



# *JICA- ENERGY POLICY-2018*

## *INDIA*

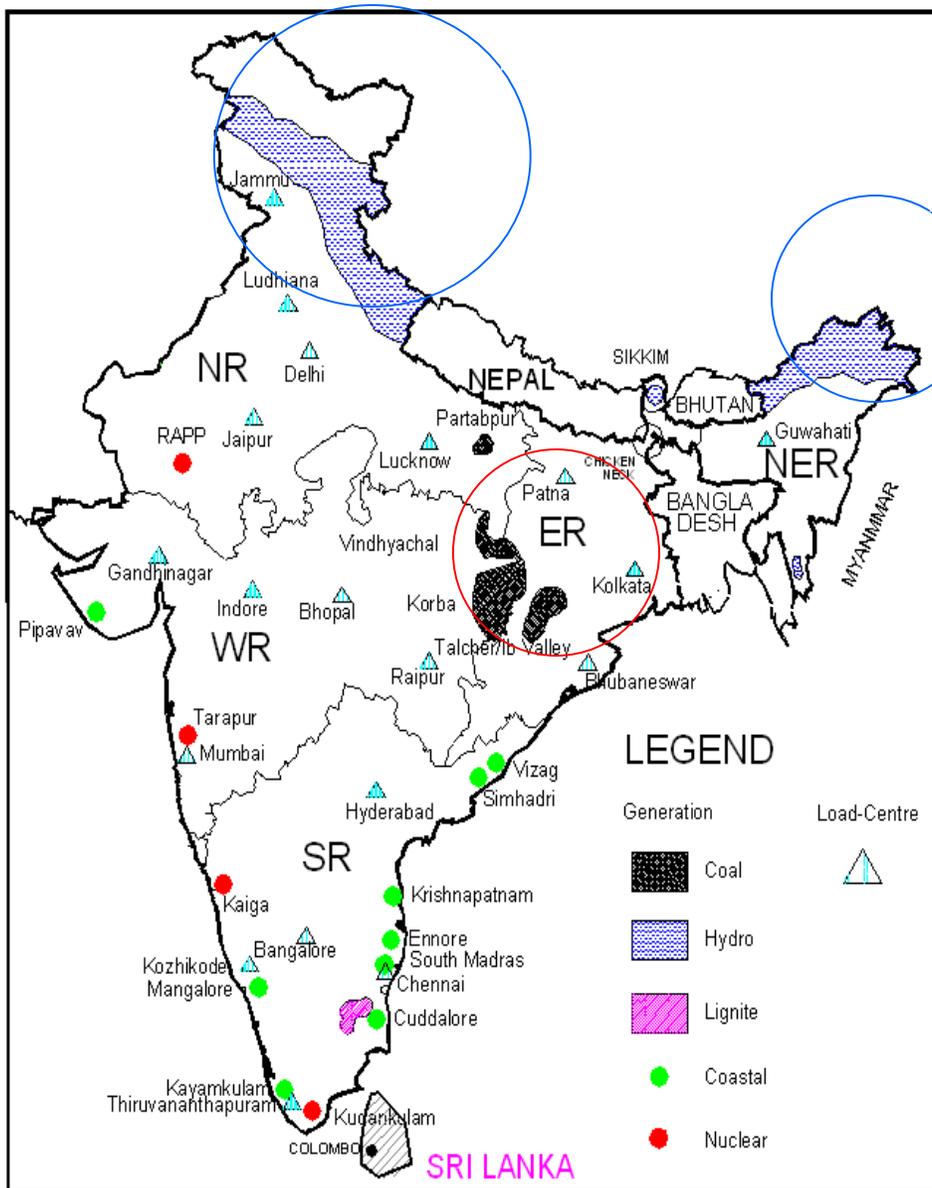
**Ammi Ruhama Toppo**  
**Director**  
**Central Electricity Authority**



# KEY OBJECTIVE OF ENERGY POLICY

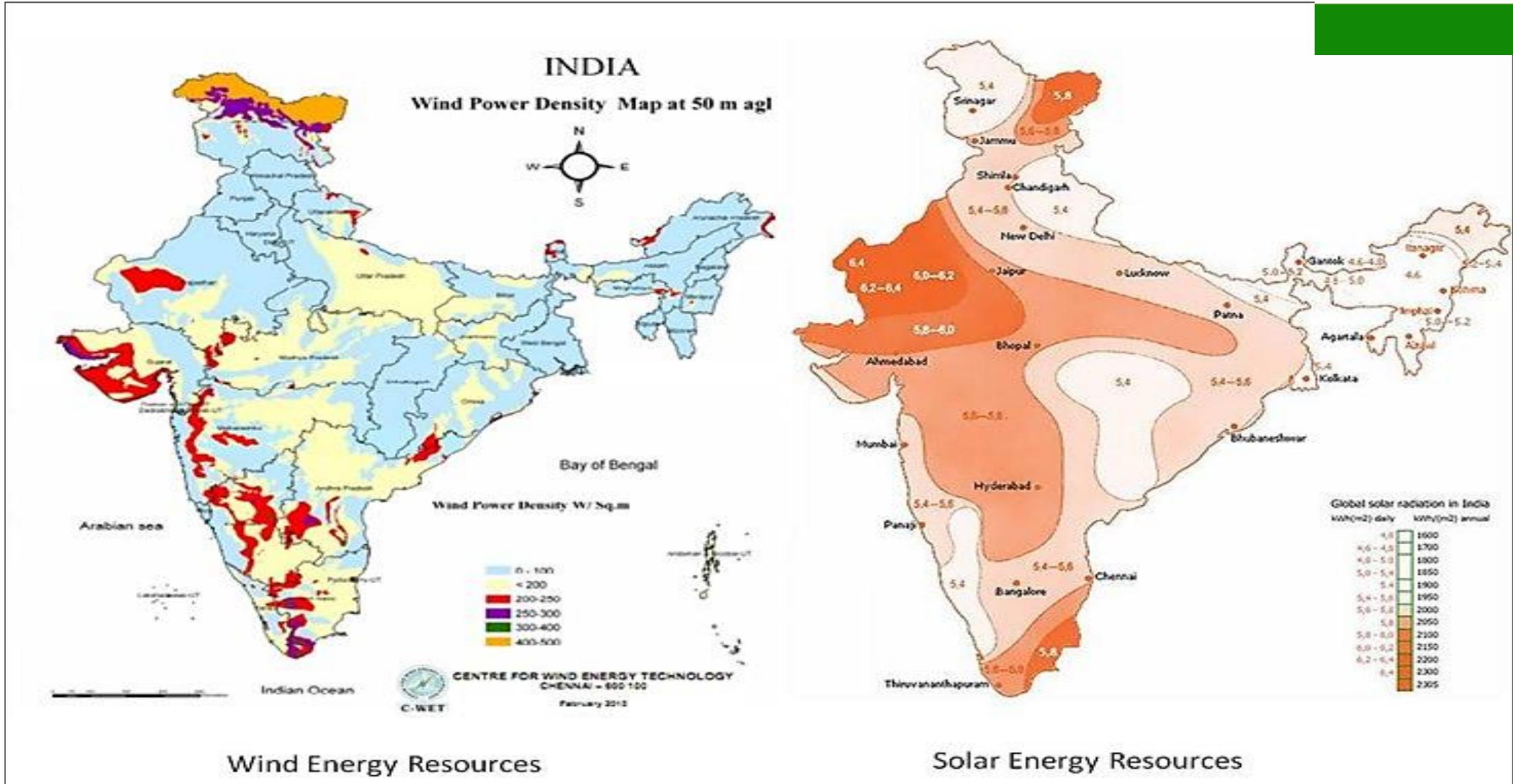
- Access at affordable prices
- Improved security and Independence
- Greater Sustainability
- Economic Growth.

