consumer.



## Renewable Energy Targets and Achievement:



### Suggestion:

- The electricity system needs flexible and dynamic generation solutions such as battery storage, pumped hydro storage, peaking gas-fired capacity and flexible operation of its existing coal fleet.
- Government should accelerate the deployment of such sources to help meet peak demand and also balance the grid at a lower cost.

## India's solar capacity: Milestones and challenges

### India's Efforts in Solar Energy & Manufacturing Capacity:

- In 2021, India added a total of 10 Gigawatts (GW) of solar energy to its installed capacity.
- India already has more than 50 GW of installed solar capacity.
- India's capacity additions place the country 5th in the world in terms of solar power deployment, accounting for about 6.5 % of total worldwide capacity.
- According to Crisil, India has 3 GW of solar cell production capacity and 8 GW of solar panel production capacity.

### Why is India falling short in roof-top solar installations?

- The sharp increase in large-scale ground-mounted solar energy is symptomatic of a significant drive across the country to increase the share of utility-scale solar projects.

- There seems to be a greater focus on such projects over smaller rooftop projects.
- Residential consumers and Small and Medium Enterprises (SMEs) that want to install rooftop solar (RTS) have limited financing options.
- RTS continues to have limited penetration across the country, owing to lukewarm responses from DISCOMS to adopting net metering.

### Challenges to India's solar power capacity addition

- Despite large increases in installed solar capacity, solar energy's contribution to the country's power output has not kept pace.
- For example, solar power generated only 3.6 % of India's total electricity generation in 2019-20.
- Domestic solar manufacturing capacity is insufficient to meet the country's current prospective demand for solar energy.
- Land costs, substantial T&D (expand) losses and other inefficiencies, and grid integration issues continue to plague the utility-scale solar PV business.

- Conflicts with local people and biodiversity preservation norms have also arisen under large scale solar power plants.
- Furthermore, because India lacks the capacity to manufacture solar wafers and polysilicon, there is no backward integration in the solar value chain.

### Recommendations:

- For solar systems, India has to embrace a **circular economy** approach.
- Recycling and reuse of solar PV waste throughout the solar PV supply chain.
- India may want to consider adopting norms for **Extended Producer Responsibility (EPR)**, resolving waste management and supply-side restrictions.
- New financial mechanisms to lower lending costs and lower the risk of investment for lenders.
- Increased knowledge and accessible financing for solar projects could help ensure that solar devices are used by a large number of SMEs and households across the country.

