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Практікум з англійської мови професійного спрямування складається з тематичних розділів, що містять базову термінологію, автентичні тексти, комплекс комунікативних лексико-граматичних вправ, передтекстовий термінологічний англо-українсько-російський вокабуляр та додаткові тексти для самостійного опрацювання.

Призначений для студентів вищих навчальних закладів.

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ПЕРЕДМОВА

Практикум призначений для аудиторної та самостійної роботи з англійської мови за професійним спрямуванням для студентів спеціальності “Електроенергетика, електротехніка та електромеханіка”, а також для фахівців, які бажають поглибити свої знання англійської термінології з фаху.

Метою практикуму є комплексне навчання студентів, робота з фаховою літературою та формування навичок професійного спілкування. Навчальні тексти слугують не лише для розвитку навичок читання та перекладу фахової літератури, а й несуть у собі нову важливу інформацію, яку можна використовувати як основу для подальшого обговорення і створення тематичних ситуацій, максимально наближених до професійних.

Практикум складається з двох модулів, що містять автентичні тексти з тем: “Energy. Types of Energy. Alternative Energy”, “Energy Saving. Energy Conservation”. Термінологічні словники- мінімуми до кожного тексту допомагають краще оволодіти лексичним матеріалом та дають змогу розширити словниковий запас.

Вправи лексично-граматичного і комунікативного характеру, спрямовані на розвиток усіх видів мовленнєвої діяльності, розподіляються за рівнем складності, дозволяючи працювати окремо з лексичними одиницями, зі словосполученнями, реченнями та з текстом. Лексичні вправи передбачають пошук українсько-англійських та англо-українських термінологічних еквівалентів, добір синонімів, антонімів. Граматичні вправи охоплюють основні граматичні явища, характерні для англійської науково-технічної літератури. Комунікативні вправи сприяють розвитку навичок висловлювання власної думки, аргументації; участі в дискусіях, студентських конференціях тощо.

Практикум містить додаткові оригінальні інформаційно насичені тексти для самостійного опрацювання, які супроводжуються творчими завданнями та поясненням важкозрозумілих термінологічних словосполучень.

UNIT I. Energy. Types of Energy. Alternative Energy

Exercise 1. *Read, practise and memorise the following words and word combinations.*

Vehicle – транспортний засіб
define – визначати
advent – поява, виникнення
harness – використовувати (енергію)
fuelwood – деревина, що використовується як паливо
windmill – вітряк
water mill – водяний млин
irrigation – зрошування, полив
occur– мати місце, відбуватися
heat – тепло; нагрівати
light – світло; освітлювати
nuclear – ядерний
rural – аграрний, сільський
renewable energy – відновлювана енергія
non-renewable – невідновлюваний
field – родовище
lift – піднімати
exploitation – розробка родовища
deposit – поклад корисних копалин
coal – вугілля
oil – нафта
nuclear – ядерний, атомний
consumption – споживання
environment – навколишнє середовище
damage – шкода, пошкодження
fossil fuel – викопне паливо
crude – сировинний
harmful – шкідливий
depletion – виснаження
vehicular pollution – забруднення від автомобільного транспорта
generate – виробляти

demand – попит; потреба
grave – серйозний, тривожний
per capita – на душу населення
twentyfold – у двадцять разів більше

Exercise 2. *Distribute these words into columns by the parts of speech.*

***Model*:**	**Noun**	**Verb**	**Adjective**
	energy	read	alternative

Exercise 3. *Read, translate and give the gist of text 1.*

Text 1. 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 on 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), hydro (water) and wind power.

As early as 4000–3500 BC[1] 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 is 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 occurred in stages from the exploitation of coal deposits to the exploitation of oil and natural gas fields. It has been only half a cen-

tury 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 concentration of harmful gases in the atmosphere. This has in turn 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 with world population grown 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 increased more than twelvefold.

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[1]BC (before Christian Era) - до нашої ери.

Exercise 4. *Translate the following universal words without a dictionary. Mind the difference in their pronunciation and spelling in English and Ukrainian.*

Energy, trolley, industries, industrial, revolution, form, transform, stage, exploitation, concentration, energy, gas, atmosphere , global, ozone, television, traditional, activity, system, generate, lift.

Exercise 5. *Write out of text 1 words that can be used both as a noun and a verb. Translate the pairs.*

***Model*:** work – to work праця – працювати

Exercise 6. *Give the initial form of the following words.*

Defined, lifting , warming, faster , various, invented, possibility, burning, harnessing, met , definition, began, used, more, drying, occurred, has, heating, began, became, had, caused, harmful, industrial, depletion, pollution, exploitation, irrigation, generated, developed, development, natural, activity, combined, been, increased, led, movement.

Exercise 7. Choose the appropriate form of the words to complete the sentences. Check the differences of word form meanings with help

of dictionary.

generation, generated, generate, generator

1. Alternative energy is the use of non-conventional energy sources to … electrical power.

2. Electricity … from fossil fuels has led to high concentration of harmful gases in the atmosphere.

3. … of energy from water is called hydro energy.

4. A large … produces electricity with a voltage of about 25,000 volts.

renewable, renewables, renewed, renew

5. Our nature has the ability to … itself constantly.

6. The consumption of non-… sources of energy had caused more environmental damage than any other human activity.

7. Solar, wind, geothermal and hydro are constantly being … or restored.

8. Most of … provide electricity.

deposits, deposited, depositing, deposit

9. The … of ammonium, nickel, polymetallic and magnesium ores were discovered and developed industrially.

10. Nature … its mineral recourses in the most industrial regions.

11. Natural gas is … in gas bearing regions.

12. Fossil fuels, … nearby energy stations are produced economically.

store, storage, stored, storing

13. Elastic energy can be … mechanically in a compressed gas or liquid.

14. A device that … energy is sometimes called an accumulator or battery.

15. Nuclear energy is the … potential of the nucleus of an atom.

16. Ice … tanks store ice frozen by cheaper energy at night to meet peak daytime demand for cooling.

Exercise 8. *Translate and comment upon the following grammar verb forms.*

Lights; warms; cools; is defined; transform; to run; led; burning; were met; heating; were developed; harnessing; began to move faster; is used; began growing; has been; are; began being used; became evident; had caused; generated; has led to; increased; invented; means; were set up; use; are used; occurred; to be used; grew.

Exercise 9. *Use the verbs in brackets in the proper tense and voice form. Translate the sentences.*

1. Energy (define) as the ability or the capacity to do work.
2. Cars, planes, trolleys, boats, and machinery also (transform) energy into work. 3. The discovery of fire by man (lead) to the possibility of burning wood. 4. For several thousand years human energy demands (meat) only by renewable energy sources 5. Solar energy (use) for drying and heating. 6. With the advent of the Industrial Revolution the use of energy in the form of fossil fuels (begin) growing as more and more industries (set) up. 7. It (be) only half a century since nuclear power (begin) (use) as an energy source. 8. In the past century it (become) evident that the consumption of non-renewable sources of energy (cause) more environmental damage than any other human activity. 9. Electricity (generate) from fossil fuels (lead) to high concentrations of harmful gases in the atmosphere.10. Ozone depletion and global warming (cause) by high concentrations of harmful gases in the atmosphere.
11. Between 1850 and 1970 per capita use of industrial energy (increase) about twentyfold, and total world use of industrial and traditional energy forms (increase) more than twelvefold.

Exercise 10. *Translate the following word combinations into Ukrainian.*

To light cities, to power vehicle, to run machinery, to warm and cool homes, to transform energy into work, to lead to the possibility of burning wood, to be met only by renewable energy sources, to be developed harnessing wind energy, to begin to move faster, to be used for drying and heating, to begin growing as more and more industries, to begin being used as an energy source, to set up the use of energy in the form of fossil fuels, to occur in stages, to become evident, to cause more environmental damage, to be generated from fossil fuels, to lead to high concentration of harmful gases, to lead to ozone depletion and global warming, to be a grave problem, to increase about twentyfold.

Exercise 11. *Match the English-Ukrainian equivalents.*

1) source of energy	a) викопне паливо
2) energy demand	b) виснаження озонового шару
3) renewable energy	c) джерело енергії
4) fossil fuel	d) споживання енергії
5) deposit	e) забруднення
6) nuclear power	f) екологічне забруднення
7) energy consumption	g) потреба в енергії
8) harmful gases	h) відновлювана енергія
9) environmental damage	i) ядерна енергія
10) ozone depletion	j) поклад
11) pollution	k) шкідливі гази

Exercise 12. *Compose all possible 'noun + noun' word combinations using the words given in columns A and B.*

A	**B**
1) irrigation	a) field
2) energy	b) depletion
3) fossil fuels	c) source
4) ozone	d) system
5) oil	e) demand
6) gas	f) industry
7) cooling	g) consumption

Exercise 13. *Match the terms (1-5) with their functions (a-e).*

1) energy	a) It can be renewed or restored
2) fossil fuel	b) It occurs when harmful substances are introduced into the Earth's atmosphere
3) renewable energy	c) It causes global environmental damage
4) air pollution	d) It is defined as the ability or the capacity to do work.

5) harmful gas	e) It is a natural fuel such as coal or gas, formed geologically from the remains of living organisms

Exercise 14. *Complete the sentences using English equivalents of the words in brackets.*

1. For several thousand years human energy (попит) was met only by (відновлювана енергія). 2. The first sailing ships and (вітряк) were developed harnessing wind energy. 3. With the use of (гідроенергія) through (водяний млин) or (зрошувальна система) things began to move faster. 4. (Сонячна енергія) is used for drying and heating. 5. The use of energy in the form of (викопне паливо) began growing with the advent of the Industrial Revolution. 6. This occurred in stages, from the exploitation of (вугільний поклад) to the exploitation of (нафтові та газові родовища). 7. It has been only half a century since (ядерна енергія) began being used as an (джерело енергії). 8. The consumption of (не відновлювані джерела енергії) had caused more (пошкодження навколишнього середовища). 9. Electricity generated from (викопне паливо) such as coal and (сировинна нафта) has led to high concentrations of (шкідливі гази) in the atmosphere. 10. High concentrations of (шкідливі гази) in the atmosphere has led to problems such as (виснаження озону) and (глобальне потепління).

Exercise 15. *Match the beginnings (column A) and the ends (column B)of the sentences.*

A	**B**
1. Energy can be found …	a) has led to high concentration of harmful gases in the atmosphere.
2. For several thousand years human energy demands …	b) are caused by electricity generated from coal and crude oil.
3. The use of energy in the form of fossil fuels began …	c) in a number of different forms.
4. The consumption of non-renewable sources of energy …	d) are constantly being renewed or restored.
5. Electricity generated from fossil fuels …	e) had caused more environmental damage .

6. Ozone depletion and global warming …	f) were met only by renewable energy sources .
7. Renewable energy …	g) cannot be renewed or replenished.
8. Non-renewable energy sources …	h) from the exploitation of coal deposits to the exploitation of oil and natural gas fields.

Exercise 16. *Translate the following sentences into English.*

1. Енергія використовується для освітлення міст, живлення автомобілів та техніки, обігріву та охолодження будинків. 2. Винайдення вогню людиною призвело до можливості спалювання деревини для приготування їжі та обігріву з використанням енергії. 3. Протягом декількох тисяч років потреби людини в енергії задовольнялись лише відновлюваними джерелами енергії - енергією сонця, біомаси (деревини, листя, гілок), гідроенергією та енергією вітру. 4. Ще в 4000-3500 рр. до нашої ери гідроенергія використовувалась у водяних млинах та системах зрошування. 6. У результаті промислової революції, з появою нових галузей почало зростати використання енергії у вигляді викопного палива. 7. Використання викопного палива відбувалося поетапно, починаючи з розробки родовищ вугілля до експлуатації нафтових і газових родовищ.

8. Споживання невідновлюваних джерел енергії завдало більшої шкоди навколишньому середовищу, ніж будь-яка інша діяльність людини. 9. Використання електроенергії, виробленої з викопного палива, такого як вугілля та сира нафта, призвело до високої концентрації шкідливих газів в атмосфері.10. Це, у свою чергу, призвело до таких проблем, як виснаження озонового шару та глобальне потепління.

Exercise 17. *Answer the questions on text 1.*

1. How is energy used in modern life? 2. What is energy defined as? 3. What were the first energy sources? 4. Where were the first energy sources used? 5. Has the advent of the Industrial Revolution influenced the development of fossil fuels? How? 6. How does electricity generated from fossil fuels influence environment? 7. Why did the de-

mand for energy increase enormously in the middle of the last century?

Exercise 18. *Give the gist of text 1 using the following phrases: The text deals with…, It describes…, The text focuses on…, It mentions…or touches upon…, The key-not of the text.*

Exercise 19. *Discuss the following problems in groups.*

1. The energy use is of great importance in modern life.
2. The difference between renewable and non-renewable energy.
3. Perspectives of renewable and non-renewable energy usage.

Exercise 20. *Read, practise and memorize the following words and word combinations to text 2.*

Motion – рух
store –1. запас; 2. запасати
drive – 1. приводити в дію; 2. керувати
generator – генератор
turbine – турбіна
immobile – нерухомий
indicate – вказувати
manifest – показувати, проявляти(ся)
acquire – здобувати
apparent – очевидний, явний
transfer – переміщати
convert – перетворювати
fossil fuel – енергоносії (мінерального походження)
greenhouse effect – парниковий ефект
law – закон
create– створювати
destroy – руйнувати
transmit – передавати
pure – чистий
boil – кипіти
similarity – подібність
core – ядро
trap – 1.утримувати; 2.заманювати в пастку
solar – солнячна енергія; солнячний; солярний

nucleus (pl. nuclei) – атомне ядро
fusion – злиття, синтез
fission – розщеплювання (атомного ядра)
matter – речовина
conserve – зберігати

Exercise 21. *Read, translate and give the gist of text 2.*

Text 2. Types of Energy

Energy comes in different forms: heat (thermal), light (radiant), motion (kinetic), electrical, chemical, nuclear energy, gravitational. There are two types of energy: stored (potential) energy, working (kinetic) energy. Mechanical energy is energy stored in objects and is the sum of two other energy sources: kinetic energy and potential energy.

Kinetic energy is motion. The faster an object moves, the higher its kinetic energy. The energy of rivers (hydraulic energy) and of the wind (wind energy) is a form of kinetic energy. This energy can be converted into mechanical energy by water mills, windmills or pumps connected to turbines or into electricity when it drives a generator.