# Energy Resource Map



- Hydro potential in NER and upper part of NR
- Coal reserves mainly in ER

# WIND AND SOLAR ENERGY RESOURCE MAP OF INDIA

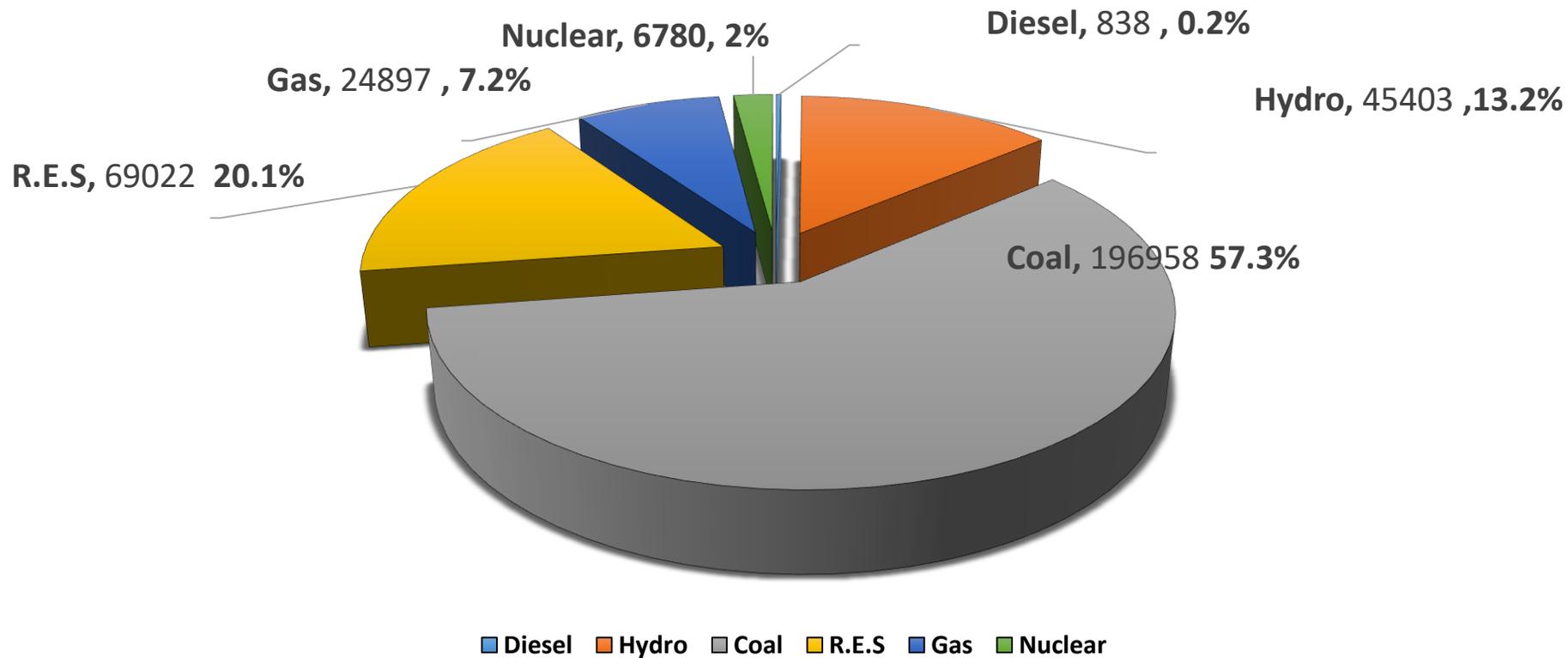


(Source CWET, Chennai)

# INSTALLED CAPACITY



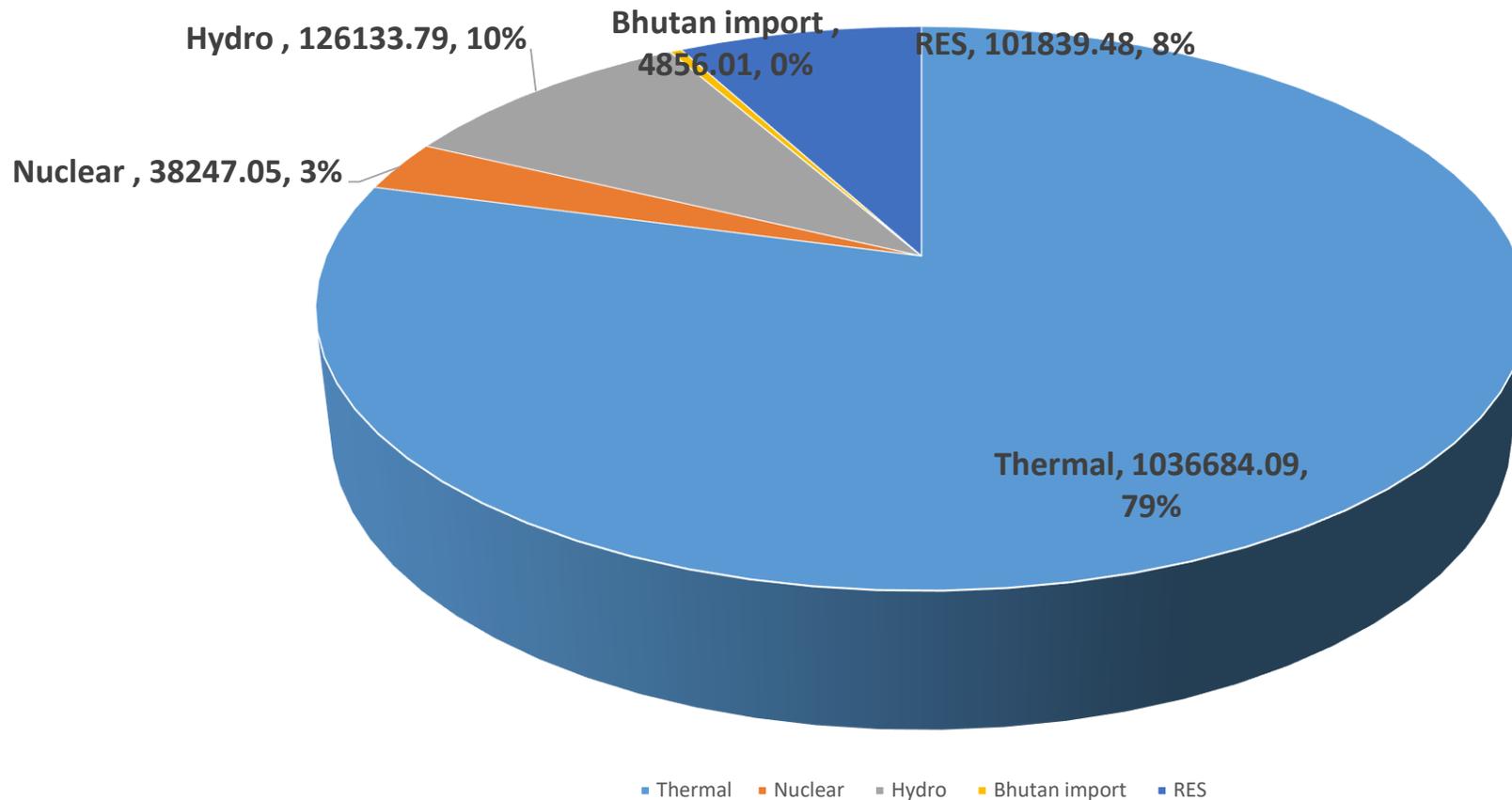
Fuel-wise Total All India Installed Capacity (MW) As on 31.05.2018



