МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ МІСЬКОГО ГОСПОДАРСТВА імені О. М. БЕКЕТОВА

МЕТОДИЧНІ РЕКОМЕНДАЦІЇ

до організації самостійної роботи

з навчальної дисципліни

«ТЕХНІЧНА ІНОЗЕМНА МОВА»

(англійська мова)

(для студентів 1 курсу денної форми навчання,
освітньо-кваліфікаційного рівня магістр
спеціальності 141 – Електротехнічні системи електроспоживання»)

Харків
ХНУМГ ім. О. М. Бекетова
2019

Методичні рекомендації до організації самостійної роботи з навчальної дисципліни «Технічна іноземна мова» (англійська мова) (для студентів 1 курсу денної форми навчання освітньо-кваліфікаційного рівня магістр спеціальності 141 – Електротехнічні системи електроспоживання) / Харків. нац. ун-т міськ. госп-ва ім. О. М. Бекетова ; уклад. І. А. Камєнєва. – Харків : ХНУМГ ім. О. М. Бекетова, 2019. – 43 с.

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Рекомендовано кафедрою іноземних мов, протокол № 1 від 21.11.2018.

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INTRODUCTION

This course is for the 1-year full-time master's degree students of speciality 141 – Electrotechnical systems of power supply, studying English for scientific and technical purposes.

The course is designed to familiarize the students of non-language higher education institutions with the information on urban electric power supply and lighting.

The material has been specifically designed for a variety of class environments and as the basis for self-study.

This course consists of the three topics and is expected to be covered during about 54 hours for self-study.

Most of the units provide the learner of English with original texts from different sources.

Units contain:

Texts which focus on one of the topic.

Reading which confirms the content of the text either in general or in detail.

Active Vocabulary which encourages students to work out the meaning from the context and reinforces the vocabulary further.

Vocabulary Exercises which are means of presenting and improving the vocabulary.

Writing Skills which include different tasks that help students put their thoughts into words in a meaningful form and to mentally interact with the message.

ENERGY ENGINEERING

UNIT 1

Active Vocabulary

1. Give equivalents of the following words and phrases. Try to memorize them.

Nouns and noun **phrases**

Fossil fuel	fuelwood	global warming
Biomass	renewable source	ozone depletion
natural gas	coal deposit	consumption
dung cake	power	exploitation
oil, crude oil	hydropower	capacity
solar energy	biodegradable waste	conversion
emission	residue	fuel cell
co-generation	irrigation	vehicular
ability		

Verbs and **verbal phrases**

to define	to ccur	to remain
to heat	to hamess	to generate
to derive from	to transform	to exhaust
to reduce	to increase	to combine
to power		

Adjectives

relevant	conventional	geothermal
tidal	nuclear	harmful
available		

Adverbs

per	capita	significantly
extremely	tremendously	

2. Answer the following question and read the text below to check your answer.

What do we need energy for?

What is Energy?

Energy lights our cities, powers our vehicles, and runs machinery in factories. It warms and cools our homes, cooks our food, plays our music, and gives us pictures our television.

Energy is defined as the ability or the capacity to do work. We use energy to do work and make all movements. When we eat, our bodies transform the food into energy to do work. When we run or walk or do some work, we 'burn' energy in our bodies. Cars, planes, trolleys, boats, and machinery also transform energy into work. Work means moving or lifting something, warming or lighting something. There are many sources of energy that help to run the various machines invented by man.

The discovery of fire by man led to the possibility of burning wood for cooking and heating thereby using energy. For several thousand years human energy demands were met only by renewable energy sources - sun, biomass (wood, leaves, twigs), hydel (water) and wind power.

As early as 4000-3500 BC, the first sailing ships and windmills were developed harnessing wind energy. With the use of hydropower through water mills or irrigation systems, things began to move faster. Fuelwood and dung cakes are even today a major source of energy in rural India. Solar energy is used for drying and heating.

With the advent of the Industrial Revolution, the use of energy in the form of fossil fuels began growing as more and more industries were set up. This occured in stages, from the exploitation of coal deposits to the exploitation of oil and natural gas fields. It has been only half a century since nuclear power began being used as an energy source.

In the past century, it became evident that the consumption of non-renewable sources of energy had caused more environmental damage than any other human activity. Electricity generated from fossil fuels such as coal and crude oil has led to high concentrations of harmful gases in the atmosphere. This has in tum led to problems such as ozone depletion and global warming. Vehicular pollution is also a grave problem.

There has been an enormous increase in the demand for energy since the middle of the last century as a result of industrial development and population growth. World

population grew 3,2 times between 1850 and 1970, per capita use of industrial energy increased about twentyfold, and total world use of industrial and traditional energy forms combined increased more than twelvefold.

Due to the problems associated with the use of fossil fuels, alternative sources of energy have become important and relevant in today's world. These sources, such as the sun and wind, can never be exhausted and are therefore called renewable. Also known as non-conventional sources of energy, they cause less emission and are available locally. Their use can significantly reduce chemical, radioactive, and thermal pollution. They are viable sources of clean and limitless energy. Most of the renewable sources of energy are fairly non-polluting and considered clean. However, biomass is a major polluter indoors.

Renewable energy sources include the sun, wind, water, agricultural residue, fuelwood, and animal dung. Fossil fuels are nonrenewable sources. Energy generated from the sun is known as solar energy. Hydel is the energy derived from water. Biomass - firewood, animal dung, and biodegradable waste from cities and crop residues - is a source of energy when it is burnt. Geothermal energy is derived from hot dry rocks, magma, hot water springs, natural geysers, etc. Ocean thermal is energy derived from waves and also from tidal waves.

Through the method of co-generation a cleaner and less polluting form of energy is being generated. Fuel cells are also being used as cleaner energy source.

Total commercial energy consumption has been growing tremendously since the last decade. Per capita commercial Energy consumption in low-income countries have more than doubled. About 15% of the world's population living in the wealthy industrialized nations consume over half the energy used in the world. The number of motor vehicles in use worldwide has more than doubled since 1970.

In some respects, the global energy system has evolved in a cleaner direction in the last 25 years. The share of world primary energy derived from natural gas – the cleanest fossil fuel – has increased by more than 25 %. So has the use and generation of renewable energy sources.

Still, the overall efficiency of energy production remains extremely low: on average, more than 90 % of energy consumed is lost or wasted in the process of conversion from raw materials such as coal to the final energy service such as the light to read a book.

The main problem isn't that we use energy, but how we produce and consume energy resources. What we really need are energy sources that will last forever and can be used without polluting the environment. Conserving energy has become the need of the day be it in the transport, household, or industrial sectors.

3. Decide whether the following statements are true or false according to the text.

1) The discovery of fire by man was the first step to use energy.

2) The very first energy sources were renewable.

3) The use of wind energy influenced the speed of moving.

4) Hydropower is a major source of energy in some countries.

5) Nuclear power has been used as an energy source for a century.

6) Vehicular pollution is considered to be a serious problem.

7) Industrial development and population growth results in increasing demand for energy.

8) The sun, wind, water are non-renewable sources.

9) Hydropower is energy derived from waves.

10) The use and generation of renewable energy sources have increased by more than 25 %.

4. Complete the following sentences according to the text.

1) Energy is defined as ....

