CLEAN ENERGY SCENARIO IN INDIA

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TOPICS

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INDIA'S NATIONALLY DETERMINED CONTRIBUTIONS

India through its **Nationally Determined Contribution (NDC)**[1] for the period 2021 to 2030 has set the following targets

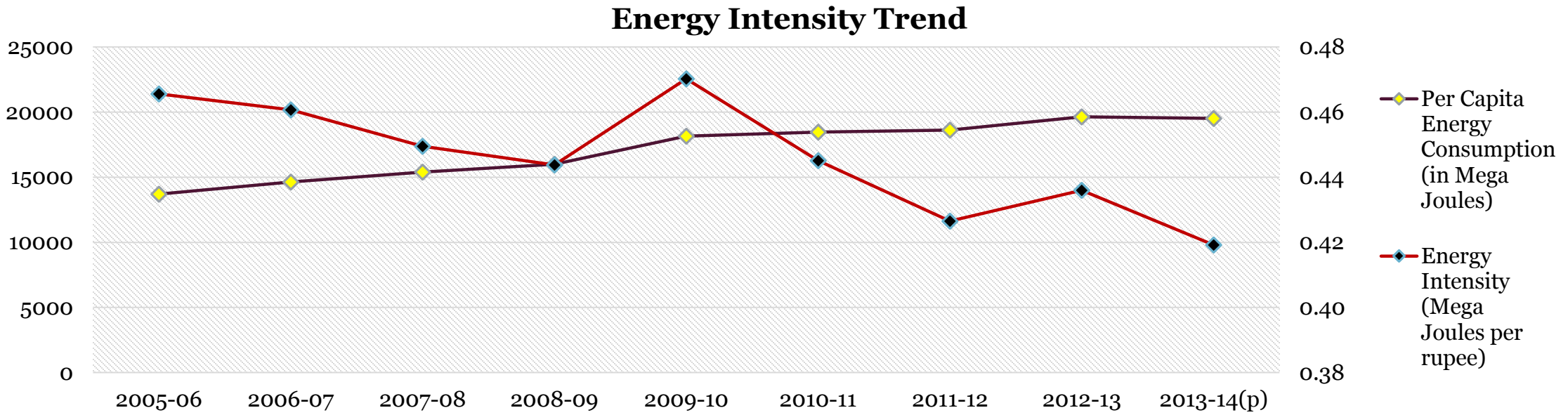
To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level.

To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).

To create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030.

1 -After the ratification of Paris Agreement, Intended Nationally Determined Contribution (INDC) are now the Nationally Determined Contribution (NDC)

INDIA'S ENERGY PERFORMANCE



- 43% growth in per capita energy consumption
- 10% reduction in energy intensity

It should be noted that

- Per capita energy consumption of India is approximately one third the global average
- No country has reached Human Development Index of 0.9 without consuming 3.5 times India's (HDI: 0.586) current per capita consumption

Energy Efficiency in India

ENERGY EFFICIENCY POTENTIAL IN MAJOR SECTORS

- The overall energy efficiency investment potential in India is **INR 173,500 crores (USD 26.3 billion)**:
  - ***INR 74000 crore (USD 11.2 billion) projected under NMEEE*** out of which INR 30,000 crore of potential exists in energy intensive industries and remaining INR 44,000 crore in the other key demand side economic sectors
  - ***INR 99500 crore (USD 15.1 billion)*** based on recent trends in the market based investments towards LED street lighting solutions and innovative market transformative business models in the residential sector

Sector	EE Investment potential (INR crore)	EE Investment potential (USD Billion)	Energy Savings (Million TOE)
Demand Side Measures			
Industry	19,949	3.0	9.45
Residential	74,237	11.2	5.95
Commercial Buildings	1,139	0.2	0.3
Municipal Street lights	25,200	3.8	0.72
Agriculture	30,000	4.5	2.58
Total (Demand Side Measures)	**150,525**	**22.8**	**19.01**
Supply Side Measures			
Thermal Power	22,912	3.5	4.55
Total (Demand Side+ Supply Side)	**173,437**	**26.3**	**23.56**

CURRENT INSTITUTIONAL AND REGULATORY FRAMEWORK FOR ENERGY EFFICIENCY IN INDIA

- **Electricity Act (2003)**
  - Roles of utilities in promotion of efficient use of energy
- **Energy Conservation Act (2001)**
  - Setting up of BEE and State Nodal Agencies
- **National Mission for Enhanced Energy Efficiency (NMEEE)**

Perform Achieve & Trade :
A market based mechanism to enhance cost effectiveness of improvements in EE in energy-intensive large industries and facilities, through certification of energy savings that could be traded.