**TOTAL: 343898 MW**



# GENERATION(2017-18)

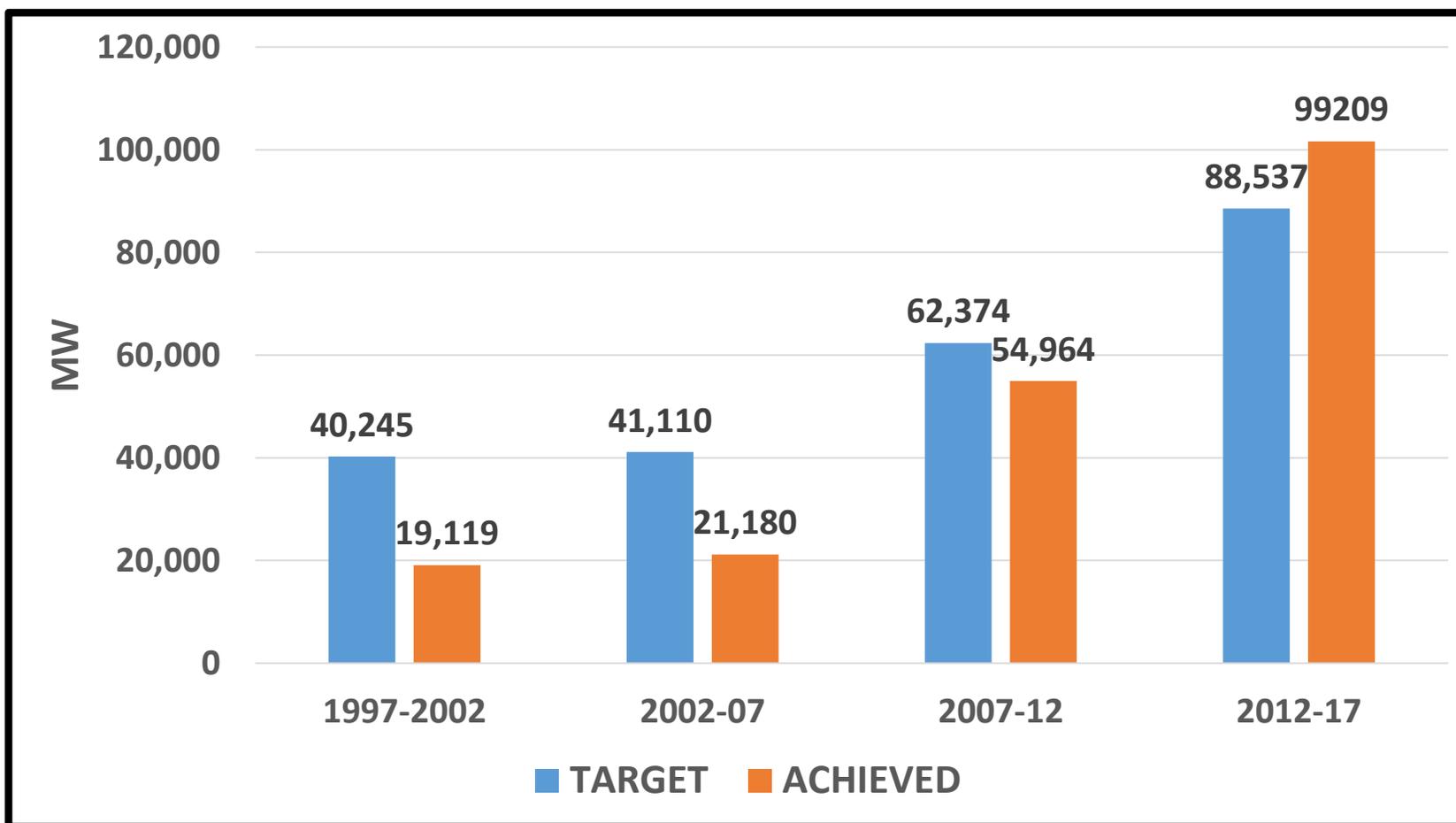


**TOTAL 1307760.4 GWh**

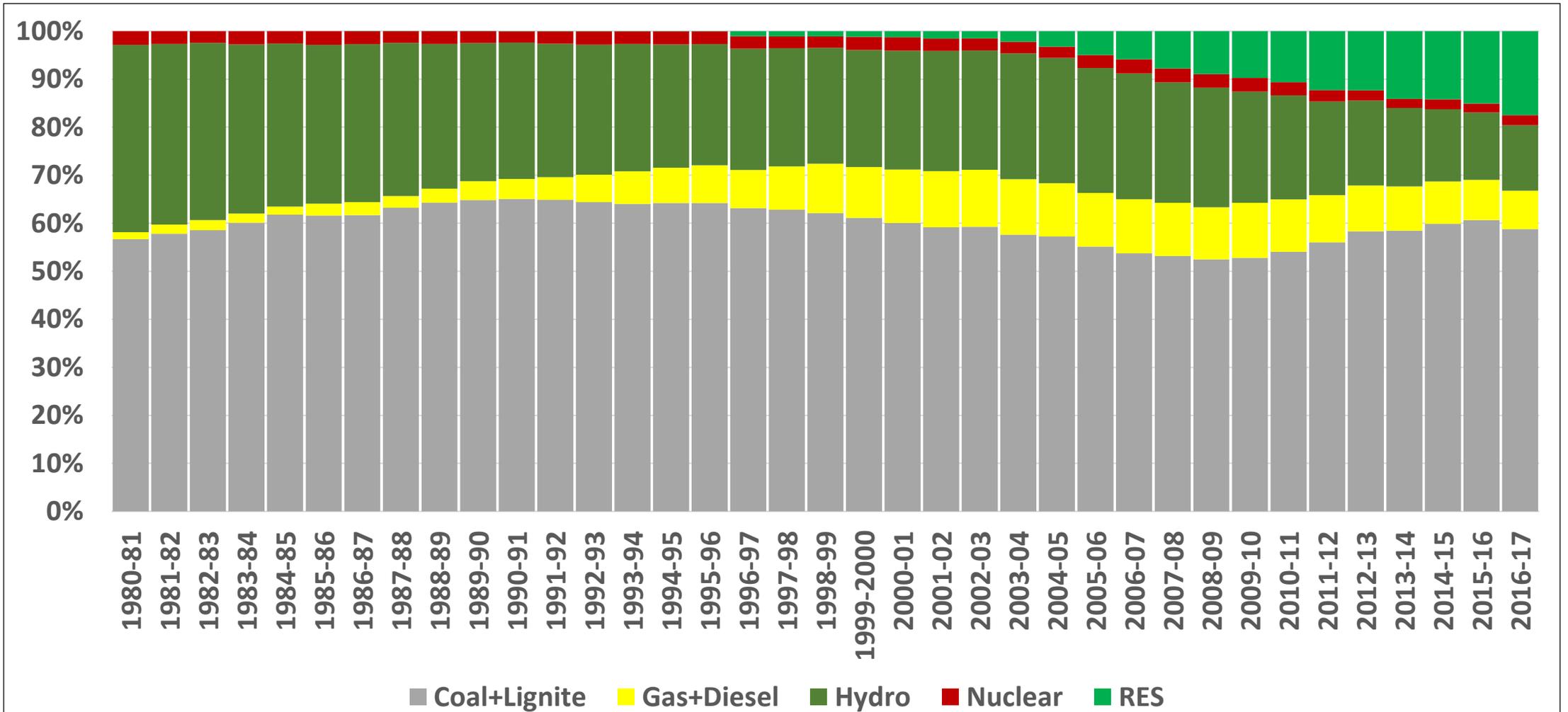
**ALL FIGURES IN GWh**



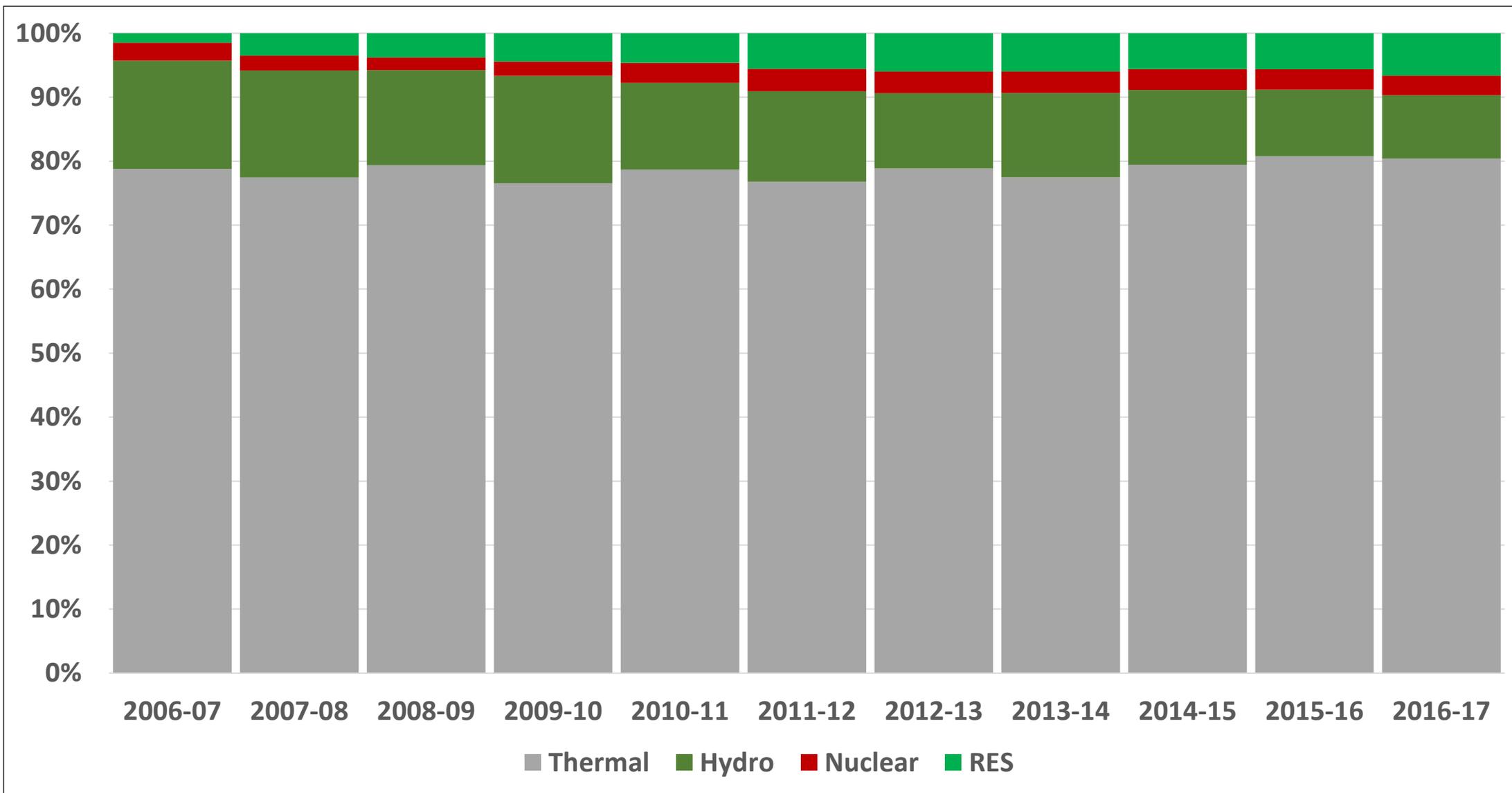
# CAPACITY ADDITION FROM CONVENTIONAL SOURCES



# CAPACITY MIX (SINCE MARCH,1981)



# GENERATION MIX (SINCE MARCH,2007)



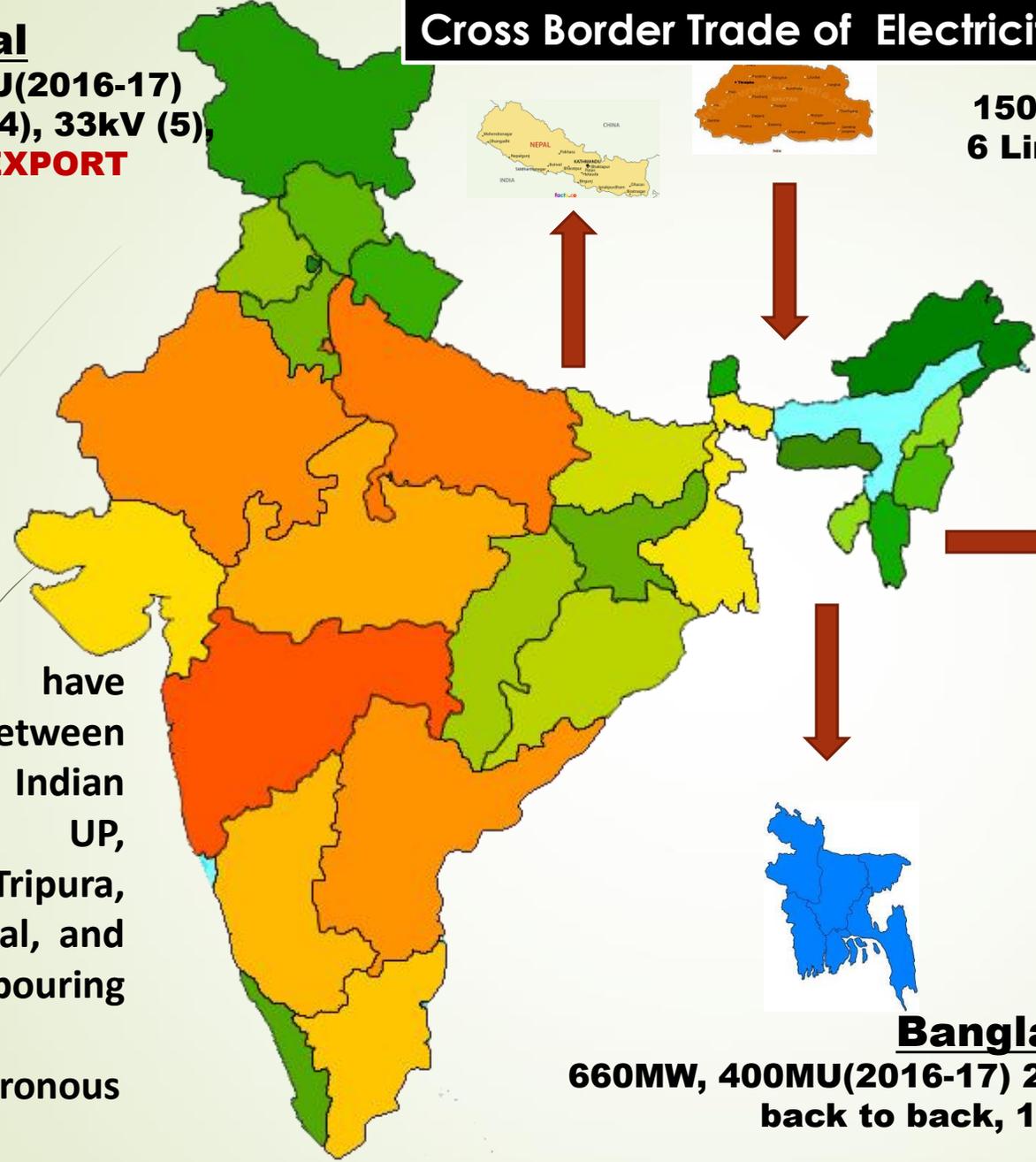
# Cross Border Trade of Electricity

## Nepal

**440MW, 200MU(2016-17)**  
**14 Links [11kV (4), 33kV (5), 132kV(5)] EXPORT**

## Bhutan

**1500MW, 1000MU (2016-17)**  
**6 Links [132kV(1), 220kV(2), 400kV(3)] IMPORT**



## Total Export & Import

	(2016-17)	(2021-22)
