SCHOOL OF ENVIRONMENTAL COMMUNICATION

AAETI

ANIL AGARWAL DIALOGUE 2022

Challenges to and options for scaling up of Renewable energy

India’s low-carbon commitment

1. India will reach its non-fossil energy capacity to 500 GW by 2030.
2. India will meet 50 per cent of its energy requirements from renewable energy by 2030.
3. India will reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030.
4. By 2030, India will reduce the carbon intensity of its economy by less than 45 per cent.
5. India will achieve the target of Net Zero by 2070.

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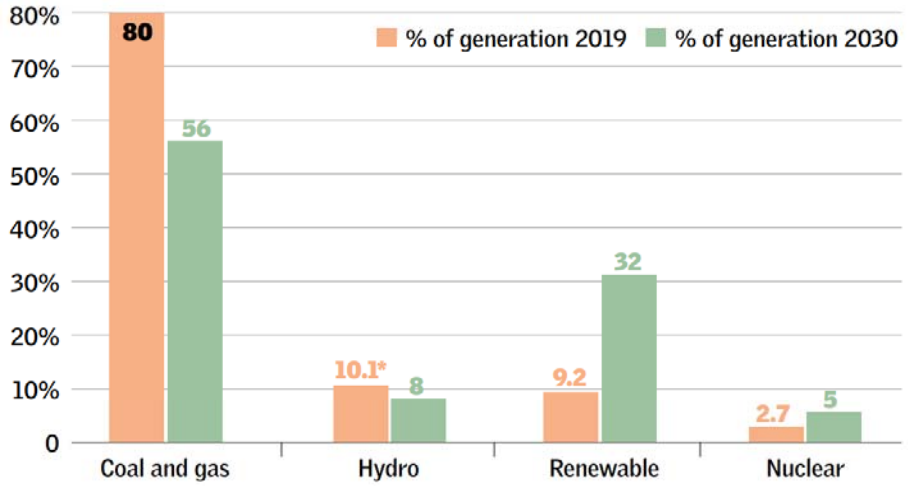
Goal 1: 500 GW of non-fossil fuel energy installed capacity by 2030
Goal 2: 50% of electricity requirements from RE

India's installed capacity of non-fossil fuel (solar, wind, hydel, nuclear): 134 GW in 2019. Projected to reach 535 GW by 2030

Will require solar installed capacity to go to 280 GW and wind energy to go to 140 GW

By 2030, Total installed capacity of 817 GW

- Coal, Gas: 80% generation in 2019 **reduce** to 56% in 2030
- Renewable Energy: **Increase** from 9.2% to 32 % in 2030
- RE capacity must **increase** from 82.5 GW in 2019 to 455 GW in 2030
- To meet target, India needs to add **35 GW of renewable power each year (added only 10GW** April-Dec. 2021)