## Hits and misses: India's solar power energy targets

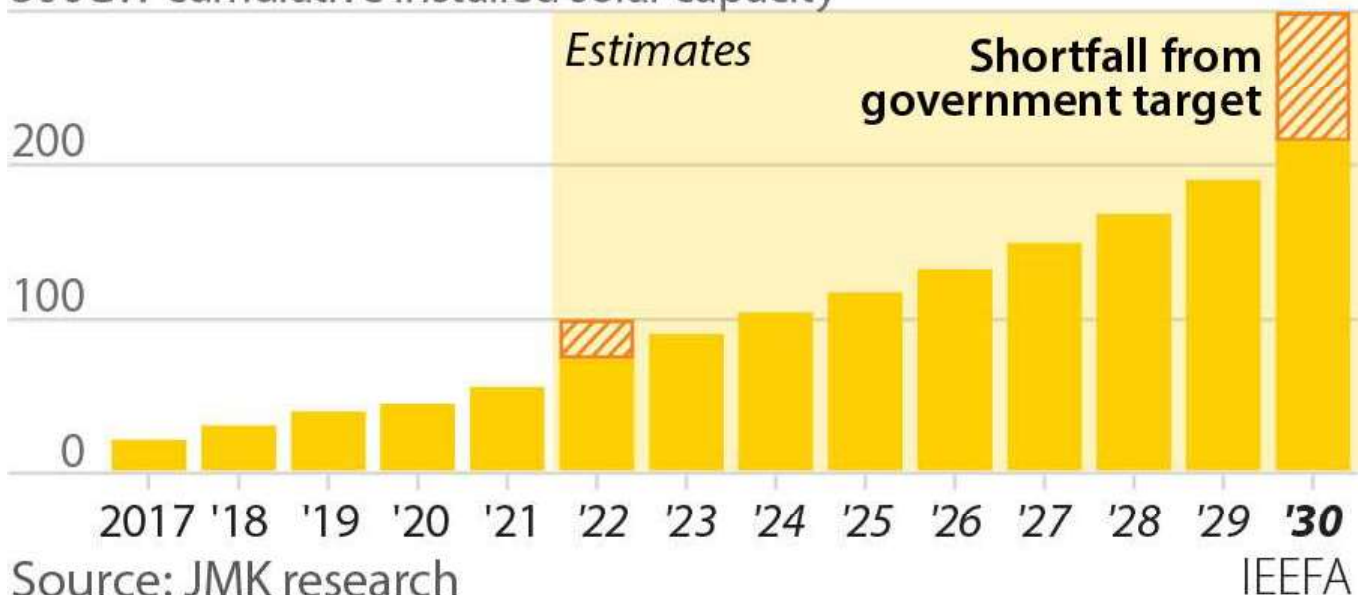
### India's solar power generation

- India is ranked fifth in terms of installed solar power capacity after China, U.S., Japan and Germany.
- In 2021, the total installed solar capacity in India was about 55 GW.
- Solar energy production accounts for roughly half the total renewable energy (RE) capacity of India (excluding large hydropower) and about 14% of the total power generation capacity of India.

## India Set to Fall Short of Solar Capacity Goals

Projections indicate 2030 target will be missed by 86GW

300GW cumulative installed solar capacity





- Of the 55GW capacity, nearly 77% is contributed by the grid-connected utility-scale projects and the remaining is from the grid-connected rooftop and off-grid projects.

### India's solar policy

- Ever since 2011, India's solar sector has made considerable progress at a compounded annual growth rate (CAGR) of nearly 59%.
- The solar energy produced was about 0.5GW in 2011 and is about 55GW in 2021.
- The Jawaharlal Nehru National Solar Mission (JNNSM) (National Solar Mission), started in 2010, was the first step of the govt towards promoting and developing solar power in India.
- According to the National Solar Mission, the total installed capacity target was set as 20GW by 2022.
- Considering the progress made, it was revised in 2015 to 100GW by 2022.
- Again in 2021, the govt set a solar target of 300GW by 2030.

## Shortfall in India's solar power targets

- India may miss achieving its 2022 target of installing 100GW of solar power capacity.
- Till April 2022, only about 55GW of the 100GW target has been met (100GW consists of 60GW of utility-scale and 40GW of rooftop solar capacity).
- It is expected that about 19GW of solar capacity is to be added in 2022.
- This means that about 26% of India's 100GW solar target would not be achieved.
- A deficit of 25GW in the targeted 40GW rooftop solar target was on the expected lines.
- Therefore, it is the shortfall in rooftop solar power that is posing challenges to India's solar-adoption policy.

## Reasons for shortfall-

- In 2015, the govt started the initial phase of the grid-connected rooftop solar programme with an aim to incentivise its use in residential, institutional and social areas.
- As of November 2021, of the 4GW set for the residential sector, only 1.1GW had been achieved.

- The **disruption in supply chains** caused due to the pandemic has further affected the implementation of rooftop solar programmes.
- **In the initial stages**, India's rooftop solar sector was impacted by issues such as,
  - Lack of consumer awareness
  - Inconsistent policy frameworks of govts
- **In the recent years**, the issues which the rooftop solar sector face are,
  - Pandemic-induced supply chain disruptions and policy restrictions
  - Regulatory challenges
  - Limits on net-metering
  - Taxes on imported cells and modules
  - Challenges in negotiating power supply agreements (PSAs)
  - Problems with Banking and Financing
  - Delays in the approval of grants

## How quickly can India move away from coal?

### Significance of Coal in India

- Coal is the most crucial and abundant fossil fuel found in India.
- Coal-based plants have lower capital costs compared to hydel and nuclear plants.
- The country's industrial heritage has been built upon indigenous coal.
- Coal accounts for about 55% of the country's energy needs.
- As per International Energy Agency's India Energy Outlook 2021 report, energy use in India has doubled since 2000 and about 80% of the demand is still being met by coal, oil and solid biomass.
- Commercial primary energy consumption in India has grown by about 700% in the last 40 years driven by the rising population and expanding economy.
- Considering the limited reserve potentiality of other energy resources in the country, coal would