Export	1100MW	2260MW
Import	1500MW	5100MW
Net	400MW	2840MW



## Myanmar

**<1MW, 0.35 MU(2016-17)**  
**One Link [11kV] EXPORT**

## Bangladesh

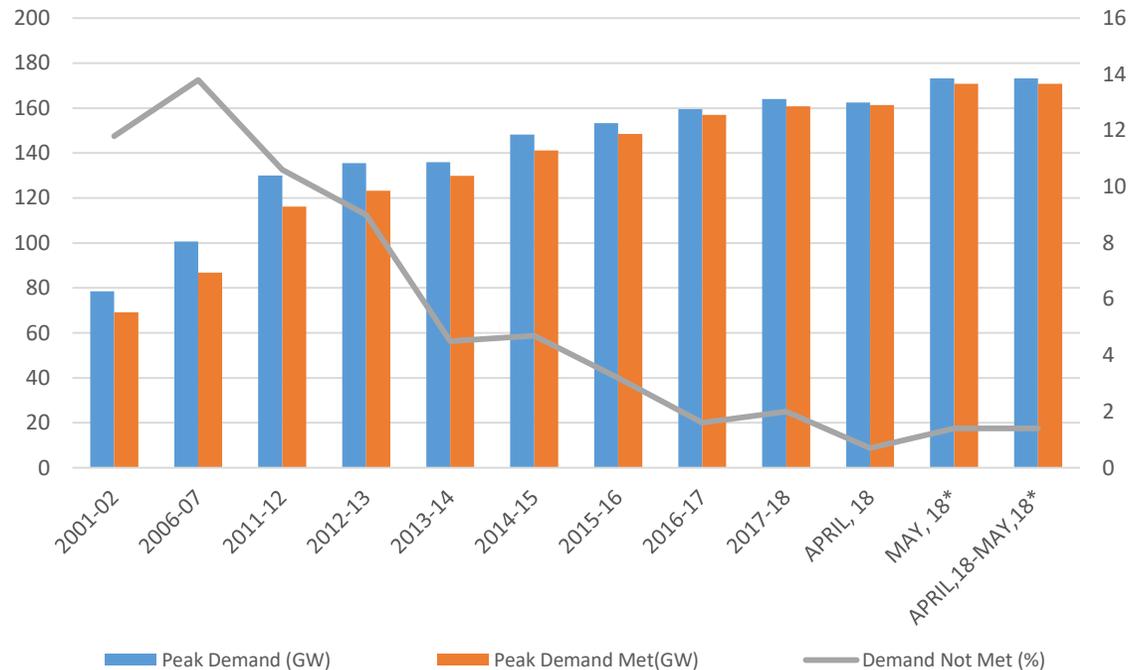
**660MW, 400MU(2016-17) 2 Links [400kV with HVDC back to back, 132kV] EXPORT**

Transmission links have been established between border states in Indian territory (Bihar, UP, Uttarakhand, Tripura, Manipur, West Bengal, and Assam) with neighbouring countries (synchronous/asynchronous /radial links).

