

Department of Geography (PG Department), Patna University

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Paper CC-8 (Geography of India)

Unit – II (Chapter – 3)

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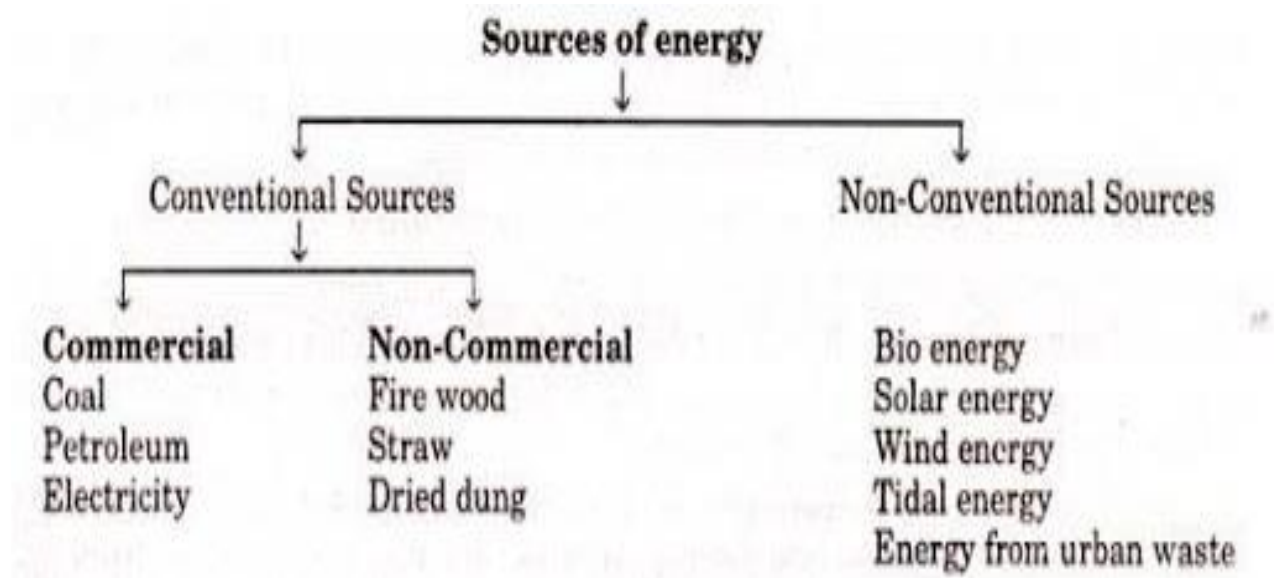
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NON CONVENTIONAL SOURCE OF ENERGY

- Energy – Energy is the prime mover of the economic growth and is vital to the sustenance of a modern economy. Energy is the to the improve and drive the life cycle. It is the gift of the nature to the mankind in different forms and its consumption is directly related to the progress of the mankind. Post industrialization the requirements and standard of living of humanity has increased and this has increased the demand of the energy globally. India is one of the largest and fastest growing economies in the world. India has demand of energy which is currently satisfied by non renewable source of energy (coal, petroleum and gases). The more the developed is the country, higher is the per capita of energy consumption and vice – versa.

There are two major sources of energy. They can be classified under:

1. Conventional Sources
2. Non- Conventional Sources



Conventional sources of energy:

Conventional sources of energy are the natural energy resources which are present in a limited quantity and are being used for a long time. They are called non-renewable sources as once they are depleted, they cannot be generated at the speed which can sustain its consumption rate. They are formed from decaying matter over hundreds of millions of years.

These resources have been depleted to a great extent due to their continuous exploitation. It is believed that the deposits of petroleum in our country will be exhausted within few decades and the coal reserves can last for a hundred more years. Some common examples of conventional sources of energy include coal, petroleum, natural gas and electricity.

Non-conventional sources of energy:

Non-conventional sources of energy are the energy sources which are continuously replenished by natural processes. These cannot be exhausted easily, can be generated constantly so can be used again and again, e.g. solar energy, wind energy, tidal energy, biomass energy and geothermal energy etc. The energy obtained from non-conventional sources is known as non-conventional energy. These sources do not pollute the environment and do not require heavy expenditure. They are called renewable resources as they can be replaced through natural processes at a rate equal to or greater than the rate at which they are consumed.

