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Historical Overview of Power Sector Transformation in India – Pankaj Batra

NATIONAL CONFERENCE

INCLUSIVE CLEAN ENERGY SOLUTIONS IN ADB OPERATIONS

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Basic Background of the structure

- India is a federal country
- There are **28** states and **8** Union territories in the country.
- The Constitution of India divides powers between the central government and the state governments.

Power System

- In 1964, the **Regional Electricity Boards** were **established in different regions** of the country for facilitating integrated operation and for encouraging exchange of power among the States.
- To encourage the States to build infrastructure for exchange of such power, **inter-state lines were treated as centrally sponsored schemes** and the States were provided interest free loans outside the State Plan.

Power System Development

- The **reason for development on the lines of regions** was that the generation resources in the country were spread unevenly.
- The hydro resources were primarily located in the Himalayan foothills and the North Eastern region whereas coal was located in the Bihar-Jharkhand-West Bengal area with some reserves also in Andhra Pradesh and Madhya Pradesh. Lignite was available in Tamil Nadu and Rajasthan.

Towards synchronous interconnections in

- The **North Eastern** and **Eastern grids** were interconnected **October 1991**.
- **Western Grid** was interconnected with the aforementioned grids in **March 2003**.
- The **Northern grid** was interconnected in **August 2006**, forming a Central Grid synchronously connected operating at one frequency.
- The sole remaining regional grid, the **Southern Grid**, was synchronously interconnected to the Central Grid on **31 December 2013** with the commissioning of the 765 kV Raichur-Solapur transmission line, thereby establishing the National Grid.

Electricity Laws

- The **Indian Electricity Act 1910** was enacted in which the power of licensing was left to the local government, and the concept of issuing license for bulk supply was introduced.
- Bulk supply meant that a company could generate and sell to other distributors in large quantities who would, in turn, retail it under a different license to small consumers.

Electricity Laws

- In 1948, the Government enacted the **Electricity Supply Act (ESA) 1948** to pave the way for the formation of the State Electricity Boards (SEBs).
- It was enacted by the Government, since it was felt that the pace of electrification was much below the desired pace and that electricity was only available in major towns/cities. The Electricity Supply Act, 1948 paved the way for **setting up of State Electricity Boards (SEBs)** and also envisaged constitution of the **Central Electricity Authority (CEA)**.

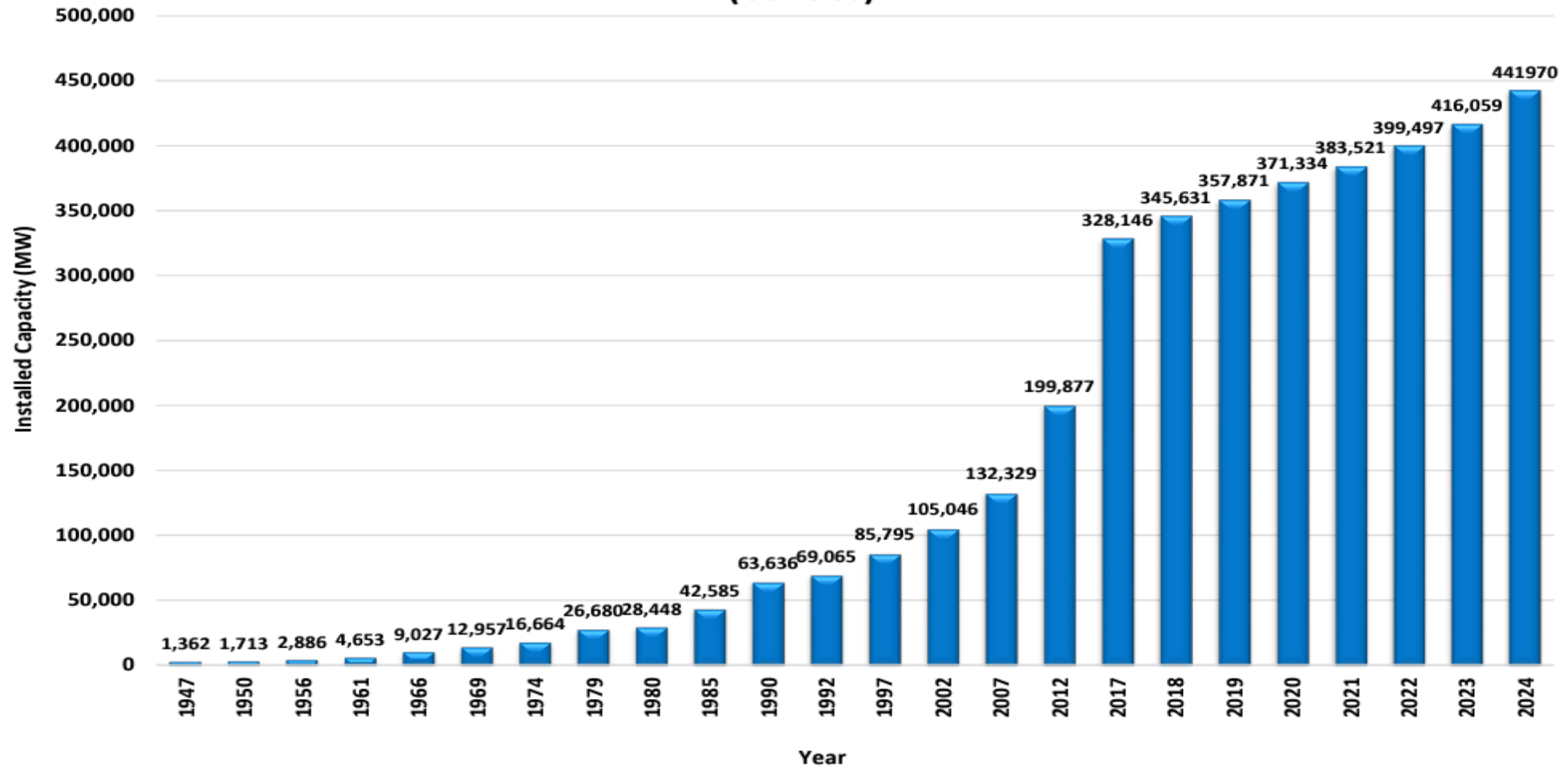
Electricity Laws

- The Electricity Act 2003 became effective from June 2003, which acknowledged **trading of power as an independent activity**, to be licensed by the appropriate regulator.
- The EA 2003 encouraged competition and privatization.
- This brought about the concept of Open Access in transmission and distribution, delicensing of generation and competition in generation and procurement of supply by the distribution companies.