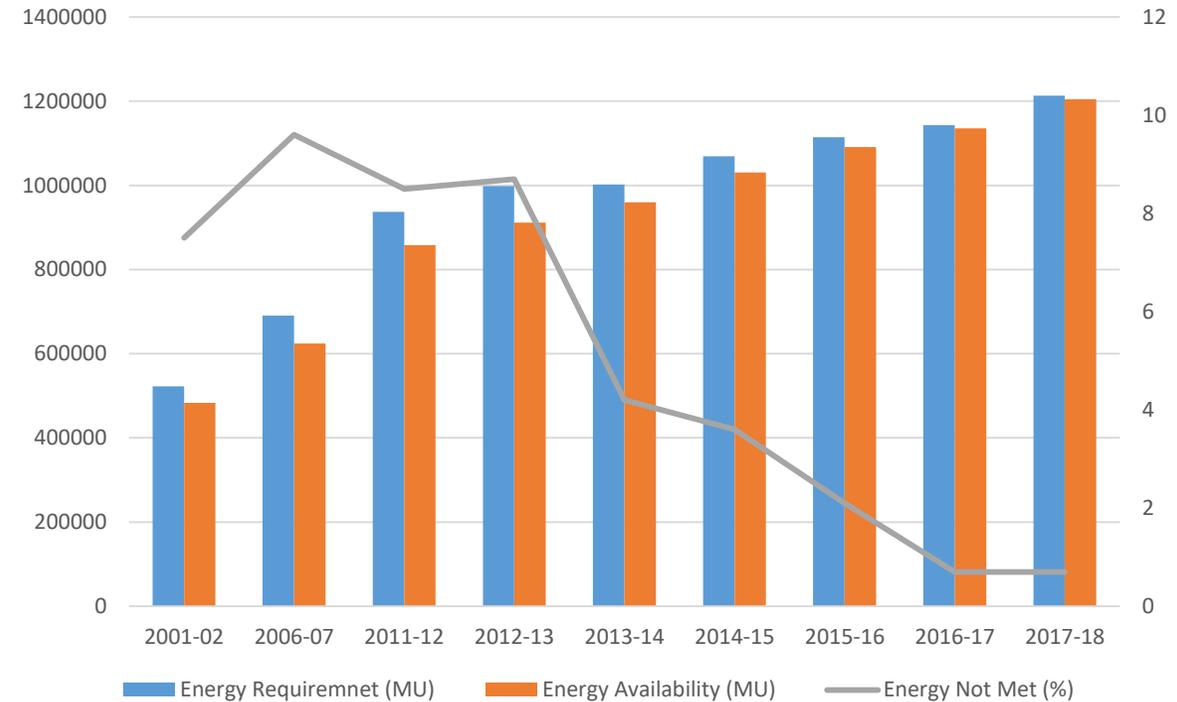
# Power Supply Position in the country



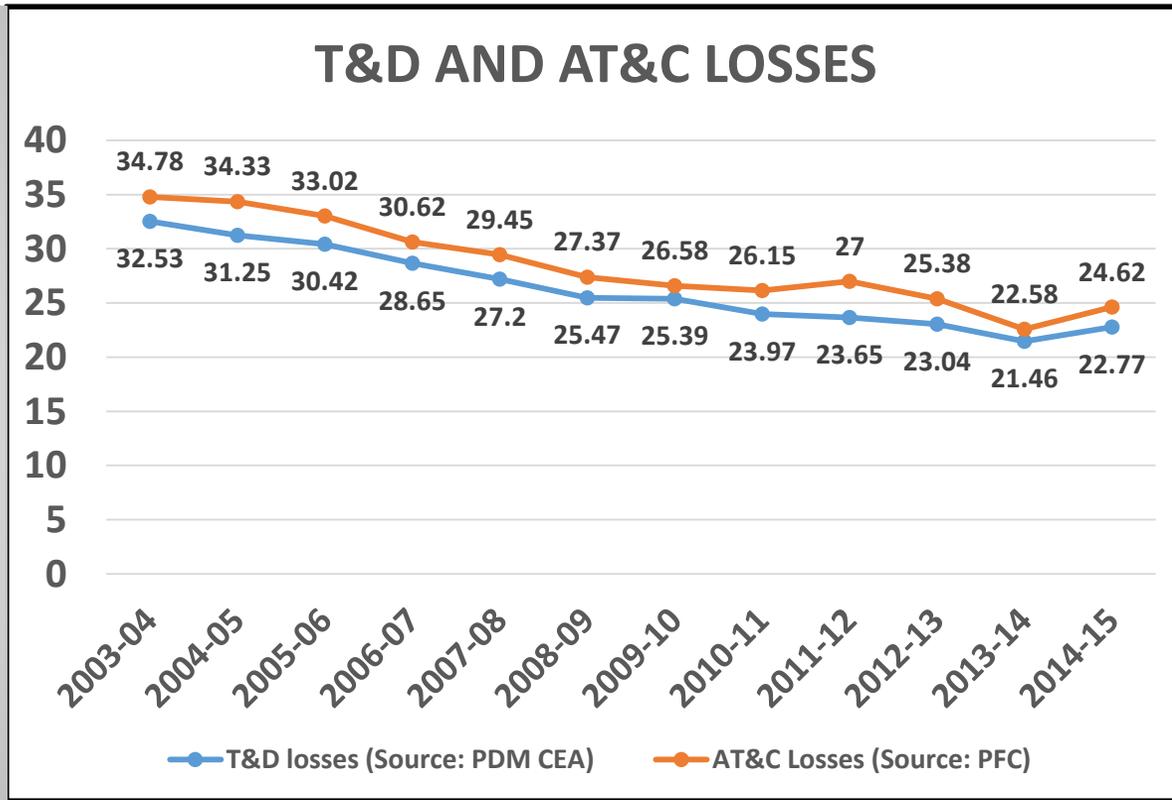
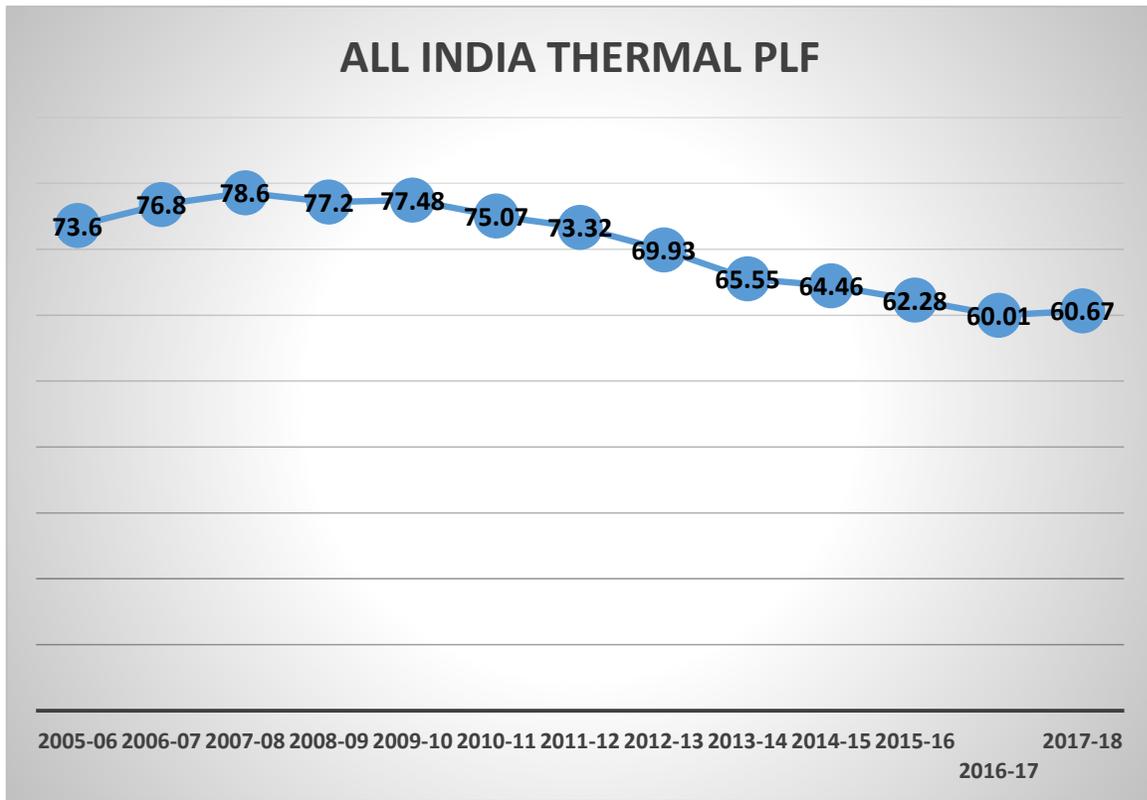
### Power Supply Position in terms of Peak



### Power Supply Position in terms of Energy



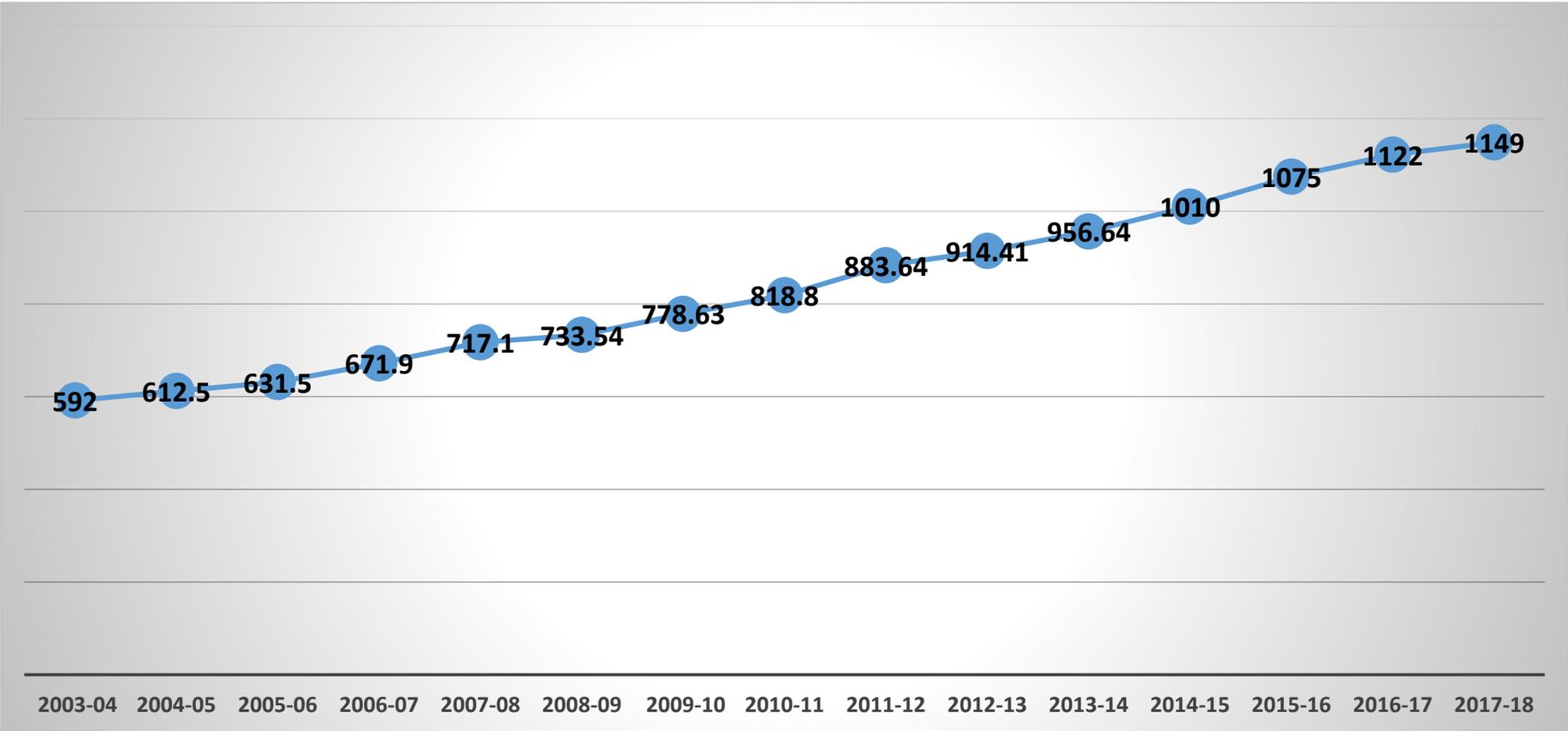
1. At present, demand supply gap at an all time low of less than 1%. This gap is on account of factors other than non-availability of power.
2. Adequate power available in the country.



Coal based capacity under reserved shut down during the current year is 15000- 25000 MW.