2) Work means ....

3) The consumption of non-renewable sources of energy causes ....

4) Such sources as the sun and wind, can never be exhausted and are therefore called ....

5) Renewable energy sources include ....

6) 15% of the world's population in developed countries consume ....

5. Answer the following questions and give examples.

1) Why do we need energy?

2) When did people begin to use wind energy? Give the reason.

3) When did the use of energy in the form of fossil fuels begin growing? Why?

4) Why have alternative sources of energy become important and relevant in today's world?

5) What are non-conventional energy sources?

6) Where is geothermal energy derived from?

7) What method was used to generate a cleaner and less polluting form of energy?

8) What sources do we call non-renewable? Why?

9) What is the main problem we deal with nowadays?

6. What parts of the text can you define? Do they correspond to the paragraphs? Name each part.

1. _____

2. _____

3. _____

4. _____

5. _____

7. Write a summary of the text.

8. Match the synonyms.

1) to define	a) need
2) to transform	b) harm
3) various	c) very
4) demand	d) to use
5) to harness	e) obvious
6) evident	f) exhaustion
7) to generate	g) to determine
8) damage	h) different
9) depletion	i) to change
10) extremely	j) to produce.

9. Fill in the correct prepositions, then choose any **five items and make up sentences of your own.**

1) to transform sth ... sth; 2) due ... the problem; 3) to be ... turn; 4) ... some respects; 5) to increase ... demand; 6) to increase ...25%; 7) the demand ... energy; 8) ... average; 9) a result ... development; 10) need ... the day.

10. Discuss with your groupmates or in pairs:

1) link between Industrial Revolution and use of energy;

2) link between population growth and energy consumption.

UNIT 2

Active Vocabulary

1. Give equivalents of the following words and phrases. Try to memorize them.

Nouns and noun **phrases**

substance	tension	nucleus
fission	cell phone	motion
fusion	reservoir	petroleum
fireplace	particle	rarefaction
object	dam	wire

Verbs and verbal phrases

to compress	to include	to convert
to store	to collide	to transfer
to split	to release	to charge

Adjectives

stretched	transverse	dramatic
tiny	longitudinal	radiant

Reading Task:

2. Answer the following question and read the text below to check your answer.

What forms of energy do you remember from the course of Physics?

Forms of Energy

Energy is found in different forms including light, heat, chemical, and motion. There are many forms of energy, but they can all be put into two categories: potential and kinetic.

Kinetic energy is motion – of waves, molecules, substances, and objects. Forms of kinetic energy include:

• Radiant Energy is electromagnetic energy that travels in transverse waves. Radiant energy includes visible light, x-rays, gamma rays and radio waves. Light is one type of radiant energy.

Sunshine is radiant energy, which provides the fuel and warmth that make life on the Earth possible.

• Thermal Energy, or heat, is the vibration and movement of the atoms and molecules within substances. As an object is heated up, its atoms and molecules move and collide faster. Geothermal energy is the thermal energy in the Earth.

• Motion Energy is energy stored in the movement of objects. The faster they move, the more energy is stored. It takes energy to get an object moving and energy is released when an object slows down. Wind is an example of motion energy. A dramatic example of motion is a car crash, when the car comes to a total stop and releases all its motion energy at once in an uncontrolled instant.

• Sound is the movement of energy through substances in longitudinal (compression/rarefaction) waves. Sound is produced when a force causes an object or substance to vibrate – the energy is transferred through the substance in a wave. Typically, the energy in sound is far less than other forms of energy.

Potential energy is stored energy and the energy of position – gravitational energy. There are several forms of potential energy:

• Chemical Energy is energy stored in the bonds of atoms and molecules. Biomass, petroleum, natural gas, and coal are examples of stored chemical energy. Chemical energy is converted to thermal energy when we burn wood in a fireplace or burn gasoline in a car's engine.

• Mechanical Energy is energy stored in objects by tension. Compressed springs and stretched rubber bands are examples of stored mechanical energy.

• Nuclear Energy is energy stored in the nucleus of an atom – the energy that holds the nucleus together. Very large amounts of energy can be released when the nuclei are combined or split apart. Nuclear power plants split the nuclei of uranium atoms in a process called fission. The sun combines the nuclei of hydrogen atoms in a process called fusion.

• Gravitational Energy is energy stored in an object's height. The higher and heavier the object, the more gravitational energy is stored. When you ride a bicycle down a steep hill and pick up speed, the gravitational energy is being converted to motion energy. Hydropower is another example of gravitational energy, where the dam «piles» up water from a river into a reservoir.

• Electrical Energy is what is stored in a battery, and can be used to power a cell phone or start a car. Electrical energy is delivered by tiny charged particles called electrons, typically moving through a wire. Lightning is an example of electrical energy in nature, so powerful that it is not confined to a wire.

Comprehension Check

3. Complete the following sentences according to the text.

1) Energy is found in different forms including ...

2) All forms of energy can be put into two categories: ... and ...

3) Kinetic energy is ...

4) ... are forms of kinetic energy.

5) Sunshine provides ...

6) Geothermal energy is ...

7) The faster objects move, the more energy is ...

8) The energy in sound is far less than .. .

9) Potential energy is stored energy and .. .

10) Forms of potential energy include ...

4. Chemical energy is converted to thermal energy when we ...

12) Nuclear power plants split the nuclei of uranium atoms in a process called .... But the sun combines the nuclei of hydrogen atoms in a process called ...

13) The ... the object, the more gravitational energy is stored.

14) Electrical energy is delivered by ... called electrons.

5. Answer the following questions and give examples.

1) What are the main categories of energy?

2) What is potential energy?

3) What is kinetic energy?

4) When is chemical energy converted to thermal energy?

5) Fission and fusion are synonyms, aren't they? Why? Why not?

6) What physical process happens when you ride a bicycle?

7) What is named «an electron»?

8) What makes life on the Earth possible?

9) As an object is heated up, its atoms and molecules move and collide slower, don't they? Why? Why not?

10) What is the least form of energy?

6. Fill in the table using the information from the text.

Energy categories	Forms of energy	Definitions	Examples
kinetic energy	radiant energy	...	visible light, x-rays, gamma rays, radio waves
	thermal energy	...	...
	...	is stored in the movement of objects	...

	…	...	…
...	chemical energy	...	biomass, coal, petroleum, natural gas
	...	is stored in objects by tension	...
	...	...	...
	...	...	hydropower, ...
	electrical energy	...	...

7. Choose the best abstract for the text.

a) The text under consideration is about energy. It dwells on the usage and examples of different energy forms in nature.

b) The text deals with two categories of energy such as potential and kinetic. The author gives the definitions of various forms of energy and points out their examples.

c) The examples of several energy forms are commented in the text. The author also touches upon the difference between kinetic and potential energies.

8. Find key words and phrases which best express the general meaning of each paragraph.

9. Write a summary of the text.

10. Combine the words from the column on the left with the suitable nouns from the column on the rjght. Translate them.

1) compressed a) instant
2) tiny b) waves
3) transverse c) springs
4) visible d) light
5) total e) particles
6) uncontrolled f) stop

11. Fill in the correct prepositions, translate the phrases, then choose any three items and make up sentences of your own.