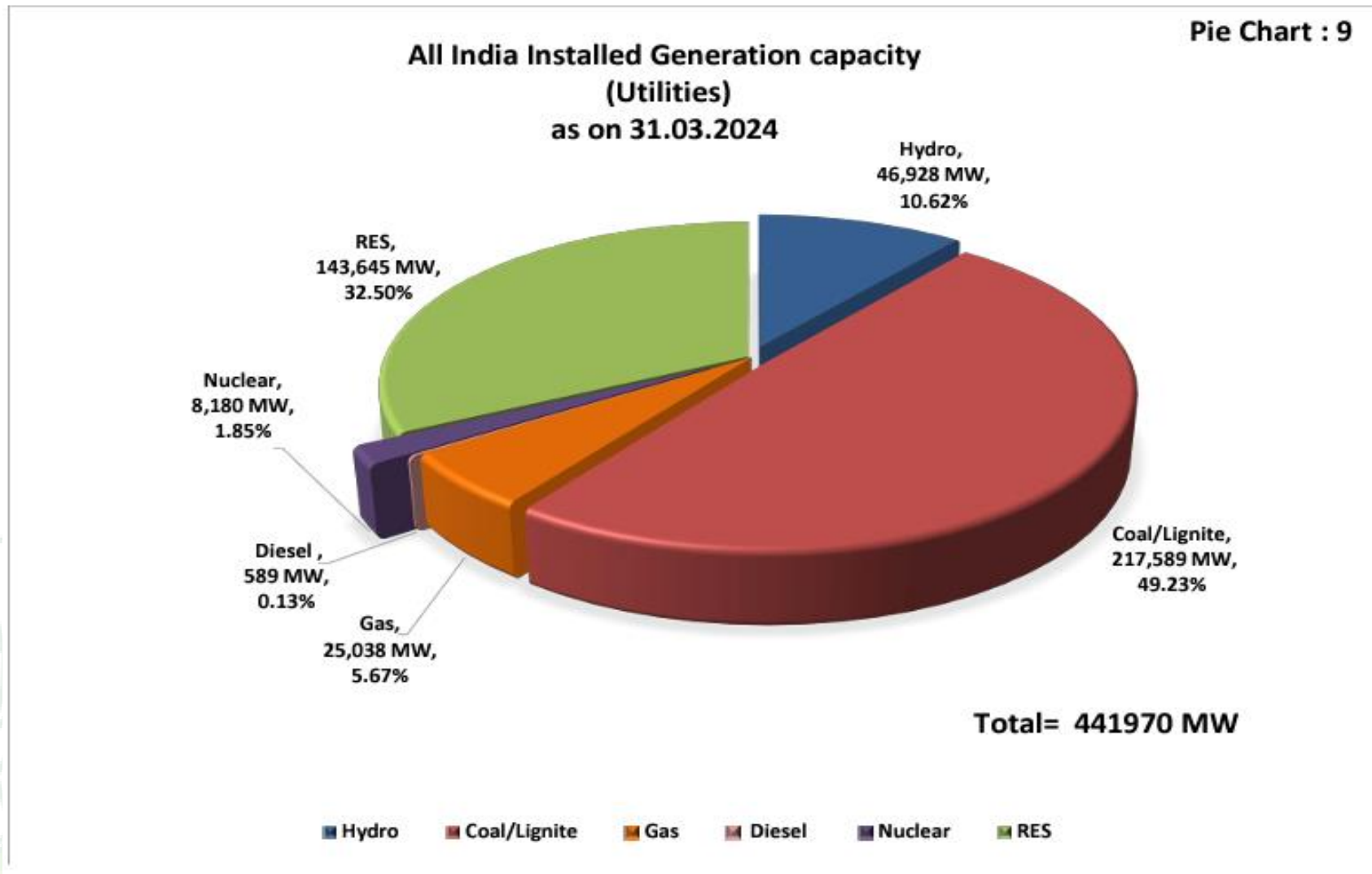
Power Sector Transformation – Installed Generating

Installed Generation Capacity
(Utilities)