Potential energy is the energy stored in immobile objects and the energy of position. As its name indicates, it is a potential form of energy. In other words, it only manifests itself when converted into kinetic energy. For example, when a ball is lifted, it acquires potential energy (from gravity) that only becomes apparent when it falls.

Energy can be transferred from one object to another. Energy can be converted from any one of these forms into any other and vice versa. Energy is never created or destroyed. The conservation of energy is formulated in the First Law of Thermodynamics.

The energy transmitted to the Earth from the Sun as light is also called "electromagnetic radiation" and may be thought of as a pure form of energy called photons. This word derives from the word "photo", which means "light".

The energy radiated to Earth from the Sun is called thermal or heat energy and is the same energy form as boiling water. For example, boiling water possesses "thermal energy", which is the collective, kinetic and potential energy of the vibrating molecules in the water.

Just as plants do today, those living millions of years ago converted the sun's light energy into food (chemical) energy through the

process of photosynthesis. That 'solar' energy was and is transferred down the food chain in animals. This energy provides living things with the energy to grow and live. When living organisms die the energy contained within them as chemical energy is trapped.

"Nuclear reactions" are the source of energy within the Sun, the core of our Earth and nuclear reactors. The similarity is that the reactions occurring involve changes in the structure of the nuclei of atoms. With both nuclear fusion and fission some of the matter making up the nuclei is actually converted into energy. In other words matter itself is a form of energy.

Exercise 22. *Answer the questions on text 2.*

1. What forms does energy come in? 2. What are the types of energy? 3. What are the sources of mechanical energy? 4. What is the difference between kinetic and potential energy ? 5. What does the First Law of Thermodynamics state? 5. How is the energy transmitted to the Earth from the Sun called? 6. What forms is light energy converted into? 7. What are nuclear reactions? 8. What nuclear reactions cause conversion of some of the nuclei matter into energy?

Exercise 23. *Comment upon the structure of the following words. Give your own examples of word formation.*

Mechanical, thermal, greatly, motion, electricity, electrical, rewrite, react, kinetic, chemical, gravity, gravitational, stored, potential, faster, higher, principally, hydraulic, converted, generator, transferred, created, destroyed, storage, called, transmitting, electromagnetic, radiation, radiated, radiant, boiling, collective, considerably, vibrating, living, contained, trapped, reactor, reaction, occurring, conversion, widen, enlarge, various, movement, different, boiler.

Exercise 24. *Distribute these words into 5 columns by the parts of speech: nouns, adjectives, verbs, adverbs, verbals.*

Exercise 25. *Give derivatives of the following words, translate the pairs or chains after the model.*

Model: radiate – radiator – radiation випромінювати – радіатор – випромінювання

Store, boil, react, generate, transmit, convert, move, communicate, use, indicate, form, vibrate, create, connect, instruct, act, collect, consume, contain, differ, derive.

Exercise 26. *Give Ukrainian equivalents of the following terminological word combination.*

Heat energy; nuclear energy; electrical energy; light energy; chemical energy; wind energy; stored energy; hydraulic energy; transmitted energy; radiated energy; converted energy; transferred energy; contained energy; trapped energy; created energy; destroyed energy; boiling water; vibrating molecule; living organism.

Exercise 27. *Write out of text 2 words that can function both as nouns and verbs. There are more than 20 of such words.*

Exercise 28. *Translate the following words and word combinations into Ukrainian. Use them in sentences of your own.*

a) Energy source, higher kinetic energy, pure form of energy, energy radiated to the Earth, nuclear reactions, sun's light energy, food chain, source of energy within the Sun, core of the Earth, pure form of energy, structure of the atom nuclei, nuclear fusion and fission, potential form of energy.

b) To come in different forms, to be stored in objects, to move faster, to be converted into mechanical energy, to be connected to turbines, to be stored in immobile objects, to be never created or destroyed, to be called "electromagnetic radiation", to be thought of as a pure form of energy, to be converted from any one of these forms, to drive a generator, to make up the nuclei.

Exercise 29. *Make Passive infinitives after the model:*

Model: translate – be translated перекладати – перекладатися

Use, heat, call, cool, lift, read, make, drive, write, convert, store, create, transmit, produce, connect, transfer, destroy.

Exercise 30. *Translate and comment upon the following verb forms.*

Comes, moves, is stored, can be converted into, drives, manifests, was lifted, falls, acquired, refers, becomes, can be transferred, were created, will be destroyed, is called, may be thought, derives from, possesses, is transferred down, provided, to grow and live, involving, making up, made of.

Exercise 31. *Put the verbs in brackets into the correct voice and tense form. Translate the sentences.*

1. Kinetic energy (can convert) into mechanical energy by water mills, windmills or pumps 2. Electricity (drive) a generator. 3. Potential energy (store) in immobile objects and the energy of position. 4. Energy (transfer) from one object to another. 5. Energy (convert) from any one of these forms into any other, and vice versa. 6. Energy never (create) or destroyed. 7. The energy transmitted to the Earth from the Sun as light (may think) of as a pure form of energy called photons. 8. The Sun light (call) "electromagnetic radiation". 9. The energy radiated to Earth from the sun (call) thermal or heat energy. 10. Boiling water (possess) "thermal energy". 11. Just as plants (do) today, those living millions of years ago (convert) the sun's light energy into food (chemical) energy through the process of photosynthesis. 12. When living organisms (die) the energy contained within them as chemical energy (trap).

Exercise 32. *Rewrite the following sentences in the Passive Voice.*

1. Immobile objects store potential energy. 2. The Sun transmits thermal or heat energy. 3. Water mills, windmills or pumps convert kinetic energy into mechanical energy. 4. James Prescott Joule who lived in the 19th century discovered heat as a type of energy. 5. Our body uses stored energy to do work. 6. Solar energy provides living things with the energy to grow and live. 7. Cars, planes, trolleys, boats and machinery also transform energy into work. 8. The consumption of non-renewable sources of energy had caused more environmental damage than any other human activity. 9. Electricity generated from fossil fuels such as coal and crude oil has caused to high concentration of harmful gases in the atmosphere. 10. Around the world, scientists measure energy in joules rather than Btus[1].

1.Btu – British thermal unit – Британська теплова одиниця

(0,252 ккал,1,06кДж)

Exercise 33. *Match the terms (1-8) and definitions (a-h).*

Terms		Definitions
1. Mechanical energy		a) chemical energy, which releases heat energy when burnt.
2. Kinetic energy		b) the phenomenon, preventing the planet from freezing or getting too cold when the sun goes down..
3. Nuclear reactions		c) the energy stored in objects and is the sum of two other energy sources: kinetic energy and potential energy.
4. The energy in fossil fuels	**is are**	d) the energy radiated to the Earth from the sun.
5. The greenhouse effect		e) the reactions, involving changes in the structure of the nuclei of atoms..
6. Non-renewable fossil fuels		f) the energy produced by burning fossil fuels such as coal.
7. Thermal or heat energy		g) the energy converted into electricity when it drives a generator.
8. Non-renewable energy		h) crude oil, natural gas, coal, oil shales and tar sands.

Exercise 34. *Match the synonyms or close in meaning words combinations.*

1. environment	a) nontraditional
2. convert	b) heat
3. gravity	c) transport
4. thermal	d) transform
5. consumption	e) power
6. alternative	f) attraction
7. energy	g) ecology
8. transfer	h) use

Exercise 35. *Translate the following sentences into English.*

1.Енергія існує в різних формах: теплова, світлова (променева), енергія руху (кінетична), електрична, хімічна, ядерна енергія, гравітаційна. 2. Є два види енергії: потенційна та кінетична. 3. Механічна енергія - це енергія, що зберігається в об'єктах і є сумою двох інших джерел енергії: кінетичної та потенційної енергії. 4. Кінетична енергія – це рух. 5. Чим швидше рухається об'єкт, тим вище його кінетична енергія. 6. Потенційна енергія - це енергія, що зберігається в нерухомих об'єктах. 7. Потенційна форма енергії виявляється лише при перетворенні в кінетичну енергію. 8. Енергія переходить з одного об'єкта на інший. 9. Перший закон термодинаміки твердить, що енергія ніколи не створюється і не руйнується. 10. Енергія, у вигляді світла, що потрапляє на поверхню Землі від Сонця, називається також "електромагнітним випромінюванням". 11. Випромінювана Сонцем енергія, називається тепловою енергією, яка за енергетичною формою є подібною до енергетичної форми киплячої води. 12. В процесі ядерних реакцій синтезу та розщеплювання частина речовини ядер фактично перетворюється в енергію.

Exercise 36. *Comment upon the following statements using the phrases: of course, surely, to my mind, most probably, perhaps.*

1. Electricity generated from fossil fuels such as coal and crude oil has led to high concentration of harmful gases in the atmosphere. 2. Energy is never created or destroyed. 3. The energy radiated to Earth from the Sun is called thermal or heat energy and is the same energy form as boiling water. 5. Potential form of energy only manifests itself when converted into kinetic energy.

Exercise 37. *Ask:*

a) if energy comes in different forms;

if mechanical energy is the sum of kinetic energy and potential energy;

if kinetic energy can be converted into mechanical energy;

if potential energy is the energy stored in immobile objects;

if energy is never created or destroyed;

b) how the conservation of energy is called ;

how the energy transmitted to the Earth from the Sun is called ;

when a potential form of energy manifests itself;
why heat energy is the same energy form as boiling water;
how light energy is converted into chemical energy;
what the similarity of energy within the Sun, the core of our Earth and nuclear reactors is.

Exercise 38. *Speak on:*

1. What is Energy?
2. Energy sources.
3. Types of Energy.

Exercise 39. *Read, practise and memorize the following words and word combinations.*

Bolt of lightening – розряд блискавки
electrical outlet – електрична розетка
power line – лінія електропередач
absorb – поглинати
reflect – відбити, відбивати
sunburn – сонячний опік
residue – залишок
shale – сланець
replenish – поповнювати
crude – сирий, необроблений
tar sands – смолистий пісок
finite resource – обмежений ресурс
exhaust – виснажувати, вичерпувати
viable – життєздатний
emission – викид, виділення; випромінювання
pollution – забруднення
raw – сирий; необроблений, неочищений
flashlight – кишеньковий електричний ліхтар
hydroelectric plant – гідроелектростанція
gasoline – бензин
fuel – заправляти (пальним)
run out – закінчуватися, вичерпуватися
non-conventional – нетрадиційний
fuel cell – паливний елемент (електрохімічний пристрій,

який перетворює хімічну енергію палива в електричну)
evolve – розвиватися

Exercise 40. *Discuss the following questions using the information of text 3.*

1. Why is energy considered to be one of the most brilliant discoveries of mankind?
2. How do different types of energy manifest themselves in our lives?

Exercise 41. *Read, translate and entitle text 3.*

Text 3

Energy makes things happen. Every time something moves, it is because of energy. Every time something gets warmer, it is because of energy. Every time something makes a noise, it is because of energy. People use energy to talk, run and think. In fact, every time we do anything, we use energy. There are different forms of energy: electrical, motion, sound, thermal, light, chemical. A bolt of lightening is electrical energy. This is the same kind energy used by an electrical outlet. Electrical energy travels through power lines and then helps make[1] lots of different machines work.

All sounds are a form of energy. The bark of a dog, the beep of a car's horn and the music from a radio are all sound energy. Does the sound of a car's horn have more energy than the sound of someone whispering? You can explain that the horn has more energy because the louder something is, the more sound energy it has. A cup of hot chocolate is warmer than a glass of cold chocolate milk. The hot chocolate has more thermal energy than the chocolate milk. When the chocolate milk is put on a hot stove, the milk's temperature rises. This happens because the milk absorbs thermal energy from the stove. When hot chocolate cools down, does it gain or lose thermal energy? You can explain that it loses thermal energy because the milk is no longer absorbing thermal energy from the rising temperature of the stove.

If your skin absorbs too much light energy from the Sun, you will get a sunburn. This is because light is a form of energy. A lot of light

energy comes from the Sun. The rays of the sun, moving along straight lines, are called heat rays or radiation. When sunlight falls on Earth, its radiation is absorbed or reflected.When this light energy reaches Earth, it makes a lot of different things happen. One of the most important things it does is help plants grow. This light energy also helps keep Earth warm. We all get energy from the food we eat. The form of energy that is in food is called chemical energy. Our bodies use this energy to grow and move. Batteries also use chemical energy. Small machines such as flashlights use the chemical energy in batteries. Chemical energy also makes[1] cars go. Cars use the chemical energy from gasoline.

1.make smth/smb. do (smth) – примушувати робити (щось)

Exercise 42. *Divide text 3 into logical parts, entitle them and write a topical sentence for each part.*

Exercise 43. *Translate the following universal words related to energy. Mind the difference in their pronunciation and spelling.*

Electrical, thermal, chemical, music, radio, radioactive, chocolate, temperature, radiation, battery, machine, generate, hydroelectric, ethanol, limit, biomass, commercial, industrialized, nation, conserve, absorb, transport, industrial, horn, gasoline.

Exercise 44. *Write 5 questions on the text: general, subject, special, alternative and tag questions.*

Exercise 45. *Read, translate and give the gist of text 4.*

Text 4. Alternative Energy

Energy sources are divided into two groups: renewable and nonrenewable. Renewable energy sources (sun, wind, water, agricultural residue, fuelwood, and animal dung) can be easily replenished while nonrenewable energy source (crude oil, natural gas, coal, oil shales and tar sands) cannot be easily replenished.

Renewable and nonrenewable energy sources can be used as primary energy sources to produce useful energy such as heat or used to produce secondary energy sources such as electricity.

When people use electricity in their homes the electrical power

was probably generated from burning coal or natural gas, a nuclear reaction or a hydroelectric plant on a river, to name a few possible energy sources. Gasoline, used to fuel cars, is made from crude oil (nonrenewable energy) and may contain a biofuel (renewable energy) like ethanol, which is made from processed corn. Non-renewable energy is energy produced by burning fossil fuels such as coal. They are non-renewable because there are finite resources of fossil fuels on the planet. If they are continually used, one day they will run out.

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.

Through the method of co-generation a cleaner and less polluting form of energy is being generated. Fuel cells are also being used as a cleaner energy source. Total commercial energy consumption has been growing tremendously since the last decade. Per capita commercial energy consumption in low-income countries has 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. The main problem isn't that we use energy, but how we produce and consume energy resources. We really need 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.