1) to put ... two categories; 2) to store ... sth .... tension; 3) the examples ... sth.; 4) to convert ... sth.; 5) to burn gasoline ... a car's engine; 6) to ride a bicycle ... a steep hill; 7) to make life ... the Earth possible; 8) movement ... sth. ... substances; 9) ... once; 10) to deliver ... charged particles; **11)** to transfer ... the substance.

12. Discuss with your groupmates or in pairs the examples of potential and kinetic forms of energy from everyday life.

TRADITIONAL SOURCES OF ENERGY

UNIT 1

Active Vocabulary

1. Give equivalents of the following words and phrases. Try to memorize them.

Nouns and noun phrases

Charcoal	campfire	exhaustion
Sawdust	stove	masonry heater
quantity	bonfire	thermal mass
application	convection	draft
furnace	hearth	ash
soapstone	heat exchanger	causticity
combustion	purpose	tile

Verbs and verbal phrases

to disintegrate	to resemble	to escape

Adjectives

concurrent	portable	refractory
incomplete	freestanding	

Reading the text

2. Answer the following questions and read the text below to check your answers.

1) What do you think was the very first source of energy for people?

2) How long have people Been using wood as a fuel?

Wood Fuel

Wood fuel is wood used as fuel. The burning of wood is currently the largest use of energy derived from a solid fuel biomass. Wood fuel can be used for cooking and heating, and occasionally for fueling steam engines and steam turbines that generate electricity. Wood fuel тау be available as firewood (e.g. logs, blocks), charcoal, chips, sheets, and sawdust. The particular form used depends upon factors such as source, quantity, quality and application. Wood may be sent into a furnace to be burned, stove, fireplace, or in a campfire, or used for a bonfire. Wood is the most easily available [ориш of fuel, and it is a renewable source of energy.

The use of wood as a fuel source for heating is as old as civilization itself. Early examples include the use of wood heat in tents. Fires were constructed on the ground, and a smoke hole in the top of the tent allowed the smoke to escape By convection.

In permanent structures and in caves, hearths were constructed - surfaces of stone or another noncombustible material upon which a fire could Be built. Smoke escaped through a smoke hole in the roof.

The Greeks, Romans, Celts, Britons, and Gauls all had access to forests suitable for using as fuel.

Total demand for fuel increased considerably with the industrial revolution but most of this increased demand was met By the new fuel source. Coal, which was more compact and more suited to the larger scale of the new industries.

The development of the chimney and the fireplace allowed for more effective exhaustion of the smoke. Masonry heaters or stoves went a step further By capturing much of the heat of the fire and exhaust in a large thermal mass, becoming much more efficient than a fireplace alone.

The metal stove was a technological development concurrent with the industrial revolution. Stoves were manufactured or constructed pieces of equipment that contained the fire on all sides and provided a means for controlling the draft. Stoves have Been made of a variety of materials: cast iron, soapstone, tile, and steel. Metal stoves are often lined with refractory materials such as firebrick, since the hottest part of a woodburning fire will Вим away steel over the course of several years' use.

The Franklin stove was developed in the United States by Benjamin Franklin. More a manufactured fireplace than a stove, it had an open front and a heat exchanger in the back that was designed to draw air from the cellar and heat it before releasing it out the sides. So-called «Franklin» stoves today are made in a great variety of styles, though none resembles the original design.

The 1800s became the high point of the cast iron stove. Each local foundry would make their own design, and stoves were built for myriads of purposes - parlour stoves, camp stoves, railroad stoves, portable stoves, cooking stoves and so on. Wood or coal could Be burnt in the stoves and thus they were popular for over one hundred years. The action ol the fire, combined with the causticity ol the ash, ensured that the stove would eventually disintegrate or crack over time. Thus a steady supply ol stoves was needed. The maintenance ol stoves, needing to Be blacked, their smokiness, and the need to split wood meant that oil or electric heat found favour.

In the 19th century the airtight stove, originally made of steel, became common. They allowed greater control of combustion, being more tightly fitted than other stoves of the day.

Use of wood heat declined in popularity with the growing availability of other, less labor-intensive fuels. Wood heat was gradually replaced By coal and later by fuel oil, natural gas and propane heating except in rural areas with available forests.

Today in rural, forested parts of the U.S., freestanding boilersare increasingly common. They are installed outdoors, some distance from the house, and connected to a heat exchanger in the house using underground piping. The mess of wood, bark, smoke, and ashes is kept outside and the risk of fire is reduced. The boilers are large enough to hold a fire all night, and can burn larger pieces of wood, so that less cutting and splitting is required. However, outdoor wood boilers emit more wood smoke and associated pollutants than other wood-burning appliances. This is due to design characteristics such as the water-filled jacket surrounding the firebox, which acts to cool the fire and leads to incomplete combustion. An alternative that is increasing in popularity are wood gasification boilers, which burn wood at very high efficiencies (85–91 %) and can be placed indoors or in an outbuilding.

As a sustainable energy source, wood fuel is still used today for cooking in тany places, either in a stove or an open fire, in тany industrial processes, including smoking meat and making maple syrup, it also remains viable for generating electricity in areas with easy access to forest products and by-products.

Comprehension Check

3. Decide whether the following statements are true or false according to the text.

1) Wood fuel can be used for cooking and heating, but can not be used for fueling steam engines.

2) Early examples include the use of wood heat near tents.

3) Total demand for fuel increased considerably with the industrial revolution.

4) This increased demand was met by the new fuel source, Oil.

5) Stoves have been made of metal materials only.

6) «Franklin» stoves aren't made today.

7) Wood gasification boilers can be placed indoors or in an outbuilding.

8) Wood fuel remains viable in areas with easy access to forest.

4. Put the following sentences in the correct order according to the text.

1) ____The Greeks, Romans, Celts, Britons, and Gauls all had access to forests suitable for using as fuel.

2) ____ Today in rural, forested parts of the U.S., freestanding boilers are increasingly common.

3) ____ So-called «Franklin» stoves today are made in a great variety of styles.

4) ____ Masonry heaters or stoves went a step further becoming much more efficient than a fireplace alone.

5) ____ The 1800s became the high point of the cast iron stove.

6) ____ The metal stove was a technological development concurrent with the industrial revolution.

7) ____ In the 19th century the airtight stove, originally made of steel, became common.

8) ____ Most of total demand for fuel was met by the new fuel source, coal.

5. Answer the following questions.

1) What is wood fuel?

2) What can wood fuel be used for?

3) What does the particular form of wood fuel used depend upon?

4) Is wood a renewable or non-renewable source of energy?

5) What is the earliest example of the use of wood as a fuel source?

6) What allowed more effective exhaustion of the smoke?

7) What materials have stoves been made on

8) Where was the Franklin stove developed? What is its characteristic?

9) What were stoves built in the 1800s for?

10) What type of stoves became popular in the 19th century?

11) Why did the use of wood heat decline in popularity?

12) Is it still used today? Where?

6. Divide the text into logical parts and make an oral report on the text according to the plan below.

Plan:

1. The Title

I've read the text (article, story) entitled ...

I'd like to tell you about the text (article, story) entitled ...

2. The Source

This is an article (story, text) published in the newspaper (magazine, book) ...

3. The Author

The author of the text is ... , a famous writer (journalist, scientist).