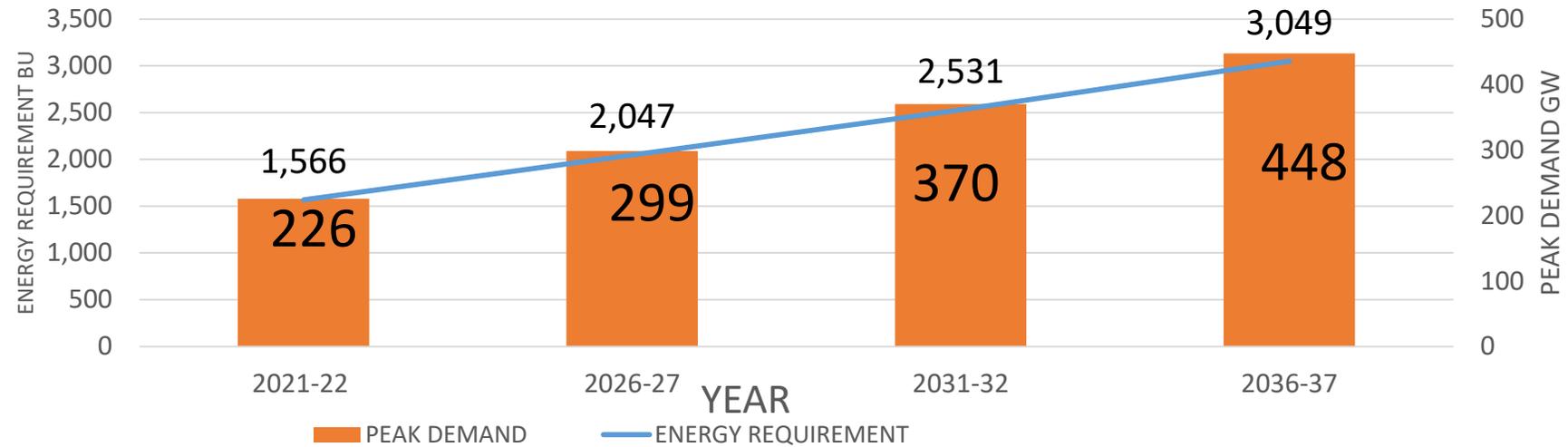


# ALL INDIA ANNUAL PER CAPITA CONSUMPTION OF ELECTRICITY (KWH)



16.3 in DEC,1947

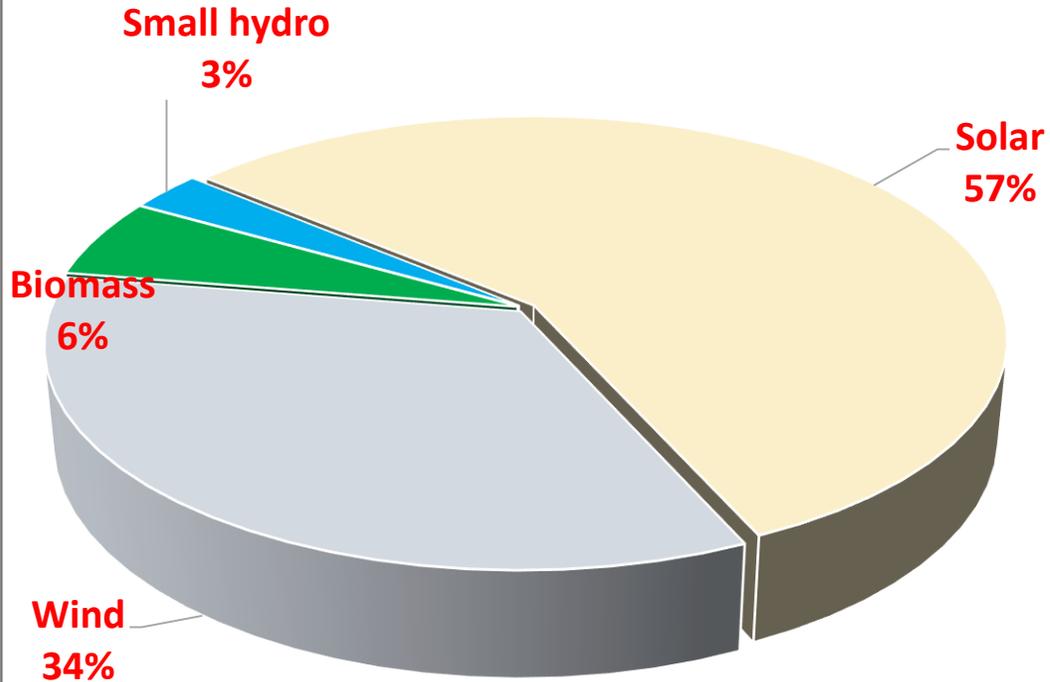
# PROJECTIONS OF ELECTRICITY DEMAND-19<sup>TH</sup> ELECTRIC POWER SURVEY



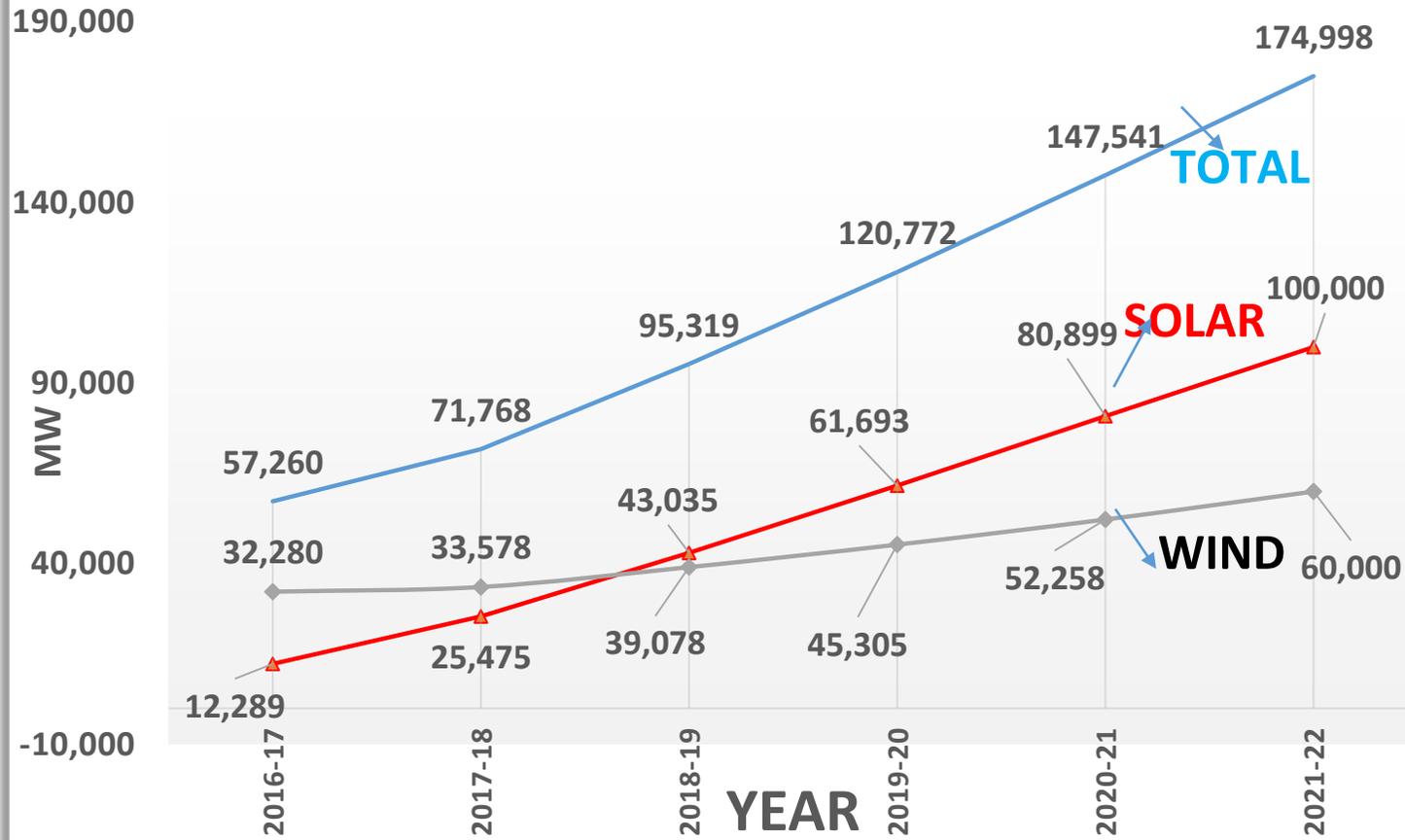
Growth Rate (%)			DEMAND REDUCTION DUE TO DSM		
	2016-17 to 2021-22	2021-22 to 2026-27	Year	Energy Requirement (BU)	Peak Requirement (GW)
CAGR of Electrical Energy Requirement	6.18	5.51	2021-22	206	9
CAGR of Peak Electricity Demand	6.88	5.77	2026-27	273	12



