

MODULE: 1

ENERGY SCENARIO UPDATES



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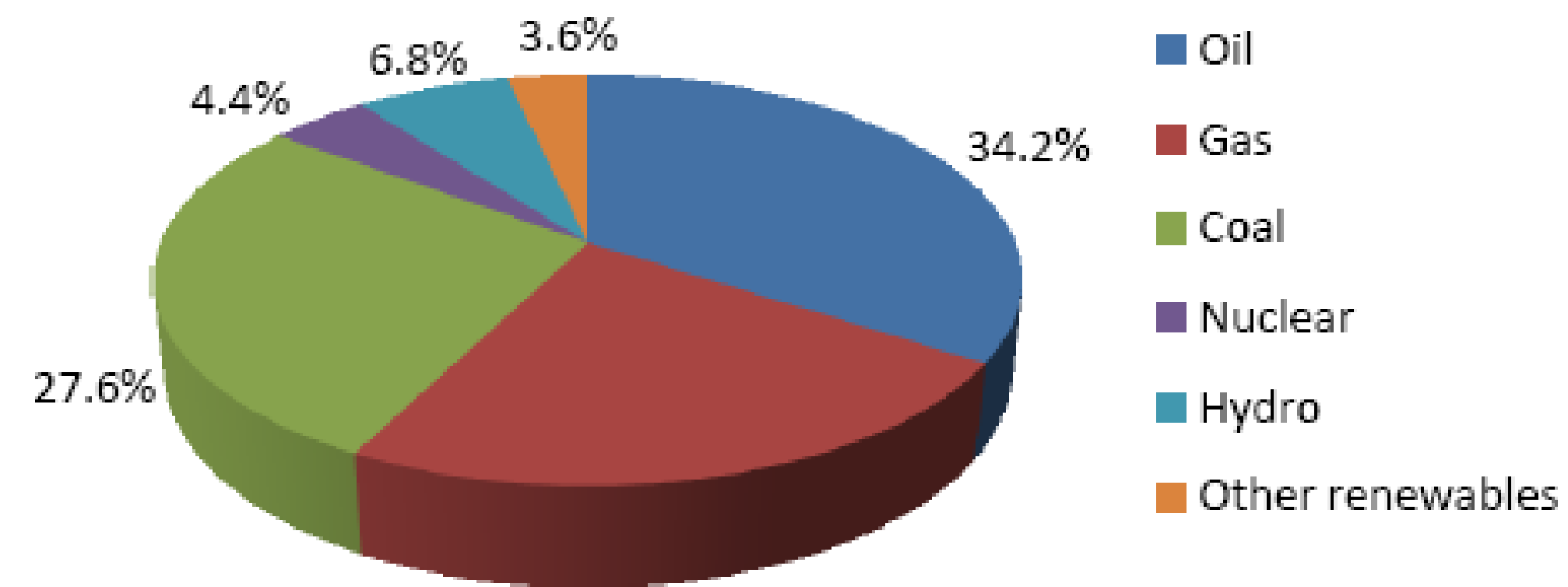
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INTRODUCTION

