



Government of Tamilnadu

Department of Employment and Training

Course : TNPSC Group II Exam
Subject : Indian Economy
Topic : **Energy Different Sources and Development**

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**Commissioner,
Department of Employment and Training.**

ENERGY DIFFERENT SOURCES AND DEVELOPMENT

Introduction

- ❖ Major sources of energy in India are classified as –
 - Conventional sources (e.g. coal, petroleum, and nuclear power).
 - Non-conventional sources (e.g. solar energy, hydro energy, geo-thermal energy, etc.)
- ❖ Fossil fuel or conventional sources of energy are found exhaustible in nature and also not environmental friendly; on the other hand, the non-conventional sources of energy such as solar energy, wind energy, geo-thermal energy, tidal energy, etc. are renewable sources of energy and they are also environmental friendly (as they do not pollute environment).
- ❖ The most important *Gondwana* coal fields of India are located in Damodar Valley region.
- ❖ Raniganj, Jharia, Bokaro, Giridih, and Karanpura are major coalfields of Jharkhand-Bengal coal belt.
- ❖ Jharia is the largest coal field followed by Raniganj.
- ❖ Other important coal mines are Singrauli (partially in Madhya Pradesh and partially in Uttar Pradesh); Korba in Chhattisgarh; Talcher and Rampur in Odisha; Chanda-Wardha, Kamptee, and Bander in Maharashtra; Singareni in Telangana; and Pandur in Andhra Pradesh.
- ❖ Tertiary coalfields are largely located in Darangiri, Cherrapunji, Mewlong, and Langrin in Meghalaya; Makum, Jaipur, and Nazira in upper Assam; Namchik – Nampuk in Arunachal Pradesh; and Kalakot in Jammu and Kashmir.

Coal

- ❖ About 80% of the coal deposits in India is of bituminous type and is of non coking grade.

- ❖ The brown coal or lignite are found in the coastal areas of Tamil Nadu, Pondicherry, Gujarat, and Jammu and Kashmir.

Petroleum

- Hydrocarbons of liquid and gaseous states varying in chemical composition, color, and specific gravity are collectively known as petroleum resource.
- Petroleum industries produce various by-products; for example, fertilizer, synthetic rubber, synthetic fiber, medicines, vaseline, lubricants, wax, soap, and cosmetics.
- Crude petroleum normally occurs in sedimentary rocks of the tertiary period.
- For the systematic oil exploration and production, the **Oil and Natural Gas Commission was set up in 1956**.
- Digboi, Naharkatiya, and Moran are important oil producing areas in Assam.
- Ankaleshwar, Kalol, Mehsana, Nawagam, Kosamba, and Lunej

are the major petroleum producing regions in Gujarat.

- Located 160 km off Mumbai, Mumbai high, an offshore oilfield was discovered in 1973. Production of petroleum at the field was started in 1976.
- Krishna-Godavari and Kaveri basin on the east coast are significant regions of petroleum production.
- Oil extracted from the wells remains in crude oil form and contains many impurities; hence, it needs to be extracted in oil refineries.
- Based on destination, there are two types of oil refineries — oil-field based (e.g. Digboi) and market based (Barauni).
- To transport and develop the market for natural gas, the **Gas Authority of India Limited** was set up in 1984 (it is a **public sector undertaking**).
- Though natural gas reserves have been located along the petroleum reserves, but some exclusive natural gas reserves are found along the eastern

coast of Tamil Nadu, Odisha, and Andhra Pradesh; as well as around Tripura, Rajasthan, and off-shore wells in Gujarat and Maharashtra.

Nuclear Energy

- Essential minerals used for the generation of nuclear energy are **uranium** and **thorium**.
- Geographically, uranium ores are found at many different locations along the Singhbhum Copper belt.
- Other important uranium reserve regions are also found in Udaipur, Alwar, and Jhunjhunu districts of Rajasthan; Durg district of Chhattisgarh; Bhandara district of Maharashtra; and Kullu district of Himachal Pradesh.
- Thorium is mainly obtained from monazite and ilmenite, which is largely found along the coast of Kerala and Tamil Nadu.
- Palakkad and Kollam districts of Kerala have the world's largest monazite deposits.
- **Atomic Energy Commission** was established in 1948 and the **Atomic**

Energy Institute at Trombay was founded in 1954.