Based on the above information, some of the key differences between conventional and non-conventional sources of energy are as follows:

Conventional sources of energy	Non-conventional sources of energy
These sources of energy are not abundant, present in limited quantity, e.g. coal, petroleum, natural gas.	These sources of energy are abundant in nature, e.g. solar energy, wind energy, tidal energy, biogas from biomass etc.
They have been in use for a long time.	They are yet in development phase over the past few years.
They are not replenished continuously. They are formed over a million years.	They are replenished continuously by natural processes.
They are called non-renewable sources of energy.	They are called renewable sources of energy.
They can be exhausted completely due to over-consumption except for hydel power.	They cannot be exhausted completely.
They pollute the environment by emitting harmful gases and also contribute to global warming.	They are environment-friendly, do not pollute the environment.
They are commonly used for industrial and commercial purposes.	They are used commonly used for household purposes.
Heavy expenditure is involved in using and maintaining these sources of energy.	Using these sources is less expensive.
They are used extensively, at a higher rate than the non-conventional sources.	They are not used as extensively as conventional sources.

NON CONVENTIONAL SOURCES OF ENERGY

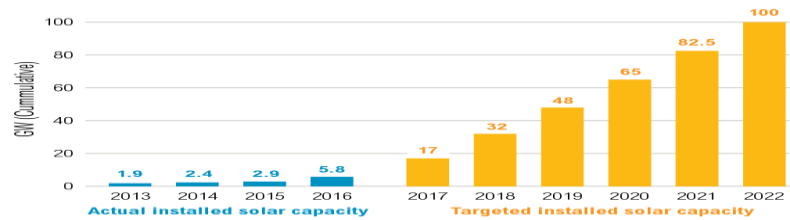
Solar Energy:

Sun is the source of all energy on the earth. India, being a tropical country, is well endowed with plenty of solar energy. Most parts of the country have bright sun-shine throughout the year except a brief monsoon period.

As our country is literally soaked in sunshine, exploitation of solar energy is an extremely important component of renewable energy sector through both the thermal and photovoltaic routes for a variety of applications like cooking, water heating, drying of farm produce, water pumping, home and street lighting, power generation for meeting decentralised requirements in villages, schools, hospitals, etc. India receives solar energy equivalent to over 5,000 trillion kWh per year which is far more than the total energy consumption of the country.

National Solar Mission – It was launched to increase the solar energy share in the total energy. India is a tropical country, which has the advantage of permitting the energy distribution and to establish the photovoltaic cells. It was launched on 11th January and has the target to create policy framework for the development of 20000 MW Solar Powers by 2022.

India Sets Year-on-Year Targets to Reach Ambitious 2022 Solar Goal



Notes: FY = All years in chart are fiscal year from April 1 to March 31; 1 GW = 1,000 MW.
Sources: Bloomberg New Energy Finance (BNEF); The Economic Times.

WORLD RESOURCES INSTITUTE

Source: Bloomberg New Energy Finance(BNEF): The Economic Times

INDIA: Annual Mean Daily Global Solar Electric Conversion Potential (in MW)