4. The Idea

The main idea of the text (article, story) is to show (to prove, to underline, to convince) ...

5. The Subject

The text deals with ...

The text describes (gives information about) ...

6. The Content

The text (story, article) starts with the fact (with the description of, with the characteristic of) ...

Then the author describes ...

After that the author touches upon the problem of .. .

Next the author deals with the fact (the problem) .. .

Besides the author stresses that ...

Finally the author comes to the conclusion that ...

7. Your Attitude

My attitude to the article (story, text) is contradictory (complicated, simple).

On the one hand 1 agree that ...

On the other hand 1 can't agree that ...

I've learned a lot of interesting (important, new) facts (information, things) from the text.

It makes us think of ...

It gives us food for thoughts.

It proves the idea (the theory, the point of view, the opinion) ...

It can help us in self-education (in solving our problems).

I'd like to cite the author (to make a quotation).

8. Your Advice

So in ту opinion it is (not) worth reading ...

7. Discuss with your groupmates or in pairs why coal and wood are considered to be traditional sources of energy.

8. Match the opposites.

1) permanent	a) unusual
2) to construct	b) to separate
3) to increase	c) to raise
4) to release	d) to draw in
5) popular	e) urban
6) to combine	f) to destroy

7) common g) temporary

8) rural h) unknown

9) to reduce i) to decrease

ALTERNATIVE SOURCES OF ENERGY

UNIT 1

Active Vocabulary

1. Give equivalents of the following words and phrases. Try to memorize them.

Nouns and noun phrases

photocell surge of water concern

Verbs and verbal phrases

to run out to capitalize to tap a resource

to sluice

Adjectives

overcast non-replenishable adaptable

habitable

Adverbs

properly

2. Answer the following question and read the text below to check your answer.

1) What is the difference between renewable and non-renewable energy sources?

2) Why is it so important to develop alternative energy sources?

The Pros and Cons of Alternative Energy

Oil and oil products make the world go round, some would say. Just about every piece of equipment or type of machinery uses oil to run. Oil, however, is a «non-replenishable» resource, and when it runs out, how will we run our equipment and machinery? In response to this question, тany are trying to develop alternative sources of energy. Hopefully, these alternative sources will make the world less dependent on the limited supply of oil.

There are a number of types of alternative energy sources which have already Been developed. They include:

• Energy from the Sun. Known as solar energy, this powerful and unlimited source of energy would offer us a very efficient alternative to oil, and it is a free resource. If solar power were properly developed, it could easily become our primary power source. The use of solar power is especially attractive in areas that have long days and not much cloud cover. It is therefore ideal for less developed areas which тау Be far from the more traditional power sources.

The problem is that capitalizing on this powerful resource is not as simple as it seems. Locations with limited daylight hours or consistently overcast skies do not receive the amount of light required to store the energy. In addition, locations that do not have wide expanses of land available will not be able to tap this resource, since the photocells necessary to collect and store the sunlight require large tracts of land.

• **Wind.** The power of the wind was harnessed hundreds of years ago to run windmills, which directly ran mills on farmlands. The same principle can now Be used, with the addition of storage capacity, to supply as much as 20% of our energy needs. In locations with strong winds, such as along the seashore, or in the mountains, wind can easily Be harnessed to run generators to create electricity.

This is an energy alternative that is safe and clean: no harmful carbon dioxide or other gases are produced in the creation of electricity through wind power. However, there are тany areas that don't receive enough wind to make it a reliable source.

• **Hydroelectric Energy.** A powerful surge of water sluicing over a cliff creates a tremendous source of energy. This is the concept behind the construction of the тany dams in the world today. Hydroelectric energy is another clean alternative to oil, since it does not produce waste or pollution. Energy produced By a dam is cheap and adaptable, but the cost of building a dam is very high and, without destroying entire potentially habitable areas, it is difficult to find locations for dams. Tidal energy - the power of water can also be harnessed on a smaller **scale** By the use of tidal flow. This alternative is very limited, however, since not every area has bodies

of water with strong tidal flows, and the concem over the effect on fish and birds in the area raise тany concerns. It is also not a steady source of energy, since tides move in twice daily movements. For this reason there are only nine workable sites for this type of power and only two being used.

• **Biomass.** Biomass can be considered a nice way of speaking of waste. Animal waste, rotten crops and grains, residues from wood mills and aquatic waste can all be fermented to form an **alcohol** that is comparable to coal in its energy producing powers. It also produces greenhouse gases, making it one of the less attractive alternative energy sources.

In addition to these more «natural» sources of energy production, fusion, fuel cells, nuclear, geothermal and hydrogen energies can be used for our future needs for power. These have negative environmental effects and so are questioned as alternative sources, but doesn't oil have as тany, if not more negative effects?

Comprehension Check

3. Decide whether the following statements are true or false according to the text.

1) Almost every piece of equipment or type of machinery uses gas to run.

2) There are few types of alternative energy sources which have already been developed.

3) Solar energy is a powerful and unlimited source of energy and it is a free resource.

4) The use of solar power is especially attractive in areas with limited daylight hours or consistently overcast skies.

5) The power of the wind has been developed recently.

6) Carbon dioxide or other gases can be produced in the creation of electricity through wind power.

7) Hydroelectric energy doesn't generate waste or pollution.

8) Energy produced by a dam is expensive and adaptable, but the cost of dam construction is very cheap.

9) There are only nine workable sites for tidal power and only two are in use.

10) Because of greenhouse gases, biomass is one of the less attractive alternative energy sources.

4. Answer the following questions.

1) What types of alternative energy sources have Been developed yet?

2) Where is solar power especially attractive?

3) What is the main problem with capitalizing on solar power?

4) Where was the power of wind harnessed for the first time?

5) What types of landscape have strong winds?

6) Wind energy is safe and clean, isn't it? Prove it.

7) Why isn't wind power reliable in some areas?

8) What is the concept behind the construction of the тany dams in the world today?

9) What are the pros and cons of tidal energy?

10) What are the pros and cons of biomass?

11) What other energies can be used for our needs in power?

5. What parts of the text can you define? Do **they correspond to the paragraphs? Name each part.**

1. _____

2. _____

3. _____

4. _____

5. _____

6. Find key words and phrases which best express the general meaning of each part.

7. Make an oral report on the text.

8. Discuss with your groupmates or in pairs:

1) What are the advantages and disadvantages of alternative energy sources?

2) What are the prospects of alternative energy sources harnessing in Ukraine? (Find out additional information).

UNIT 2

Active Vocabulary

1. Give equivalents of the following words and phrases. Try to memorize them.

Nouns and noun phrases

Elevation injustice

Verbs and verbal phrases

to evaporate to capture to spin

to absorb to rot to penetrate

Adjectives

inexhaustible viable low-impact

Reading Task:

2. Answer the following question and read the text below.

Where can you see solar panels on?

1. garden lamps
2. _____
3._____
4._____

How Solar Energy Works

Solar energy - power from the sun - is free and inexhaustible. This vast, clean energy resource represents a viable alternative to the fossil fuels that currently pollute our air and water, threaten our public health, and contribute to global warming. Failing to take advantage of such a widely available and low-impact resource would Be a grave injustice to our children and all future generations.