World Primary Energy Consumption - 2017

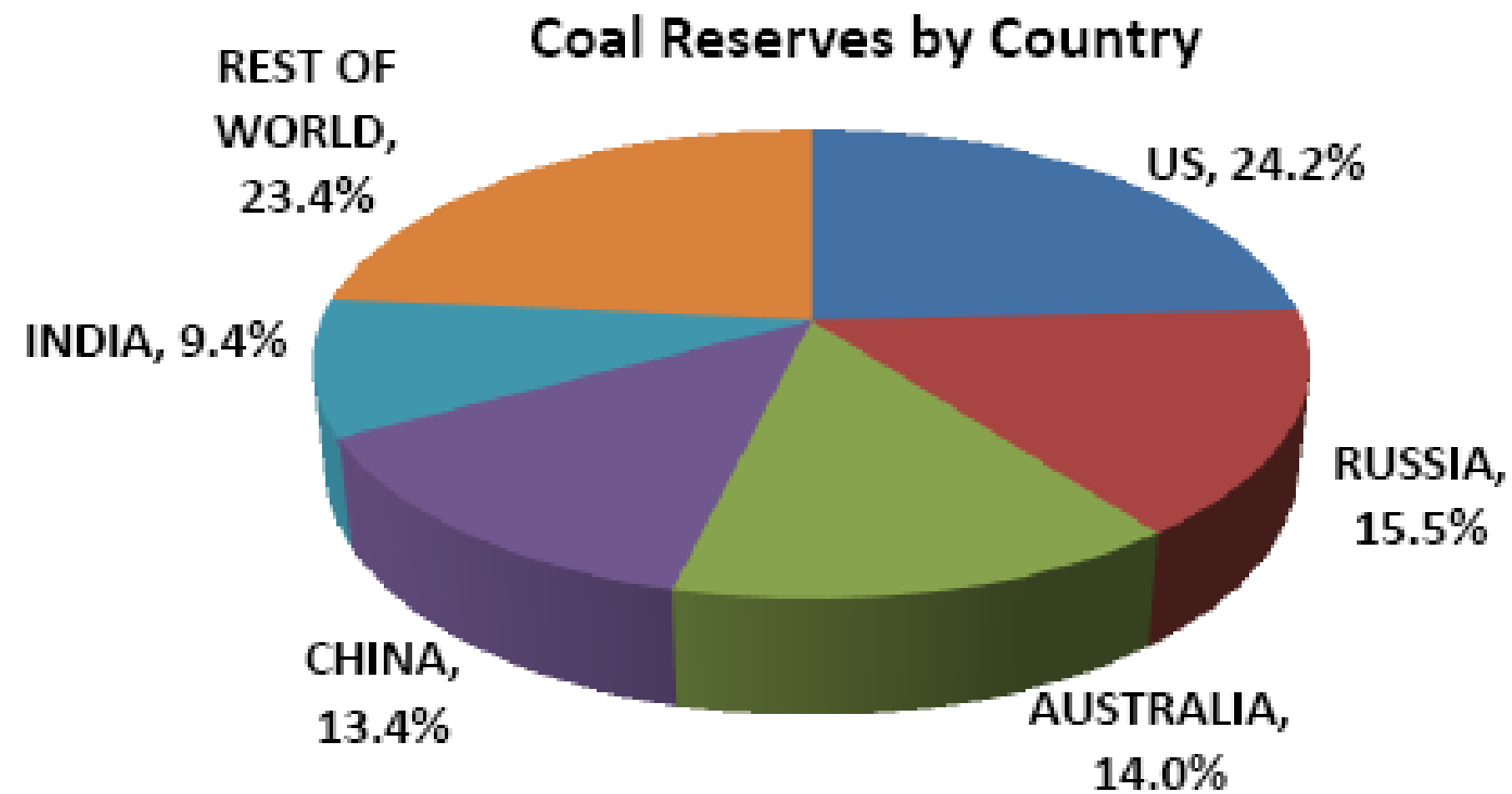


World Total Primary Energy consumption - 13511.2 MTOE

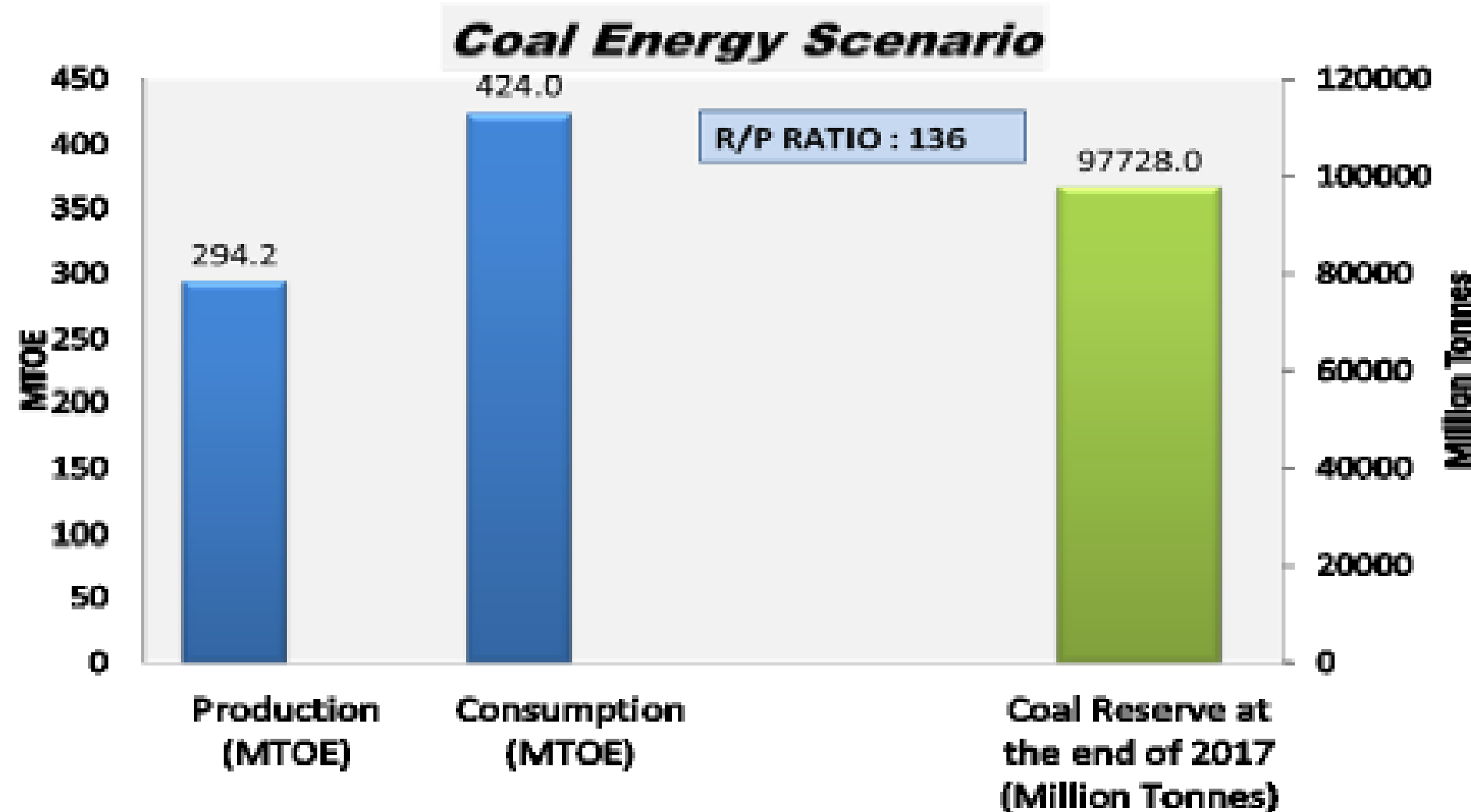
- Fossil fuels such as oil, natural gas and coal supply about 85% of energy to industrial, transportation, commercial and residential sector.
- India's primary energy consumption was 753.7 million tonnes oil equivalent in 2017.
- However, these fossil fuels will be exhausted soon as well as global environment is worsening due to increasing greenhouse gas emissions by fossil fuels.

The background features a series of diagonal stripes in two shades of teal, creating a sense of movement and depth. The stripes are set against a solid teal background. The word "COAL" is prominently displayed in the upper right quadrant.