Market Transformation for Energy Efficiency (MTEE): Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable.

Energy Efficiency Financing Platform (EEFP):
Creation of mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings.

Framework for Energy Efficient Economic Development (FEEED): Developing fiscal instruments to promote energy efficiency.

ENERGY EFFICIENCY MEASURES - AGDSM

- India's agriculture sector consumes about 18% of total electricity consumption (consumption of around 153,116 GWh in FY 13)

- Ag DSM programme is expected to reduce burden of utility during the peak hours and enable them to prevent losses in the agriculture sector where subsidized tariff is a usual norm.

  - **Avoided power purchase by DISCOM**- 44 billion kWh (25% savings at pump end and 25% losses at bus bar)
  - **Reduction in annual subsidy of State Govt**: INR 5014 Cr (INR 1.52 per unit)
  - **Investments required:** INR 54000 Cr (INR 30,000 per 5 HP pump set)

- **Current Status:**

  - BEE had launched the national AgDSM program and created bankable DPRs for more than 8 states in India incl. launching the first project in Maharashtra
  - EESL further implemented pilot projects in states of Andhra Pradesh and Karnataka
  - EESL is launching the first large scale AgDSM program in Andhra Pradesh (1.5 lakh pumps).
  - The program would be further extended to Maharashtra, Karnataka and Rajasthan

ENERGY EFFICIENCY MEASURES - LIGHTING

- The Hon'ble Prime Minister of India launched the "100 cities LED based Domestic Efficient Lighting Program (DELP – renamed as UJALA) and National Street Lighting Program on 5th January, 2015

  - The program targets to replace 77 crore inefficient lighting fixtures with LED bulbs
  - The program also targets replacement of 3.5 crore inefficient street lights with LED luminaires
  - The targeted avoided capacity addition due to these programs is around 22000 MW and has abatement potential of 90 million tCO_2

- **Current Status:**

  - More than 17.1 crore LEDs has been distributed under the UJALA program
  - More than 13 lakhs street lights has been fitted with LED luminaires

ENERGY EFFICIENCY MEASURES - STANDARD & LABELLING

- The S&L program started by Bureau of Energy Efficiency in 2006 with voluntary labels for refrigerators and fluorescent tube lights. Today, it has expanded to a total of 21 appliances, with the label being mandatory for 7 appliances.

- The BEE at present is working on introduction of newer segments under the domain of S&L program such as Passenger Cars, Solar PV, Solar Water Heater, DC based appliances, Boilers, etc.

- Energy Savings: In a five year period from 2015-16 to 2019-20, the S&L program alone is expected to result in Energy Savings of about 18 GWH (BU) till 2020. This would result in monetary savings of approximately INR 7200 cr.

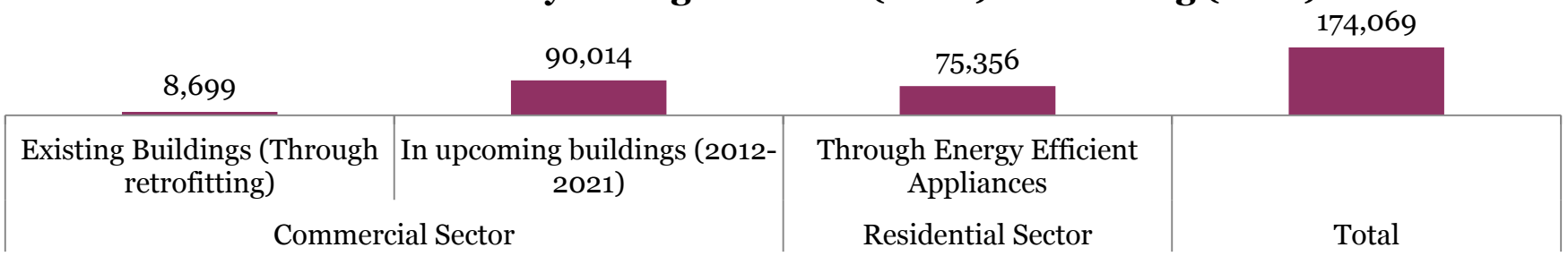
ENERGY EFFICIENCY MEASURES - BUILDINGS

- Residential & Commercial Building sector constitutes around 30% of the total electricity consumption in India.
- Average growth rate of 9 % in last 10 years (2005-2014) and electricity consumption in buildings will increase by more than 2 times by 2021, from 2015-16 level