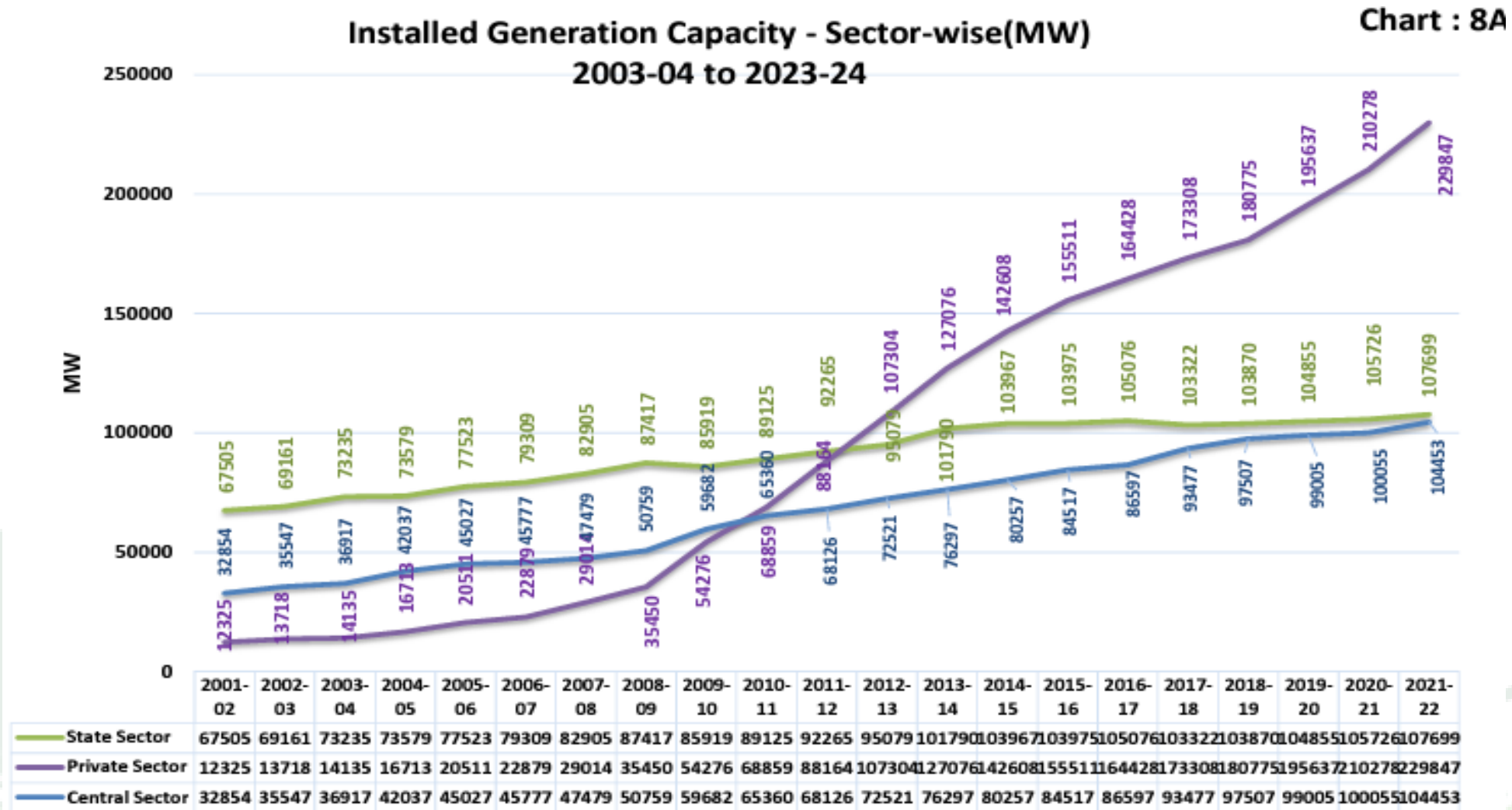
Chart : 1



Power Sector Transformation – Installed Generating capacity



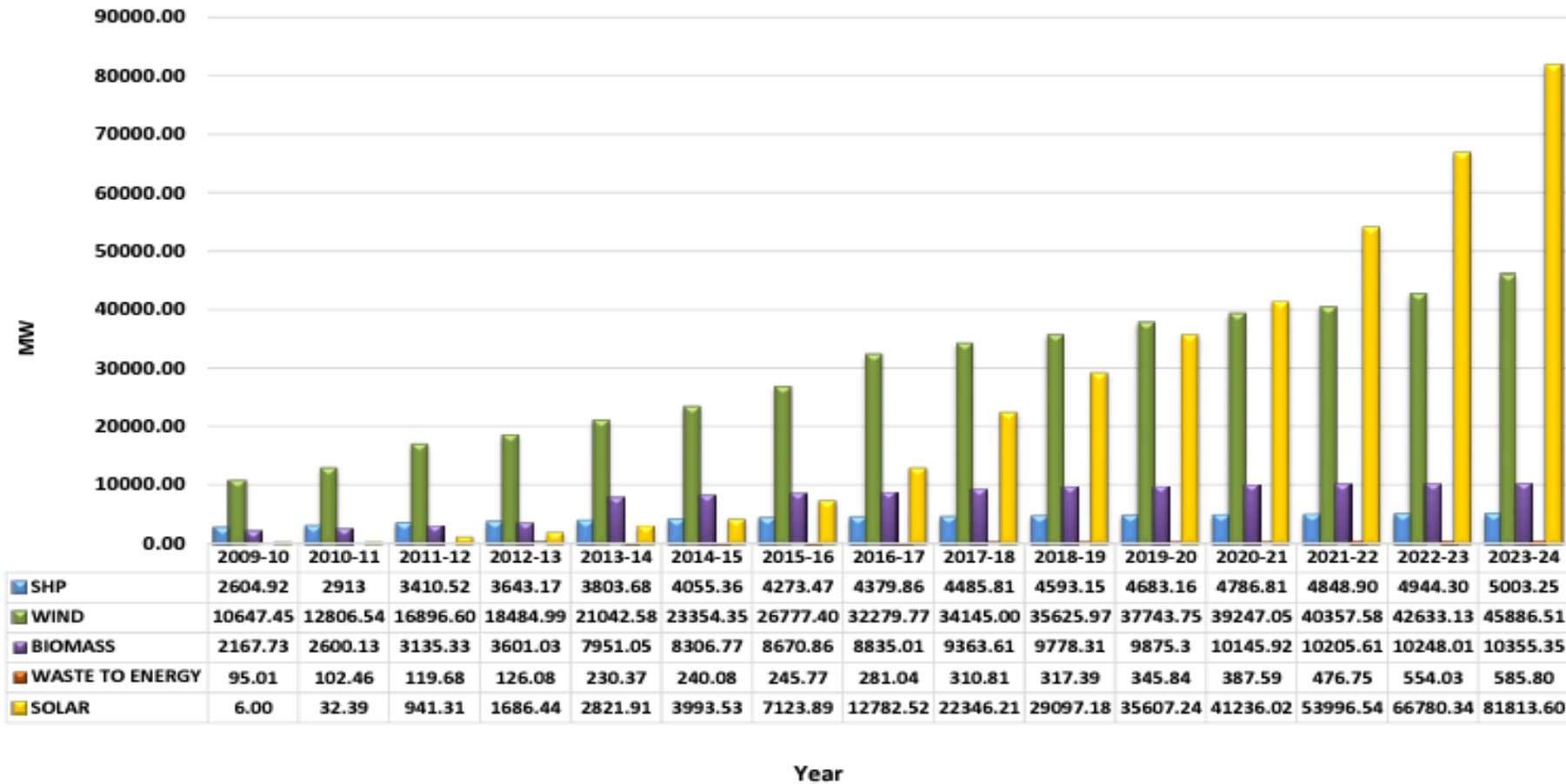
Power Sector Transformation – Sector-wise Generating



Power Sector Transformation – Growth of RES Generating

Installed Generation Capacity of R.E.S. - Mode-wise/Year-wise during last 15 years