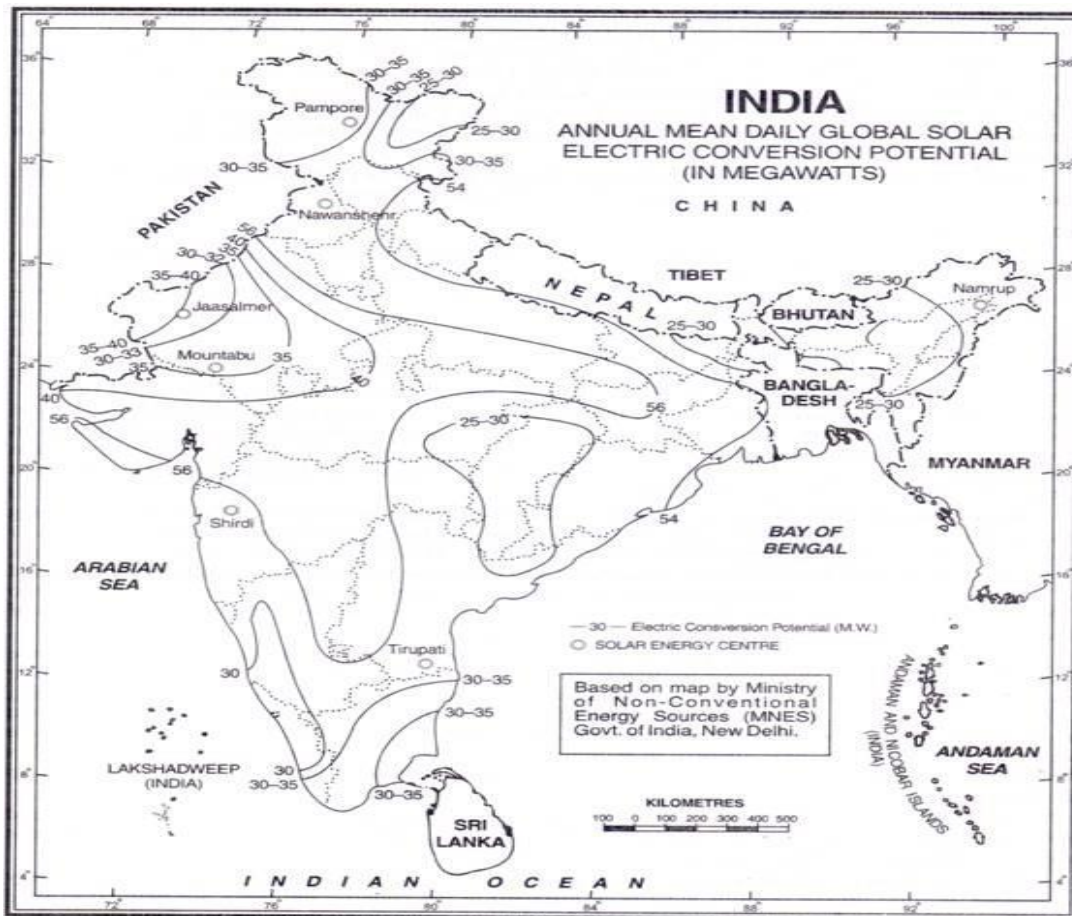


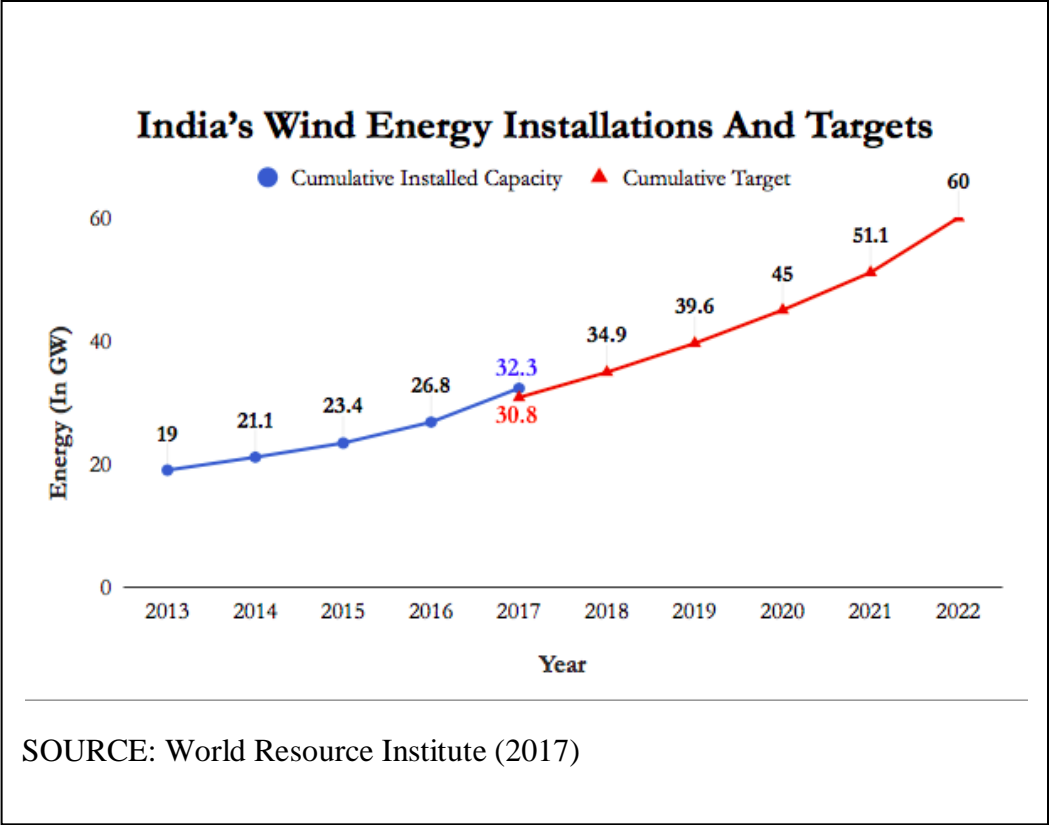
FIG. 26.10. India : Annual mean daily global solar electric conversion potential (in MW) and Solar Energy centres