Exercise 46. *Translate the objective and attributive word combinations below. Remember the ways of their formation.*

1**. *V-ing + n***

burning wood, burning fossil fuel, conserving energy, burning coal or gas, polluting form of energy, non-polluting sources of energy, growing energy consumption, polluting emission

2. ***V-ed + n***

replenished energy sources, transformed energy, used energy, generated power, made fuel, processed corn, produced energy, absorbed or reflected radiation, associated problem, exhausted energy sources, industrialized nation, doubled motor vehicle, evolved energy system, derived energy, increased share, consumed energy, stored energy, wasted energy.

3. ***adv V-ed + n***

continually used fuel, significantly reduced pollution, locally produced sources energy, easily replenished energy source, probably generated power, really needed energy sources, extremely lowed energy production .

4. ***n + n***

energy source, fuel cell, energy consumption, low-income country, world population, energy production, energy service, light energy, motor vehicle,energy source, energy system, oil shale.

Exercise 47. Determine the parts of speech of the following words by the suffixes, if any, give the initial forms and translate them.

Cleaner, cleanest, most, more, extremely, slower, less, warmer, easier, louder, longer, significantly, smallest, really, better, least, higher, easily, faster, fewer, continually.

Exercise 48. *Give the comparative and superlative forms of the following adjectives and adverbs.*

Clean, powerful, warm, long, rare, intensive, many, effective, large, slow, probably, fast, common, well, high, low, easy, easily, few, little, far, much, good, little.

Exercise 49. *Fill in the blanks with the correct form of the adjectives and adverbs basing on texts 1- 4.*

a) 1. The ____ an object moves, the ____ its kinetic energy is. 2**.** With the use of hydropower through water mills or irrigation systems things began to move ____. 3. With the advent of the Industrial Revolution the use of energy in the form of fossil fuels began growing as _____ industries were set up. 4. Also known as non-conventional sources of energy, renewable sources of energy cause ____ . 5. ____ of the renewable sources of energy are fairly non-polluting and considered clean. 6. Through the method of co-generation a _____ and _____ polluting form of energy is being generated. 7. Per capita commercial energy consumption in low-income countries has _____ than doubled. 8. In some respects the global energy system has evolved in a ____ direction in the last 25 years. 9. The share of world primary energy derived from natural gas, the ___ fossil fuel, has increased by ____ than 25%. 10. Fuel cells are also being used as a ____ energy source.

Exercise 50. *Express each of these ideas as a compound.*

1. Energy sources that can be easily replenished –
2. Energy produced by burning fossil fuels –
3. Sources that can never be exhausted –
4. Sources of energy that cause less emission –
5. Energy sources that can be used without polluting the environment –
6. Secondary energy sources we use –
7. Energy sources used to produce useful energy –

Exercise 51. *What energy is being described? Find a word or phrase from texts 3 and 4.*

1. It can be converted into mechanical energy.
2. It only manifests itself when converted into kinetic energy.
3. It can be converted into mechanical energy.
4. It is absorbed or reflected.
5. They are finite resources of fossil fuels.
6. They are fairly non-polluting sources of energy.
7. It is made from crude oil.

Exercise 52. *Insert articles where necessary.*

1. … faster an object moves, … higher its kinetic energy. 2. … louder something is, … more sound energy it has. 3. ... more oil, gas and

coal we use, … faster they can be exhausted. 4. … cleaner energy sources, … less pollution they cause. 5. … more population, … more energy we produce and consume. 6. … lower the efficiency of energy production, … more energy consumed is lost or wasted in the process of conversion from raw materials. 7. … more energy we produce and consume, … more energy can be saved.

Exercise 53. *Translate and comment upon the following grammar forms.*

Can be replenished, can never be exhausted, are divided into, can be used, was generated from, may contain, is produced, will run out, associated with, have become important, are called, can reduce, are considered, is being generated, are being used, has been growing, has more than, has evolved in, has increased, is lost or wasted.

Exercise 54. *Put the verbs in brackets into the correct tense and voice form. Translate the sentences.*

1. Energy sources (divide) into two groups: renewable and nonrenewable. 2. Renewable and nonrenewable energy sources can (use) as primary energy sources. 3. When people (use) electricity in their homes the electrical power probably (generate) from burning coal or natural gas, a nuclear reaction or a hydroelectric plant on a river. 4. Gasoline (make) from crude oil. 4. Ethanol (make) from processed corn. 5. Alternative sources of energy (become) important and relevant in today's world. 6. Alternative sources of energy can never (exhaust) and therefore (call) renewable. 7. Non-conventional sources of energy (cause) less emission and (be) available locally. 8. Most of the renewable sources of energy (be) fairly non-polluting and (consider) clean. 11. The global energy system (evolve) in a cleaner direction in the last 25 years. They (use) the touch screen technology. 13. Conserving energy (become) the need of the day (be) it in the transport, household or industrial sectors.

Exercise 55. *Analyse the ing-forms. State which of them are Non-finite forms of the verb (gerund, participle) or other parts of speech. Translate the sentences.*

1. The discovery of fire by man led to the possibility of burning wood for cooking and heating thereby using energy. 2. Work means

moving or lifting something, warming or lighting something. 3. When people use electricity in their homes the electrical power was probably generated from burning coal or natural gas. 4. Non-renewable energy is energy produced by burning fossil fuels such as coal. 5. Most of the renewable sources of energy are fairly non-polluting. 6. Through the method of co-generation a cleaner and less polluting form of energy is being generated. 7. Fuel cells are also being used as cleaner energy source. 8. Total commercial energy consumption has been growing tremendously since the last decade. 9. About 15% of the world's population living in the wealthy industrialized nations consume over half the energy used in the world. 10. What we really need are energy sources that can be used without polluting the environment. 11. A bolt of lightening is electrical energy. 12. The rays of the sun, moving along straight lines, are called heat rays or radiation. 13. Boiling water possesses "thermal energy", which is the collective, kinetic and potential energy of the vibrating molecules in the water.

Exercise 56. *Define the functions of the Participle II in the following sentences (it may be used as an attribute part of a compound verbal predicate). Translate the sentences.*

1. Electricity generated from fossil fuels such as coal and crude oil has led to high concentrations of harmful gases in the atmosphere. 2. There are many sources of energy that help to run the various machines invented by man. 3. Potential energy is the energy stored in immobile objects. 4. The energy transmitted to the Earth from the Sun as light is also called "electromagnetic radiation" and may be thought of as a pure form of energy called photons. 5. When living organisms die the energy contained within them as chemical energy is trapped. 6. Gasoline, used to fuel cars, is made from crude oil. 7. Non-renewable energy is energy produced by burning fossil fuels such as coal. 8. Also known as non-conventional sources of energy, renewable energy sources cause less emission and are available locally. 9. The share of world primary energy derived from natural gas has increased by more than 25%. 10. More than 90% of energy consumed is lost or wasted in the process of conversion from raw materials to the final energy service.

Exercise 57. *Give synonyms of the following words.*

Thermal, radiant, kinetic, electrical, hydraulic, nuclear, conven-

tional, non-conventional, power, crude, pure, non-finite.

Exercise 58. *Give English equivalents of the following terminological word combinations.*

Відновлювані та невідновлювані джерела енергії; первинні джерела енергії; чиста форма енергії; корисні копалини; передові технології; шкідливі викиди; споживати енергію; забруднення навколишнього середовища; сільськогосподарські залишки; термальна енергія; теплові промені; ядерна енергія; природний газ; зменшувати забруднення; потенційна та кінетична енергія; механічна енергія; закон термодинаміки; виробляти енергію; перетворення з сировини; екологічно чисті джерела енергії; виснаження озонового шару; глобальне потепління.

Exercise 59. *Translate into English.*

1. Джерела енергії поділяються на дві групи: відновлювані та невідновлювані. 2. Відновлювані джерела енергії можуть легко поповнюватись на відміну від невідновлюваних джерел енергії. 3. Відновлювані та невідновлювані джерела енергії можуть використовуватися як первинні для отримання корисної енергії, такої як тепло, або для виробництва вторинних джерел енергії, таких як електроенергія. 4. Невідновлювана енергія - це енергія, вироблена шляхом спалювання викопного палива, такого як вугілля. 5. Альтернативні джерела енергії ніколи не вичерпуються, і тому називаються відновлюваними. 6. Відомі як нетрадиційні, альтернативні джерела енергії спричиняють менше викидів. 7. Використання альтернативної енергії може істотно знизити хімічне, радіоактивне та теплове забруднення атмосфери. 8. Більшість відновлюваних джерел енергії вважаються досить екологічно чистими. 9. Однак біомаса є основним забруднювачем у приміщеннях. 10. Головною проблемою є не те, що ми використовуємо енергію, а як ми виробляємо та споживаємо енергоресурси.

Exercise 60. *Say whether the following statements are true or false. Correct the false ones using one of the following phrases:* ***I don't think so, I'm afraid I can't agree with you here, it's not quite so, on the contrary, nothing of the kind.***

1. 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. 2. Electricity generated from fossil fuels such as coal and crude oil has led to high concentration of harmful gases in the atmosphere. 3. Renewable energy is energy produced by burning fossil fuels such as coal. 4. Non- renewable energy sources cause less emission and are available locally. 5. The share of world primary energy derived from natural gas has decreased by more than 25%. 6. Alternative sources of energy can never be exhausted and are therefore called renewable. 7. Energy is never created or destroyed.

Exercise 61. *Complete the table.*

Energy sources	Renewable	Non- renewable
Sun		
Biomass		
Coal		
Geothermal sources		
Wind		
Crude oil		
Water		
Radiation		
Natural gas		

Exercise 62. *Answer the questions on text 4.*

1. What groups are energy sources divided into? 2. What are renewable and non-renewable energy sources? 3. How are renewable and non-renewable energy sources consumed? 4. Which of them can significantly reduce chemical, radioactive and thermal pollution? 5. Why have alternative sources of energy become important and relevant in today's world? 6. Why does the overall efficiency of energy production remain extremely low? 7. What problems does the mankind face in energy consumption?

Exercise 63. *Discuss the following questions in groups.*

1. How does energy influence our life? 2. How can alternative energy replace traditional energy sources? 3. What energy sources are more preferable nowadays? Why?

Exercise 64. *Speak on "Alternative Energy".*

Exercise 65. *Read, practise and memorize the following words and word combinations.*

Greenhouse gases – парникові гази
restore – відновлювати
enhance – підсилювати, збільшувати
nitrous oxide – окис азоту
acid rain – кислотний дощ
sulphur dioxide – діоксид сірки
carbon dioxide – вуглекислий газ
global warming – глобальне потепління
experience – 1. досвід; 2. зазнавати, переживати
beneficial – вигідний, корисний
prevent– запобігати
freezing – замерзання
melting – танення
polar – полярний
flooding – затоплення
coastal – прибережний
unpredictable – непередбачуваний
contribute – сприяти

Exercise 66. *Read, translate, entitle and give the gist of text 5.*

Text 5

Fossil fuels are non-renewable and will eventually run out because we are using them much faster than they can be restored within the earth. The problem we now face is that human activities – particularly burning fossil fuels (coal, oil and natural gas), agriculture and land clearing – are increasing the concentration of greenhouse gases. This is the enhanced greenhouse effect, which is contributing to warming of the Earth. Burning fossil fuels produces photo-

chemical pollution from nitrous oxides and acid rain from sulphur dioxide. Burning fuels also produce greenhouse gases including vast amounts of carbon dioxide that may cause the phenomenon of global warming that the planet is currently experiencing.

Have you ever been inside a greenhouse? What did you notice about the atmosphere?

You can examine the effect on temperature of a greenhouse by doing a simple activity. The Greenhouse Effect is the trapping of solar heat energy by gases in the atmosphere. The greenhouse effect is usually beneficial to us as it prevents the planet from freezing or getting too cold when the sun goes down.

The enhanced Greenhouse Effect caused by the accelerated increase of greenhouse gases in the atmosphere may cause Global Warming. Global warming has the potential to bring catastrophic changes to our environment that will affect not only us, but also all life on the planet. This could lead to the melting of the polar ice caps which would raise the levels of the oceans and cause flooding of islands and other low lying coastal areas. It may also have a major effect on rainfall and other world climatic patterns, creating extreme and unpredictable weather.

As well as greenhouse gases being capable of increasing the earth's atmospheric temperature, some of the gases produced by burning fossil fuels can be toxic and can cause pollution. One of these is sulphur dioxide, which produces acid rain.

Exercise 67. *Answer the questions on text 5.*

1. Why will fossil fuels eventually run out ? 2. What does burning fossil fuels cause? 3. What is contributing to warming of the Earth? 4. What does burning fossil fuels produce? 5. What is Greenhouse Effect ? 6. Why is greenhouse effect usually beneficial to our planet? 7. What may enhanced Greenhouse Effect cause ? 8. Can Global warming influence all life on the planet? 9. What changes can global warming bring to our environment? 10.What gases can cause pollution?

Exercise 68. *Translate the following universal terms without a dictionary. Mind the difference in their pronunciation and spelling in English and Ukrainian.*

Natural; gas; agriculture; atmosphere; effect; temperature; planet; potential; catastrophic; climatic; atmospheric; toxic; electromagnetic radiation; global; kinetic; molecule; extreme; organism; thermal; material; problem; final; electrical; hydraulic; energy; industrial; process; alternative; examine; machine; concentration; biomass.

Exercise 69. *Explain the meaning of the following word combinations in English . Translate them*.

Fossil fuel, non-renewable fuel, burning fossil fuel, greenhouse gas, photochemical pollution, global warming, acid rain.

Exercise 70. *Match the English-Ukrainian equivalents.*

1) harmful emission	a) кислотний дощ
2) pollution	b) нетрадиційні джерела
3) greenhouse gases	c) кінцеві джерела енергії
4) acid rain	d) шкідливі викиди
5) carbon dioxide	e) забруднювач
6) global warming	f) забруднення
7) non-conventional sources	g) парникові гази
8) unpredictable weather	h) вуглекислий газ
9) finite energy sources	i) глобальне потепління
10) polluter	j) непередбачувана погода

Exercise 71. *Translate the following infinitive phrases into Ukrainian and use them in sentences of your own.*

To increase concentration of greenhouse gases; to produce greenhouse gases; enhanced greenhouse effect; to produce photochemical pollution; to contribute to warming of the Earth; to include vast amounts of carbon dioxide; to cause global warming; to trap solar heat energy; to be beneficial to the planet; to be caused by the accelerated increase of greenhouse gases; to bring catastrophic changes to environment; to have a major effect on rainfall and other world climatic patterns; to be capable of increasing the earth's atmospheric temperature; to be produced by burning fossil fuels.