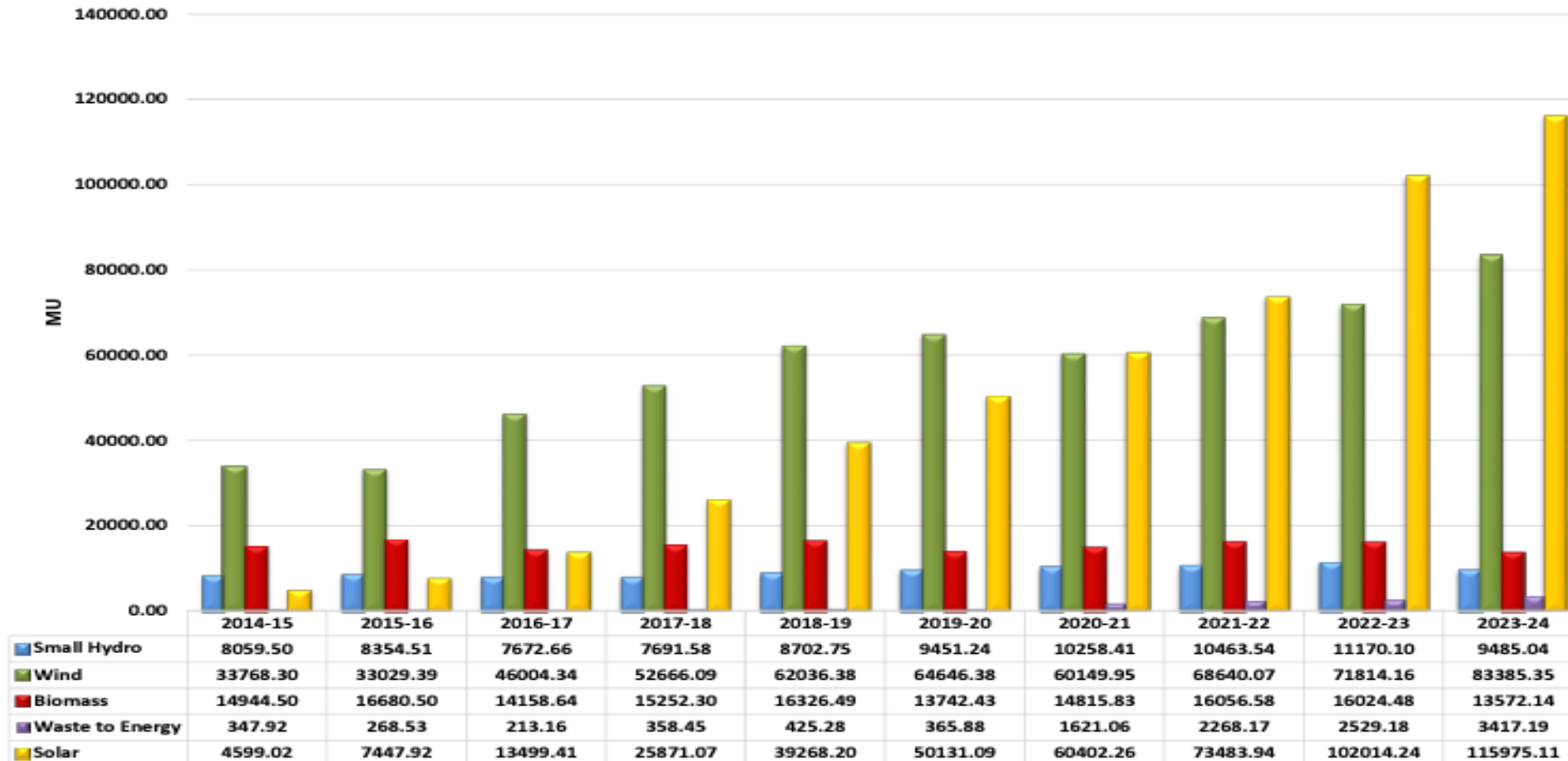
Chart :8 B



Power Sector Transformation – Growth in

Electricity Generation from R.E.S. - Mode-wise/ Year-wise during last 10 years

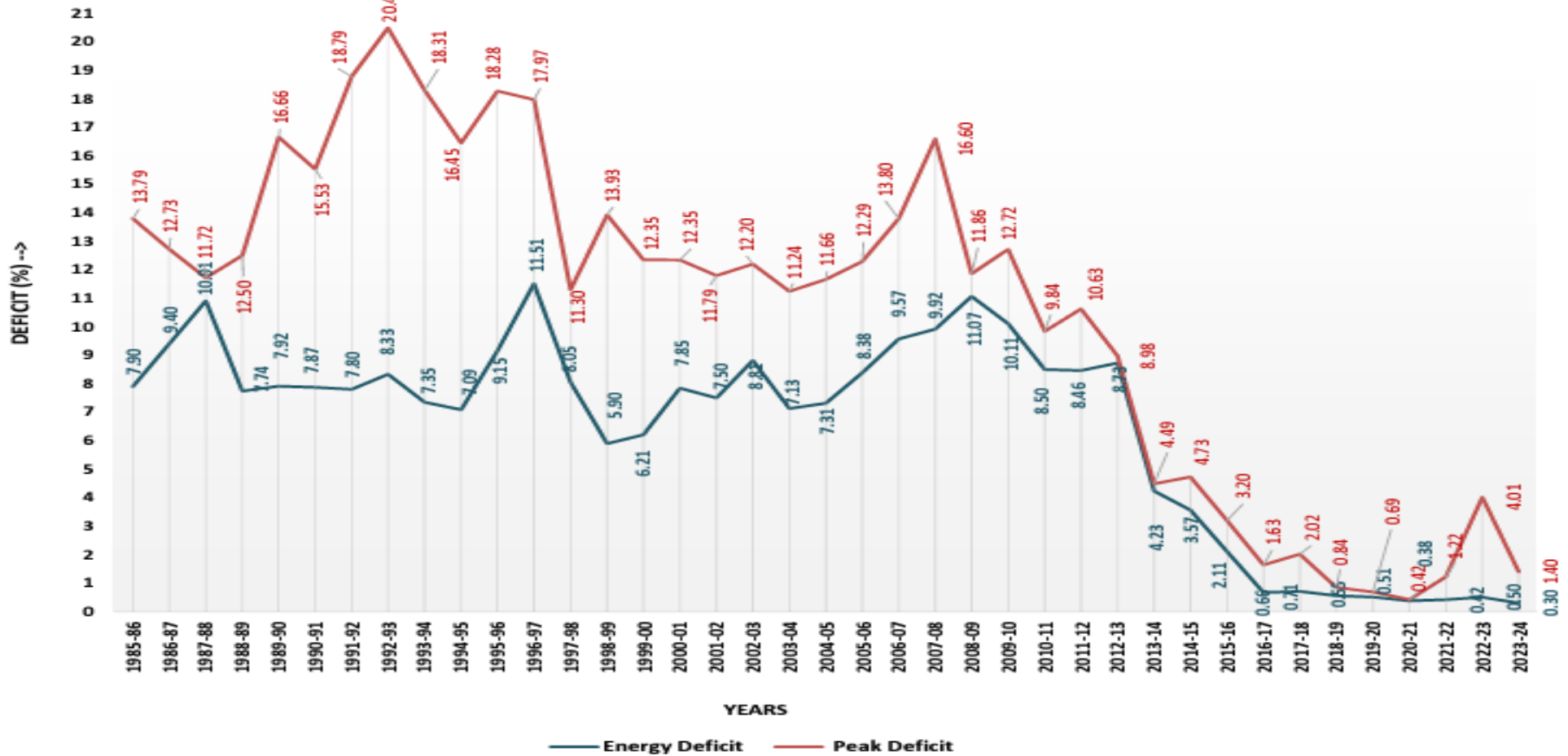
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Power Sector Transformation – Reduction in