- **Policy and Regulatory framework for Energy Efficient Buildings**

Codes	Rating systems	Smart city program
• Energy conservation building code (ECBC) • National building code (NBC)	• BEE star rating for existing buildings • LEED and IGBC rating system for buildings	• 80% of buildings to be green and energy efficient

Estimated Electricity Saving Potential (GWh) in Building (2021)



Renewable Energy in India

RENEWABLE ENERGY SCENARIO OF INDIA

- India's installed capacity is 305 GW.
- India aims at 175 GW RE installation by 2022.
- This includes 60 GW from wind power, 100 GW from solar power, 10 GW from biomass power and 5 GW from small hydro power.
- India's RE capacity has exceeded **47 GW** which accounts for 14.5% of the installed power capacity
- Current share of renewable energy (in **energy produced**) is ~**7.5%**
- Wind contributes to 64.5% of the installed Renewable Capacity

CURRENT INSTITUTIONAL AND REGULATORY FRAMEWORK FOR RENEWABLE ENERGY IN INDIA

- **Jawaharlal Nehru National Solar Mission**
  To tap the huge potential from solar power in the country.

- **Small Hydro Power Program**
  To tap the potential from hydro power by developing projects of up to 25 MW capacity in various states of the country

- **Wind Energy Program including the National Wind Mission**

- **National Offshore Wind Energy Policy**

- **Guidelines for setting up and development of Onshore Wind Power projects**

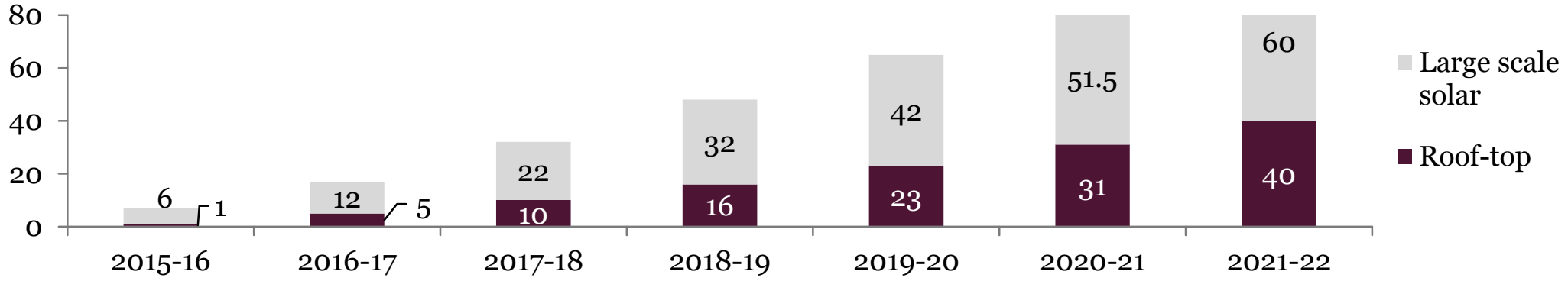
- **National Policy on Biofuels**

RE MEASURES – INDIA SOLAR PROGRAM (1/2)

- **Jawaharlal Nehru National Solar Mission**

Category 1. Rooftop Projects	Category 2. Large Scale Projects	
40,000 MW	Inside Solar Park 20,000 MW	Outside Solar Park 40,000 MW