COAL

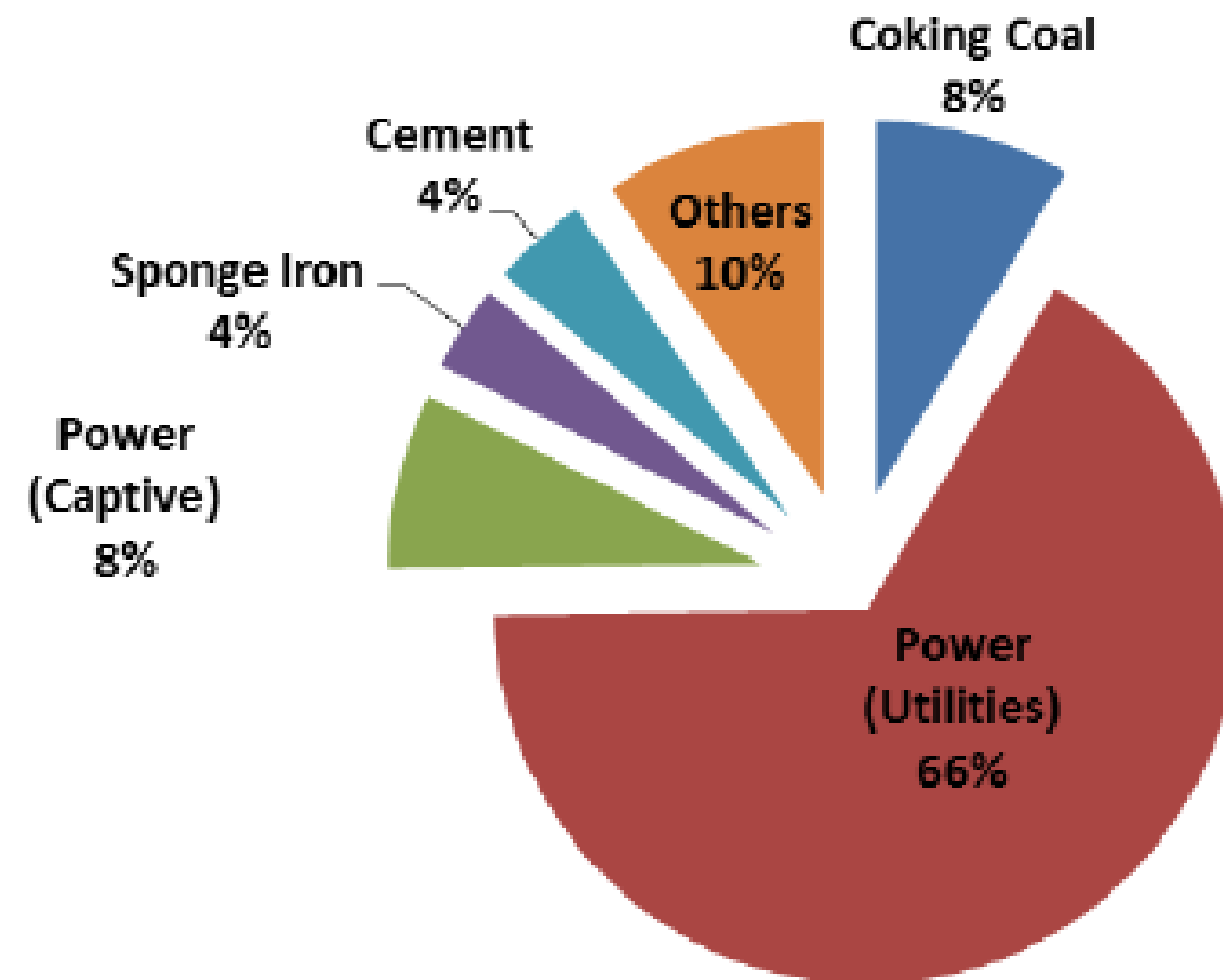


- Coal is the predominant of the three major fossil fuels.
- Have reserves in over 100 countries.
- Reserve/Production (R/P) ratio of coal is much higher than that of oil and gas.



Production – 716 MT, Consumption- 424 MTOE, Reserve 97728 MT

- India has 9% of the world reserves (fifth largest coal reserves in the world).
- India is second largest in terms of coal consumption after China.
- Coal used in India comprises 10% coking coal and 90% non-coking coal.
- The efficiencies of most of coal-fired power plants in India range from 28 to 32% as compared to 45% for the most efficient plant (IEA).



- Coal is mainly used as a fuel for electricity generation and other industrial processes.
- Ministry of Environment, Forest and Climatic Change (MoEFCC) issued a directive in 2016 which requires washing of coal for supplies to stand-alone power plants of 100 MW capacity or above located within 500 and 749 km from pitheads.