**All India Peak and Energy Deficit (Utilities)
1985-86 to 2023-24**

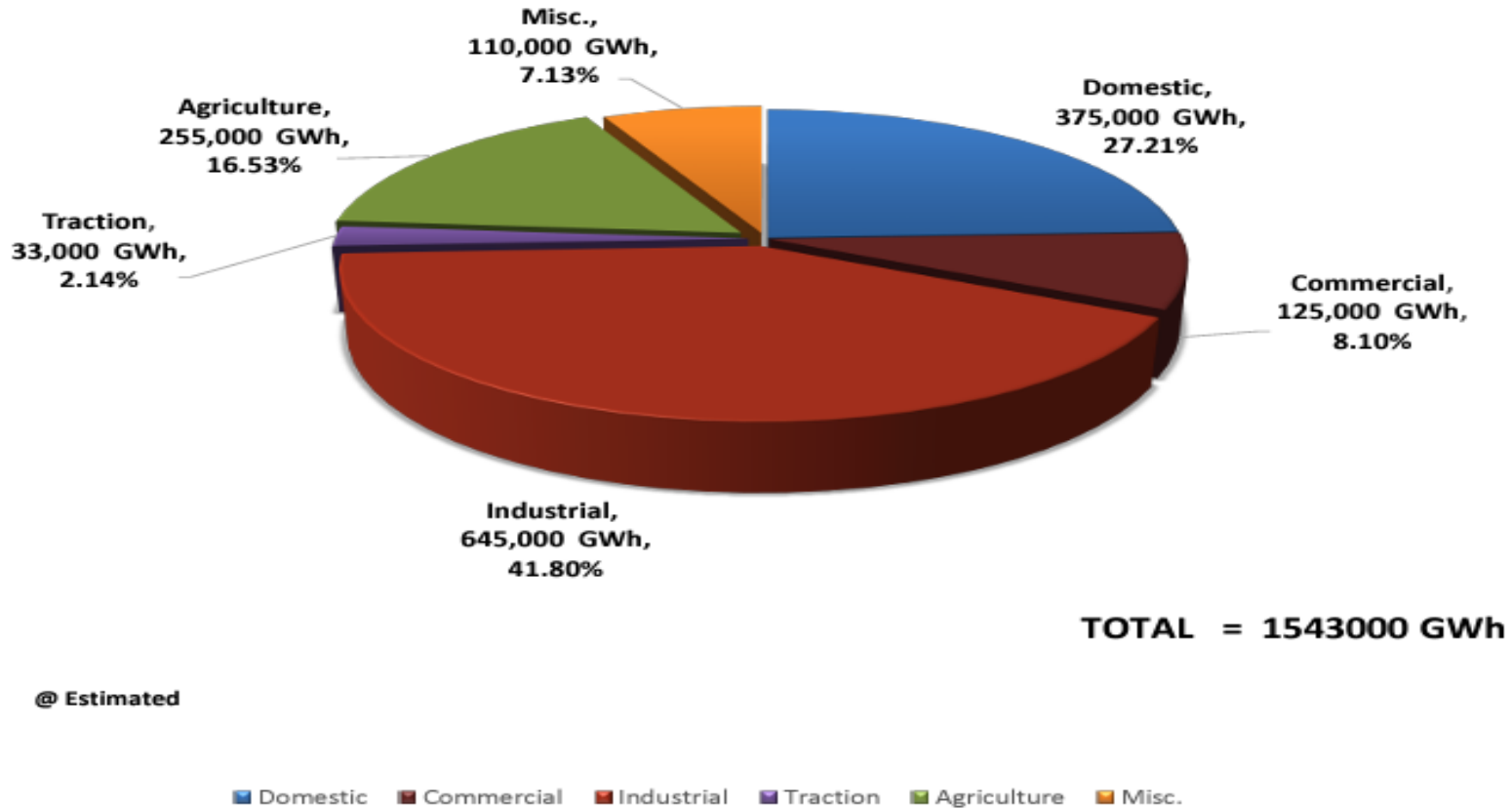
Chart : 38



Power Sector Transformation – Category-wise

Chart : 26

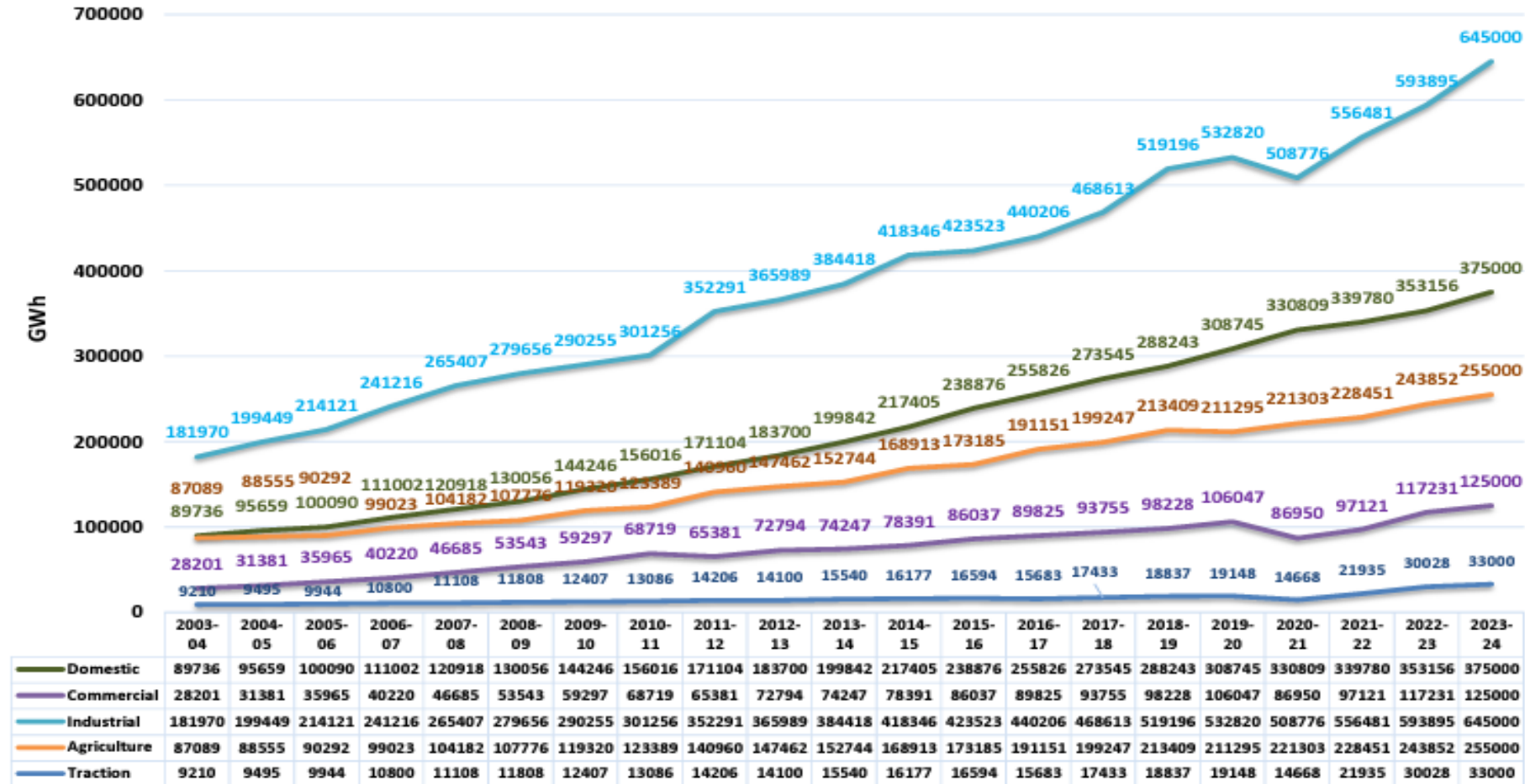
**Electricity Consumption Sector-wise
(Utilities & Non- Utilities)
2023-24**



