Renewable resources: uses, advantages, and disadvantages

As stated earlier in this chapter, natural sources of energy i.e. water, wind, waves, and solar power are renewable as their reserves and supply do not come to an end. The uses, advantages and disadvantages of these resources are discussed below.

Solar power

Pakistan has an abundance of sunshine throughout the year. The length of the shortest day of the year in Pakistan is about 9.5 hours and even during the rainy season, there are very few cloudy days; hence the conditions in Pakistan are ideal for the development of solar energy.

The government has been seriously exploring alternate sources of energy and the Alternate Energy Development Board (AEDB) has been active in this field. Private organizations have submitted feasibility studies, one of which has been approved by AEDB. Under the Solar Village Electrification Project, the Solar Home System has been installed in 3000 homes in Tharparkar. Private companies have been exempted from import duty on solar panels for their installation for industry. However, since there are economic, technical, and organizational problems, power generation from solar energy is still on a small scale, albeit individuals have set up solar panels as well as windmills atop their homes to exploit natural resources,

especially in the face of prolonged power outages. The Punjab government plans to set up solar energy panels in Bahawalpur's Cholistan region with help from China; the project will generate 1000 MW in two years' time.

Wind and wave energy

Wind energy is a renewable resource that has been exploited in other regions across the world for quite some time such as in Holland (Europe) and in the USA. Pakistan has the advantage of having high wind speeds across most of the country and these should be exploited to generate power at an affordable cost.

Pakistan's first wind-power plant is in Jhimpir, Sindh; it was developed in collaboration with a Turkish power company and became operational in 2002. Fauji Fertilizer Company also plans to set up a wind-energy plant in Jhimpir, in collaboration with German and local engineering companies. More such power plants are being set up in Gharo, Keti Bandar, and Port Qasim, the last two being close to the Arabian Sea. The federal government has plans for more wind-powered plants in Sindh and Balochistan, with help from the Chinese government, to generate up to 2500 MW through wind energy by 2015 to reduce power shortage in the country.

Pakistan's energy problems have multiplied since 2000 mainly due to the fast-growing demand vs. the rate of supply. Energy is linked to the country's GDP growth hence it has been the focus of all successive governments from 2000 to date.

Oil and gas are the key components for power generation (15 and 50 per cent respectively) followed by coal (7 per cent) and nuclear energy (2 per cent). A large volume of oil has to be imported: Pakistan spent US$10,292 million in 2012 on oil imports hence the government is giving attention to alternative and renewable energy resources; the Alternative Energy Development Board (AEDB) has supported public and private projects in this field.

- Wind energy projects by private companies are supported by AEDB; two projects with joint capacity of 106.4 MW are operational and three projects with 150 MW capacity are due by end of 2014.
- These projects are financed by the Asian Development Bank, Islamic Development Bank, and the International Finance Corporation.
- The main location for wind energy projects in Pakistan is lower Sindh: 80 km of coastline westward from Gharo–Keti Bunder and a 170-km corridor inland from Karachi to Hyderabad.
- 50 MW power project developed by Fauji Fertilizers in Jhimpir; another 56.4 MW project by a Turkish company to start operation
- 3000 Solar Home Systems installed in 49 districts of Tharparkar
- Solar water heaters installed in Balochistan, Gilgit–Baltistan, Khyber Pakhtunkhwa, and northern Punjab; solar water pumping units being installed for agriculture and potable water

Advantages of wind energy

Wind power is free of direct greenhouse emissions and does not emit other pollutants like oxides of sulphur and nitrogen; it does not consume water which is already in short supply across the world. On the other hand, Thermal and hydel power plants require water for cooling the units (thermal) and power generation, while thermal plants add to atmospheric pollution.

Wave energy

Wave energy, i.e. power generated by turbines run by tidal movement, is another renewable resource. However, this has not yet been exploited by Pakistan which has a 1100-km long coastline along the Arabian Sea; in

Biomass

Huge amounts of domestic, agricultural, and industrial waste—up to 50,000 tons—are produced daily in the country as the population of towns and cities grows with migration from rural areas. This biomass can be converted into energy to meet the ever-growing demand across the country and can generate up to 5000 MW. A World Bank-funded project has been launched to assess the feasibility of converting biomass into energy in Pakistan.

particular, the region to the west along the Makran Coast is favourable for setting up wave energy plants.

Biogas

Based on a demonstration unit in 1974, a natural biogas programme was launched in Pakistan in 1980–81. By 1985–86 more than 4000 biogas units were installed. But most of them are already in disuse and further expansion in this field is doubtful.

Advantages and disadvantages of non-renewable sources of energy

Water power (Hydroelectricity)

Advantages:

- It is clean and does not cause pollution.
- It is environmentally friendly as the water can be re-used.
- It is the cheapest. In hydroelectricity, the heaviest expenditure is on the installation of the plant.
- The running expenses are negligible because the turbine wheel is moved by running water.
- It is renewable and can continue indefinitely unless something catastrophic takes place, like change in climate, or diversion of the course of the river on which the hydroelectric plant is located.

Disadvantages:

- The generation of hydroelectricity requires rough topography so that a good head is available for running the turbine; such areas are mostly located in the mountainous north which is sparsely populated and the least economically developed.
- Electricity has to be transmitted long distances to the lowlands where it is most required. This adds to the cost of electricity consumption.

Thermal Power

Thermal power in Pakistan is produced from oil, gas, and coal, and there are more disadvantages than advantages to their use. The main advantage is that Pakistan has rich reserves of natural gas; the problem is that these are being fast depleted.

Disadvantages

- The sources of thermal power cause pollution. Coal is the largest polluter, followed by oil and gas.
- Pakistan is deficient in oil and has to import it. Oil is most needed by transport, particularly air transport. Therefore, electricity generated by oil becomes very costly.
- Coal produced in Pakistan is of inferior quality. Some good quality coal is imported, due to which the cost of consumption rises.
- All the three sources of thermal power (coal, oil, and gas) are non-renewable. They will be exhausted within measurable time

Nuclear Energy

Advantages

- Nuclear energy has the advantage of being a clean source of power.
- Its raw material is exhaustible, but will last for a very long period of time.

Disadvantages

- Nuclear energy is costly; it is also risky as seen in disasters in nuclear power plants in developed countries.
- Its safety measures are costly and require the utmost precautions.