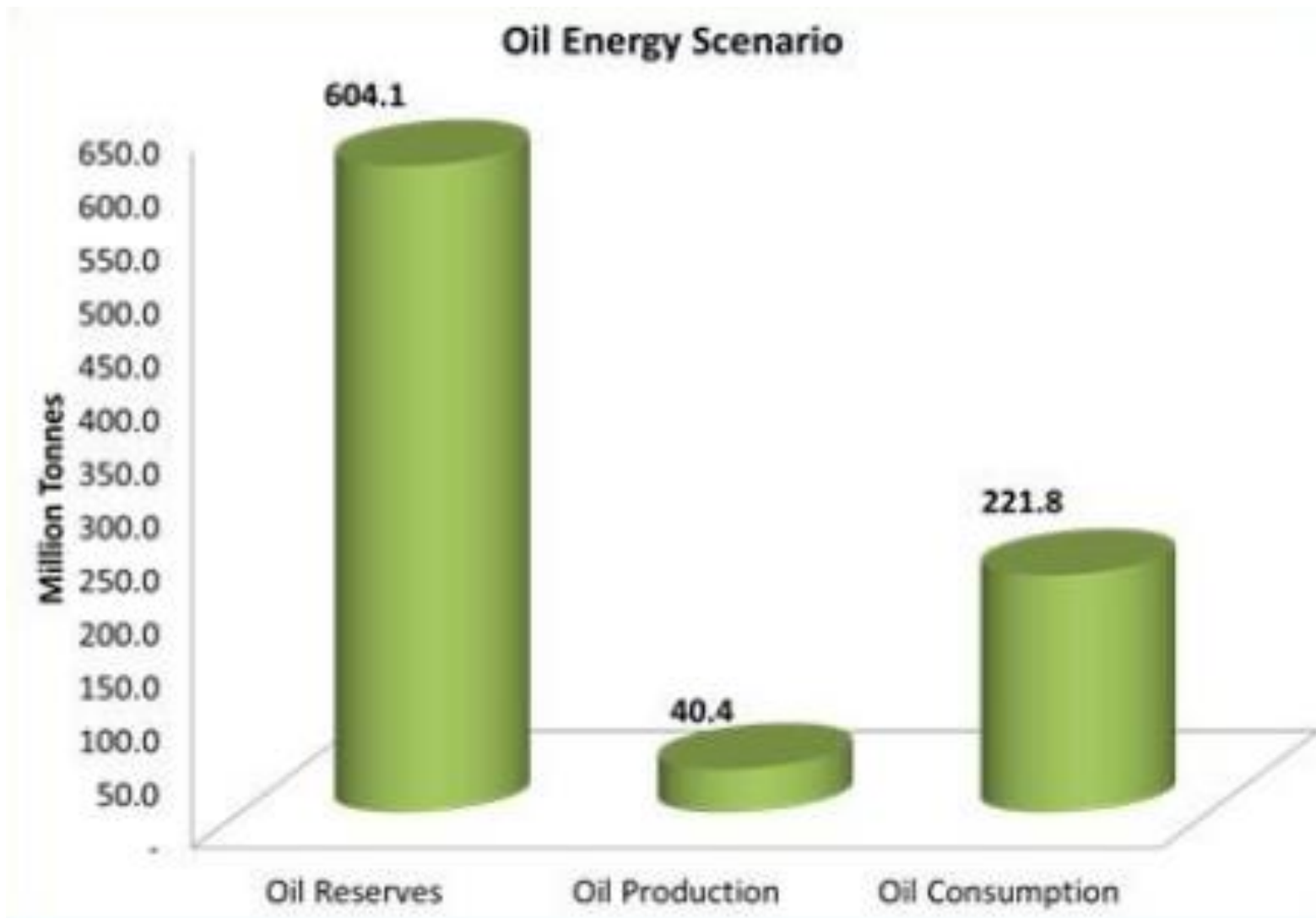


OIL

1

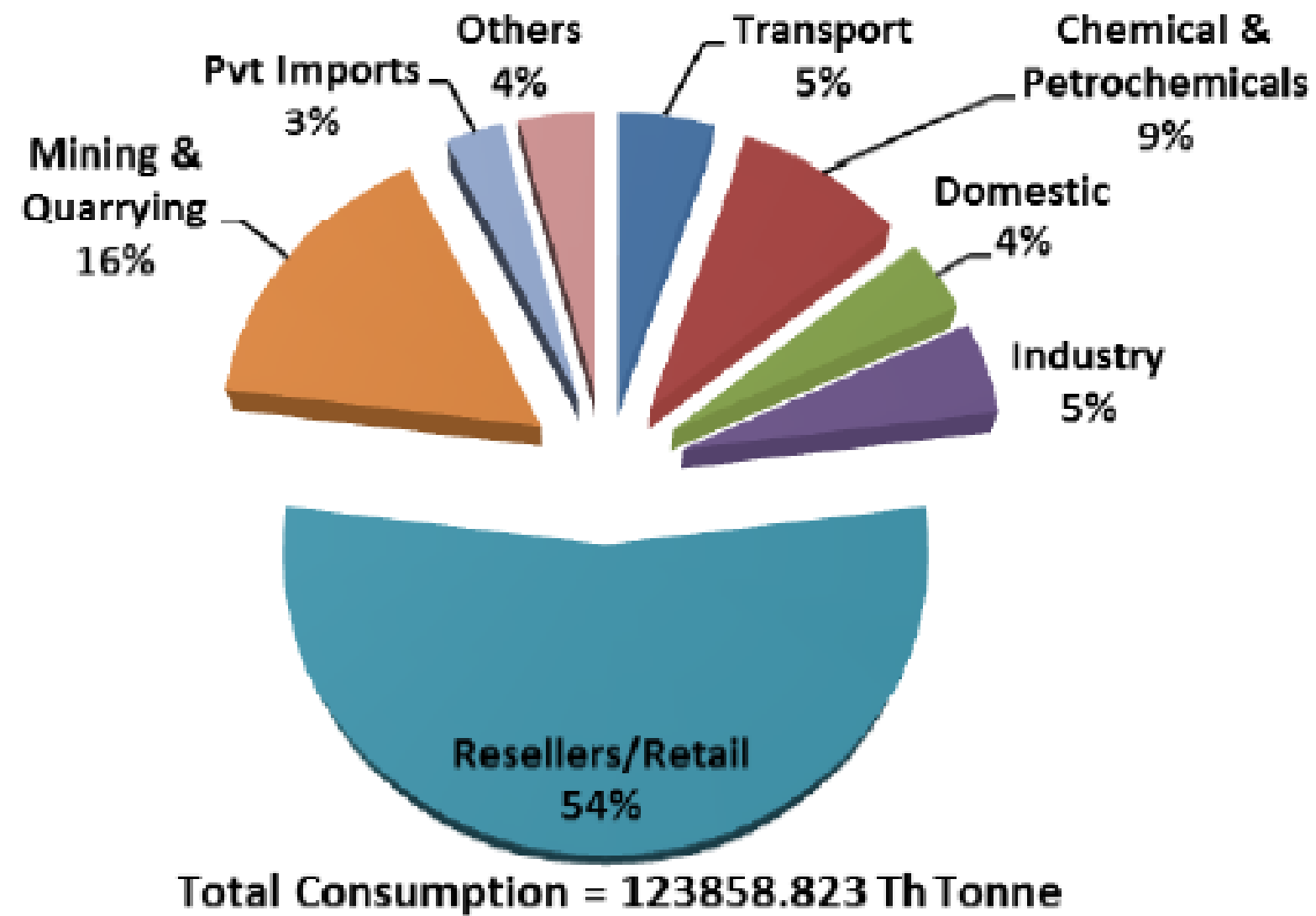
Introduction

- Major demand for oil has come from transportation sector.
- India has only 0.3% of the world reserves with an estimated R/P ratio of only 14.4 years.
- India imports over 85.5% of its crude oil in 2021-22.