Exercise 72. *Use the correct form of the adjective given in brackets.*

1. Fossil fuels are non-renewable and will eventually run out because we are using them (much/ most) (fast/faster) than they can be restored within the earth. 2. Non-conventional sources of energy cause (little/less) emission. 3. Through the method of co-generation a (clean/cleaner) and (less/least) polluting form of energy is being generated. 4. Per capita commercial energy consumption in low-income countries has (many/more) than doubled. 5. The number of motor vehicles in use worldwide has (more/most) than doubled since 1970.
6. The share of world primary energy derived from natural gas – the (clean/cleanest) fossil fuel – has increased by (many/more) than 25%. 7. (Many/most) of the renewable sources of energy are fairly non-polluting and considered clean.

Exercise 73. *Put the verbs in brackets into the correct Active or Passive forms.*

1. Burning fuels also (produce) greenhouse gases including vast amounts of carbon dioxide that may (cause) the phenomenon of global warming. 2. The enhanced Greenhouse Effect (cause) by the accelerated increase of greenhouse gases in the atmosphere and may (cause) Global Warming. 3. Global warming (have) the potential (bring) catastrophic changes to our environment. 4. Some of the gases (produce) by burning fossil fuels and can (be) toxic and can (cause) pollution.
5. Greenhouse gases (be) capable of increasing the earth's atmospheric temperature. 6. The greenhouse effect (be) usually beneficial to us as it (prevent) the planet from freezing or getting too cold when the sun (go) down. 7. Fossil fuels (be) non-renewable and eventually (run) out.

Exercise74. *Match the synonymous words or word combinations.*

1) fossil fuels	a) clean energy
2) environment	b) heat energy
3) renewable sources	c) use of energy
4) power	d) ecology
5) replenished energy	e) toxic emission
6) non-polluting energy	f) motion
7) thermal energy	g) non-conventional sources
8) harmful emission	h) energy
9) energy consumption	i) non-renewable fuels
10) kinetic energy	j) renewed energy

Exercise 75. *Write the following sentences in the Past / Future Indefinite, Present / Past / Future Continuous, Present / Past / Future / Perfect tenses. Add appropriate adverbial modifiers.*

1. The Greenhouse Effect contributes to warming of the Earth.
2. Global warming brings catastrophic changes to our environment .
3. The mankind faces the problem of burning fossil fuels .

Exercise 76. *Change the sentences of exercise 75 into the Passive Voice.*

Exercise 77. *Match the definitions in the left column with the terms in the right column.*

1.The complex of physical, chemical and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival	a) environmental protection
2. The introduction of contaminants into the natural environment that cause adverse change	b) clean energy
3. A practice of protecting the natural environment on individual, organizational or governmental levels	c) fossil fuel
4. Harmful emissions polluting the environment	d) global warming
5. The result of human practices like emission of Greenhouse gases	e) pollution
6. The non-useable gaseous waste products produced during the combustion	f) environment
7. Poisonous byproducts as a result of industries such as manufacturing, farming, construction, automotive, laboratories, and hospitals	g) exhaust emissions
8. Any combustible organic material, as	h) toxic materials

oil, coal, or natural gas, derived from the remains of former life

9. The sources of energy that produce only very small amounts of greenhouse gas — i) pollutants

Exercise 78. *Give definitions to the following terms.*

Global warming, environment, pollution, pollutants, exhaust emissions, toxic materials, environmental protection, clean energy.

Exercise 79. *Translate into English.*

1. Викопні палива не відновлюються і, врешті-решт, вичерпуються, тому що ми використовуємо їх набагато швидше, ніж їх можна відновити в межах Землі. 2. Діяльність людини, зокрема спалення викопного палива, сільське господарство та очищення землі збільшує концентрацію парникових газів. 3. Концентрація парникових газів - це підвищення парникового ефекту, що сприяє потеплінню Землі. 4. Парниковий ефект зазвичай є корисним для нас, оскільки він заважає планеті замерзнути. 5. Посилений парниковий ефект, спричинений збільшенням парникових газів в атмосфері, може призвести до глобального потепління. 6. Глобальне потепління може призвести до танення полярних снігів, що підвищить рівень океанів і спричинить затоплення островів та інших прибережних районів. 7. Глобальне потепління здійснює також серйозний вплив на опади та інші кліматичні умови світу, створюючи екстремальну та непередбачувану погоду.

Exercise 80. *Speak on the following topics.*

1. Renewable and nonrenewable energy sources .
2. Greenhouse gases and environmental pollution.

Exercise 81. *Read, practise and memorize the following words and word combinations.*

Aquatic – водяний
magnifying glass – збільшувальне скло, лупа
beam – промінь

capture – утримувати
utilize – використовувати
photovoltaic cell – фотоелектричний елемент
pump – 1.насос; 2. подавати під тиском, нагнітати
fan – вентилятор
deflect – перенаправляти, відбивати (світло)
conserve – зберігати
maintenance – технічне обслуговування
install – встановлювати
consistent – систематичний
free – безкоштовно
catch fire – спалахувати; загоратися
in plenty – у великій кількості
attractive – привабливий
prospect – перспектива
constant – постійний
remote – віддалений

Exercise 82. *Read, translate and give the gist of text 6.*

Text 6. Solar Energy

Solar is the first energy source in the world. It was in use much earlier before humans even learnt how to light a fire. Many living things are dependent on solar energy from plants, aquatic life and the animals. The solar is mostly used in generating light and heat. The solar energy coming down to the planet is affected by the orbital path of the sun and its variations within the galaxy. In addition, it is affected by activity taking place in space and on the sun. It was this energy that is believed to have been responsible for the breaking of ice during the ice age, which creates the separation of lands and sea.

Solar energy is the energy that is produced by the sun in the form of heat and light. It is one of the most renewable and readily available source of energy on the planet Earth. The fact that it is available in plenty and free and does not belong to anybody makes it one of the most important of the non-conventional sources of energy. Solar energy has been used by people since ancient times by using simple magnifying glasses to concentrate the light of the sun into beams so hot they would

cause wood to catch fire.

Mainly, solar energy can be used to convert it into heat energy or it can be converted into electricity. Solar energy is energy harnessed from the sun. Solar energy can be broadly categorized as active or passive solar energy depending on how it is captured and utilized. In active solar energy special solar heating equipment is used to convert solar energy to heat energy whereas in passive solar energy the mechanical equipment is not present. Active solar technologies include the use of mechanical equipment like photovoltaic cells, solar thermal collectors or pumps and fans to trap the solar energy.

Passive solar technologies convert solar energy to heat energy without use of active mechanical systems. It is mainly the practice of using windows, walls, trees, building placement and other simple techniques to capture or deflect the sun for use. Passive solar heating is a great way to conserve energy and maximize its utilization. An example of passive solar heating is what happens to your car on a hot summer day.

Solar energy does not create any pollution and is widely used by many countries. It is renewable source of power since sun will continue to produce sunlight all the years. Solar panels, which are required to harness this energy can be used for long time and require little or no maintenance. This energy can be harnessed by installing solar panels that can reduce our dependence on other countries for consistent supply of coal to produce electricity. This makes it an attractive energy prospect for most countries that are looking to go completely green in the future. Although solar energy can not be produced during night and cloudy days but it can be used again and again during day time. Solar energy from sun is consistent and constant power source and can be used to harness power even in remote locations.

Exercise 83. *Find English equivalents in text 6. It will help you to translate it.*

Генерування світла і тепла; орбіта сонця; льодовиковий період; нетрадиційні джерела енергії; легкодоступне джерело енергії; теплова енергія; механічне обладнання; активна механічна система; пасивні сонячні технології; використання механічного обладнання; встановлення сонячних батарей; обладнання для сонячного опалення; сонячні теплові колектори або насоси;

зберігати енергію; поглинати та відбивати сонячне світло; відновлюване джерело енергії; встановлення сонячних батарей; постійне джерело живлення; енергія, отримана від сонця; регулярне постачання вугілля; віддалені місця.

Exercise 84. *Translate the following phrases into Ukrainian and use them in sentences of your own.*

To be produced by the sun in the form of heat and light; to be one of the most important of the non-conventional sources of energy; to concentrate the light of the sun into beams; would cause wood to catch fire; to convert solar energy into heat energy; to capture or deflect the sun; does not create pollution; to be renewable source of power; to produce sunlight; to harness the energy; to require little or no maintenance; can be harnessed by installing solar panels; can reduce the dependence on other countries for supply of coal; to harness power in remote locations; to produce electricity; can not be produced during night and cloudy days; is consistent and constant power.

Exercise 85. *Match the English-Ukrainian equivalents.*

1) photovoltaic cell	a) сонячний колектор
2) pump	b) використання енергії
3) fan	c) фотоелектричний елемент
4) heat energy	d) технічне обслуговування
5) heating equipment	e) джерело енергії
6) solar heating	f) сонячний промінь
7) conversion of energy	g) вироблення світла
8) harnessed energy	h) теплова енергія
9) solar thermal collector	i) орбіта
10) maintenance	j) насос
11) power source	k) опалювальне обладнання

12) sun beam — l) сонячне тепло
13) generating light — m) перетворення енергії
14) utilization of energy — n) використана енергія
15) orbital path — o) вентилятор

Exercise 86. *Complete the sentences with English equivalents of the words in brackets.*

1. The solar is mostly used in (генерування світла і тепла). 2. It is one of the most (поновлюване та легкодоступне джерело енергії) on the Earth. 3. Solar energy is one of the most important of the (нетрадиційні джерела енергії). 4. Mainly, solar energy can be used to convert it into (теплова енергія) or it can be converted into (електрична енергія). 5. Solar energy can be broadly categorized as active or passive solar energy depending on how it (утримується та використовується). 6. In active solar energy special solar (опалювальне обладнання) is used to convert solar energy to (теплова енергія) whereas in passive solar energy the (механічне обладнання) is not present. 7. Active solar technologies include the use of (механічне обладнання) like (фотоелектричний елемент), solar (сонячний колектор) or (насос) and (вентилятор) (утримувати) the solar energy.8. Passive solar heating is a great way (зберігати енергію) and (збільшувати використання енергії). 9. Solar panels, which are required (використовувати) this energy can be used for long time and require little or no (технічне обслуговування). 10. Installing solar panels can reduce our dependence on other countries for consistent (постачання вугілля) (для виробництва електроенергії).

Exercise 87. *Write out of text 6 words that can function both as a noun and a verb. Translate the pairs.*

Exercise 88. *Work in pairs. Ask and answer the following questions.*

1. Why is solar energy the most important energy source in the world.? 2. What are the forms of solar energy? 3. How can solar energy be used? 4. What can solar energy be categorized as? 5.What solar technologies use mechanical equipment? 6. What mechanical equipment is

used to trap the solar energy? 7. How do passive solar technologies convert solar energy to heat energy? 8. What advantages make solar energy an attractive energy for most countries? 9. What can be installed to produce electricity? 10. Why is solar energy called green energy?

Exercise 89. *Speak on "Solar energy".*

Exercise 89. *Read, practise and memorize the following words and word combinations to text 7.*

Explorer – дослідник
trade –торгівля
route–шлях
irrigation – зрошення
grind – молоти, розтирати
feed – подавати, постачати
power grid – енергосистема
advancement –прогрес
extract – добувати, витягати
disturbance – перешкода, завада
capacity – виробнича потужність
at any rate – у будь-якому разі
take care of – піклуватися
harm – шкода
strike – 1.удар; 2.ударяти
in advance – заздалегідь

Exercise 90. *Read, translate and give the gist of text 7.*

Text 7. Wind Energy

This is one of the energy sources that have been in use for a very long time and for centuries. It was used in powering sailing ships, which made it possible for explorers to sail around their trade routes in distant lands. We have been harnessing the wind's energy for hundreds of years. From old Holland to farms in the United States, windmills have been used to power the crop irrigation and the family energy needs, water pumping or grinding grain and electric lights. Today, the windmill's modern equivalent - a wind turbine - can use the wind's energy to gener-

ate electricity. There are several windmills that are used to generate required energy mostly for industrial uses. Many of the wind turbines can capture much power all at once before feeding it to the power grid. This is commonly known as wind farms and has been in use for many years all round the world. It is only the United States that is going slow in terms of[1] accepting this alternative energy source.

Wind power **is a** renewable source of energy and reduces our **alliance on foreign countries** for supply of oil and gas. It does not cause any air pollution and has created several jobs in last few decades. Advancement in technologies has brought down the cost of setting up wind power plants. Wind energy can only be used in areas which experience high winds which means that it cannot be used as a source to extract energy anywhere on earth. The wind power plants sometimes create noise disturbances and cannot be used near residential areas. These disadvantages have made the use of wind energy in particular regions only. Wind doesn't generally blow reliably and turbines usually function at about 30% capacity or so. In the event that the weather is not going to support you, you may do without power or at any rate you'll need to depend on the electric company to take care of you during those times. Serious storms or high winds may cause harm to your wind turbine, particularly when they are struck by lightning. Wind turbines and other supplies needed to make wind energy could be extremely costly in advance and hard to maintain.

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1. in terms of – з точки зору, що стосується, щодо

Exercise 91. *Answer the questions on text 9.*

1. What have windmills been used for? 2. What windmill equivalent is used to generate required energy for industrial uses at present? 3. What is called wind farms? 4. Why is wind energy an attractive energy for many countries? 5. How has advancement in technologies influenced energy costs? 6. What are the advantages and disadvantages of wind turbines application?