Wind Energy:

Wind is another important source of non-conventional energy. The first wind farms in India were installed in 1986 in coastal areas in Tamil Nadu, Gujarat, Maharashtra and Orissa. Some of the states have joined hands with centre in coming out with a number of promotional incentives. Since 1985, the MNES has carried out an extensive wind monitoring and mapping programme to identify better sites and to assess the resource potential. The programme has been implemented in a very systematic manner.

The compiled data has been analysed and is being published with the ultimate objective of preparing a wind atlas of the country. This data has been utilised in identifying some excellent

sites for wind farms. Map in Figure 26.11 shows that coastal areas in Gujarat, Tamil Nadu, Andhra Pradesh, Orissa and West Bengal as well as vast areas of Maharashtra, Madhya Pradesh and Rajasthan are in a much better position with respect to wind power resources.



INDIA: Wind Resource in 10 States (in W/M²)

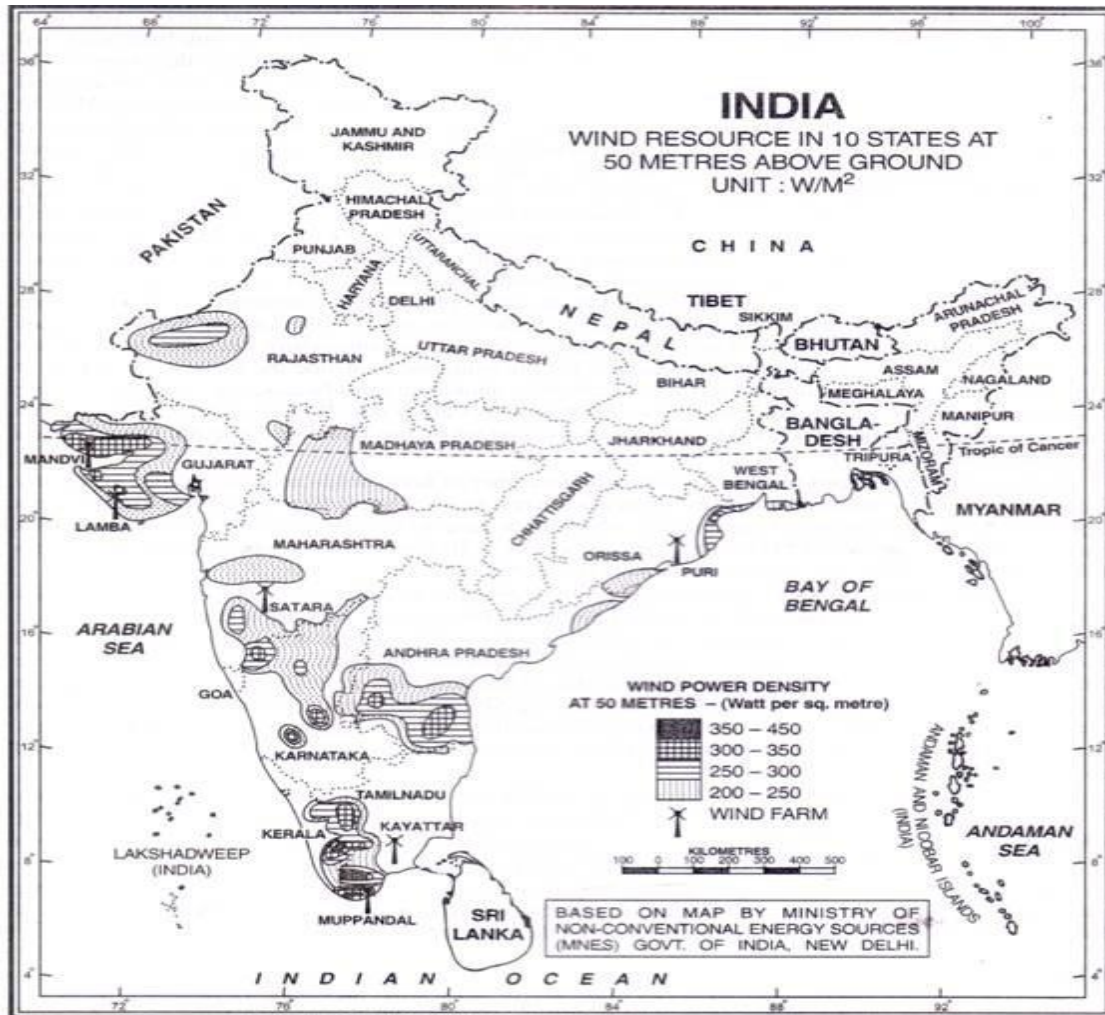


FIG. 26.11. India : Wind Resource in 10 states at 50 m above ground

Biogas:

Biogas is based upon the use of dung to produce gas which is used as domestic fuel especially in the rural areas. This technique is based on the decomposition of organic matter in the absence of air to yield gas consisting of methane (55%) and carbon dioxide (45%) which can be used as a source of energy.