2

Consumption of Oil



- Transport sector is the largest consumer of commercial energy (diesel and petrol).
- The road-based mobility is the dominant mode in passenger transport.



4

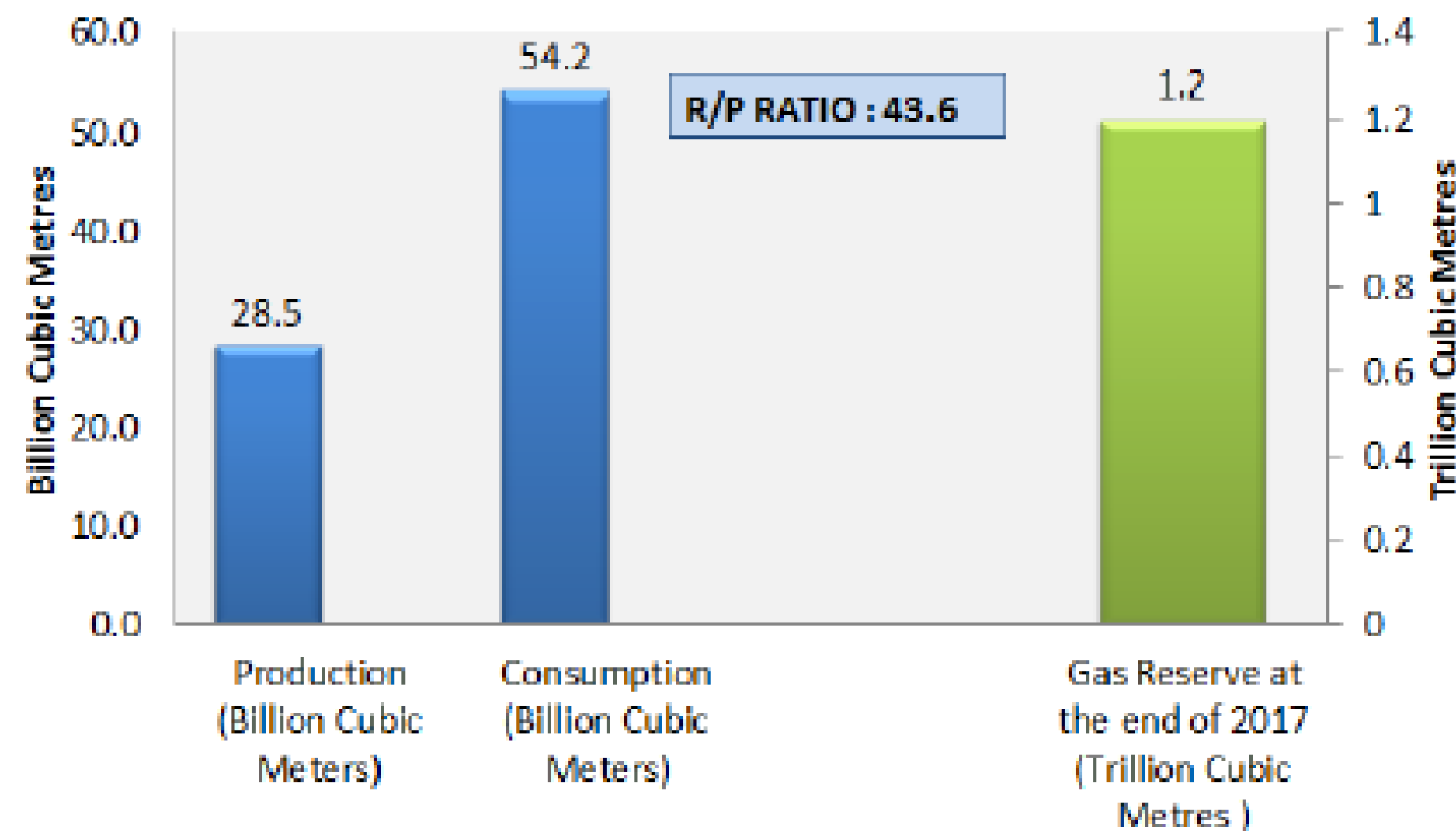
Role of Government

- Government is promoting non-conventional vehicles.
- India has adopted Euro 6/VI equivalent standards that will go into effect in 2020.
- The government is promoting use of electric and hybrid vehicles.
- Government of India has also proposed methanol and ethanol blending in petrol.