Exercise 92. *Translate the following words and word combinations into Ukrainian. Use them in sentences of your own.*

a) Trade routes; single windmill; crop irrigation; family energy needs; water pumping; electric lights; industrial use; wind turbine; pow-

er grid; wind farm ; alternative energy source; renewable source of energy; alliance on foreign countries for supply of oil and gas; air pollution; advancement in technologies; wind power plant; noise disturbance.

b) To harness the wind's energy; to generate electricity; to power crop irrigation, to provide water pumping; to generate required energy; to capture much power; to feed power to the power grid; to generate energy for industrial uses; to reduce alliance on foreign countries;
to cause no air pollution; to bring down the cost; to extract energy; to be used as a source; to create noise disturbances; to function at about 30% capacity; to depend on the electric company; to take care of somebody; to cause harm to wind turbine; to be struck by lightning; to make wind energy; to be extremely costly; to be hard to maintain.

Exercise 93. *Match the synonyms or synonymous expressions.*

1) accept	a) draw out
2) harness	b) produce
3) function	c) supply
4) irrigation	d) catch
5) harm	e) sun
6) extract	f) use
7) generate	g) operate
8) capture	h) influence
9) feed	i) watering
10) solar	j) receive
11) affect	k) damage

Exercise 94. *Complete the sentences translating the words given in brackets into English.*

1. We have been harnessing (енергія вітру) for hundreds of years. 2. Windmills have been used for (живлення зрошувальних систем) and the family energy needs, (постачання води або подрібнення зерна) and electric lights. 3. A wind turbine can use the wind's energy (виробляти електроенергію). 4. Several windmills that are used to generate required energy mostly for (промислове використання).
5. Many of the wind turbines can (утримувати) much power all at once

before (постачання) it to the (електромережа). 6. (Вітроенергетика) is (відновлюване джерело енергії) and reduces our alliance on foreign countries for (постачання нафти та газу). 7. (Вітроенергетика) does not (спричиняти забруднення атмосфери). 8. (Розвиток технологій) has brought down the (вартість) of setting up (вітрова електростанція). 9. (Вітрова енергія) cannot be used as a (джерело видобування енергії) anywhere on earth. 10. (Вітрові електростанціїі) sometimes create (шумові перешкоди) and cannot be used near residential areas. 11. (Вітрова електростанція) usually functions at about 30% (виробнича потужність) or so. 12. Serious storms or high winds may (нанести шкоду) to the (вітрова турбіна). 13. (Вітрові турбіни) and other supplies needed to make wind energy could be (надзвичайно дорогі).

Exercise 95. *Use the verbs in brackets in the correct tense and voice forms.*

1.Wind energy is one of the energy sources that (be) in use for a very long time and for centuries. 2. We (harness) the wind's energy for hundreds of years. 3. Windmills (use) to power the crop irrigation and the family energy needs, water pumping or grinding grain and electric lights. 4. There are several windmills that (use) to generate required energy mostly for industrial uses. 5. This commonly (know) as wind farms and (be) in use for many years all round the world. 6. Wind power (be) renewable source of energy and (reduce) our alliance on foreign countries for supply of oil and gas. 7. Wind power (not to cause) any air pollution and (create) several jobs in last few decades. 8. Advancement in technologies (bring) down the cost of setting up wind power plants.
9. Wind energy can only (use) in areas which (experience) high winds which (mean) that it cannot (use) as a source to extract energy anywhere on earth. 10. The wind power plants sometimes (create) noise disturbances and cannot (use) near residential areas. 11. Wind generally (not to blow) reliably and turbines usually (function) at about 30% capacity or so. 12. Serious storms or high winds may (cause) harm to your wind turbine, particularly when they (strike) by lightning.

Exercise 96. *Put the verbs in brackets into the Indefinite, Perfect or Continuous Tense Active or Passive voice forms.*

1. The government (set) a green tariff for power produced from

renewable sources. 2. Ukraine currently (receive) 37 applications for wind, small hydropower, and bioenergy. 3. The energy saving potential of Ukraine (determined) at almost 50% of the volumes of used fuel and energy resources. 4. In Vienna in October 2011 it (announce) the completion of the fourth and last phase of the solar-park Ohotnikovo, one of the biggest photovoltaic power plants ever realized in Central Europe and definitely the largest in Eastern Europe. 6. The greatest wind energy potential (locate) in the vast areas adjacent to the Black Sea and the Azov Sea, as well as the Carpathian, Transcarpathian and Lower Carpathian areas. 7. Ukraine (have) considerable geothermal resources that can (use) mainly for heat supply. 8. At present thermal water (use) for municipal heat supply and in agriculture in the western and central part of the Crimea. 9. Intensification of the process of modern wind power plants construction in Ukraine (start) in 2011 with construction of the Novoazovsk wind power plant in Donetsk region. 10. According to the Wind Energy Association, wind energy potential in Ukraine (estimate) at 30,000 GWh[1]. 11. Renewable energy producers (benefit) from high green tariffs, or so called feed-in tariffs, that (make) such sources more attractive financially to produce. 12. Fuhrlander Wind technology company (FWT) (build) seven wind farms in Ukraine and one more in Kazakhstan since 2010. 13. By mid-2016 the total capacity of renewable energy plants in Ukraine (reach) 1,028 MW and the power capacity (continue) to grow steadily.

1.GWh – gigawatt-hour – ГВт-ч – гігават-час

Exercise 97. *Translate into English.*

1. Ми використовуємо енергію вітру впродовж сотень років. 2. Вітряки використовувались для живлення зрошувальних та побутових енергетичних потреб, постачання води, подрібнення зерна та електричного освітлення. 3. Сьогодні сучасний еквівалент вітряного млина - вітрова турбіна - може використовувати енергію вітру, щоб генерувати електроенергію. 4. Вітроелектростанції можуть накопичувати велику кількість енергії, перш ніж передати її до електромережі. 5. Вітроенергетика не викликає забруднення атмосфери. 6. Розвиток технологій знизив вартість встановлення вітрових електростанцій. 7. Енергія вітру може використовуватися тільки в районах, де спостерігається сильний вітер, і це означає, що

його не можна використовувати як джерело для видобування енергії в будь-якому місці Землі. 8. Вітряні електростанції іноді створюють шумові перешкоди і не можуть використовуватися поблизу житлових районів. 9. Вітер, як правило, не завжди потужний і турбіни зазвичай функціонують приблизно на 30% потужності. 10. Вітрові турбіни та інше обладнання, необхідні для створення вітрової енергії, можуть бути надзвичайно вартісними.

Exercise 98. *Ask*

a) if we have been harnessing the wind's energy for hundreds of years;

if wind turbines can use the wind's energy to generate electricity;

if wind power is renewable source of energy;

if wind's energy does not cause any air pollution;

if wind's energy can be used as a source to extract energy anywhere on earth;

b) how wind farms are mostly used;

why wind power does not cause any air pollution;

why wind energy cannot be used as a source to extract energy anywhere on earth;

what has brought down the cost of setting up wind power plants;

what disadvantages have made the use of wind energy in particular regions only.

Exercise 99. *Speak on "Wind energy".*

Exercise 100. *Memorize the following words and word combinations to text 8.*

Originate – походити
decay – розпад, розкладання, гниття
inexhaustible – невичерпний
emit – випускати,викидати; випромінювати
hazardous – небезпечний
manifest – проявляти, робити очевидним
herald – оповіщати
steam – пара
erupt – вивергатися,вириватися

spread – поширювати(сь)
binary – подвійний
beneath – під, нижче
scale – масштаб
liquid – рідина
abandon – відмовлятися; залишати
well – свердловина
municipal – комунальний, муніципальний
competitiveness – конкурентоспроможність
availability – наявність; доступність
reliability – надійність
cost – вартість
extinction – вичерпування, зникнення
confine – обмежувати

Exercise 101. *Read and translate text 8. Select the key words and expressions for a five-minute conversation with your partners on topic "Geothermal Energy".*

Text 8. Geothermal Energy

The term geothermal originates from the Greek words: Geo, which means earth and Thermal, which means heat. The energy inside the earth was formed by the decay of minerals and forests several years ago. Traditionally, it was used for bathing and heating purposes but today it is also used for generating electricity. It's a renewable energy source, meaning it's inexhaustible to humans. It's also a green source of energy, meaning it does not emit greenhouse gases that are hazardous to human and environmental health. Utilizing geothermal energy to generate electricity is a considerably new industry, which manifested in 1904 in Italy. Italians first powered a turbine generator using natural steam erupting from beneath the earth. The year 1960 heralded the first successful operation of the large-scale geothermal electricity generation plant at the Geysers, North California. A lot of American geothermal power plants are spread across California, while the rest are located in Hawaii, Nevada, Utah, Idaho and Montana. Ukraine has considerable geothermal resources that can be used mainly for heat supply. There are also prospects for binary geothermal power plant creation based on existing wells at abandoned oil and gas fields. At present thermal water is

used for municipal heat supply and in agriculture in the western and central part of the Crimea.

The conversion of geothermal energy into electricity occurs through a geothermal power plant. The power plant harnesses the steam from the hot water beneath the earth's surface to turn turbines, which later activates a generator to produce electricity. Some geothermal power plants utilize steam to directly turn the turbine. Others utilize the steam to heat a liquid that is used to turn the turbine.

The future of geothermal energy depends on three factors: its demand, supply and its competitiveness among other renewable resources in terms of cost, availability, reliability etc. Demand for geothermal energy is going to increase with the increase in the population and extinction of other non-renewable sources.

Supply of geothermal energy is limited and confined to certain areas only. The entire resource of geothermal energy is fairly bigger than that of coal, oil and gas. Geothermal energy can be made more widely available if the methods and technologies used to extract it are improved.

Exercise 102. *Give English equivalents of the following word combinations.*

Розпад мінералів і рослин; вироблення електроенергії; проміжний пристрій; відновлюване джерело енергії; невичерпне джерело енергії; альтернативне джерело енергії; парникові гази; небезпечні для здоров'я людини та навколишнього середовища; використання геотермальної енергії; природна пара; з-під землі; генераторна установка з вироблення геотермальної електрики; перетворення геотермальної енергії в електричну енергію; вартість, доступність, надійність джерела енергії; попит, пропозиція та конкурентоспроможність геотермальної енергії; збільшення населення; вичерпування невідновлюваних джерел; набагато більше, ніж вугілля, нафти та газу; весь ресурс геотермальної енергії.

Exercise 103. *Fill in the gaps with the words or word combinations below and translate the sentences.*

Turbine generator, inexhaustible, green source, heat supply, environmental, decay, municipal heat supply, extinction, wells, hazardous,

geothermal electricity generation plant .

1. The energy inside the earth was formed by the … of minerals and forests several years ago. 2. Greenhouse gasses that are … to human and … health. 3. Geothermal energy is a renewable energy source, meaning it's … to humans. 4. Italians first powered a … … using natural steam 5. The year 1960 heralded the first successful operation of the large-scale … … … … at the Geysers, North California. 6. Demand for geothermal energy is going to increase with the increase in the population and … of other non-renewable sources. 7. Geothermal energy is also a … … of energy. 8. Ukraine has considerable geothermal resources that can be used mainly for … … . 9. There are also prospects for binary geothermal power plant creation based on existing … at abandoned oil and gas fields. 10. At present thermal water is used for … … … and in agriculture in the western and central part of Crimea.

Exercise 104. *Use the verbs in brackets in the correct tense and voice forms.*

1. The term geothermal (originate) from the Greek words: Geo, which (mean) earth and Thermal, which (mean) heat.2. The energy inside the earth (not emit) greenhouse gasses that are hazardous to human and environmental health 3. The conversion of geothermal energy into electricity (occur) through a geothermal power plant. 4. The power plant (harness) the steam from the hot water beneath the earth's surface. 5. Some geothermal power plants (utilize) steam to directly turn the turbine. 6. Utilizing geothermal energy to generate electricity (be) a considerably new industry, which (manifest) in 1904 in Italy. 7. Geothermal energy can (make) more widely available if the methods and technologies (improve). 8. Natural steam (erupt) from beneath the earth. 9. The power plant (activate) a generator to produce electricity.

Exercise 105. *Say whether the following statements are true or false. Correct the false ones using the following expressions.*

I don't agree with this statement.
I disagree with this.
I am afraid I can't agree with you here.
I see your point, but … .
I am afraid (I think) you are mistaken.
On the contrary...

Nothing of the kind, I am afraid.

I am sure, that ...

1. Geothermal energy is also a green source of energy, meaning it emits greenhouse gasses that are hazardous to human and environmental health. 2. Ukraine has considerable geothermal resources that can be used mainly for heat supply. 3. At present thermal water is used for industrial heat supply in the western and central part of the Crimea. 4. Some geothermal power plants utilize steam to directly turn the turbine. 5. Demand for geothermal energy is going to decrease with the increase in the population and extinction of other non-renewable sources. 6. Today geothermal energy is not used for generating electricity. 7. The entire resource of geothermal energy is fairly bigger than that of coal, oil and gas.

Exercise 105. *Write a summary of text 8.*

Exercise 106. *Speak on "Geothermal energy".*

Exercise 107. *Memorize the following words and word combinations to text 9.*

Hydropower – гідроенергетика
mill –молоти, подрібнювати
milling – млин
dam – дамба, гребля
shaft – вал
similar – подібний, схожий
wheel – колесо
penstock – жолоб, шлюз
conductor – провідник
shaf– вал; пропускати, направляти
output – потужність; продуктивність
sophisticated – складний
wind (wound) – намотувати
suspend – підвішувати
trigger – запускати (процес)
circulate – циркулювати, бути в обігу
field – поле (електричне)
pole – полюс

boundary – границя, межа
spin – обертатися
speed – швідкисть
result – призводити
terminal – клема

Exercise 108. *Read, translate and give the gist of text 9.*

Text 9. Hydropower

Hydropower is simply the process of harnessing the kinetic energy from moving water to produce power. Hydropower is classified as a renewable energy due to the fact that the water cycle is continually renewed by the sun. Hydropower was first used in mechanical millings like grinding grain. In the modern world hydropower plants utilize turbines and generators to produce electricity.

For power to be generated, three things must be present: flowing water, a turbine and a generator. Flowing water from the dam or upstream river strikes the turbine, which causes it to turn. The turbine is connected to the generator through a shaft. So, when the turbine turns, the shaft also turns causing the generator to start running, eventually, producing power.

The principle of hydroelectric power is similar to that of wind energy which turns the wheels of the turbine by its energy. Hydroelectric power uses the natural flow of water to give mechanical energy to turbines to produce electricity. The water flows continuously to provide energy. Gravitational energy gives water kinetic energy required for the flow.

In normal cases the ordinary flow of water is enough for its working like for home electricity; but in other cases its flow and efficiency has to be increased which can be done by shafting of water along channels and penstocks which would increase the output.