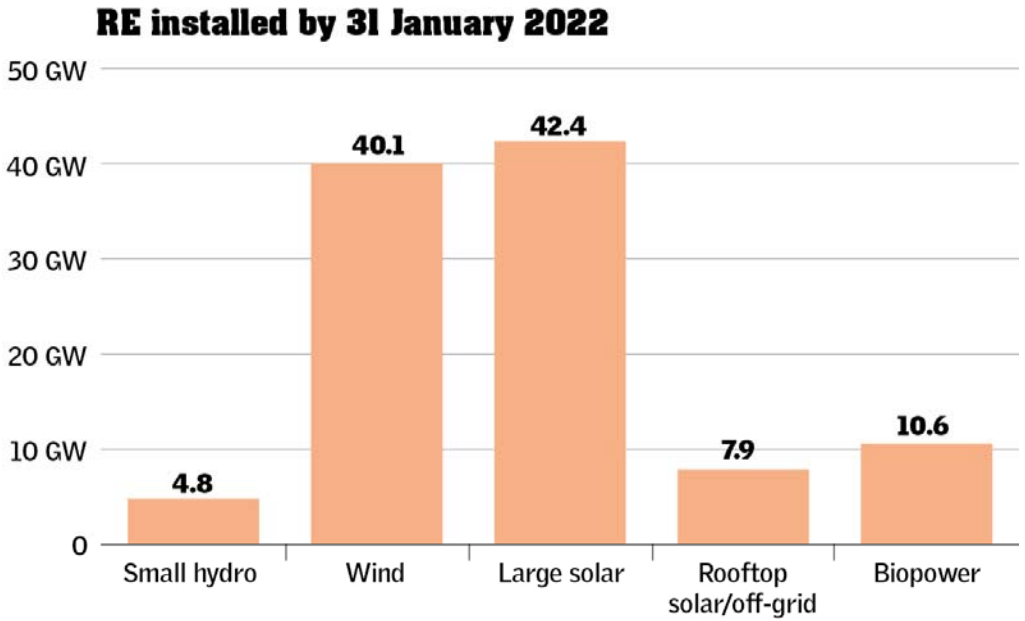
Goal 2

- India's power requirement in 2030 is projected to be 2,518 BU (almost double of now)
- Need 700 GW of RE installed capacity to meet 50 percent of electricity requirements (630 GW when factoring in hydropower)

	Installed capacity (GW) 2019	% of installed capacity 2019	Generation (Billion Units) 2019	% of generation 2019	Installed capacity (GW) 2030	% of installed capacity 2030	Generation (Billion Units) 2030	% of generation 2030
Coal and gas	228	63	1,072	80	282	36	1,393	56
Hydel	45	12.5	139	10.1*	61	7.5	206	8
Renewable	82.5	22.7	126	9.2	455	54.5	805	32
Nuclear	6.7	1.9	378	2.7	19	2.3	113	5
	362		**1,376**		**817**		**2,518**	

*Including import from Bhutan; Source: Report on Optimal Generation Capacity Mix for 2029–2030. Central Electricity Authority, Ministry of Power

Is India on track to meet the target?



Source: MNRE

RE goal of 450 GW by 2030 - To meet this target, India needs to add 35 GW of renewable power each year

India added 10 GW of RE in 2021 - below what it needs to do to achieve its 2030 goal

As of 31 January 2022, India had installed 105.8 GW of renewable power

Challenges, options for scaling up RE

01 The future of renewables is linked to the health of electricity distribution companies (Discoms)

02 Curtailment of power adds to risk of investment

03 State govts want to renegotiate or cancel power purchase agreements with higher tariffs

04 Hike in GST rates and import duty on solar components will increase costs of projects

05 As intermittent power sources, RE will require planning & balancing of the grid for supply, storage, backup

06 Energy access: Exploring options for scaling up of clean energy to meet the twin challenges of energy access and clean power

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Discom duress, curtailment

- Discoms are deep in debt, and will cannot continue to pay for power for long
- Dues towards 342 RE projects (for 14.56 GW of RE) amounted to 9,400 cr. in Nov. 2019. Now dues to RE developers increased to Rs 20,000 crore
- As of Feb. 2022, Discoms owe power companies Rs 1,01,714 crore (Praapti, GOI)
- Discoms have started losing paying customers: e.g. captive green power by institutional / commercial rooftop solar, and now GOI's Hydrogen policy which lets RE power developers sell directly to green hydrogen manufacturers
- Discoms remain vital as backup for captive clean power and also for backups – otherwise battery storage will be needed for night time use
- Curtailment of power leads to substantial losses and no restitution to developers: Common in wind & solar projects, despite 'must run' assurances by state load dispatch centers & Discoms to prioritise evacuation of RE-generated power. No transparency.
- Curtailment made worse by poor grid availability in RE rich states (TN, sees a massive curtailment in monsoon months)

Finance, technological challenges

- Reverse bidding tariffs have fallen steeply:
  - Solar utility: Rates dropped from INR 10.39/unit in 2012 to INR 1.99/unit today
  - Wind: From INR 7.49/unit in 2012 to 2.85/unit today
- State governments (e.g. AP, Punjab) want to renegotiate or cancel power purchase tariffs that have been locked in (usually 25 years). This will make many first-generation projects face an uncertain future, and spooks investors.
- Hike in GST rates and import duty on solar components increases costs of projects. GOI recently announced INR 24,000 crore production linked incentives (PLIs) for high-efficiency solar modules to boost Indian manufacturing
- Tech challenge: Need to enhance grid management (e.g. forecasting & scheduling, grid flexibility, etc.)
- Storage tricky and expensive for RE-based intermittent sources of power supply. Solutions for balancing the grid will most likely involve various options and technologies (e.g. pump-storage hydroelectricity, battery storage, exporting solar energy generated in the daytime to parts of the world where it is night