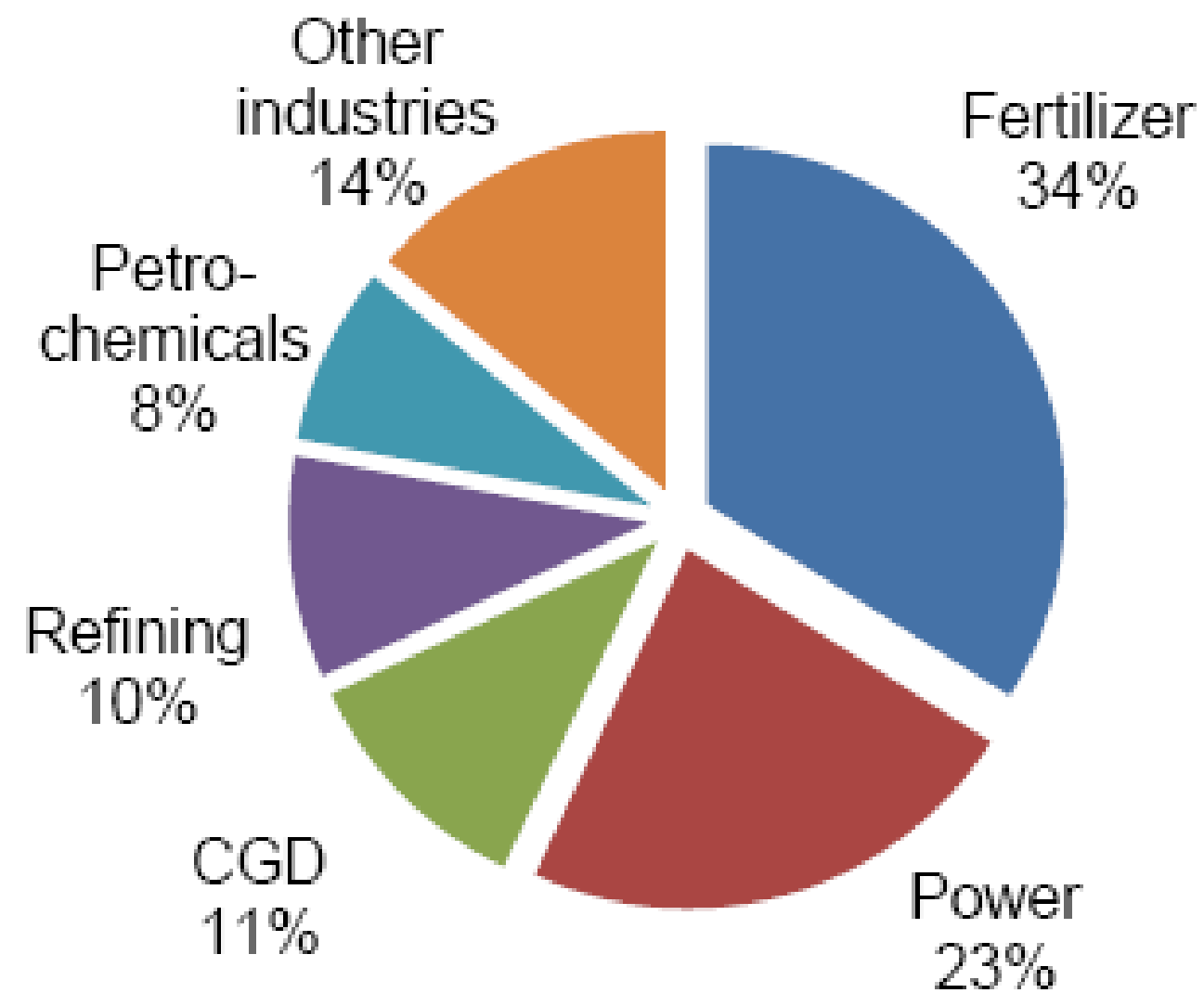


NATURAL GAS

Gas Energy Scenario



- It is contributing 23.4% of global primary energy.
- India has only 0.6% of the world reserves with an estimated R/P ratio of 43.6 years.
- Natural gas is available as:
 - (i) Domestic Natural Gas
 - (ii) Re-gasified Liquefied Natural Gas (R-LNG)



- Used in fertilizer industry ,refineries, city gas distribution and petrochemical industry.
- CGD sector has distinct segments — Compressed Natural Gas (CNG) used as auto-fuel, and Piped Natural Gas (PNG) domestic, commercial and Industrial applications.



HYDRO AND NUCLEAR POWER

- Hydropower is renewable source for electricity.
- India has the potential of about 150 GW hydro power and out of which about 43 GW has been installed.
- The development of nuclear power is today concentrated in a relatively small group of countries namely China, Korea, India and Russia.
- The nuclear is increasingly seen as a means to add large scale base load power generation while limiting the amount of GHG emissions.
- India has 22 nuclear reactors in operation in seven nuclear power plants, having a total installed capacity of 6780 MW or nearly 2% of total installed utility power generation capacity.