The operation of a generator is sophisticated. It operates on a principle that when a magnet is pushed through a conductor it triggers electricity to flow. In a large scale generator electromagnets are developed by simply circulating DC (direct current) through wires, wound

and suspended between magnets and known as field poles. These field poles are placed upon the boundary of the rotor. The rotor is normally connected to the turbine shaft and spins at a set speed. As the rotor spins, it triggers the field poles, also known as the electromagnets, to go beyond the conductors placed in the stator. This, eventually, results in flow of electricity. It also results in voltage generation at the output terminals of the generator.

Exercise 109. *Find English equivalents in text 9. It will help you to translate the text.*

Використання кінетичної енергії; цикл руху води; механічне подрібнення; подрібнення зерна; гідроелектростанція; обертати колесо турбіни; природний потік води; механічна енергія; вода, що тече з дамби; підключений до генератора через вал; подібний до енергії вітру; спричиняти запуск генератора і вироблення енергії; обертати колесо турбіни; надавати механічну енергію; забезпечувати енергію; гравітаційна енергія; направлення маси води по каналах і шлюзах; робота генератора; проштовхувати через провідник; електромагніт великогабаритного генератора; проходження постійного струму по дротах; намотані та підвішені між магнітами; відомі як полюси електричного поля; вихідні клеми генератора.

Exercise 110. *Write out of the text 20 words that can function both as nouns and verbs.*

Exercise 111. *Fill in the gaps with the words given in brackets below and translate the sentences.*

Gravitational energy, turbine shaft, channels and penstocks, field poles, mechanical energy, harnessing the kinetic energy, boundary, turbines and generators, electromagnets.

1. Hydropower is simply the process of … … … from moving water to produce power. 2. In the modern world hydropower plants utilize … … … to produce electricity. 3. The rotor is normally connected to the … … and spins at a set speed. 4. Hydroelectric power uses the natural flow of water to give … … to turbines to produce electricity.

5. … … gives water kinetic energy required for the flow.6. Shafting of water along … … … would increase the output. 7. In a large scale generator … are developed by simply circulating DC (direct current) through wires. 8. The … … are also known as the electromagnets. 9. The field poles are placed upon the … of the rotor.

Exercise 112. *Rewrite the following sentences in the Past Simple and Present Perfect. Add appropriate adverbial modifiers.*

Model: The system operates … .
The system operated … before.
The system has operated … for 2 years now.

1. In the modern world hydropower plants utilize turbines and generators to produce electricity.
2. The running generator produces power.
3. Hydroelectric power uses the natural flow of water to produce electricity.
4. Flowing water from the dam or upstream river causes the turbine to turn.
5. The natural flow of water gives mechanical energy to turbines.
6. Magnet triggers electricity to flow.
7. The turbine causes the generator to start running .

Exercise 113. *Put the verbs in brackets into the correct tense and voice forms.*

1. Hydropower (classify) as a renewable energy due to the fact that the water cycle continually (renew) by the sun. 2. Hydropower first (use) in mechanical millings like grinding grain. 3. In the modern world hydropower plants (utilize) turbines and generators to produce electricity. 4. The turbine (connect) to the generator through a shaft. 5. When the turbine (turn), the shaft also (turn) causing the generator to start running, eventually, producing power. 6. When a magnet (push) through a conductor it triggers electricity to flow. 7. In a large scale generator electromagnets (develop) by simply circulating DC (direct current) through

wires. 8. These field poles (place) upon the boundary of the rotor. 9. The rotor normally (connect) to the turbine shaft and (spin) at a set speed. 10. The field poles also (know) as the electromagnets.

Exercise 114. *Translate into English.*

1. Гідроенергія - це процес використання кінетичної енергії руху води для вироблення електричної енергії. 2. Гідроенергетика є відновлюваною енергетикою через те, що завдяки сонцю постійно відбувається циклічність руху води. 3. Для того, щоб генерувати енергію, необхідні три складові: течія води, турбіна та генератор. 4. Вода з дамби або верхньої течії річки змушує турбіну обертатись. 5. Турбіна, з'єднана з генератором, через вал, обертаючись, змушує генератор працювати, і, зрештою, виробляти електроенергію. 6. Гідроелектростанція використовує природний потік води, щоб забезпечити турбіну механічною енергією для виробництва електроенергії.7. Гравітаційна енергія забезпечує кинетичну енергію води. 8. Генератор діє за таким принципом: коли магніт проходить через провідник, це спричиняє генерацію електроенергії. 9. Зазвичай ротор з'єднується з валом турбіни та обертається із встановленою швидкістю. 10. Коли ротор обертається, він запускає полюсні поля, відомі як електромагніти, що приводить до генерації напруги на вихідних клемниках генератора.

Exercise 115. *Answer the questions on text 9.*

1. What is hydropower? 2. Why is hydropower classified as a renewable energy? 3. What is necessary for power to be generated? 4.What gives water its kinetic energy? 5. In what way can water and efficiency be increased? 6. What do hydropower plants utilize to produce electricity? 7. How does the turbine operate? 8. What principle does a generator operate on? 9. What are field poles? 10. Where are field poles placed? 11. What is the function of field poles? 12. What results in voltage generation at the output terminals of the generator?

Exercise 116. *Speak on "Hydropower".*

UNIT II. ENERGY SAVING AND CONSERVATION

Exercise 1. *Memorize the basic vocabulary to text 1.*

Value – цінність; важливість; корисність
national security – національна безпека
direct consumer – прямий споживач
energy costs – витрати на енергію
sustainable – *(екологічно)* стійкій
sustainability – стійкість; стійкий розвиток
profit – прибуток
energy policy – енергетична політика

flexibility – гнучкість
replace – замінювати
solution – вирішення *(проблеми)*
energy shortage – дефіцит енергії
energy efficiency – енергоефективність
insulate – 1. захищати *(від втрати енергії)* 2.ізолювати
achieve – добиватися, досягати
maintain – підтримувати, зберігати
LED lighting – світлодіодне освітлення
fluorescent lighting – люмінесцентне освітлення
attain – досягати
incandescent light bulb – лампа розжарювання
adopt – приймати
energy loss – втрата енергії
cost saving – зниження собівартості
offset – компенсувати; відшкодовувати
implement – 1.виконувати, здійснювати 2. забезпечувати
greenhouse gas emission – викид парникових газів
International Energy Agency – Міжнародне енергетичне агентство
subsidy – субсидія; дотація
pillar – стовп, опора
promote – сприяти; підтримувати
benefit – вигода; користь; прибуток
hierarchy – ієрархія
rate – темп
deplete – виснажувати, вичерпувати
fuzzy – невизначений; розпливчастий

force – форсувати; примушувати

Exercise 2. *Read, translate and give the gist of text 1.*

Text 1. Energy Conservation and Efficiency

Energy conservation is a process used to reduce the amount of energy that is used for different purposes. This practice may result in increase of financial capital, environmental value, national and personal security, and human comfort. Individuals and organizations that are direct consumers of energy may want to conserve energy in order to reduce energy costs and promote economic, political and environmental sustainability. Industrial and commercial users may want to increase efficiency and thus maximize profit.

On a larger scale, energy conservation is an important element of energy policy. In general, energy conservation reduces the energy consumption and energy demand per capita. This reduces the rise in energy costs, and can reduce the need for new power plants, and energy imports. The reduced energy demand can provide more flexibility in choosing the most preferred methods of energy production.

By reducing emissions, energy conservation is an important method to prevent climate change. Energy conservation makes it easier to replace non-renewable resources with renewable energy and is often the most economical solution to energy shortages.

Efficient energy use, sometimes simply called energy efficiency, is the goal to reduce the amount of energy required to provide products and services. For example, insulating a home allows a building to use less heating and cooling energy to achieve and maintain a comfortable temperature. Installing LED lighting, fluorescent lighting, or natural skylight windows reduces the amount of energy required to attain the same level of illumination compared to using traditional incandescent light bulbs. Improvements in energy efficiency are generally achieved by adopting a more efficient technology or production process or by application of commonly accepted methods to reduce energy losses.

There are many motivations to improve energy efficiency. Reducing energy use reduces energy costs and may result in a financial cost saving to consumers if the energy savings offset any additional

costs of implementing an energy efficient technology. Reducing energy use is also seen as a solution to the problem of reducing greenhouse gas emissions. According to the International Energy Agency, improved energy efficiency in buildings, industrial processes and transportation could reduce the world's energy needs in 2050 by one third, and help control global emissions of greenhouse gases. Another important solution is to remove government-led energy subsidies that promote high energy consumption and inefficient energy use in more than half of the countries in the world.

Energy efficiency and renewable energy are said to be the twin pillars of sustainable energy policy and are high priorities in the sustainable energy hierarchy. In many countries energy efficiency is also seen to have a national security benefit because it can be used to reduce the level of energy imports from foreign countries and may slow down the rate at which domestic energy resources are depleted.

As with other definitions, the boundary between efficient energy use and energy conservation can be fuzzy, but both are important in environmental and economic terms. This is especially the case when actions are directed at the saving of fossil fuels.

Exercise 3. *Give Ukrainian equivalents of the following word combinations.*

a) energy conservation , direct consumer, energy costs, environmental sustainability, industrial and commercial users, energy consumption, energy demand, energy import, energy production, economical solution, energy shortage, energy efficiency, fluorescent lighting, incandescent light bulb, cost saving, energy subsidy, inefficient energy use, sustainable energy policy, high priorities, sustainable energy hierarchy, national security benefit, greenhouse gas emissions;

b) to reduce the amount of energy, to conserve energy, to cut energy costs, to promote economic sustainability, to increase energy efficiency, to maximize profit, to reduce energy demand per capita, to provide flexibility, to prevent climate change, to replace non-renewable resources with renewable energy, to find solution to energy shortage, to provide products and services, to use less heating, to achieve and maintain a comfortable temperature, to install LED lighting, to adopt efficient technology, to apply innovative methods, to result in a financial

cost saving, to offset additional costs, to implement energy efficient technology, to control greenhouse gas emissions, to remove government-led energy subsidies, to promote high energy consumption, to avoid inefficient energy use, to be the twin pillars of sustainable energy policy, to slow down the rate of energy resources depletion, to save fossil fuels.

Exercise 4. *Find English equivalents of the following word combinations in text 1.*

а) енергозбереження, прямий споживач, витрати на енергію, енергетична політика, попит на електроенергію, дефіцит енергії, енергоефективність, енергоспоживання, світлодіодне освітлення, втрата енергії, зниження собівартості, викид парникових газів, державні субсидії, національна безпека;

б) зменшувати кількість енергії; підвищити екологічну цінність; зменшити енерговитрати; сприяти стійкому економічному, політичному та екологічному розвитку; максимізувати прибуток; забезпечити гнучкість у виборі найбільш ефективних методів виробництва енергії; запобігати зміні клімату; замінити невідновлювані ресурси відновлюваною енергією; встановлювати люмінесцентне освітлення, використовувати менше опалення; підтримувати комфортну температуру; поліпшувати енергоефективність ; призводити до заощадження коштів споживачів; відшкодовувати додаткові витрати на впровадження енергоефективних технологій; контролювати викиди парникових газів; забезпечувати стійку енергетичну політику; виснажувати внутрішні енергетичні ресурси; бути спрямованим на економію викопного палива.

Exercise 5. *Fill in the blanks with the terms below. Translate the sentences.*

Energy efficiency, direct consumers, energy conservation , energy costs, energy consumption, energy demand, sustainability, greenhouse gas emissions, renewable energy, efficient energy use, non-renewable resources, sustainable energy policy, cost saving, energy shortages

1. … is using technology that requires less energy to perform

the same function. 2. … is any behavior that results in the use of less energy. 3. Individuals and organizations that are … of energy may want to conserve energy in order to reduce … and promote economic, political and environmental … . 4. Energy conservation reduces the … and … per capita. 5. Energy conservation makes it easier to replace … with … and is often the most economical solution to … . 6… is sometimes simply called energy efficiency. 7. Reducing energy use reduces energy costs and may result in a financial … to consumers and is also seen as a solution to the environmental problem of reducing … . 8. Energy efficiency and renewable energy are said to be the twin pillars of ….

Exercise 6. *Write out of text 1words that can function both as nouns and verbs.*

Exercise 7. *Complete the following sentences and translate them.*

1. Energy conservation is a process used to… . 2.The practice of energy conservation may result in … . 3. On a larger scale, energy conservation is … . 4. By reducing emissions, energy conservation is an important method to … . 5. Efficient energy use is the goal to reduce the amount of energy required to … . 6. Fluorescent lighting, or natural skylight windows reduce the amount of energy required to … .
7. Improvements in energy efficiency are generally achieved by … .
8. Another important solution to improve energy efficiency is to … .
9. Energy efficiency and renewable energy are said to be … . 10. Both energy conservation and energy efficiency are directed at … .

Exercise 8. *Answer the questions on text 1.*

1. What is energy conservation and what purposes is it used for? 2. Why may direct energy consumers be interested in conserving energy? 3. Why is energy conservation an important element of energy policy? 4. What can the reduced energy demand provide for industrial and commercial users? 5. How important is energy conservation in terms of preventing climate changes? 6. What is another term for efficient energy use? 7. What is energy efficiency aimed at? 8. How can individual energy consumers make their buildings more energy efficient? 9. What are improvements in energy efficiency generally achieved by? 10. How is reducing energy related to the problem of reducing greenhouse

gas emissions? 11. Why are government-led energy subsidies considered to be undesirable when it comes to energy saving? 12. What is said to be the twin pillars of sustainable energy policy? 13. Why is energy efficiency seen to have a national security benefit in many countries? 14. What is the difference between efficient energy use and energy conservation?

Exercise 9. Decode the following abbreviations with the help of a dictionary.

AC, CCT, DC, GHG, IAEA, IEA, LNG, OECD, RAPS, WTO, REEF.

Exercise 10. *Translate the following sentences using the words in brackets in the correct tense and voice forms.*

1. DC This power plant (commission) last year. 2. Energy companies must (comply with) all rules and regulations. 3. Steam (condense) into water at the power station. 4. DC (convert) into AC if necessary. 5. Some plants (decommission) as they were not economic. 6. Coal stocks (deplete) due to a rise in consumption. 7. Unwanted activities (disinvest) next year. 8. A nuclear plant can (dismantle) at the end of its life. 9. Some companies (dispose of) waste by burning it. 10. Gas (distribute) throughout Europe from fields in the North Sea. 11. Many harmful gases (emit) from power stations. 12. Emissions must not (exceed) certain levels. 13. Wholesale prices (fluctuate) over the past year. 14. Electricity (generate) at domestic power stations. 15. Many employees (lay off) after the takeover.