- However, the Atomic Energy Institute at Trombay was renamed as Bhabha Atomic Research Centre in 1967.
- The important nuclear power projects are located at Tarapur (Maharashtra); Rawatbhata near Kota (Rajasthan); Kalpakkam (Tamil Nadu); Narora (Uttar Pradesh); Kaiga (Karnataka); and Kakrapar (Gujarat).

Solar Energy

- Solar energy is 7% more effective than coal or oil based plants and 10% more effective than nuclear plants.
- The western part of India has greater potential for the development of solar energy.

Other Sources of Energy

- The Ministry of Non-conventional Sources of Energy is responsible for the development of wind energy in India as the major source of renewable energy.
- **Ocean currents** are the store-house of infinite energy. Hence,

- India has great potential for the development of **tidal** energy.
- **Natural hot springs and geysers** are being used since medieval period, but in the present world, these could be potential sources of renewable energy.
 - **Manikaran**, a hot spring in Himachal Pradesh is a major renewable source of energy in India.
 - **Bio-energy** is the energy derived usually from the biological products, such as agricultural residues and other bio-waste.
 - Bio-energy can be converted into electrical energy, heat energy, and gas for cooking.
 - Okhla in Delhi presents a good example by producing bio energy from municipal waste.
- to our future. Energy security is very important for economic growth. Renewable energy sources are essential in view of the depleting nature of conventional energy resources. Electricity is a critical infrastructure for sustainable growth of economy.
- Power development is an important input for the States Industrial, Commercial and Socio economic growth. For this, the availability of affordable, reliable and quality power is necessary. Therefore, adequate provision has to be made for augmenting power supply to bridge the gap between demand and supply as well as to meet the increasing future demand. Keeping this in view, Government is giving utmost importance to power sector in Tamil Nadu.

ENERGY SECTOR in tamilnadu

Introduction

Power sector is the most important sector among various infrastructure sectors in the country. Energy security and environmental Sustainability are vital

Tamil Nadu has one of the best power utilities in the country and the power sector in the State has grown manifold in capacity generation. All the villages and the towns are fully electrified. Tamil Nadu Generation and Distribution Corporation Limited

(TANGEDCO) is responsible for power generation and distribution.

Tamil Nadu Transmission Corporation Limited (TANTRANSCO) is responsible for transmission of power. Further, the electricity network has been extended to all villages and towns throughout the State and all the villages in the State are 100% electrified.

GENERATION:

Present Status of Demand – Supply:

The present average demand of power in the State is around 14,500 MW. It is expected to go upto 17,500 MW by the end of 2018-19. This demand will be met by generation from existing power stations and power projects to be commissioned in the year 2018-19. At present this deficit is managed through power purchase and Restriction and Control measures. TANGEDCO is taking several steps to bridge the gap between demand and supply to provide uninterrupted power supply to the consumers.

The state as on installed capacity of 24,433 MW as on 31.3.2016.

RENEWABLE ENERGY SOURCES

The State is blessed with various forms of renewable energy sources. The environment-friendly renewable energy sources are perennial in nature, available locally and quite suitable for decentralized applications. The important renewable energy sources are as follows:

- Wind Energy (including offshore wind)
- Solar Energy
- Biomass and other forms of bio energy
- Small Hydro
- Tidal Energy
- Ocean Thermal Energy

Among the above mentioned sources, the first three renewable energy sources, viz., wind, solar and bio energy are being harnessed in a big way in India and also in Tamil Nadu. With a view to develop and propagate the non-conventional sources of energy, the Tamil Nadu Energy Development Agency (TEDA) was formed.

Apart from serving as a coordinating agency to promote and harness the use of renewable energy sources, TEDA acts as nodal agency to

the Ministry of New and Renewable Energy (MNRE), Government of India to implement centrally funded and sponsored schemes in the state.

Present Scenario – Renewable Energy Sources

Tamil Nadu is a leader in Renewable Energy. At present, the total installed capacity of renewable energy including solar, wind etc., is 10,480 MW. In the last wind season, the State has harnessed around 13,000 Million Units of energy from wind generators, which is an all time record. Also, the State has harnessed around 1,644 million units of energy from solar generators during 2016-17. Proactive steps are being taken to maintain this prominent position in renewable energy.