BIO - ENERGY

1

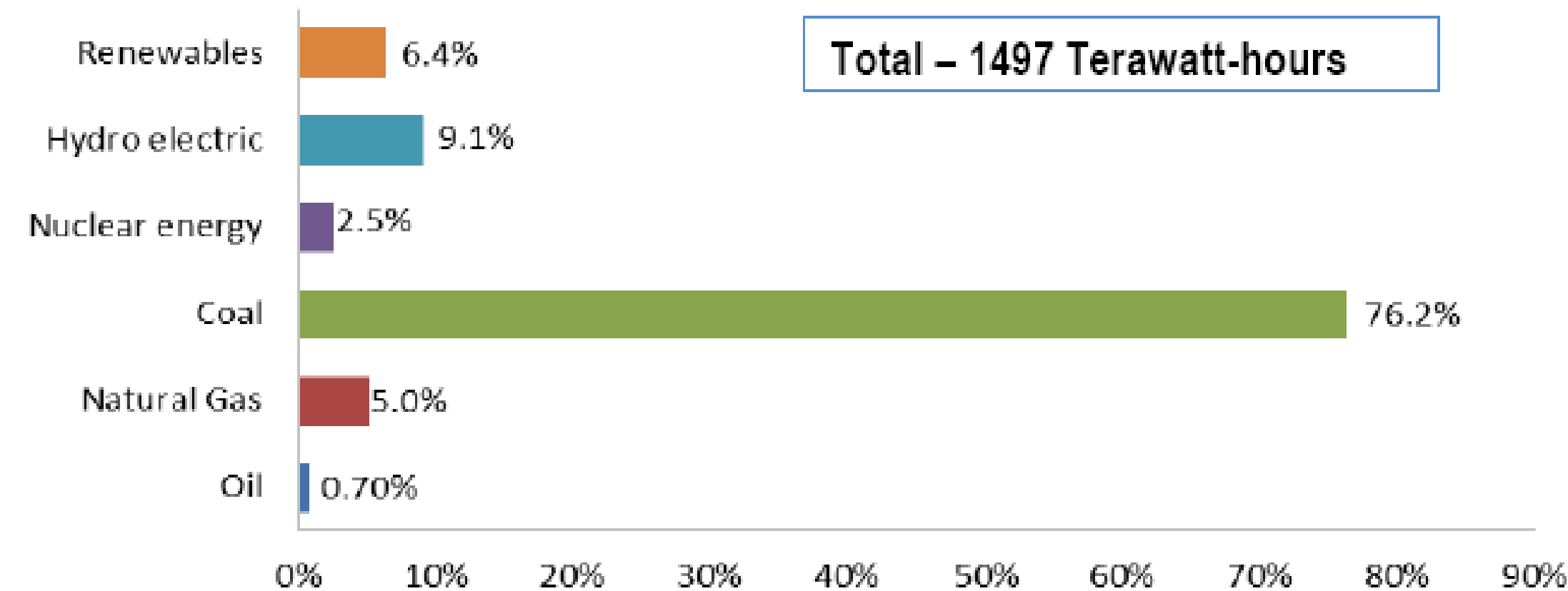
Introduction

- Bio-Energy represents the transformation of organic matter into a source of energy, whether it is collected from natural surroundings or specifically grown for the purpose.
- It can be used in its original form as fuel, or be refined to different kinds of solid, gaseous or liquid biofuels.
- These fuels can be used in all sectors of society, for production of electricity, for transport, for heating and cooling, and for industrial processes.
- Around 500 million tonnes per annum (MTPA) of biomass is available in India.
- Approximately, 120-150 MTPA of biomass (covering agricultural and forest residues) is estimated to be surplus, which corresponds to a potential of approximately 18000 MW of electricity.