Exercise 11. *Put questions on the italicized words.*

1. *The consumption of energy* is reduced *by using less of an energy service*. 2. *Energy conservation* is achieved either *by using energy more efficiently or by reducing the amount of service used*. 3. *Energy conservation* reduces *the need for energy services* and can result in *increased environmental quality*. 4. *Energy saving* lowers energy costs *by preventing future resource depletion*. 5. *Energy* can be conserved by *reducing wastage and losses, improving efficiency through technological upgrades*. 6. *Passive solar design techniques* can be applied most easily to *new buildings*. 7. In *solar building* design, windows, walls, and floors are made *to collect, store, and distribute solar energy in the form of heat*. 8. *Building technologies and smart meters* can allow energy

users *to visualize the impact of their energy use*.

Exercise 12. *Translate the following sentences into English.*

1. Енергозбереження стосується зменшення споживання енергії за рахунок використання меншої кількості енергетичних послуг. 2. Енергозбереження відрізняється від енергоефективності, яка стосується використання меншої кількості енергії за ту саму послугу. 3. Як енергозбереження, так і енергоефективність є технологіями зменшення використання енергії. 4. Енергозбереження зменшує споживання енергетичних послуг та призводить до покращення якості довкілля, національної та особистої фінансової безпеки. 5. Енергозбереження домінує у сталій енергетичній ієрархії. 6. Для заохочення споживачів зменшувати споживання енергії деякі країни запровадили енергетичні податки, які можуть спричиняти заміну споживання енергії з викопного палива на атомну енергетику та інші альтернативні джерела, що має позитивні наслідки впливу на довкілля. 7. В 2010 році була прийнята Енергетична стратегія ЄС на період до 2020 року, яка спрямована на зменшення викидів парникових газів, збільшення частки відновлювальної енергії у кінцевому енергоспоживанні, досягнення зростання енергоефективності на 20%.

Exercise 13 . *Memorize the basic vocabulary to text 2.*

Relate – відноситися
distinct – виразний, чіткий
adjust – пристосовуватися
thermostat – термостат
hub – *(мережевий)* концентратор; *проф.* хаб
eco-sufficiency – екологічна достатність
wastage – втрата
upgrade – 1.вдосконалення, модернізація 2.вдосконалювати
array – сукупність
shift *(to)* – змінювати(ся); переміщати(ся); переходити *(на щось інше)*
consequence – наслідок
energy input – енергія, що споживається

energy output – вихід енергії, енергія, що виділяється
smart meter – розумний лічильник; лічильник з мікро процесором
app – додаток
enable – надавати можливість
homeowner – домовласник
residential – житловий
energy metering – вимірювання енергії
passive solar building design – конструкція будинку з вико ристанням сонячній енергії
solar heating system – система опалення, що працює на сонячній енергії
take advantage *(of)* – використовувати у своїх інтересах
suburban – приміський
access – доступ
telecommuting – дистанційна робота
commute – їздити на роботу *(транспортом)*
consumer products – споживчі товари
upfront cost – попередня ціна
lifespan – термін експлуатації
save – економити
go hand in hand – бути тісно пов'язаним; відбуватися сукупно, разом
intermediary – посередницький
publicly funded program – державна фінансова програма
opt *(for smth /to do smth)* – віддавати перевагу *(чомусь)*
retrofit – 1. модифікація 2. модифікувати *(модель)*

Exercise 14. *Read, translate and give the gist of text 2.*

Text 2. Increasing Energy Conservation

Although energy conservation and efficiency may be related, they have distinct definitions in the energy world. Energy conservation involves using less energy by adjusting behaviors and habits, while energy efficiency involves using technology that requires less energy to perform the same function. Energy saving light bulbs, large household

appliances, smart thermostats and smart home hubs are all examples of technology that can be efficient.

Energy conservation can be achieved either by using energy more efficiently, for example, using less energy for a constant service or by reducing the amount of a service used. It is a part of the concept of eco-sufficiency and is at the top of the sustainable energy hierarchy. Energy can be conserved by reducing wastage and losses, improving efficiency through technological upgrades and improved operation and maintenance.

Some countries employ energy taxes to motivate energy users to reduce their consumption. Such measures can force consumption to shift to nuclear power and other energy sources reducing an array of negative environmental consequences.

One of the primary ways to improve energy conservation in buildings is to perform an energy audit, which is an inspection and analysis of energy use and flows for energy conservation in a building, process or system with an eye[1] toward reducing energy input without negatively affecting output. This is normally accomplished by trained professionals and can be part of some of the national programs. Recent development of smart phone apps enables homeowners to complete relatively sophisticated energy audits themselves. Building technologies and smart meters can allow energy users, both commercial and residential, to visualize the impact their energy use can have in their workplace or homes. Advanced real-time energy metering can help people save energy by their actions.

In passive solar building design, windows, walls, and floors are made to collect, store, and distribute solar energy in the form of heat in winter and reject solar heat in summer. This is called passive solar design or climatic design because, unlike active solar heating systems, it does not involve the use of mechanical and electrical devices. The key to designing a passive solar building is to best take advantage of the local climate.

In many countries suburban infrastructure evolved during an age of relatively easy access to fossil fuels, which has led to transportation-dependent systems of living. Urban designs for walking and bicycling can greatly reduce energy consumed for transportation. The use of telecommuting by major corporations is a significant opportunity to conserve energy, as many people now work in service jobs that enable

them to work from home instead of commuting to work each day.

Another important issue for energy conservation is consumer products and appliances. Unfortunately, consumers are often poorly informed of the savings of energy efficient products. A prominent example of this is the energy savings that can be made by replacing an incandescent light bulb with a more modern alternative. Although these energy-efficient alternatives have a higher upfront cost, their long lifespan and low energy use can save consumers a considerable amount of money. So, energy conservation requires large investments of money, time and effort to inform and support people as well as[2] link to their topical concerns

Energy conservation is a challenge requiring policy programs, technological development and behavior change to go hand in hand. Many energy intermediary organizations, for example governmental or non-governmental organizations on local, regional, or national level, are working on often publicly funded programs or projects to meet this challenge.

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1. with an eye *(toward)* – з метою
2. as well as – а також

Exercise 15. *Translate word combinations with the term* ***energy.*** *Look up a dictionary if necessary.*

Energy audit, energy balance, energy barrier, energy budget, energy capacity, energy certificate, energy change, energy charge, energy concentrator, energy conservation vehicle, energy consumption, energy content, energy conversion efficiency, energy degradation, energy demand, energy department, energy dependence, energy distribution, energy duplication, energy efficiency ratio, energy exchange, energy generation, energy industries, energy input, energy level, energy loss, energy needs, energy output, energy product, energy release, energy resources, energy saving, energy spread, energy storage, energy supply, energy value, energy yield.

Exercise 16. *Give Ukrainian equivalents of the following word combinations.*

To have distinct definition; to adjust behavior and habit; to be conserved by reducing wastage and losses; to improve efficiency

through technological upgrade; to employ energy taxes; to motivate energy users; to shift to nuclear power; to reduce negative environmental consequences; to perform energy audit; to affect energy output; to be accomplished by trained professionals; to complete sophisticated energy audit; to visualize energy impact; to collect, store, and distribute solar energy; to take advantage of local climate; to commute to work; to be poorly informed of the savings of energy efficient products; to replace an incandescent light bulb with a modern alternative; to have a higher upfront cost; to save consumers a considerable amount of money; to require large investments of money, time and effort; to go hand in hand; to work on a publicly funded program; to meet a challenge.

Exercise 17.*Give English equivalents of the following word combinations.*

Бути взаємопов'язаними; мати чітке визначення; зменшити споживання енергії за рахунок використання меншої кількості енергетичних послуг; домінувати у сталій енергетичній ієрархії; заохочувати споживачів; запровадити енергетичні податки; спричинити перехід зі споживання енергії з викопного палива на атомну енергетику; обмежити наслідки впливу на довкілля; проводити енергетичний аудит; здійснюватися кваліфікованим персоналом; бути частиною національної програми; нещодавні розробки додатків до смартфонів; надавати змогу власникам житла самостійно проводити відносно складні енергоаудити; будівельні технології; розумні лічильники; конструкція будинку з використанням сонячній енергії; проектуватися з метою збору, зберігання та розподілу сонячної енергії; використовувати механічні або електричні прилади; враховувати особливості місцевого клімату; залежати від транспортної мережі; використання систем віддаленого доступу для роботи; їздити на роботу транспортом, термін експлуатації продукту, посередницька організація, державна фінансова програма; супроводжуватися технологічними змінами.

Exercise 18. *Say whether the following statements are true or false. Correct the false ones.*

1. Energy conservation and efficiency are interrelated and do

not have distinct definitions. 2. Energy efficiency involves using less energy by adjusting behaviors and habits. 3. Some countries employ energy taxes to force consumption to shift to nuclear power. 4. Passive solar design techniques can be applied most easily to new buildings, but existing buildings can be retrofitted. 5. The use of telecommuting by major corporations is a significant opportunity to conserve energy. 6. Consumers are usually well-informed of the savings of energy efficient products. 7. Energy conservation programmes do not require large investments of money. 8. Passive solar designs involve the use of mechanical and electrical devices. 9. Energy efficient appliances have a higher cost but long lifespan.

Exercise 19. *Give definitions of the following terms.*

Energy conservation, energy efficiency, energy taxes, energy audit, energy output, energy input, eco-design, energy-efficient technology, telecommuting, green programmes.

Exercise 20.*Chose the right word in brackets to complete the sentences about energy saving.*

1. You can (*win/save)* on average 60$ per year by using (*small /low)* energy light bulbs. 2. Most large appliances like washing machines come with an energy efficiency (*mark/rating)* from A to G. 3. You can waste a lot of energy by leaving your television on (*standby/back-up)*. 4. Always remember to (*extinguish/switch off*) the light when you leave the room. 5. Another way to reduce your electricity bill is to (*switch/turn down)* the thermostat on your radiators. 6. Never (*load/fill)* your kettle with more water than you need. 7. Never (*let/leave)* an iron on when you are not using it. 8. Tumble driers have very high energy (*consumer/consumption)*.

Exercise 21. *Answer the questions on text 2.*

1. How are energy conservation and efficiency related to each other? 2. What are the examples of energy efficient technologies? 3. Can energy conservation be achieved by using less energy for a constant service or by reducing the amount of a service used? 4. What taxes do some countries employ to motivate energy users to reduce energy consumption? 5. How beneficial is energy audit to homeowners? 6. Who is energy audit normally accomplished by? 7. What technologies allow

energy users to visualize the impact their energy use can have in workplace or homes? 8. How advantageous is passive solar building design in terms of energy saving? 9. Why is telecommuting a good solution to energy saving? 10. Why does energy conservation require large investments of money, time and effort? 11. What do governmental or non-governmental organizations do to meet the challenge of energy conservation?

Exercise 22. *Translate the following verbs with the help of a dictionary: to liberalize, to merge, to monitor, to operate, to phase out, to pollute, to procure, to regulate, to reprocess, to retrofit, to subsidize, to supply, to switch, to transmit. Use the words in brackets in the appropriate tense and voice form to fit in the sentences.*

1. Customer can choose their supplier as the energy market (liberalize). 2. Two unities (merge) to form a new company. 3. Image of the energy sector (monitor) by the government. 4. The transmission systems operator (operate) the transmission grid. 5. Some countries wish (phase out) nuclear power. 6. Generators that (pollute) too much must (buy) credits or allowances. 7. Our company (procure) large quantities of gas. 8. Some countries (regulate) the energy market through price control. 9. Nuclear waste (reprocess) before final storage. 10. Our older plants (retrofit) to bring them up to standard. 11. The coal industry (subsidize) through state support. 12. We (supply) gas to a number of different companies. 13. Many residential customers (switch) suppliers because of high prices. 14. Electricity (transmit) through the grid.

Exercise 23. *Ask questions on the missing words.*

1. Energy conservation involves… 2. Cost saving can be achieved by … . 3. Energy efficiency involves using technologies that require … . 4. Energy is conserved by … . 5. Some countries employ … . 6. Tax measures can force … . 7. One of the primary ways to improve energy conservation in buildings is … . 8. Energy audit is normally accomplished by … . 9. Smart meters allow energy users … .10. In passive solar building design, windows, walls, and floors collect, store and distribute solar energy in … . 11. Urban designs for walking and bicycling greatly reduce … . 12. Consumers are often poorly informed of … .

Exercise 24 .*Put a tag question at the end of each sentence.*

1. Conserving energy helps the planet and saves money, … ? 2. We can reduce energy bills and generate our own clean energy by installing solar panels, … ? 3. A solar photovoltaic system doesn't replace all of your household electricity, … ? 4. A solar system only generates electricity during daylight hours, … ? 5. Installing energy efficient systems gives us significant savings, … ? 6. When purchasing light bulbs, many consumers don't take into account their higher energy consumption, … ? 7. Energy-efficient alternatives have a higher upfront cost, … ? 8. In cold climates, heating air and water is a major demand on household energy use, … ? 9. Significant energy reductions are possible by using different technologies, … ? 10. A solar system doesn't generate electricity at night, …?

Exercise 25. *Put subject questions on each sentence.*

1. Passive solar building design takes advantage of the local climate. 2. Many energy intermediary organizations work on publicly funded programs. 3. Low-power version of efficient device gives off less heat for air conditioning. 4. Urban designs for walking and bicycling reduce energy consumed for transportation. 5. Energy audit is normally accomplished by trained professionals. 6. Recently developed smartphone apps are useful to homeowners in completing sophisticated energy audits. 7. Taxes on all energy consumption can reduce energy use across the country. 8. Consumers should be better informed of the savings of energy efficient products.