Power Sector Transformation – Category-wise

Trend of Energy Consumption - Category-wise
2003-04 TO 2023-24

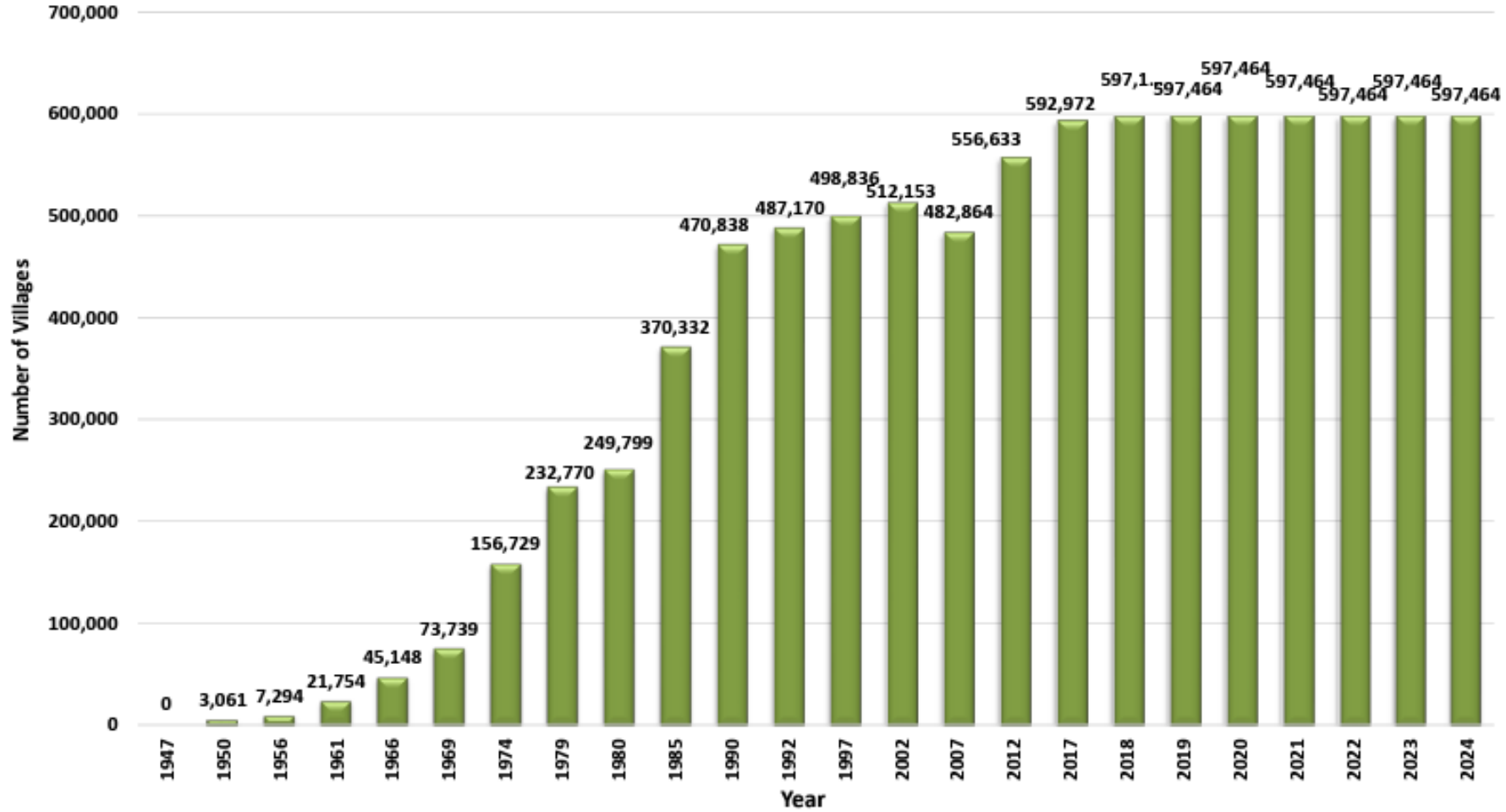
Chart : 25A



Village Electrification

Number of Villages Electrified in the Country

Chart : 3



Village

Electrification

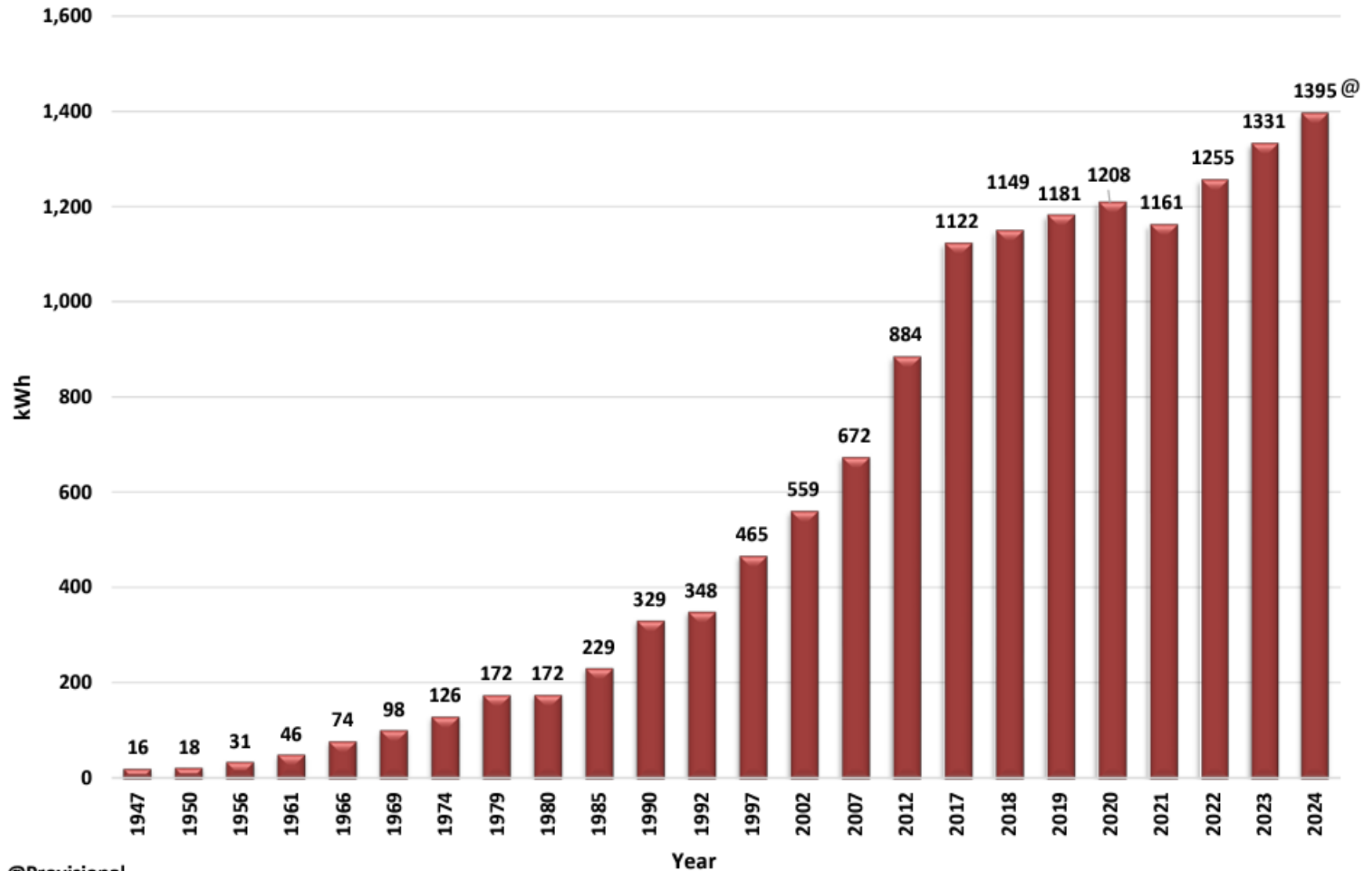
India has achieved 100% electrification of inhabited villages, including tribal villages. The Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya) scheme was launched by the central government in April 2018 to achieve this goal, with an investment of Rs. 1.85 lakh crores (22,024 million USD).