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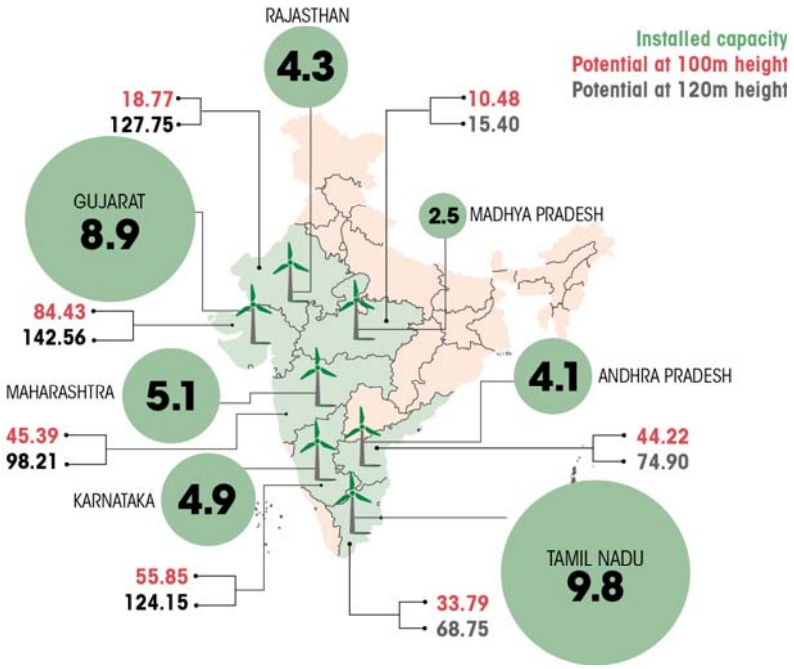
Clean energy: Options for scaling up

Repowering wind projects

Map 1: Installed capacity and wind potential in seven windy states at a hub height of 100m and 120m (in GW)



Wind

- Potential: 302 GW @100 m & 695.5 GW @ 120 m
- @ March 2021: 39.2 GW installed + 9.7 GW under development
- MNRE target of 60 GW capacity by 2022, and 140 GW by 2030. Growth lagging. Needed: 10 GW / yr; now only 5 GW/year
- Offshore wind: High capex & tariffs @ Rs. 7-9 /unit (need for transmisison corridor) vs. INR 2-3 for onshore wind

Biomass in coal-based thernal power plants

- Budget 2022: mandating 5-10% biomass pellets in TPPs too small a target.
- Win-win for cirularity: For climate, agriculture, air pollution mitigation

Energy access: Clean and reliable energy for the poor

- Grid may have reached almost every part of the country, but electricity has not. `Saubhagya' scheme: shows 99.9% HHs are electrified (min. 10% HHs connected). But unreliable, esp. during evening peak hours, need expensive power back-ups, poor quality of power
- Mini grids: Key source for last-mile connectivity and assured quality of power supply. Help shift away from dirty & polluting fuels (e.g. DG sets).
- Tech makes possible service steadfastness, operational efficiency & tailored solutions to meet local needs & address energy poverty, including needs for clean cooking, play role to balance grid load, generate jobs, secure small businesses. Customers willing to pay more for reliable electricity supply.
- Clean cookstoves: Long attempt to curtail widespread use of biomass fuel on inefficient stoves. Although PM Ujjwala scheme has provided 90 million households (Jan. 2022) with subsidised LPG cylinders, refill rates remain abysmally low. Cultural practices are a powerful barriers, e.g. to adoption of electric cooking.

Clean energy for energy access: Mini grids

- Econonics of the small needs support: mini grids-sourced power is expensive (INR 6-28/unit) as developer sets up entire dist. system
- Need a feed-in tariff policy for widespread adoption of decentralised mini grids
- Policy agenda: Push draft National Policy on Mini and Micro-grids (2016), which had a target of deploying at least 10,000 RE-based micro / mini-grids with 500 MW capacity over next five years in under-served locations. UP has its own policy; Bihar & Odisha have included in main state RE policy. Little to show on the ground though.
- Models for scale up: Grid interactivity, safety standards, tariff/feed-in regulation, smart metering, pay-as-you-go, smart O&M, community engagement, climate finance
- MNRE @ February 2022: Draft policy framework for DRE-based livelihood applications
- Learn from global South:
    - Financial support, technical standards, tariff structures by Govt. of Rwanda
    - Compensation on arrival of grids, technology and size specific feed-in tariffs by Govt of Tanzania