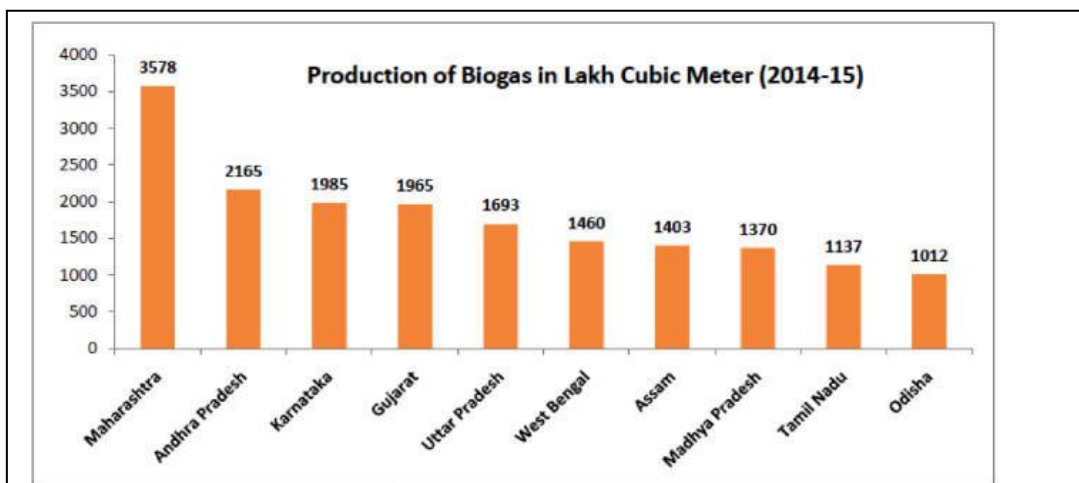
This energy is piped for use as cooking and lighting fuel in specially designed stoves and lamps respectively. It can also be used for replacing diesel oil in dual fuel engines for generation of motive power and electricity. The left-over digested slurry serves as enriched manure. Biogas technology is taking deep roots in rural India because of certain inherent advantages.

Biogas has higher thermal efficiency when compared with kerosene, firewood, dung and charcoal is commonly used in villages. The use of gobar gas fuel is advantageous from the point of view of not only fuel efficiency but also fuel saving. The success of biogas technology has brought about a sort of Brown Revolution in rural India.

Although biogas plants and improved chullahs have been disseminated in India since 1940s, they picked up only in early 1980s. The National Project on Biogas Development (NPBD) was taken up in Central Sector during 1981-82 on country wide basis. It seeks to provide clean and convenient fuel for cooking and lighting purposes in rural areas, produce enriched organic manure, improve sanitation and hygiene by way of linking household biogas plants with toilets and reduce the drudgery of women.