Per Capita

Per Capita Consumption of Electricity

Chart : 4



@Provisional



GDP Growth Rate

GDP Growth Rate

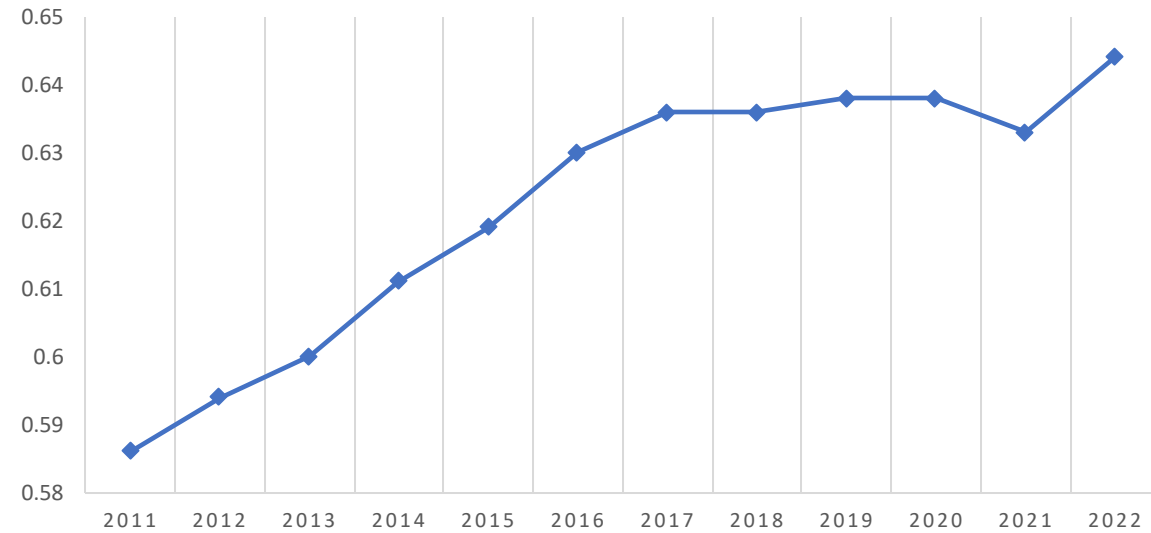


Source: Centre for Monitoring Indian Economy (CMIE)



Human Development

HDI: INDIA 2011-22



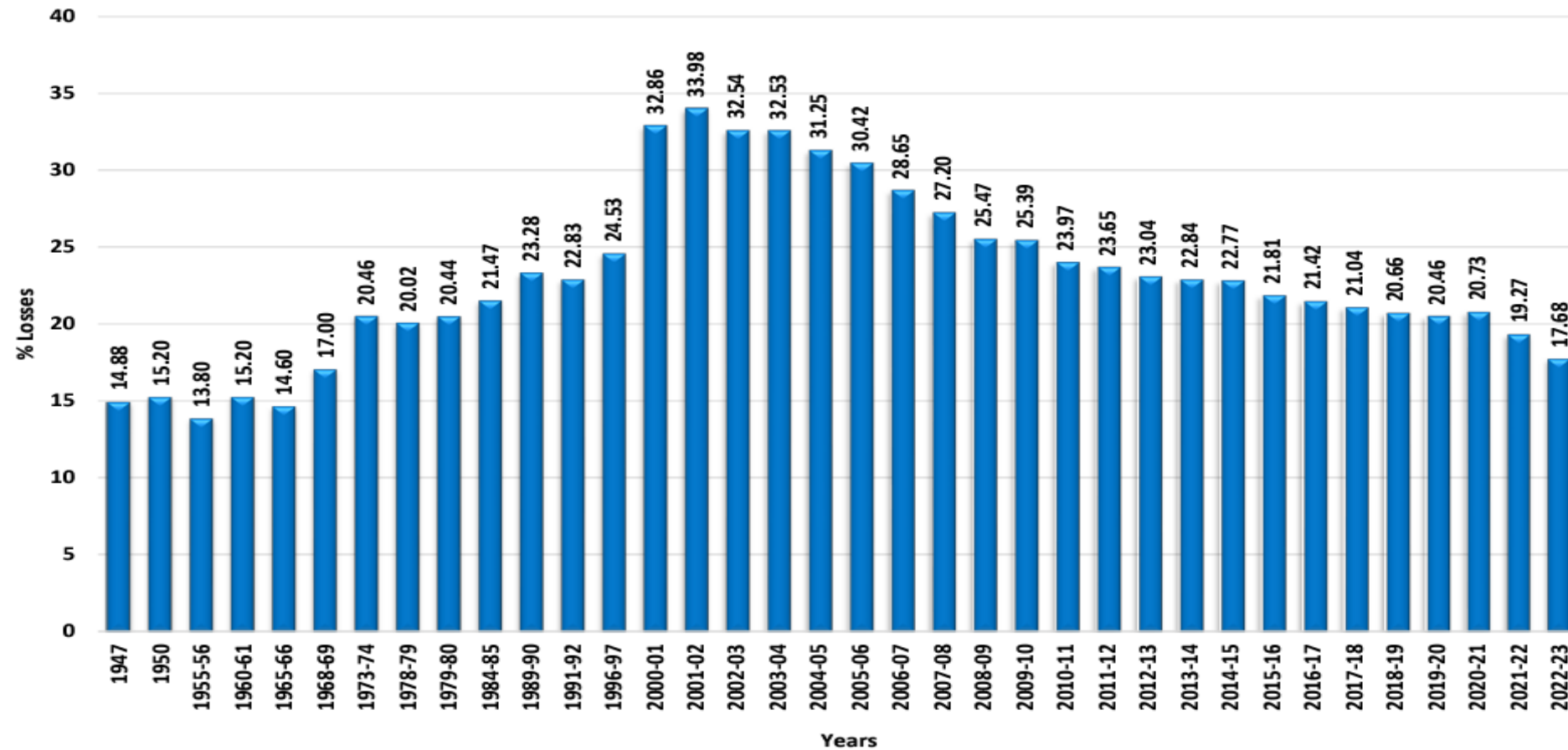
Source: Human Development Report, UNDP



Power Sector Transformation – T&D Losses

All India Transmission and Distribution Losses (%)

Chart : 29



Power Market, Power

- Presently there are about 40 licensed traders in the country for inter-State trading of power.
- These are governed by the Central Electricity Regulatory Commission (Procedure, Terms and Conditions for grant of trading licence and other related matters) Regulations, Fixation of Trading Margin Regulations and Power Market Regulations.
- The traders can facilitate long term contracts, medium term contracts and short term contracts.
- Power import from Bhutan (long term contract) is being facilitated by Power Trading Corporation.

Power Exchange

- The first Power Exchange in India , Indian Energy Exchange (IEX), became functional in June 2008.
- The second power exchange in India, Power Exchange India Ltd. (PXIL), became functional in October, 2008.
- Since then, power trading in India has grown in leaps and bounds.
- From hourly trading blocks, they were reduced to 15-minute trading blocks, for more optimum utilization of generation surpluses.