In the broadest sense, solar energy supports all life on Earth and is the basis for almost every form of energy we use. The sun makes plants grow, which can be burned as «biomass» fuel or, if left to rot in swamps and compressed underground for millions of years, in the form of coal and oil. Heat from the sun causes temperature differences between areas, producing wind that can power turbines. Water evaporates because of the sun, falls on high elevations, and rushes down to the sea, spinning

hydroelectric turbines as it passes. But solar energy usually refers to ways the sun's energy can be used to directly generate heat, lighting, and electricity.

The Solar Resource. The amount of energy from the sun that falls on Earth's surface is enormous. All the energy stored in Earth's reserves of coal, oil, and natural gas is matched by the energy from just 20 days of sunshine. Outside Earth's atmosphere, the sun's energy contains about 1,300 watts per square meter. About one-third of this light is reflected back into space, and some is absorbed by the atmosphere (in part causing winds to blow).

By the time it reaches Earth's surface, the energy in sunlight has fallen to about 1,000 watts per square meter at noon on a cloudless day. Averaged over the entire surface of the planet, 24 hours per day for a year, each square meter collects the approximate energy equivalent of almost a barrel of oil each year, or 4,2 kilowatt-hours of energy every day.

This figure varies by location and weather patterns. Deserts, with very dry air and little cloud cover, receive the most sun-more than six kilowatt-hours per day per square meter. Northern climes get closer to 3,6 kilowatt-hours.

Passive Solar Design for Buildings. One simple, obvious use of sunlight is to light our buildings. If properly designed, buildings can capture the sun's heat in the winter and minimize it in the summer, while using daylight year-round. Buildings designed in such a way are utilizing passive solar energy - a resource that can be tapped without mechanical means to help heat, cool, or light a building. Southfacing windows, skylights, awnings, and shade trees with the sun in mind can be comfortable and beautiful places to live and work.

Solar Heat Collectors. Besides using design features to maximize their use of the sun, some buildings have systems that actively gather and store solar energy. Solar collectors, for example, sit on the rooftops of buildings to collect solar energy for space heating, water heating, and space cooling. Most are large, flat boxes painted black on the inside and covered with glass. In the most common design, pipes in the box carry liquids that transfer the heat from the box into the building. This heated liquid-usually a water-alcohol mixture to prevent freezing-is used to heat water in a

tank or is passed through radiators that heat the air. Oddly enough, solar heat can also power a cooling system. Today, about 1,5 million U.S. homes and businesses use solar water heaters. In other countries, solar collectors are much more common; Israel requires all new homes and apartments to use solar water heating, and 92 percent of the existing homes in Cyprus already have solar water heaters. With natural gas prices at historically high levels, solar water and space heaters have become much more economic.

The Future of Solar Energy. Solar energy technologies are poised for significant growth in the 21st century. More and more architects and contractors are recognizing the value of passive solar and learning how to effectively incorporate it into building designs. Solar hot water systems can compete economically with conventional systems in some areas. And as the cost of solar PV continues to decline, these systems will penetrate increasingly larger markets. In fact, the solar РУ industry aims to provide half of all new U.S. electricity generation by 2025.

Aggressive financial incentives in Germany and Japan have made these countries global leaders in solar deployment for years.

Comprehension Check

3. Decide whether the sentences are true or false according to the text.

1) Energy from the sun is the basis for almost every form of energy we use.

2) Solar energy occurs as a result of temperature differences between areas.

3) Solar energy is considered to Be the ways the sun's energy is used to directly generate heat.

4) The sun's energy contains about 1,500 watts per square meter outside Earth's atmosphere.

5) The sun's energy reduces to about 1,000 watts per square meter at noon on a cloudy day.

6) Each square meter collects the energy equivalent of 5,2 kilowatt-hours of energy every day.

7) Skylights, south-facing windows are the examples of passive solar energy.

8) Solar collectors are installed on the roofs of buildings to accumulate solar energy for heating.

9) Solar collectors use a water-alcohol mixture to prevent drying np.

10) About 1,5 million German homes and enterprises use solar water heaters currently.

11) Solar hot water systems have become a good alternative to conventional systems in some areas.

12) The purpose of the solar PV industry is to provide half of all new U.S. electricity generation by 2035.

4. Answer the following questions and give examples.

1) What are the main advantages of solar energy?

2) What does solar energy contribute to?

3) How тапу watts per square meter does the sun's energy contain?

4) How much energy on average does square meter collect for a year?

5) How does this figure vary?

6) What is an obvious use of sunlight for buildings?

7) What are the systems that gather and store solar energy?

8) What countries with active harnessing of solar power for buildings do you know?

9) What are the prospects of solar energy technologies in the nearest future?

10) What countries are leaders in solar deployment?

5. Find key words and phrases which best express the general meaning of each paragraph.

6. Write a summary of the text.

7. Discuss with your groupmates or in pairs:

1) What is the main problem with solar panels usage in Ukraine?

2) Is it possible to use energy from the sun for industrial purposes in our country? Why? Why not?

Language Focus

8. Fill in the table with appropriate derivatives.

Awning, beautiful, difference, comfortable, common, outside, mixture, existing, alternative, properly, rot, evaporates, directly, contains, minimize, oddly.

Noun	**Verb**	**Adjective**	**Adverb**

9. Match the appropriate derivatives and translate them.

1) to exhaust	a) injustice
2) current	b) vapor
3) to justify	c) south-facing
4) to evaporate	d) to affect
5) cloudy	e) currently
6) sun1ight	f) inexhaustible
7) equiva1ent	g) atmosphere
8) sphere	h) c1oud1ess
9) to loca1ize	i) requirement
10) to face	j) sunny
11) to require	k) equa1
12) effectively	l) location

UNIT 3

Active Vocabulary

1. Give equivalents of the following words and phrases. Try to memorize them.

Nouns and noun phrases

Windmill	paddle wheel	shaft
sawmill	airfoil	cluster
altitude	tax break	propeller-type
sail	axis	blades

wind farm electrical grid wind tunneling
green pricing public utility
program company

Verbs and verbal phrases

to rush to cause to capture to span
to reverse to scatter to rotate

Reading Task

2. Answer the following question and read the text below to check your answer.

What is the principle of harnessing wind power?

Energy from Wind

Wind is simple air in motion. It is caused by the uneven heating of the earth's surface By the sun. Since the earth's surface is made of very different types of land and water, it absorbs the sun's heat at different rates.

During the day, the air above the land heats np more quickly than the air over water. The warm air over the land expands and rises, and the heavier, cooler air rushes in to take its place, creating winds. At night, the winds are reversed because the air cools more rapidly over land than over water (see Fig.1. Air in motion).

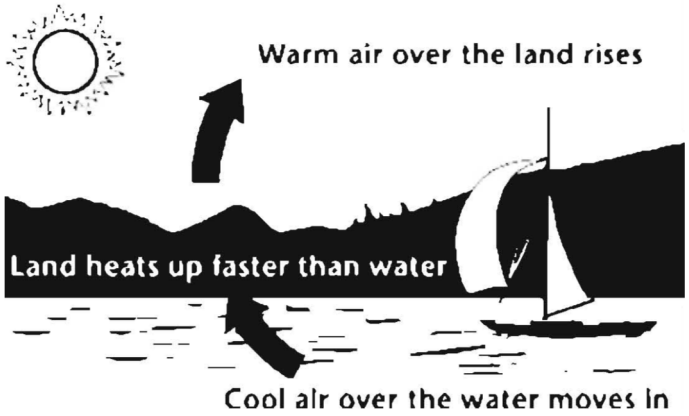

Figure 1 – Air in motion

In the same way, the large atmospheric winds that circle the earth are created because the land near the earth's equator is heated more by the sun than the land near the North and South Poles.