## Renewable Installed Capacity Target by 2022



## Projected Growth of RES Installed Generating Capacity (MW)

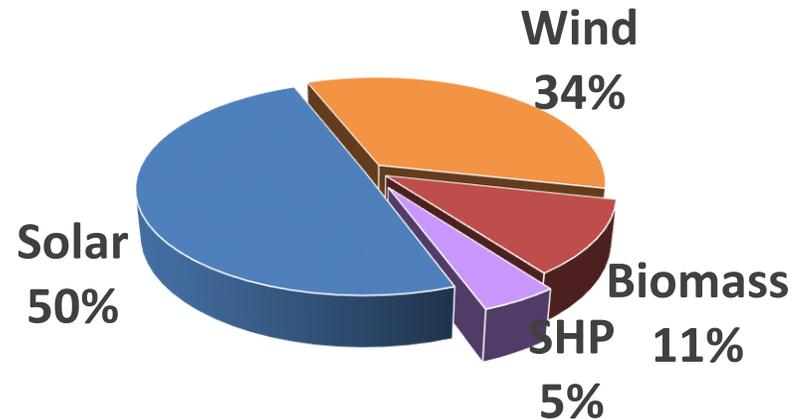




## Estimated Electricity Generation from RES in years 2021-22 and 2026-27

Year	Installed capacity of RES (GW)	Expected Generation in (BU)					Total Energy Requirement (BU)	Contribution of RES to Total Energy Demand(%)
		Solar	Wind	Biomass	SHP	Total		
2021-22	175	162	112	37	15	326	1,566	20.8%
2026-27	275	243	188	63	24	518	2,047	25.3%

PROJECTED ELECTRICITY GENERATION FROM RES BY 2021-22





## BASE CASE(2017-22) ASSUMPTIONS

### Capacity addition considered

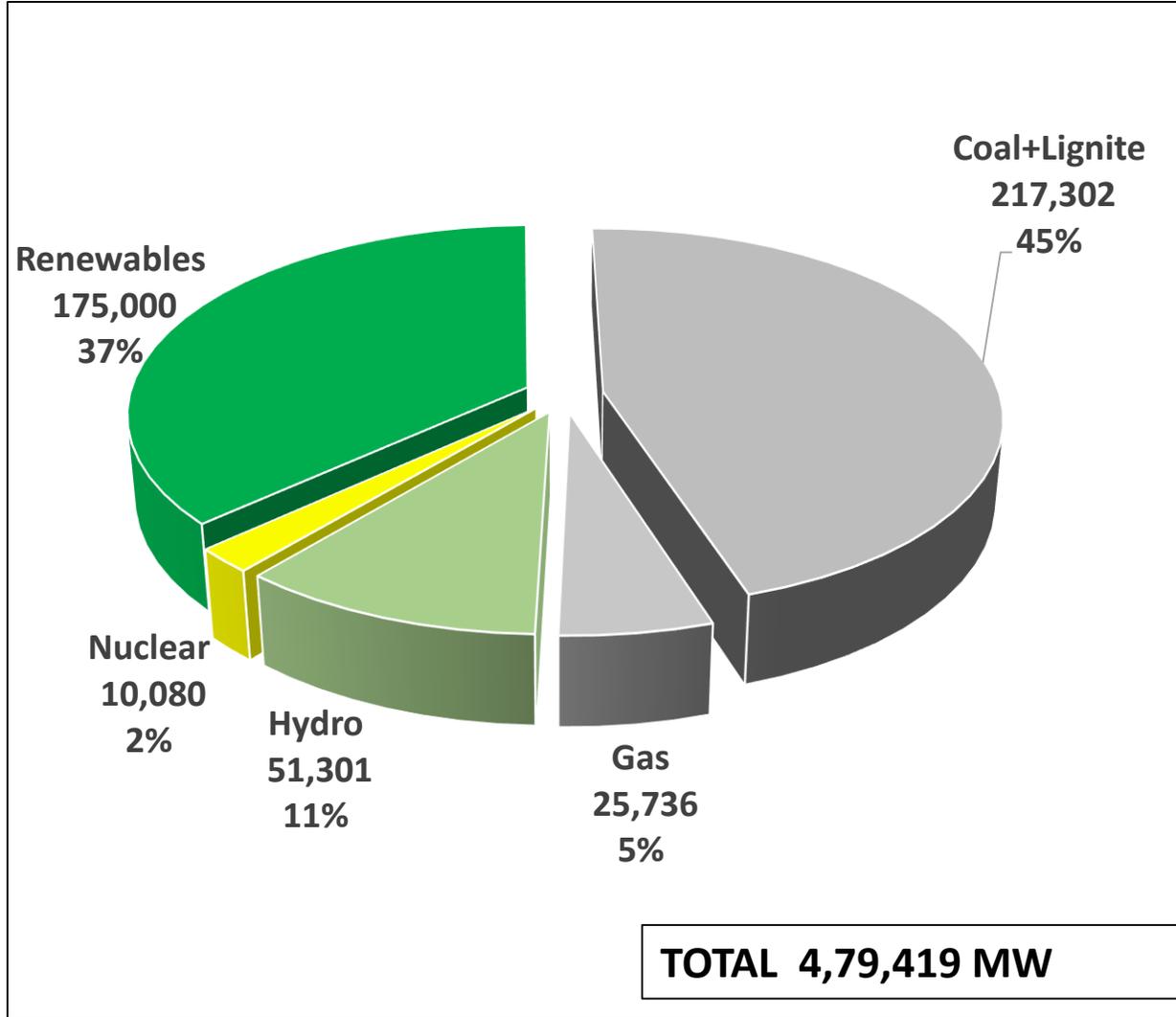
Years	Committed Capacity (MW)			Coal based Capacity under construction (MW)	RES Capacity by March, 2022 (MW)	Retirement of Coal Based Plants (2017-22) (MW)
	Hydro	Nuclear	Gas			
2017-22	6,823	3,300	406	47,855	175,000	22,716

## BASE CASE(2017-22) RESULT

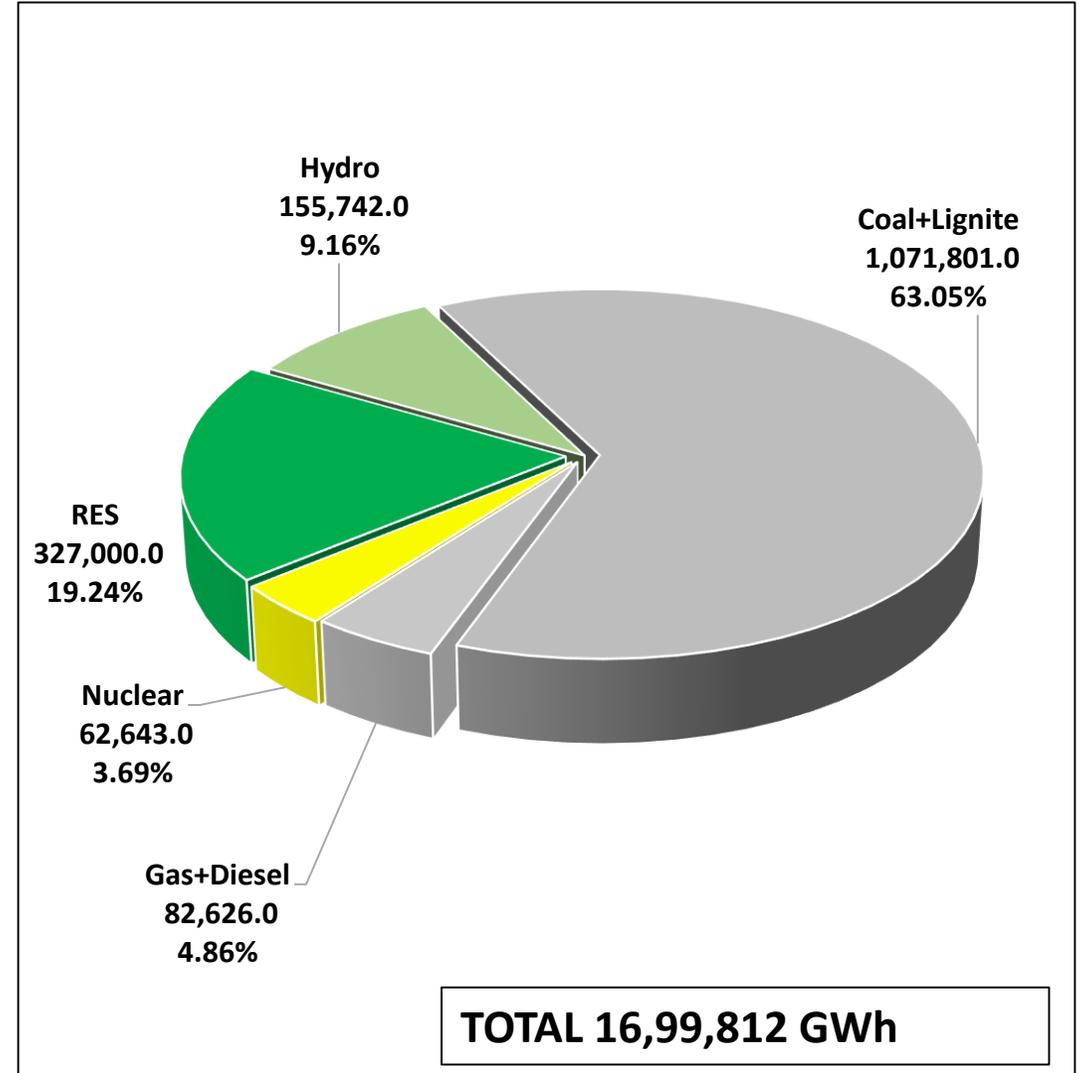
Additional Coal based capacity Requirement during 2017-22 (MW)*	Coal Based Generation (Gross) (GWh)	Expected PLF% during 2021-22 During 2017-22*
6445	1072	56.5%

\*Actual coal based capacity addition required during 2017-22 is 6,445 as per study even though 47,855 MW are expected to come between 2017-22. However, this addition of 47,855 MW of coal based capacity during 2017-22 would bring down the PLF as indicated in the result.

