UNIT 3

ENERGY SUPPLY AND DEMAND

WORLD ENERGY SITUATION

Electric power is a form of energy which influences all sectors and activities of modern life determining the industrial development and living standards of a country.

World energy resources can be divided into two categories:

a) the non-renewable, e.g. fossil fuels (coal, oil, natural gas, etc.) and nuclear fuels and

b) the renewable, e.g. wind and sea waves, solar, tidal geothermal and hydroelectric energy, which are also called «alternative».

Up to now, most of the world's needs for electric energy have been met mainly by non-renewable sources. However, the over exploitation of these sources has led the world supplies to run low. Furthermore, it has caused serious environmental problems by adding to the air pollution and affecting weather and climate.

In the last few decades, a lot of countries have used nuclear power to meet their demands for energy. Electric power is generated by nuclear reactors at an unbelievably economical cost, since one ton of nuclear fuel (Uranium 235) can produce as much energy as 20,000 tons of coal. Today, however, after some nuclear accidents, and especially that in Chernobyl in 1986 (reactor's meltdown and explosion), a lot of people think that nuclear power is too dangerous to be widespread. Therefore, if nuclear power is to be established, strict safety measures should be taken.

To face the expansion of world demand for energy, mankind has started to search for new energy sources and at the same time to harness economically the already known renewable ones.

Renewable sources of energy have obvious advantages in that they are inexhaustible and their exploitation does not result in chemical or thermal pollution. Besides hydropower, however, the exploitation of the other "alternative" sources of energy is still at an early stage of development. Though generation and maintenance costs at power plants using these sources are low, they require large investment, the transmission costs are high and they cannot provide constant supply of electricity.

In man's attempt to find solutions to the energy problem safely and economically, power-system engineering will play a major role in our future world.

EXERCISES

1. Split the text according to the following subtitles.

1. "Renewable sources of energy".

2. "The importance of electricity".

3. "The necessity for developing new forms of energy".

4. "The role of power system engineering".

5. *“Types of energy”.*
6. *“Problems arising from the use of fossil fuels”.*
7. *“Nuclear energy”.*

2. Complete the following table:

e.g.

TYPES OF ENERGY		ENERGY SOURCES
NON RENEWABLE		
RENEWABLE	*geothermal*	*heat from the earth*

3. Answer the following questions.

1. *What led mankind to search for new energy sources?*
2. *Why are renewable sources of energy, more preferable than nonrenewable ones?*
3. *What raised the nuclear power controversy?*
4. *What do you think power-system engineering deals with?*

4. Match words with definitions.

1. renewable	*a) developing or using something (e.g. natural resources) for benefit or profit.*
2. exploitation	*b) something new that can be used to replace something traditional.*
3. alternative	*c) bring something under control and use it.*
4. inexhaustible	*d) substances formed from remains of plants and used as fuel.*
5. fossil fuels	*e) something that can be replaced after it has been used or consumed.*
6. harness	*f) something found in such a large amount that cannot be exhausted.*

5. Use the words defined in the previous exercise to fill in the gaps in the sentences that follow.

1. There has been an increase in research on _____ forms of energy in the recent years.
2. Oil, natural gas and coal belong to _____.
3. Techniques to _____ the energy of the sun are being developed.
4. The _____ of fossil fuels satisfies the 90% of the world energy demand.
5. Heat from dry rocks can be used as an _____ source of energy.
6. Energy coming from the sun is _____.

6. What do the underlined expressions mean? a, b or c?

1. Fossil fuels add to the air pollution.
a. They make the atmosphere clean and healthy.
b. They are also responsible for making the atmosphere dirty and dangerous to live in.
c. They cause serious accidents.

2. Fossil fuel plants maintenance costs are high.
a. Keeping the plants in good condition costs a lot of money.
b. The expenses for installing the plants are high.
c. The pay of the staff is high.

3. Solar power plants require large investment.
a. They can produce a large amount of energy.
b. They cause environmental problems.
c. Their installation costs are high.

4. Wind power transmission costs are high.
a. The expenses for constructing the power plant are high.
b. Sending the wind energy over long distances costs a lot.
c. Generating electricity from the wind is expensive.

5. Wind power plants do not provide constant supply of electricity.
a. They do not produce electricity continuously.
b. They supply electricity alternatively.
c. They generate electricity at low costs.

6. The expansion of world demand for energy…
a. The world searches for new energy sources.
b. The world energy resources are enough.
c. The increasing requirement of mankind for energy.

7. Reactor's meltdown and explosion…
a. The reactor's emergency mechanisms were turned off.
b. The reactor was heated so much that it changed from solid to liquid and burst violently.
c. The reactor was normally checked and regulated.

7. A. Complete the chart taking information from the table below it. (The same information may be used twice).

	SOURCES	POWER PLANTS	
		Advantages (Pros)	**Disadvantages (Cons)**
NON - RENEWABLE	***Fossil Fuels***	• *Require relatively low investment costs.* • *Produce large amounts of energy.* • _____ • _____ • *Apart from diesel engine driven plants, the others don't start very quickly.*	• *Running (operation) costs are high.* • _____ • *Cause thermal and chemical pollution.* • _____ • *Do not start quickly.* • *Primary energy used is expensive.*
	Nuclear Fuels	• *Running costs are low.* • _____ _____ • _____ • *Do not cause air pollution.* • *Start relatively quickly.* • *Produce large amounts of energy.* • *Transmission costs are not high.*	• _____ _____ • *In case of accident, the radioactivity emitted:* *- contaminates whole areas,* *- causes serious health problems to people.* • _____ • *Primary energy used is expensive.*
RENEWABLE	***Hydro*** ***Tidal*** ***Sea Wave*** ***Wind*** ***Solar*** ***Geothermal***	• _____ _____ • *Energy used is inexhaustible.* • _____ • *Primary energy used is free since it comes from nature.*	• _____ • *Must be built near the source, thus raising transmission costs.* • *Apart from hydroelectric, the other plants:* *- don't provide constant supply of electricity.* - _____ _____

Missing information

Advantages	Disadvantages
• *Provide constant supply of electricity.* • *Are safe for the environment.* • *Transmission costs are not high.* • *Require little amount of primary energy to produce large amounts of electricity.* • *Operation and maintenance costs are low.*	• *Waste products severely pollute ground and sea.* • *Fuels used have run low.* • *Are at an early stage of development.* • *Affect weather and climate.* • *Require high investment costs.*

B. Use the information from the chart to comment on the characteristics of the various power plants.

Expressions to help you

In case of similarity	In case of difference
All *Both* *Also* *Too* *As well (as)* *So is / are the…* *So do / does the…* *Neither … nor*	*Only the…* *While* *Besides* *On the contrary* *On the other hand* *(Al)though* *However* *But*

Examples

• *Neither fossil nor nuclear power plants are safe for the environment.*
• *Though hydroelectric power plants provide constant supply of electricity, solar plants do not.*
• *Both running and transmission costs of a nuclear power plant are low.*