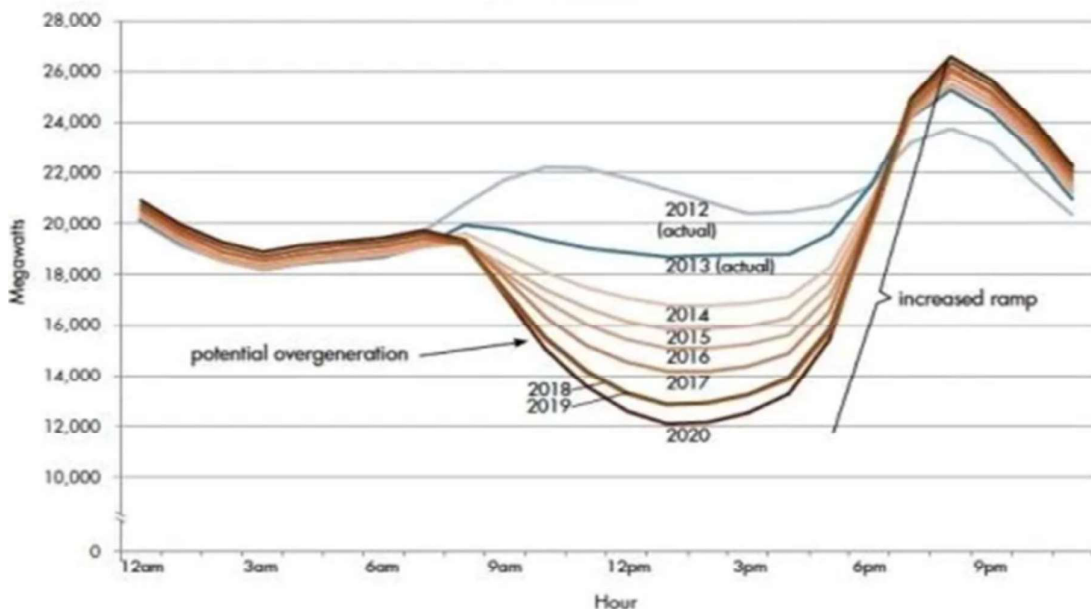
continue to be the top source of India's energy production.

### Decline in Coal stocks

- The coal stocks have declined below the critical mark (less than 25% of the required stock) in over 100 thermal power plants in India.
- Further, the coal stocks in about 50 thermal power plants are less than 10%.

### Duck curve

- Named so because it resembles a duck.
- Duck curve represents the difference between the demand & availability of energy throughout the day.



## India's renewable energy capabilities

- The Union govt is said to have spent about ₹3,793 crores until March 2021 on implementing a number of renewable energy-based schemes and initiatives.
- Presently, about 152.90 GW of renewable energy capacity has been installed in India with,
  - Solar energy contributing over 50.78 GW
  - Wind energy - 40.13 GW
  - Bio-power - 10.63
  - Large hydel power - 52 GW
  - Small hydel power - 4.84 GW
- The Ministry of New and Renewable Energy aims to set up 500 GW of non-fossil fuel-based electricity by 2030 which is in line with the commitments made by India at COP26.
- The CEA's report on optimal generation capacity suggests that the share of renewable energy in the gross electricity generation would be around 40% by 2029-30.

## Challenges to renewable energy sector

- The capacity of a plant does not necessarily translate into the actual power it generates because of the losses due to external factors like heat or transmission losses.
- Renewable sources such as solar and wind are "variable resources" with this 'variability' being exposed during periods of peak demand.
- These resources also experience "seasonal variations".
  - Example: In monsoons, solar energy is not abundantly available whereas wind energy is abundant.
- Another challenge with respect to these sources is "spatial variability".
  - Example: Places close to coastal areas have more wind and therefore, possess a greater ability to produce wind energy.
  - Whereas places which are drier, experience more sunlight

## Importance of transmission and storage facilities

- Transmission and storage facilities are the key to address the "variability" challenges.
- These facilities help address the 'duck curve' power demand among consumers in India.
- Transmission and storage facilities help in balancing the demand and supply of power.
- Through these facilities, a complementing model can be set up by balancing the imports and exports based on the demand in the country.