Today, wind energy is mainly used to generate electricity. Wind is called a renewable energy source because the wind will blow as long as the sun shines. Since ancient times, people have harnessed the winds energy.

Over 5,000 years ago, the ancient Egyptians used wind to sail ships on the Nile River. Later, people built windmills to grind wheat and other grains. The earliest known windmills were in Persia (lran). These early windmills looked like large paddle wheels. Centuries later, the people of Holland improved the basic design of the windmill. They gave it propeller-type blades, still made with sails. Holland is famous for its windmills.

American colonists used windmills to grind wheat and cor, to pump water, and to cut wood at sawmills. The oil shortages of the 1970s changed the energy picture for the country and the world. It created an interest in alternative energy sources, paving the way for the re-entry of the windmill to generate electricity.

Like old fashioned windmills, today's wind machines use blades to collect the wind's kinetic energy. Windmills work because they slow down the speed of the wind. The wind flows over the airfoil shaped blades causing lift, like the effect on airplane wings, causing them to tum. The blades are connected to a drive shaft that tums an electric generator to produce electricity. With the new wind machines, there is still the problem of what to do when the wind isn't blowing. At those times, other types of power plants must Be used to make electricity.

There are two types of wind machines (turbines) used today based on the direction of the rotating shaft (axis): horizontal-axis wind machines and vertical-axis wind machines. The size of wind machines varies widely. Small turbines used to power a single home or business тау have a capacity of less than 100 kilowatts.

Some large commercial sized turbines тау have a capacity of 5 million watts, or 5 megawatts. Larger turbines are often grouped together into wind farms that provide power to the electrical grid.

Horizontal-axis. Most wind machines being used today are the horizontal-axis type. Horizonta1-axis wind machines have blades 1ike airp1ane propellers. A typica1 horizonta1 wind machine stands as tall as a 20-story bui1ding and has three blades

that span 200 feet across. The 1argest wind machines in the wor1d have blades longer than a football fie1dl Wind тachines stand tall and wide to capture more wind (see fig. 2).

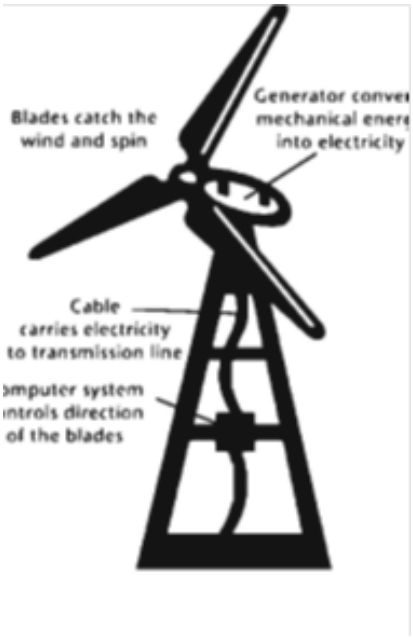

Figure 2 - Horizontal machine

Vertical-axis. Vertica1-axis wind machines have blades that go from top to bottom and the Fig. 14. Horizontal wind machine most common type looks 1ike a giant two-bladed egg beaters. The type of vertica1 wind machine typically stands 100 feet tall and 50 feet wide. Vertica1-axis wind machines make up on1y a very small percent of the wind machines used today.

Wind power plants, or wind farms as they are sometimes called, are c1usters of wind machines used to produce electricity. A wind farm usually has dozens of wind machines scattered over a 1arge area. The world's 1argest wind farm, the Horse Hollow Wind Energy Center in Texas, has 421 wind turbines that generate enough e1ectricity to power 220,000 homes per year.

Unlike power p1ants, many wind p1ants are not owned by public uti1ity companies. Instead they are owned and operated By business people who sell the e1ectricity produced on the wind farm to e1ectric uti1ities. These private companies are known as Independent Power Producers.

Operating a wind power plant is not as simp1e as just bui1ding a windmill in a windy place. Wind p1ant owners must carefully p1an where to locate their machines. One important thing to consider is how fast and how much the wind blows. As a rule, wind speed increases with a1titude and over open areas with no windbreaks. Good sites for wind p1ants are the tops of smooth, rounded hills, open p1ains or shore1ines, and mountain gaps that produce wind tunneling. Wind speed varies throughout the country. It also varies from season to season.

New technologies have decreased the cost of producing electricity from wind, and growth in wind power has been encouraged by tax breaks for renewable energy and green pricing programs. Many utilities around the country offer green pricing options that allow customers the choice to pay more for electricity that comes from renewable sources.

Most of the wind power plants in the world are located in Eиrope and in the United States where government programs have helped support wind power development. The United States ranks second in the world in wind power capacity, behind Germany and ahead of Spain and India. Denmark ranks number six in the world in wind power capacity but generates 20 percent of its electricity from wind.

In the 1970s, oil shortages pushed the development of alternative energy sources. In the 1990s, the push came from a renewed concem for the environment in response to scientific studies indicating potential changes to the global climate if the use of fossil fuels continues to increase. Wind energy is an economical power resource in тany areas of the country. Wind is a clean fuel; wind farms produce no air or water pollution because no fuel is burned. Growing concem about emissions from fossil fuel generation, increased government support, and higher costs for fossil fuels (especially natural gas and coal) have helped wind power capacity grow substantially over the last 10 years.

The most serious environmental drawbacks to wind machines may be their negative effect on wild bird populations and the visual impact on the landscape. To some, the glistening blades of windmills on the horizon are an eyesore; to others, they’re a beautiful alternative to conventional power plants.

Comprehension Check

3. Put the following sentences in the correct order according to the text.

1) _ A typical horizontal wind machine stands as tall as a 20-story building and has three blades that span 200 feet across.

2) _ Over 5,000 years ago, the ancient Egyptians used wind to sail ships on the Nile River.

3) _ Government programs adopted in Europe and in the US support wind power development.

4) _ The large atmospheric winds that circle the earth are created because the land near the earth's equator is heated more by the sun than the land near the North and South Poles.

5) _ There are horizontal-axis and vertical-axis wind тachines.

6) _ Wind power plants are clusters of wind machines used to produce electricity.

7) _ Wind is caused By the uneven heating of the earth’s surface By the sun.

8) _ Like old fashioned windmills, today's wind machines use blades to collect the wind's kinetic energy.

9) _ Vertical-axis wind machines have blades that go from top to bottom and usually look like a giant two-bladed egg beaters.

10) _ Wind plants тay be owned by public utility companies or business people.

11) _ New technologies have decreased the cost of producing electricity from wind, and growth in wind power has been encouraged by tax breaks for renewable energy and green pricing programs.

12) _ Potential changes to the global climate pushed the development of alternative energy sources in the 1990s.

4. Make the following statements true according to the text.

1) The air above the water heats up more quickly than the air over land during the day.