In India, the estimate for the production of biogas is about 20,757 lakh cubic meters in 2014-15. This is *equivalent to 6.6 crore domestic LPG cylinders*. This is equivalent to 5% of the total LPG consumption in the country today.

Within states, Maharashtra tops the production with 3578 lakh cubic meters while Andhra Pradesh comes next with 2165 lakh cubic meters.



SOURCE: World Resource Institute

Tidal Energy:

Tidal energy, also known as Tidal Power is classified as an alternate energy or better known as the renewable energy. It is one of the forms of hydropower energy that exercises energy of the oceanic tides to generate electricity.

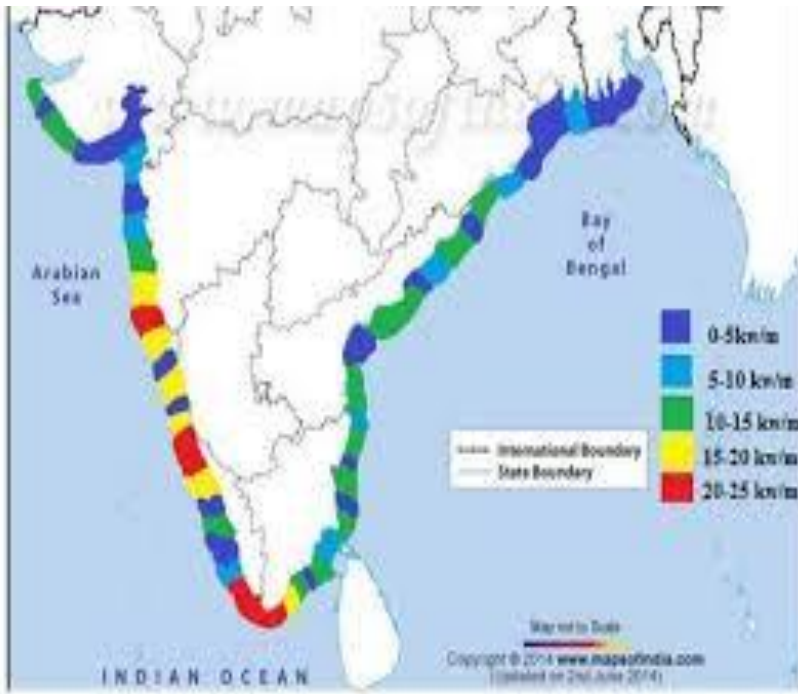
Types of Tidal Energy:

1. Tidal Barrage – As the name suggests uses tidal barrages (a low dam set up) to generate electricity. It uses the potential energy in the difference in height between high and low tide.
2. Tidal Stream Generator – This method uses the kinetic energy of flowing water to power turbines placed beneath the water. The water flows across the rotor blades which rotates the turbine and thus tidal streams are formed by the constant incoming and outgoing of the tide.

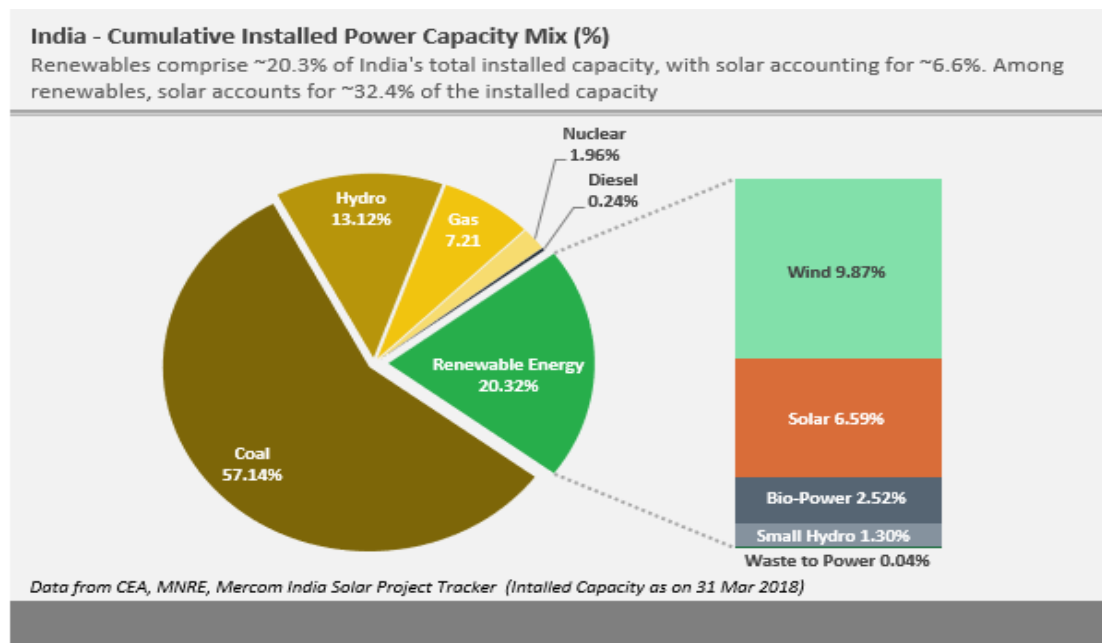
Tidal Energy in India:

As of March 2017, India announced of its 7500Km long coastline, where the height of tide was recorded over 5 meters higher than the low tide which can essentially capture the potential tidal power. The Ministry of New and Renewable Energy estimated that the country can produce 7000MW of power in the Gulf of Khambhat in Gujarat, 1200MW of power in the Gulf of Kutch in Gujarat and about 100MW of power in the Gangetic delta of Sunderban in the West Bengal

INDIA: Coastline of India



India: Cumulative Installed Power Capacity Mix (in percentage)



INDIA: Statewise estimated potential of renewable power

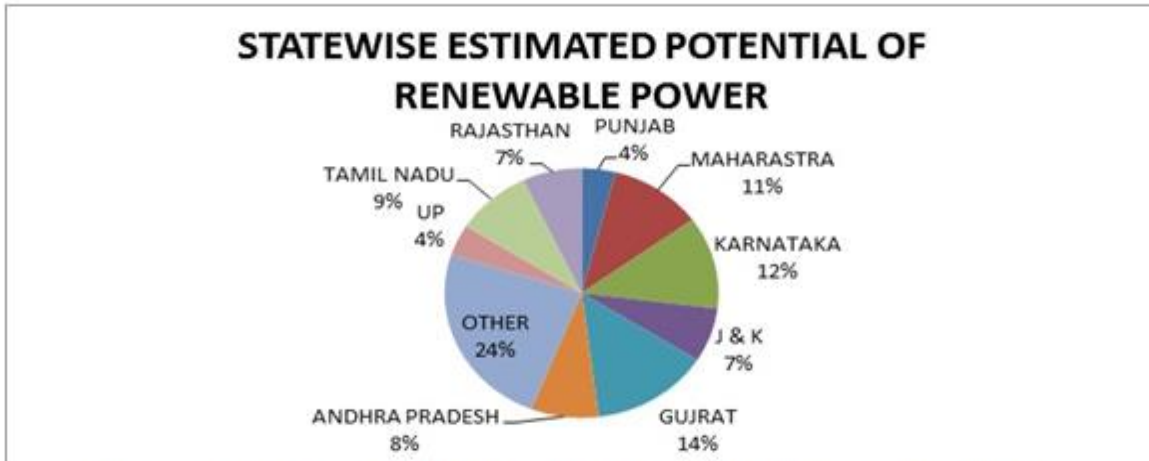


Figure-3-: State wise estimated Potential Renewable Energy Sources in India

Advantages of Non-Conventional Sources of Energy

The non-conventional sources of energy have many advantages. They are discussed below:

1. Cheaper and Renewable: Most of the Non-conventional Power resources are cheaper and renewable as compared to the conventional sources.
2. Scarcity of Fossil Fuels: The overall limitation and scarcity of fossil fuels has given rise to the urgent need for exploiting alternative energy sources.
3. Rural Energy Needs: Locally available non-conventional and renewable power resources can meet localized rural energy needs with minimum transportational cost.
4. Inexhaustible and Environment friendly: Power from Non-conventional and Renewable is a must in order to reduce carbon dioxide (CO₂) emissions of the coal-based power plants. It is inexhaustible in nature and environment friendly.