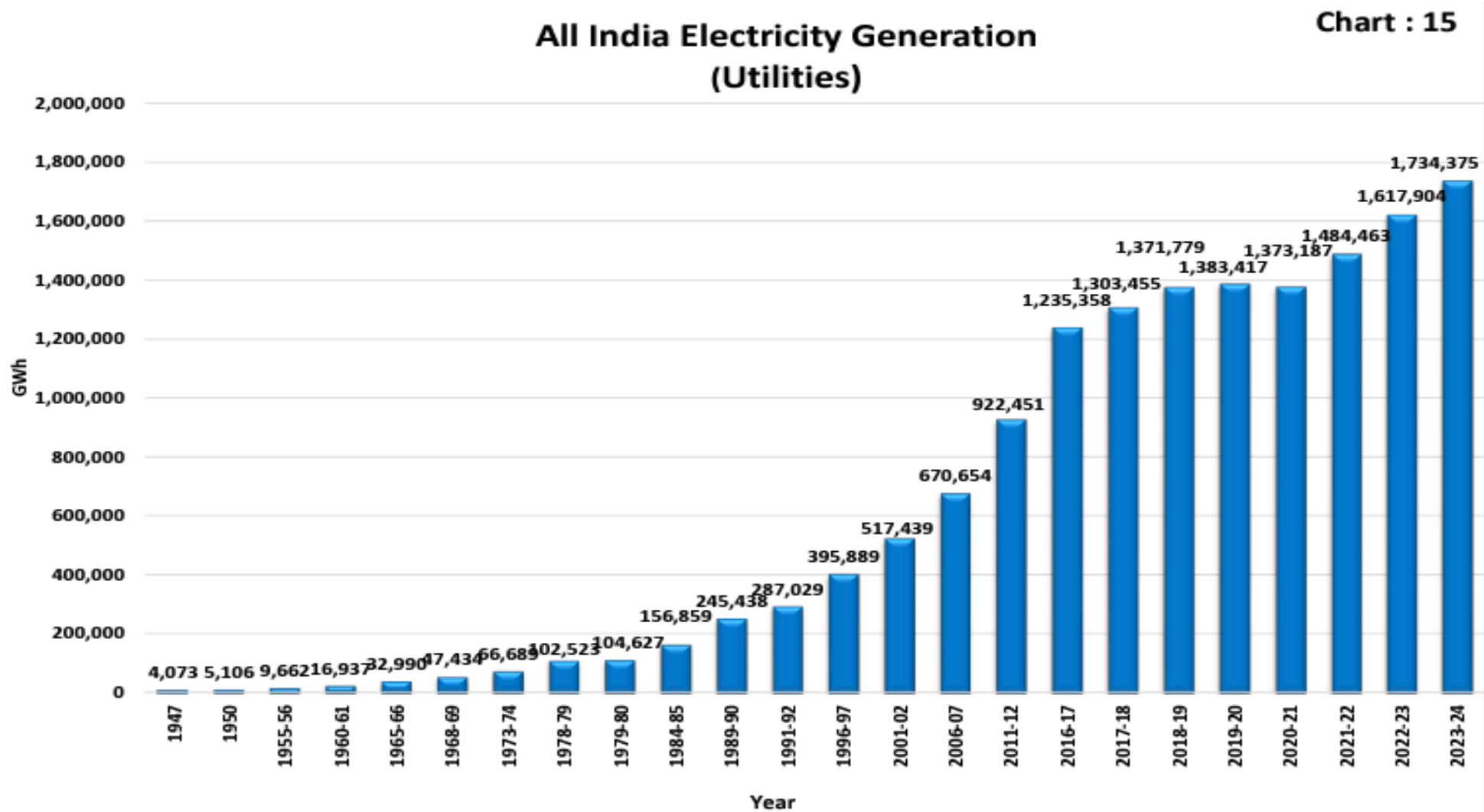
Conclusio

- India has made rapid strides in the power sector.
- From a shortage of upto 10-15% at one time, it has achieved close to zero shortage in 2017-18, with surplus capacity, which it is exporting to Bangladesh and Nepal.
- It started a power market in 2008, for efficient procurement and sale of power, which has resulted in efficient and optimal utilization of power resources in the Region.
- All villages have been electrified by 2018 and all households by 2019.
- India has one of the largest renewable generation capacity addition programmes in the world.

Thank You



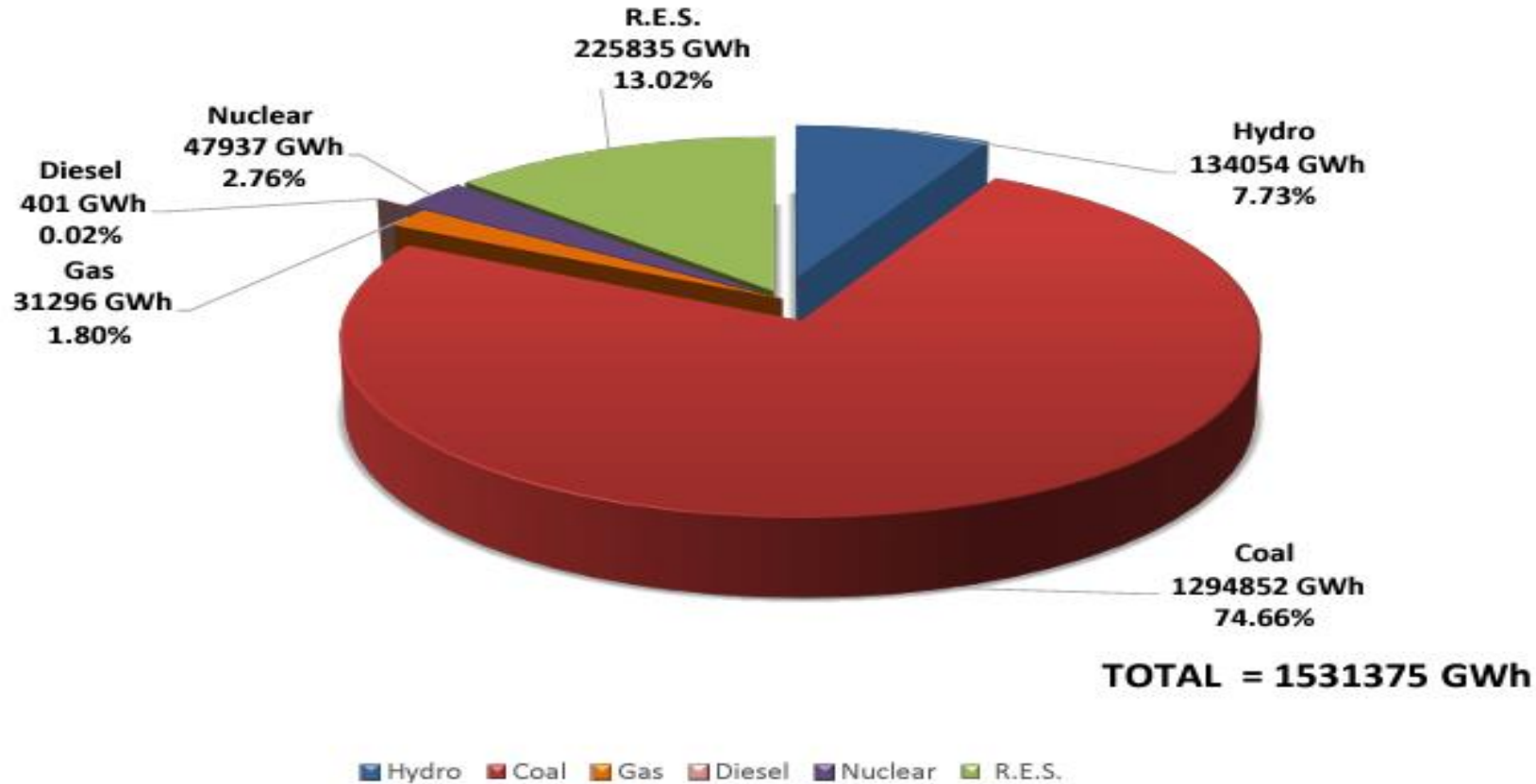
Power Sector Transformation – Growth in actual



Power Sector Transformation – Growth in

Electricity Generation in India
Mode-wise -Utilities
2023-24

Chart : 16



Power Sector Transformation – Growth in