2) Contrary the air cools more slowly over land than over water and the winds are reversed at night.

3) The earliest known windmills were in Holland.

4) American colonists created an interest in alternative energy sources.

5) The blades are joined to a drive shaft that tums a windmill to produce electricity.

6) Small turbines тау have a capacity of more than 100 kilowatts and some large turbines тау have a capability of 5 megawatts.

7) The most popular wind machines are vertical-axis.

8) Many wind plants as well as power plants are not owned by public utility companies.

9) Operating a wind power plant is easier than just building a windmill in a windy place.

10) Wind speed remains constant throughout the country but it varies from season to season.

11) The cost of producing electricity from wind has been increased by new technologies.

12) The negative effect on wild bird populations and the visual impact on the landscape are the most serious environmental advantages of wind machines.

5. Answer the following questions and give examples.

1) Why does the earth's surface absorb the sun's heat at different rates?

2) What is wind energy mainly used to?

3) Why is wind called a renewable energy source?

4) How did the early windmills look like?

5) Who improved the basic design of the wind mill later?

6) What changed the energy picture for the world in the 1970s?

7) How do windmills work?

8) What is the problem with the new wind machines? What is the solution?

9) What are wind machines based on?

10) What are wind farms?

11) What is the difference between the horizontal-axis and vertical-axis wind machines?

12) The world's largest wind farm is located in Texas, isn’t it?

13) Who owns wind plants?

14) What must be considered before building a wind plant?

15) What sites are suitable for wind plants?

16) What has growth in wind power been encouraged by?

17) What was the development of alternative sources of energy caused By in the 1990s?

18) What has helped wind power capacity grow substantially over the last 1 O years?

19) What are the advantages of wind energy?

20) What are the disadvantages of wind machines?

6. Write a summary of the text.

7. Discuss with your groupmates or in pairs:

1) What are the main problems with wind power usage in Ukraine?

2) Is it possible to use energy from the wind for industrial purposes in our country? Why? Why not?

3) What European countries actively utilize wind energy? Give examples. (Find out additional information).

Language Focus

8. Fill in the gaps with the words from the text.

1) Wind farms are considered to be ... of wind machines used to produce ...

2) The types of wind machines are based on the direction of the rotating ...

3) Many power plants are ... by business people who sell the electricity from the wind farm to ...

4) Good sites for wind plants are the tops of ... hills and mountain ...

5) Wind speed increases with ...

б) Many utilities around the U.S. offer ... to the customer to support alternative ...

7) Germany ... first in the world in wind power ...

8) The most serious environmental ... to the wind machines are their negative effect on ...

9. Find the defined words in the text.

1. The height of an object or structure above a reference level, usually above sea level or the Earth's surface.

2. A fence or a line of trees that gives protection from the wind by breaking its force.

3. A company that performs a public service; subject to government regulation.

4. Energy or a substance given out by something.

5. A tax deduction that is granted in order to encourage a particular type of commercial activity.

10. Fill in the correct prepositions, translate the phrases, then choose any five items and make up sentences of your own.

1) air _ motion; 2) to Be made _ sth.; 3) land heats _ more quickly; 4) air cools more rapidly _land; 5) _ the same way; б) the wind blows _ long _ the sun shines; 7) _ ancient times; 8) to be famous _ sth.; 9) to slow _ the speed of the wind; 10) to be connected _ sth.; 11) to be based _ the direction of the axis; 12) blades that go _ top _bottom; 13) to make _ a small percent; 14) to scatter _ a large area; 15) to be owned_ public utility companies; l6) _ a rule; 17) to vary _ season_ season; 18) tax breaks _ renewable energy; 19) to pay _ electricity that comes _ renewable sources; 20) _ response _.

11. Fill in the words listed below.

a) production, b) growing, c) electricity, d) larger, e) fraction, j) generated, g) year
h) times

In 2006, wind machines in the United States 1) ____a total of 26,6 billion kWh per 2) _____of electricity, enough to serve more than 2,4 million households. This is enough 3) _____ to power a city 4) _____than Los Angeles, but it is only a small 5) _____ of the nation's total electricity 6) ____, about 0,4 percent. The amount of electricity generated from wind has been 7) ____ fast in recent years. In 2006, electricity generated from wind was *21/2* 8) ____more than wind generation in 2002.

UNIT 4

Active Vocabulary

1. Give equivalents of the following words and phrases. Try to memorize them.

Nouns and noun phrases

elevation water intake penstock

demand	tailrace	conductor
current	loops	load
field poles	stator	adjustment
gravity	wicket gate	

Verbs and verbal phrases

to attach	to rotate

Reading the Text

2. Answer the following question and read the text below to check your answer.

How do we get electricity from water?

Hydroelectric Power: How It Works

So just how do we get electricity from water? Actually, hydroelectric and coal-fired power plants produce electricity in a similar way. In both cases a power source is used to turn a propeller-like piece called a turbine, which then turns a metal shaft in an electric generator, which is the motor that produces electricity. A coal-fired power plant uses steam to turn the turbine blades; whereas a hydroelectric plant uses falling water to tum the turbine. The results are the same (see Fig. 3).

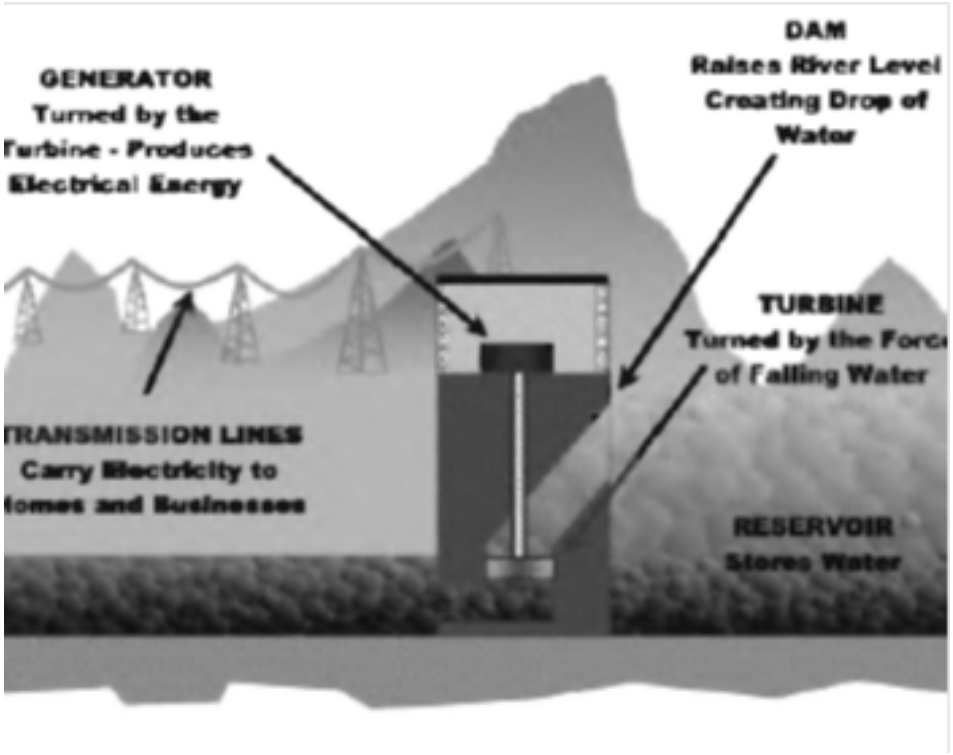

Figure 3 - How hydroelectric power works

The theory is to build a dam on a large river that has a large drop in elevation. The dam stores lots of water behind it in the reservoir. Near the bottom of the dam wall there is the water intake. Gravity causes it to fall through the penstock inside the dam. At the end of the penstock there is a turbine propeller, which is turned By the moving water. The shaft from the turbine goes up into the generator, which produces the power. Power lines are connected to the generator that carry electricity to your home. The water continues past the propeller through the tailrace into the river past the dam.