# PROJECTED INSTALLED CAPACITY (MARCH, 2022)



**ALL FIGURES IN MW**



**ALL FIGURES IN GWh**



## BASE CASE(2022-27) ASSUMPTIONS

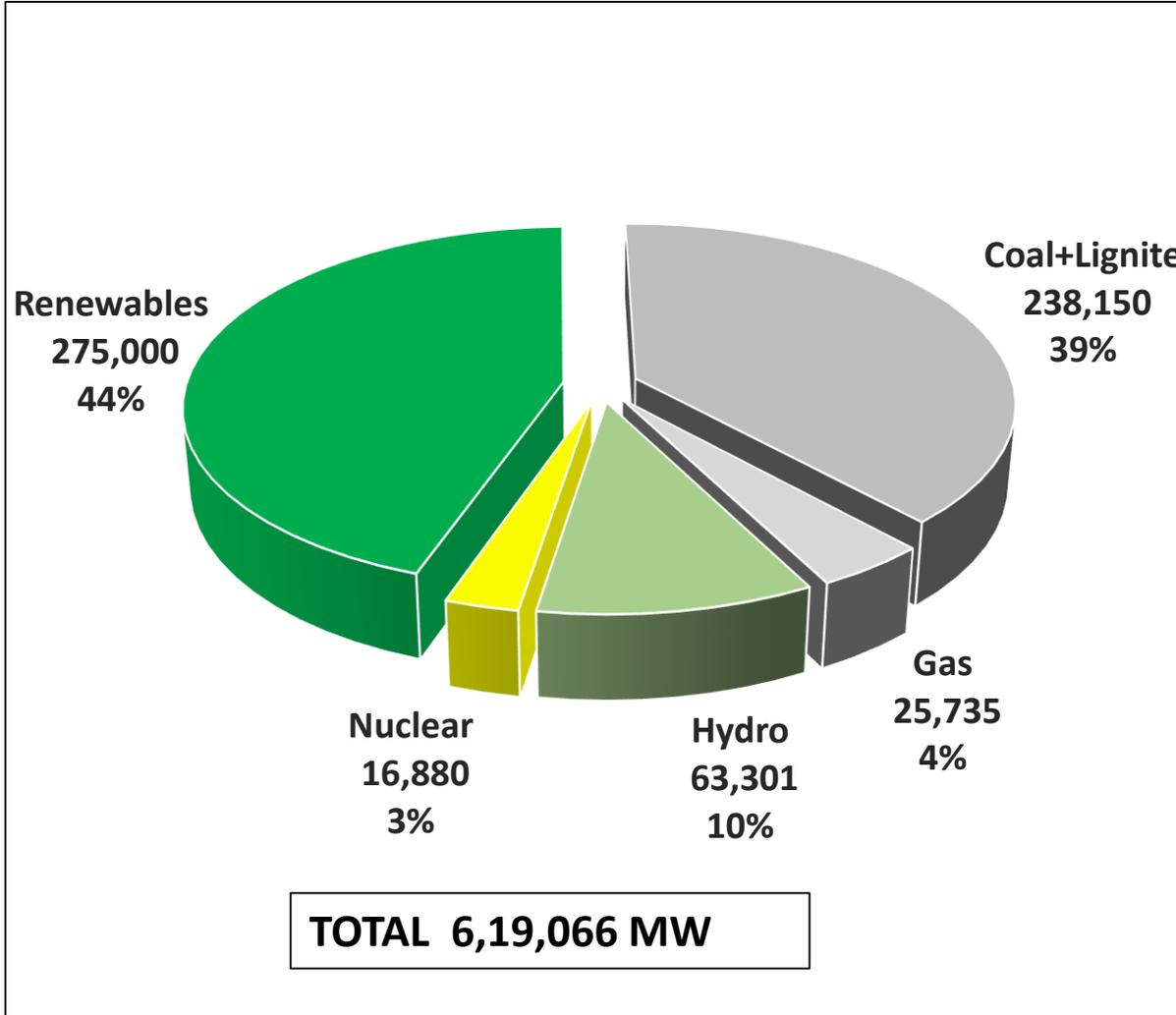
### Capacity addition considered

Years	Committed Capacity (MW)			Coal based Capacity under construction during 2017-22 (MW)	RES Capacity by March, 2027 (MW)	Retirement of Coal Based Plants (2022-27) (MW)
	Hydro	Nuclear	Gas			
2022-27	12,000	6,800	0	47,855	275,000	25,572

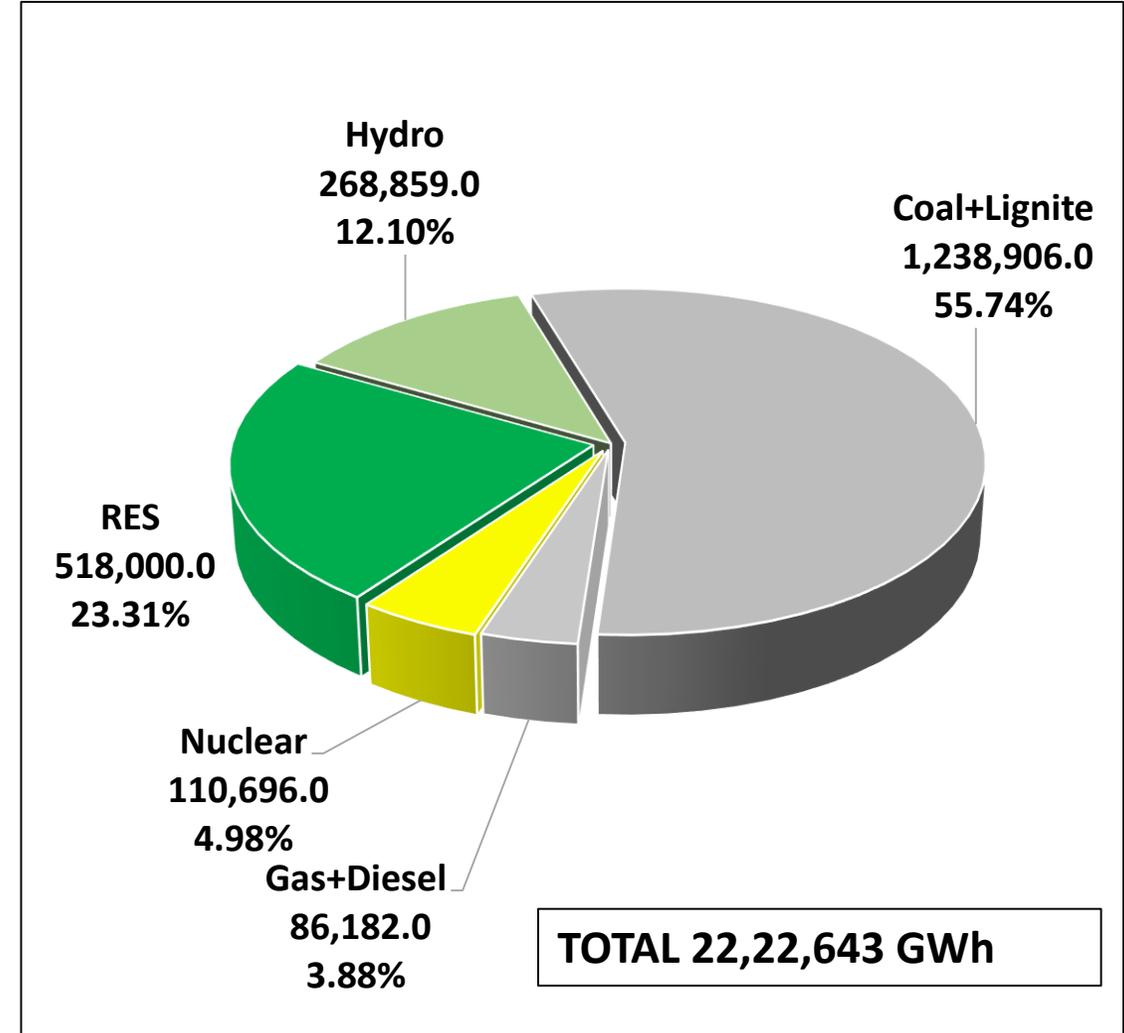
## BASE CASE(2022-27) RESULT

Additional Coal based capacity Requirement during 2022-27 (MW)	Coal Based Generation (Gross) (GWh)	Expected PLF% during 2026-27
46,420	1259	60.5%

# PROJECTED INSTALLED CAPACITY (MARCH, 2027)



**ALL FIGURES IN MW**



**ALL FIGURES IN GWh**



## India's Intended Nationally Determined Contribution (INDC)

### 40 % cumulative power installed capacity from non-fossil fuels by 2030

Year	Likely IC (GW)	Likely IC of Fossil Fuel (GW)	Likely IC of Non-Fossil Fuel (GW)	% of Non-Fossil Fuel in IC
March 2022	479.4	243.0	236.4	49.31%
March 2027	619.0	263.8	355.2	57.37%

\* Generation from RES also included.



## PROJECTED CO<sub>2</sub> EMISSIONS FROM GRID CONNECTED POWER STATIONS

<b>YEAR</b>	<b>Projected Total Carbon Emissions from Coal and Gas Based Plants (Million Tones)</b>	<b>Emission Rate* (KgCO<sub>2</sub>/kWh)</b>
<b>2015-16</b>	<b>859</b>	<b>0.732</b>
<b>2021-22</b>	<b>1026</b>	<b>0.604</b>
<b>2026-27</b>	<b>1173</b>	<b>0.524</b>

\* Generation from RES also included.

# NAMASTE