## Cabinet nod for climate pledges

- Indian Cabinet has ratified the commitments made by the PM at the COP26 in Glasgow
  - To boost India's reliance on renewable energy to power the economy
  - Be effectively free from the use of fossil fuels by 2070.
- Five commitments (Panchamrit) made at COP26 include:

**PM MAKES FIVE PLEDGES**

- 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

- But India's updated Nationally Determined Contribution (NDC) post Cabinet approval, only includes two of these commitments, namely:
  - India is committed to reducing the emissions intensity of its GDP by 45% by 2030, from the 2005 level.
  - Achieving 50% of total electric power installed capacity through non-fossil fuel-based energy resources by 2030.

## Sticking to commitments

### Details

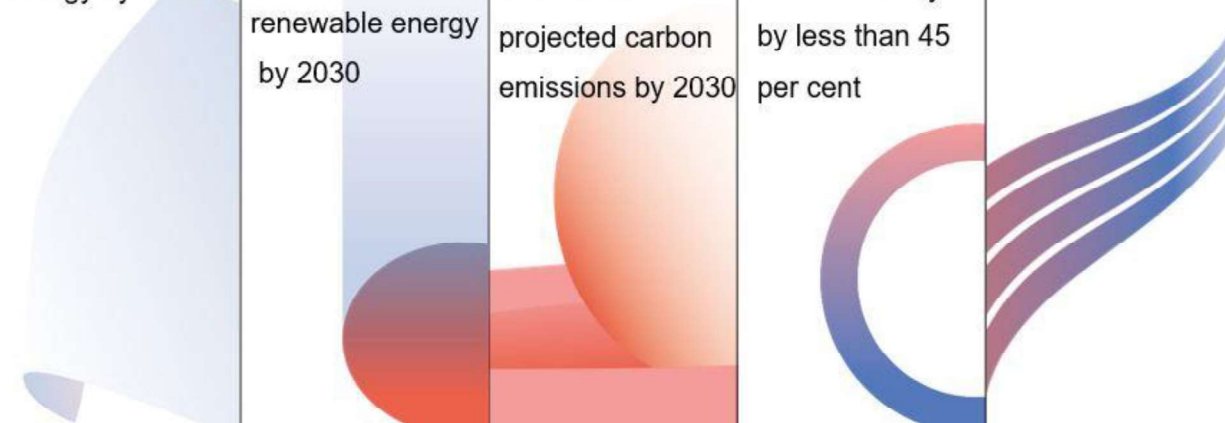
- Union Cabinet has approved India's Nationally Determined Contributions (NDC) with the
  - 27th Conference of the Parties of the UNFCCC (COP 27) scheduled to take place in El-Sheikh, Egypt, in Nov. 2022.
- Paris Agreement of 2015 mandated nations to announce measures to ensure that the globe does not heat beyond  $2^{\circ}\text{C}$ , and mitigate it below  $1.5^{\circ}\text{C}$  by 2100.
- COP of UNFCCC persuades countries to make compromises on the cuts they can undertake with the least impact on their developmental priorities.
- Countries are required to submit NDCs every 05 years, about their contributions towards minimising fossil-fuel emissions.

### India's NDC

- India announced 08 targets in its first NDC, in 2015:
  - Reducing the emissions intensity of GDP by  $33\%-35\%$  (of 2005 levels) by 2030
  - Achieving 40% of its installed electricity capacity through renewable energy
  - Developing an additional carbon sink of 2.5-3 billion tonnes of  $\text{CO}_2$  equivalent through forest and tree cover by 2030.

- At COP 26 in Glasgow, Indian PM announced 05 commitments which are famously called "Panchamrit"

| PHASE I                          | PHASE II  | PHASE III   | PHASE IV   | PHASE V          |
|----------------------------------|---|---|--|------------------|
| 500 GW non-fossil energy by 2030 | 50 per cent of the energy requirement from renewable energy by 2030 | Reduction of 1 billion tons of the total projected carbon emissions by 2030 | Reduction the carbon intensity of its economy by less than 45 per cent | NET ZERO By 2070 |



### Recommendation

India must follow and implement established grounds and become an example for balancing energy use, development and meeting climate goals.