As to how this generator works, the Corps of Engineers explains it this way: “A hydraulic turbine converts the energy of fllowing water into mechanical energy. A hydroelectric generator converts this mechanical energy into electricity. The operation of a generator is based on the principles discovered by Faraday. He found that when a magnet is moved past a conductor, it causes electricity to flow. In a large generator, electromagnets are made by circulating direct current through loops of wire wound around stacks of magnetic steel laminations. These are called field poles, and are mounted on the perimeter of the rotor. The rotor is attached to the turbine shaft, and rotates at a fixed speed. When the rotor turns, it causes the field poles (the electromagnets) to move past the conductors mounted in the stator. This, in turn, causes electricity to flow and a voltage to develop at the generator output terminals (see Fig. 4).”

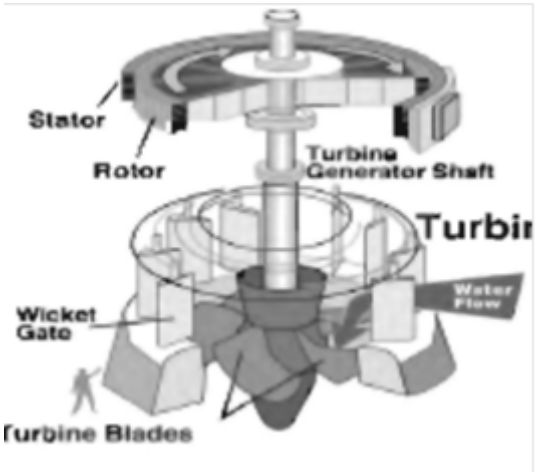

Figure 4 - Generator

Demand for electricity is not «flat» and constant. Demand goes up and down during the day, and overnight there is less need for electricity in homes, businesses, and other facilities. Hydroelectric plants are more efficient at providing for peak power demands during short periods than are fossil-fuel and nuclear power plants, and one way of doing that is by using «pumped storage», which reuses the same water more than once (see Fig. 5, 6).

Figure 5 - Daytime: Water flows downhill through turbines, producing electricity

Figure 6 - Nighttime: Water uphill to reservoir for tomorrow's use

Pumped storage is a method of keeping water in reserve for peak period power demands by pumping water that has already flowed through the turbines back up a storage pool above the power plant at a time when customer demand for energy is low, such as during the middle of the night. The water is then allowed to flow back through the turbine-generators at times when demand is high and a heavy load is placed on the system.

The reservoir acts much like a battery, storing power in the form of water when demands are low and producing maximum power during daily and seasonal peak periods. An advantage of pumped storage is that hydroelectric generating units are able to start up quickly and make rapid adjustments in output. They operate efficiently when used for one hour or several hours. Because pumped storage reservoirs are relatively small, construction costs are generally low compared with conventional hydropower facilities.

Comprehension Check

3. Complete the following sentences according to the text.

1) Hydroelectric and coal-fired power plants produce electricity in ....

2) The theory is to build a dam on a large river that has ....

3) ... causes water to fall through the penstock inside the dam.

4) There is less need for electricity in homes, businesses, and other facilities ....

5) Hydroelectric plants are more efficient at providing for peak power demands during short periods than are ....

6) An advantage of pumped storage is ....

4. Answer the following questions and give examples.

1) What does a coal-fired power plant use to tum the turbine blades?

2) What does a hydroelectric plant use to tum the turbine?

3) Where is the water intake?

4) What is a turbine propeller turned by?

5) Does the generator produce the power?

6) Is demand for electricity «flat» and constant? Why? Why not?

7) What is «pumped storage»?

8) Does the reservoir act much like a battery? Why? Why not?

9) Why are construction costs generally low compared with conventional hydropower facilities?

5. Translate the italicized passage in written form paying attention to Passive Voice.

6. Find key words and phrases which best express the general meaning of each paragraph.

7. Write a **summary of the text**.

8. Discuss with your groupmates or in pairs:

1) Is it possible to use energy from water in our country? Why? Why not?

2) What European countries actively utilize hydroelectric power? Give examples. (Find out additional information).

Language Focus

9. Combine the words from the column on the left with the suitable nouns from the column on the right. Translate them .

1) similar	a) intake
2) metal	b) generator
3) water	c) way
4) turbine	d) shaft
5) hydroelectric	e) propeller
6) magnetic	f) load
7) field	g) poles
8) fixed	h) power demand
9) peak period	i) storage
10) heavy	j) adjustment
11) pumped	k) steel laminations
12) rapid	l) hydropower facilities
13) conventional	m) speed

10. Fill in the correct prepositions, translate the phrases, then choose any five items and make up sentences of your own.

1) _ a similar way; 2) _both cases; 3) a drop _ elevation; 4) to fall _ the penstock; 5) the shaft _ the turbine; 6) the shaft goes up _ the generator; 7) to be connected _ the generator; 8) to carry electricity _ one's home; 9) to convert the energy of flowing water _ mechanical energy; 10) to be mounted _ the perimeter of the rotor; 11**)** need _ electricity; 12) to flow _ the turbines back _ a storage pool _ the power plant; 13) to place load _ the system; 14) to start _ quickly; 15) to compare _ sth.

12. Translate the text.

Different Natural Sources of Energy

We all know that the earth has limited stock of non-renewable sources of energy like coal and oil. On the other hand, renewable energy sources like solar energy, wind energy, bio-gas is available in unlimited quantities and can thus, help us solve the energy crisis that might arise in the future.

Alternative sources of energy are a key towards future power generation. With the increasing green house emission rates and with ever growing global warming, it is now the responsibility of every citizen and the government to deal with the energy problems seriously. Alternative energy sources help in energy production. Solar power generators are even capable of meeting our transportation needs. Wind and hydro power can be used to run machines and thus, generate electricity.

Виробничо-практичне видання

Методичні рекомендації
до виконання контрольної та організації самостійної роботи
з навчальної дисципліни

«ТЕХНІЧНА ІНОЗЕМНА МОВА»

*(для студентів 1 курсу денної форми навчання
освітньо-кваліфікаційного рівня магістр
спеціальності 141 - Електротехнічні системи електроспоживання)*

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План 2019, поз. 359 М.

Підп. до друку 24.04.2019. Формат 60×84/16.
Друк на ризографі. Ум. друк. арк. 2,0
Тираж 50 пр. Зам. №

Видавець і виготовлювач:
Харківський національний університет
міського господарства імені О. М. Бекетова,
вул. Маршала Бажанова, 17, Харків, 61002.
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Свідоцтво суб'єкта видавничої справи:
ДК № 5328 від 11.04.2017.