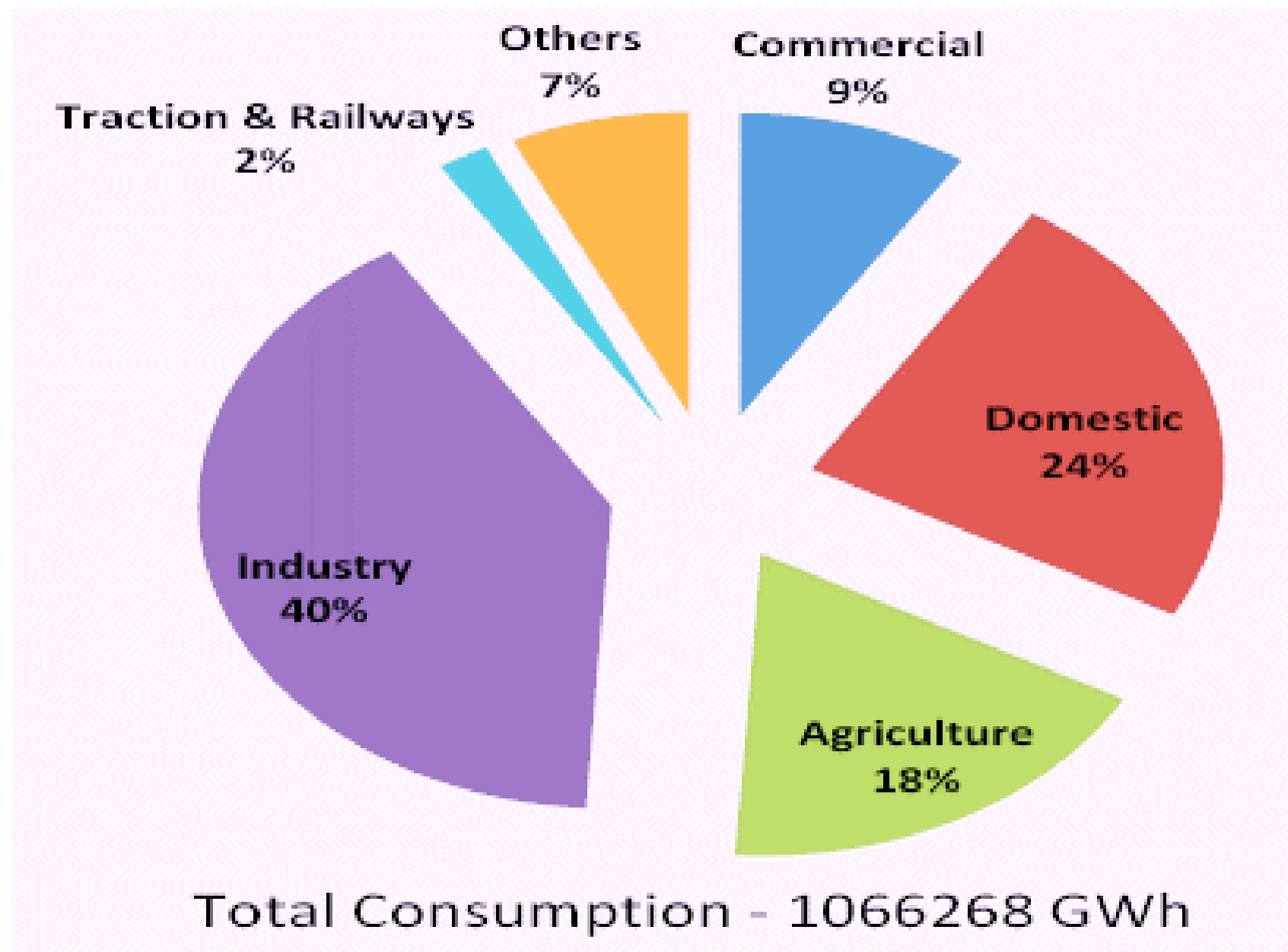
ELECTRICITY

Electricity generation by fuel

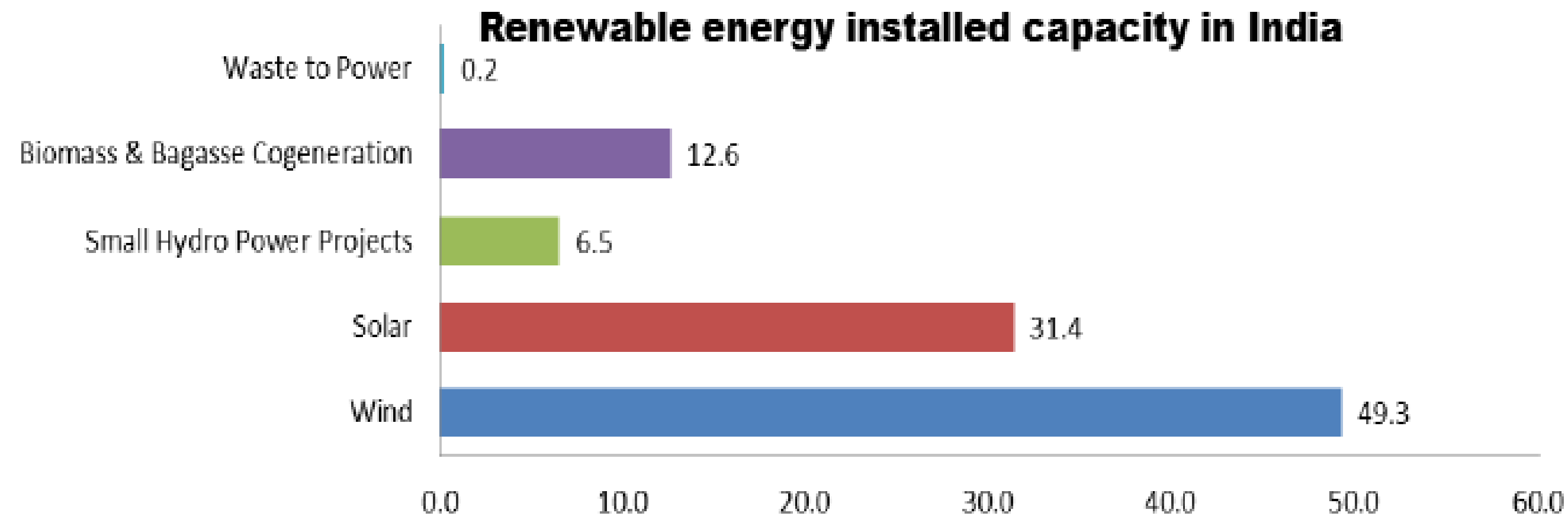


- India is the world's third largest producer and consumer of electricity with capacity of 344 GW as on 31 May 2018.
- India's electricity sector is dominated by coal-based power plant for meeting about 76.2% of all electricity.

- The overall plant load factor (PLF) of all thermal power plants is only about 65%.
- Industry dominates electricity consumption (40%) followed by domestic (24%) and agriculture (18%).



- India is very active in renewable energy development, especially solar and wind electricity generation.





POLICY INTERVENTIONS

- The Government has adopted an energy policy to provide energy security to all its citizens.
- **The Electricity Act, 2003** : The Act specifies distributed generation and supply through stand-alone conventional and renewable energy systems.
- **The National Electricity Policy notified in 2005** : recommends providing reliable rural electrification system; wherever conventional grid is not feasible.
- **The Rajiv Gandhi Grameen Vidyutikaran Yojna** : provide up to 90% capital subsidy for rural electrification projects using decentralized distributed generation options based on conventional and non-conventional fuels.

2

Paris Agreement on Climatic Change

- Conference of the Parties (COP 21) was held in Paris under the UN Body, UNFCCC in 2015.
- The agreement reaffirms the goal of keeping average warming below 2 degrees Celsius.
- India has submitted its Intended Nationally Determined Contributions (INDC) with plan, policies, measures, actions etc. to combat climatic change.

Renewable Purchase Obligation ('RPO')

- **Renewable Purchase Obligation ('RPO')** Renewable Purchase Obligation (RPO) is the requirement set by the Central Electricity Regulatory Commission (CERC) for an obligated entity to purchase electricity from renewable energy sources or buy Renewable Energy Certificates.
- Under Renewable Purchase Obligation mechanism, each State has to meet 3% of its energy demand from solar sources

TERMS RELEVANT TO RENEWABLE ENERGY

Renewable Energy Certificate (REC)

- Renewable Energy Certificate (REC) It is a market based instrument created to promote renewable energy and facilitate renewable purchase obligation (RPO).
- 1 REC = 1 MWh of renewable electricity generated and injected into the grid.
- REC can be traded only in the CERC approved power exchanges namely Indian Energy Exchange and Power Exchange of India. However, RE generators with existing PPAs are not eligible for REC mechanism.

Open Access

- Open Access enables heavy consumers with more than 1 MW connected load to buy cheap power from the open market. The concept is to allow the consumer to choose from a number of competitive power companies, rather than being forced to buy power from the local utility monopoly.
- Inter-State Open Access: In this, the purchasing and selling entities belong to different states and they have to follow Central Electricity Regulatory Commission (CERC) regulations.
- Intra-State Open Access: As evident from the name, the purchasing and selling entities, in this case, belong to the same state. State Electricity Regulatory Commission (SERC) regulations apply.

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