In the State, the contribution to the installed capacity is highest from wind energy, followed by biogases-based cogeneration plants in sugar industries. This has largely come through private investments encouraged by policy initiatives of the Central and the State Governments.

Solar Energy

1. Tamil Nadu has a very good solar potential with 300 clear sunny days as it receives very high solar radiation.
2. The Solar Photo Voltaic (SPV) technology which enables the direct conversion of sun light into electricity has several distinct advantages, since it does not have moving parts, produces no noise or pollution, requires very little maintenance and can be installed anywhere.
3. These advantages make them an ideal power source for use especially in remote and isolated areas which are not served by conventional electricity, making use of ample sunshine available in the State.
4. SPV technology provides for decentralized installations thereby minimizing the need for transmission infrastructure.
5. Tamil Nadu has total solar installed capacity of 2000 MW as on 08.04.2018. Considerable quantum of solar generation is being realized during day time to a tune of around 1200 MW to 1700 MW.

6. Further, an all-time high generation of 1498 MW and the all time maximum energy of 9.40 Million Units has been harnessed from solar generators on 27.03.2017.
7. It is proposed to increase the solar power installed capacity by further 5000 MW in a phased manner in the forthcoming years. In this regard a tender has been floated for the procurement of 1500 MW under reverse bidding route.

WIND ENERGY

Wind energy is one of the cleanest renewable sources of power. The potential area that are suitable for establishment of wind generators are mostly confined to the southern (Aralvoimozhi pass and Shengottai pass) and south western (Palghat and Cumbum pass) parts of the State.

Total installed capacity under wind mill generation is 7470.86 MW. Tamil Nadu tops in harnessing resources of energy among all Indian States of the installed capacity, thus making it a clear leader in the wind energy sector.

- Tamil Nadu is a pioneer in promoting wind energy in the country, with an installed capacity of 8197 MW as on 31.03.2018 (34.293 GW as on 30.06.2018) and which is the highest wind power capacity in the country and contributes to about 28.43% of the country's total installed wind power capacity.
- It is proposed to increase the wind installed capacity by further 4500 MW in a phased manner in the forthcoming years.
- As Tamil Nadu is already having a huge installed capacity of wind power which satisfies the States Renewable Energy Purchase Obligation (RPO), it is in a position to sell wind power to the other needy States who require this power to fulfill their RPO. During the last wind season around 120MW of wind power has been scheduled daily to Odisha as sale of green power.
- Similarly efforts are being taken to schedule around 500MW of green power daily to the needy States.

Biomass Energy

Bio-mass produced by green plants through photosynthesis using

sunlight, contains organic matter which could be converted to energy. Biomass can be obtained by raising energy plantations or may be obtained from organic waste.

The biomass resources can be used in bio-energy technologies viz., biogas, gasifier, biomass combustion, cogeneration, etc., to produce energy-thermal or electricity. Biomass can be used in three ways – one in the form of gas through gasifiers for thermal applications, second in the form of methane gas to run gas engines and produce power and the third through combustion to produce steam which drives a turbine to generate electricity.

Biomass power & cogeneration programme is implemented with the main objective of promoting technologies for optimum use of country's biomass resources for grid power generation and captive power production. Biomass materials used for power generation include juliaflora, bagasse, rice husk, straw, cotton stalk, coconut shells, soya husk, de-oiled cakes, coffee waste, jute wastes, groundnut shells, saw dust etc.

Biogas

A combustible gas (composed primarily of methane) produced when Organic waste, sewage or manure is fermented in the absence of oxygen. The solid material that remains in the digester after fermentation can be used as an organic fertilizer.

Biogas – a gas mixture of methane, carbon dioxide and small quantities of hydrogen and hydrogen sulphide – is created under air exclusion through the fermentation of organic substances with microorganism assistance. Biogas is a gas mixture, consisting of approximately 40 to 75 % methane (CH₄), 25 to 60 % carbon dioxide (CO₂), and approx. 2 % of other gases (hydrogen, hydrogen sulphide and carbon monoxide).

Advantages of Biogas

- No smoke , Clean Fuel
- Produces organic manure for a sustainable agriculture
- It reduces fossil fuel Dependency