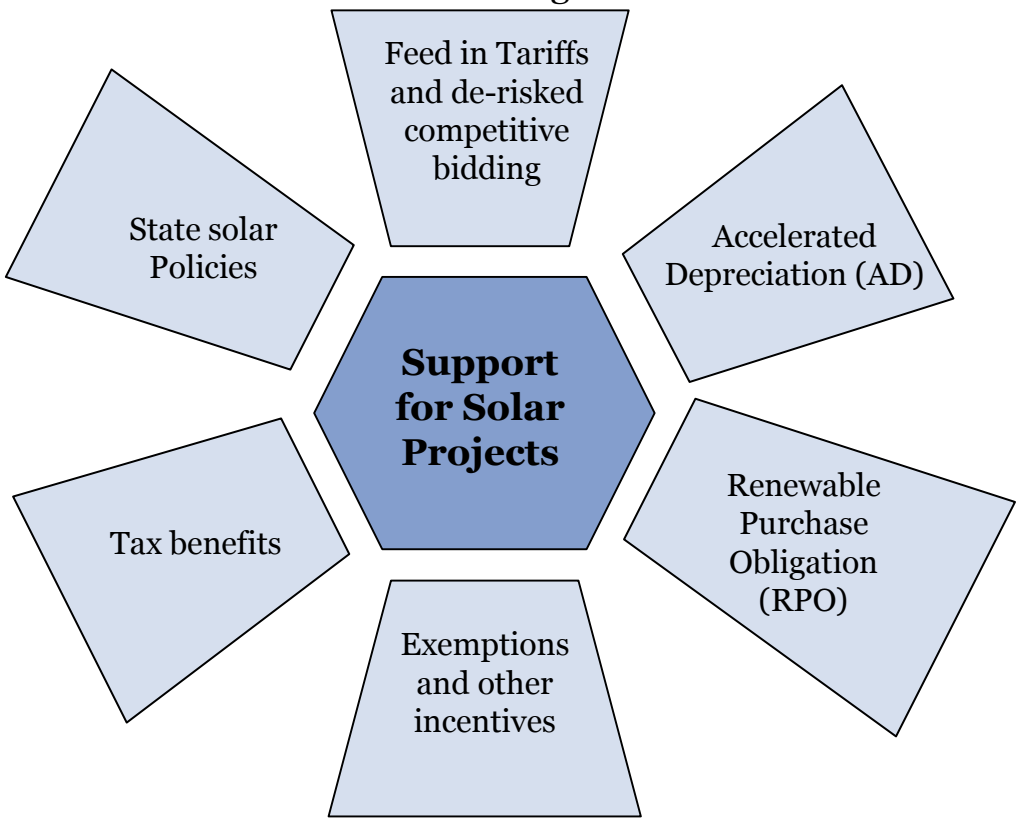
Cumulative Solar Targets (GW)



RE MEASURES – INDIA SOLAR PROGRAM (2/2)

- Introduced by almost all states for solar technologies

- States have formulated solar policies providing benefits on Wheeling, Banking, Transmission, Electricity duty, Cross Subsidy Surcharge, etc.



- Accelerated depreciation @ 40% on solar assets
- Additional depreciation @ 20% on new plant/ machinery in the 1st year

- Tax Holiday for 10 consecutive years - MAT @ 20% to apply
- Certain States offer VAT exemption and reduced VAT rates (5%) on RE projects

- RPOs mandated by the Electricity Act 2003 and National Tariff Policy
- National Tariff Policy recommends 8% SPO

- Excise & Custom exemptions for solar panels, Equipment, manufacturing Machinery etc.

RE MEASURES – WIND ENERGY PROGRAM

- The wind power potential of the country has been reassessed by the National Institute for Wind Energy (NIWE), it has been estimated to be 302 GW at 100 meter hub-height.
- India is globally placed at 4th position in terms of wind power with total installed capacity of 28.1 GW.
- With a strong manufacturing base, about 20 approved manufacturers have been identified with 53 models of wind turbines in the country up to a capacity of 3.00 MW single turbines.
- Wind turbines being manufactured in India are of international quality standards and cost-wise amongst the lowest in the world being exported to Europe, USA and other countries.

RE MEASURES – SMALL HYDRO POWER PROGRAM

- The estimated potential for power generation in the country from small / mini hydel projects is 19,749 MW from 6474 identified sites.

- About 50% of the total potential lies in the States of Himachal Pradesh, Uttarakhand, Jammu & Kashmir and Arunachal Pradesh

- Various assistance programs are in place from Central to State governments towards promoting small hydro projects in the country.

- Currently, the total installed small hydro power capacity is about 4.2 GW across 1049 sites in the country.

RE MEASURES – BIOMASS POWER PROGRAM

- Biomass power includes installations from biomass combustion, biomass gasification and bagasse co-generation (in sugar mills)
- Efficient utilization of biomass such as agro-residue in the form of stalks, stems and straw; agro-industrial residues such as shells, husks, de-oiled cakes and wood from dedicated energy plantations for power generation
- The total estimated biomass power potential is about 25,000 MW
- Currently, over 300 biomass power and cogeneration projects aggregating to about 4800 MW capacity have been installed in the country for feeding power to the grid.

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End of Training Module

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