Energy conundrum: Speakers

Sumant Sinha: How solar and wind revolution is taking off

Chairperson and CEO, ReNew Power, Gurugram

- Overview of solar and wind's contribution to RE targets, energy transition (wrt net zero)
- Scaling up: Policy enablers for generating demand; finance; risks

Pankaj Batra: Renewable Energy Transition

Former Chairperson and Member (Planning), Central Electricity Authority & Project Director, SARI/EI program at IRADe

- The big picture: Role of RE in securing energy security for all
- Regulatory challenges and Discom reform
- Preparing the grid for massive RE scale-up: Progress & challenges

Sunil Wadhwa: Why energy access is important in this energy revolution

Founder CEO, Multiple Orbits Consulting

- An agenda for reform: Discoms, power markets, tariffs
- Why we need both: Energy security (big RE) and energy access (RE for energy access): A co-benefit agenda
- DRE and mini grids: electricity for all

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Thank You!

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India’s low-carbon commitment

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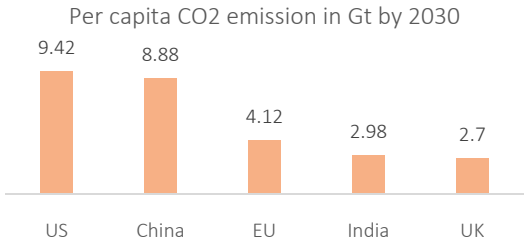
Goal 3: Reduction of 1 Gt of carbon emissions by 2030

Current CO2 emissions are 2.88 Gt/year

In the business-as-usual (BAU) scenario India's CO2 emissions will be 36.28 Gt cumulatively from between 2020 and 2030. India has committed to emit 1 Gt less, or 35.28 Gt in this period.



In terms of per capita

In 2030, the world should emit less than 2.14 tonnes of CO2 per capita to stay below 1.5°C in temperature.

In terms of the carbon budget

With the new NDC announcement (2 November 2021), India will occupy:

9.5 per cent of remaining IPCC 400 Gt carbon budget for 1.5°C by 2030

4.4 per cent of world emissions between 1870–2030

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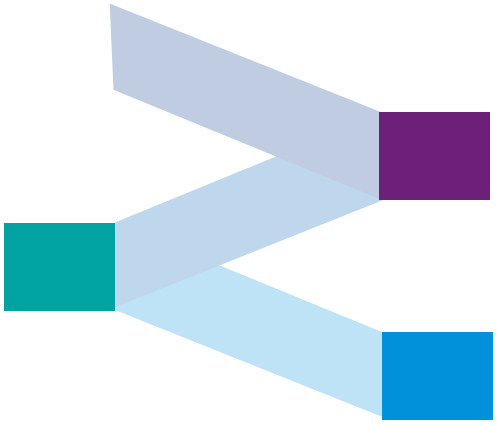
Goal 4: Carbon intensity reduction by 45 per cent



On the path to achieve more than 40 per cent reduction by 2030

India has reduced emission intensity of its GDP by 25 per cent between 2005–2016

Transport and energy-intensive sectors - cement, iron and steel, non-metallic minerals and chemicals - need to take stronger measures to reduce emissions.

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Goal 5: Net zero by 2070

Given the enormous inequity in emissions in the world, the OECD countries must reach net zero by 2030, China by 2040 and India and the rest of the world by 2050.

According to IPCC, global emissions must be halved by 2030 and reach net zero by 2050

OECD countries have declared net zero target for 2050 and China for 2060. Therefore, India's net zero target of 2070 is an extension of this and cannot be argued against.

The targets for net zero are both inequitable and unambitious

Most importantly, China, which will occupy 33 per cent of the remaining budget, must be asked to reduce its emissions drastically by 2030. China alone will add 126 Gt in this decade.

This combined net zero goal will not keep the world below 1.5° C temperature rise

Renewables will play a critical role in India's energy future and reach anywhere between 455–630 GW by 2030
The cost of this energy will have to be affordable so that it can meet the needs of the poor in the country
Energy poverty is unacceptable and even as India ramps up renewable power, access to energy must also be secured

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Goal 2: 50% of electricity requirements from RE

India's power requirement in 2030 is projected to be 2,518 BU (almost double of now)

We would need 700 GW of RE installed capacity to meet 50 percent of electricity requirements (630 GW when factoring in hydropower)

India's coal capacity will be 282 GW by 2030—an addition of 54 GW which is close to the capacity currently under construction. As stated – India will not invest in new coal thermal power beyond this

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