Exercise 26. *Put questions on the italicized words.*

1. Some countries employ *energy* taxes to motivate energy users *to reduce their consumption.* 2. *Carbon taxes* can force *consumption* to shift *to nuclear power*. 3. *Significant* energy reductions are possible by *using different technologies.* 4. One of the primary ways to improve *energy conservation in buildings* is *to perform an energy audit*. 5. *LED lamps* use at least *75% less* energy, and last *25 times longer*, than traditional incandescent light bulbs. 6. *Consumers* are often poorly informed of *the savings of energy efficient products*. 7. *Many consumers* opt for *cheap incandescent bulbs*, failing to take into account their *higher energy costs* and *lower lifespan*. 8. *Advanced real-time energy metering*

helps people *save energy by their actions*. 9. In *cold* climates, *heating air and water* is a major demand on *household energy use*.

Exercise 27 . *Translate the following sentences into English.*

1. Для заохочення споживачів зменшити споживання енергії деякі країни запровадили енергетичні податки. 2. Енергоаудит – це інспекція та аналіз використання енергії та можливостей для енергозбереження у будинку, процесі чи системі для зменшення використання енергії системою без негативного впливу на результат її роботи. 3. У конструкції будинку з використанням сонячної енергії, вікна, стіни та підлога проектуються з метою накопичувати, зберігати та розподіляти сонячну енергію у формі тепла взимку та відштовхувати сонячне тепло влітку. 4. Конструкція будинку з використанням сонячної енергії або кліматична конструкція, на відміну від активної системи сонячного обігріву, не передбачає використання механічних або електричних приладів. 5. В багатьох країнах географічний та економічний розвиток призвів до розвитку життєво важливих систем, залежних від транспортної мережі. 6. На сьогодні в розвинених країнах вживаються заходи із зонування міст з одночасним створенням в таких зонах мережі пішохідних та велосипедних доріжок для зменшення використання автотранспорту. 7. Джерелом енергозбереження у транспорті є використання системи віддаленого доступу для роботи, яка дає змогу працювати вдома замість необхідності щодня їздити на роботу.

Exercise 28. *Translate and memorize the following phrases to express your ideas.*

Giving opinions
I think/feel/believe…
In my opinion…
It seems to me that …
As I see it …
For me, …
I don't think …
I have mixed feelings about it

Generalisations
On the whole, …
Generally speaking, …
By and large, …
I feel sure that …

Giving examples
A good example is…
Take …, for example …

I doubt whether …
I'm certain that …
I'm in two minds about it
I'm afraid I have no idea
I feel sure that …

… is a case in point
In places such as …
For instance, …

Exercise 29. *Comment upon the following questions using the phrases from exercise 27.*

1. What does our government do to help people save energy in the home?
2. Are there programmes to develop eco-homes or energy-efficient homes?
3. What business opportunities can you see for energy service companies in today's world, where sustainability and environmental protection are increasingly important?

Exercise 30. *Read, translate and give the gist of text 3.*

Text 3. Energy Efficiency

Meeting energy demand over the next century will require not just producing more, but also using what we do produce more efficiently while supplying consumers with affordable energy to allow them to maintain a comfortable standard of living. New technologies and new cultural habits will be needed. Electricity generated in the distant areas must be carried efficiently to houses and businesses. Doing so remains difficult, since a large portion of useable electricity is lost to heat as it travels long distances through wires and cables. By improving efficiency, less total energy will be needed to power everything we use. Accordingly, scientists and engineers are working to streamline the electricity grid, modernizing transmission cables with new materials that allow electrons to move more easily, producing less waste.

Another energy-saving efficiency can be found in hybrid cars. These cars capture a portion of the energy traditionally wasted as heat from friction between the tires and brakes. When the brakes on a car slow the rotating wheels—the energy used to move the wheel is converted into heat. In hybrid cars, this contact recycles some of that wasted energy into electricity that can then offset some of the gasoline used in

the car's engine.

Becoming more energy efficient will also require us to change the ways in which our buildings are made, how we heat our homes, and how we light our classrooms. For example, when coal is burned in a power plant, the energy released is used to superheat water, just as you would boil a pot of water on your stove. The process creates very hot and high-pressure steam that then pushes a propeller. The spinning motion of this propeller turns a large magnet that generates an electrical current that is then transmitted to your home. But that steam at the power plant is still very hot after it has been used to create electricity. Rather than letting this heat escape as wasted energy, it is possible to send the steam out to homes and buildings to provide warmth on cold winter days. This process, called "combined heat and power," will require us to rethink the ways in which we live and work, making our cities and buildings more connected.

Energy efficiency is also being explored in other areas as well[1]. By redesigning our homes and buildings, the energy from the sun could be captured to heat rooms or the water we use in our showers and kitchens. We can use less energy by making even the simplest things more efficient—from our light bulbs to our cars, from our home air conditioners to our computers. Engineers will continue to be on the forefront of such innovation, helping to reduce our reliance on fossil fuels and impact on the environment.

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1. as well – також

Exercise 31 . *Answer the questions on text 3.*

1. What is required to meet energy demand over the next century to maintain a comfortable standard of living? 2. What improvements are scientists and engineers currently working on to ensure greater efficiency? 3. Why are hybrid cars regarded as another energy-saving efficiency solution? 4. How can energy efficiency be applied to our buildings? 5. What process is called "combined heat and power"? 5. How are buildings designed to be a part of increasing energy efficiency? 6. In what ways can we use less energy at home?

Exercise 32. *Discuss in groups what can be done to improve the energy efficiency of a typical house. Think about the following:*

• the walls • the roof • the windows • the doors • the central heating system • the hot water system • lighting • electrical appliances –washing machines, dishwasher, TV, cooker, computer • the electricity supplied to the property.

Exercise 33. *Memorize the following terms.*

disposable– одноразового використання
idling – режим малого газу; холостого ходу
setting – 1. режим 2. установка
tune – налагоджувати
gasket – прокладка, сальник
seal – 1. щільно закривати 2. герметизувати
car pool – об'єднуватися для спільного почергового користування легковими автомобілями
faucet – водопровідний кран
drip – капати
mileage – пробіг автомобіля *(у милях)* на одиницю витрати пального

Exercise 34. *Distribute the recommendations below in the following columns to describe easy ways to conserve energy.*

Saving Energy at Home	Saving Energy on the Road	Saving Energy as You Shop

Buy minimally packaged goods. Clean or replace air filters as recommended. Pace your driving. Adjust heating and cooling controls to reduce overheating or overcooling and use natural ventilation more effectively. Choose reusable products over disposable ones, and recycle. Keep the air flow by keeping air vents open. Keep your tires properly inflated. Use fans to cool off. Install a programmable thermostat. Avoid lengthy engine idling. Turn down your water heater thermostat. Run your dishwasher when it is full and use the energy-saving setting, if available, to allow the dishes to air dry. Have your car tuned regularly. Check the gaskets around your refrigerator/freezer doors to make sure

they are clean and tightly sealed. Avoid abrupt starts. Buy local food to reduce the need for the food to be transported a great distance. Whenever possible, walk, bike, car pool, or use mass transit. Use less hot water by installing low-flow showerheads. Fix any faucets that drip. Replace light bulbs with compact fluorescent lights. Buy local fresh fruit and vegetables in season, which will reduce the amount of produce grown in energy-intensive greenhouse conditions Turn off lights, TVs, and computers when they are not being used. When you buy a car, choose one that gets good mileage. When purchasing an appliance such as a dishwasher or television, look for a model that's highly efficient. Insulate your walls and ceilings.

Exercise 35. *Translate and memorize the following phrases. Use them in sentences of your own.*

Agreeing	**Disagreeing**
I completely agree with …	I don't agree with that.
That's absolutely right.	I see what it means, but …
I feel the same way	I don't think so, because …
That's a good point	I see this point, but …
I couldn't agree more	My thoughts are entirely different

Exercise 36. *Discuss the following issues in groups using the phrases from exercises 35 and 28.*

1. What is your view of the statement "The only serious interest in renewables has been when governments have subsidized it, or have imposed targets on industry with schemes like Green certificates"? Do you think it is fair?
2. Are there any promising energy saving trends we can observe in Ukraine's energy sector?
3. Do you feel optimistic about the future in terms of energy?

Exercise 37. T*ranslate in writing*..

The epic challenge of the 21st century is filling the gap between energy supply and demand for clean, reliable and inexpensive energy. While new sources of energy are gradually changing the landscape,

products made from fossil fuels continue to heat our homes, fuel our cars and power our computers. Despite extraordinary advances in technology, rapid economic growth in countries like China and India will require more energy. Some solutions are being implemented today, but many will come from the next generation of entrepreneurs, engineers and scientists. In order to rise to this grand challenge, we must consider the following issues: encouraging growth of alternative energy sources; new transportation technologies; reducing environmental impact; increasing energy efficiency; energy sustainability.

Exercise 38. *Memorize the basic vocabulary to text 4.*
Challenge – складне завдання, проблема
pioneering – новаторський
swing – коливання, зміна
cutting-edge – передовий, сучасний
algae – водорості
breakthrough – досягнення, успіх, відкриття
stride – просування, прогрес
environmentally sound – екологічно прийнятний
wellhead – джерело
obstacle – перешкода
byproduct – побічний продукт
option – вибір, альтернатива
mindset – тип мислення

Exercise 39. *Read, translate and give the gist of text 4.*

Text 4. Energy Challenges

Encouraging Growth of Alternative Energy Sources

Research at companies, universities and national laboratories are pioneering technologies that will aim to be sustainable and economically competitive with today's fossil fuels. The challenge will be to bridge their supply limitations with a 24-hour demand for electricity throughout the world. This means making our electricity grid more efficient and streamlined while developing storage systems to allow wind and solar energy to be saved for times of peak use.

Another source of future alternative energy may come from the world's vast reserves of natural gas. Currently, much of our electricity comes from burning coal in power plants, releasing large quantities of carbon dioxide and other gases. Despite advancements in "clean coal" technology, alternatives to coal will surely be part of tomorrow's solution. New technologies are beginning to unlock vast reservoirs of natural gas in North America, making it both a cheap and clean alternative to coal. Natural gas is also more easily transportable over long distances and releases less pollutants for the same amount of energy produced.

It is likely that meeting tomorrow's energy needs will require not just one but all of these alternatives working alongside traditional fossil fuels.

New Transportation Technologies

A large portion of the oil produced globally is directly processed into transportation fuels like gasoline and diesel. These fuels dominate in the transportation industry because they combine reliability, affordability and performance. But, large swings in gasoline prices during the past few years are growing symptoms of this century's energy challenge. In order to meet surging demand over the next 50 years, alternatives to these transportation technologies are vital.

Among the alternatives being considered is equipping vehicles with the ability to consume clean and affordable natural gas. It will also be important to develop cutting-edge electric cars to offset the demand for gasoline and diesel fuel. On the distant frontier of alternative transportation technologies are novel ideas such as the use of algae or other micro-organisms to convert the sun's energy into liquid fuel that can be used like oil.

Another emerging technology involves hydrogen-powered cars that transform hydrogen into electricity. The major promise of this technology is that water is the only waste product released. Scientific breakthroughs in these areas are still required to make these technologies competitive with today's fuels.

Reducing Environmental Impact

Already great strides have been made to ensure that oil and gas producers make as little impact as possible on the natural environments in which they operate. This includes drilling multiple wells from a single location or pad to minimize damages to the surface, employing environmentally sound chemicals to stimulate well production, and ensuring

a seamless transition from the wellhead to the consumer.

Another major environmental obstacle to low-impact fossil fuel production is the highly intensive process of mining coal. Currently, coal-powered plants are one of the largest sources of electricity in the world. The transition to cleaner sources of energy will reduce the impact of coal production on the environment.

Substantial work will be required to address the impact of oil and gas consumption, notably the emission of carbon dioxide as a major byproduct. Among the proposed solutions to this problem is the sequestration, or storage, of carbon dioxide in old oil and gas fields. Ultimately, reducing emissions will require storing carbon dioxide, developing new alternative sources of energy and, perhaps most importantly, using less.

Increasing Energy Efficiency

Increasing efficient energy use by means of a more efficient technology rather than[1] by changes in individual behavior will become the next top priority in the coming years.

Energy Sustainability: Will We Run Out of Fossil Fuels?

Most of the world's energy needs are met through fossil fuels demand for which is projected to increase. While there is enough supply for several more decades, what will happen when it starts running low? There are ways to reduce waste and use existing technologies to keep the air cleaner by reducing fossil fuels emissions. Options like these are part of a concept called energy sustainability.

Energy sustainability is about finding the balance between a growing economy, the need for environmental protection and social responsibilities in order to provide an improved quality of life for current and future generations. It can inspire technical innovation with an environmentally conscious mindset. Regulations designed to reduce air, water and waste emissions from energy-related activities such as coal mining and electricity generation also help with energy sustainability, as do people who conserve energy.

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1. rather than – а не; замість

Exercise 40. *Match the synonyms.*

1) reduce	a) oblige
2) influence	b) end-use-data

3) enforce	c) lower
4) final data	d) impact
5) capacity	e) deliver
6) incentive	f) costly
7) convert	g) fast
8) ultimately	h) output
9) supply	i) transform
10) expensive	j) stimulus
11) gradually	k) finally
12) rapid	l) eventually
13) require	m) demand

Exercise 41. *Give Ukrainian equivalents of the following word combinations from text 4.*

Pioneering technologies; to bridge supply limitation; to make our electricity grid efficient and streamlined; to be saved for times of peak use; vast reserves of natural gas; to be a part of tomorrow's solution; to release less pollutants; to dominate in transportation industry; to combine reliability, affordability and performance; to consume clean and affordable natural gas; to develop cutting-edge electric cars; to produce a hydrogen-powered car; to transform hydrogen into electricity; scientific breakthrough; to make technologies competitive; to minimize damage to the surface; to reduce the impact of coal production on the environment; to address the impact of oil and gas consumption; to project fossil fuels demand; to provide an improved quality of life for future generations.

Exercise 42. *Write out of text 4 words that can function both as nouns and verbs. How many of them have you found?*

Exercise 43. *Make up key questions on text 4 and practice asking and answering them in pairs.*

Exercise 44. *Speak on the following issues.*

1. Encouraging growth of alternative energy sources.
2. New transportation technologies.
3. Reducing environmental impact.
4. Increasing energy efficiency.

5. Energy sustainability.

Exercise 45. *Make three predictions (either confident or less certain) about what you think will happen to energy technologies in the next ten years.*

Exercise 46. *Memorize the basic vocabulary to text 5.*

Unprecedented – безпрецедентний
ongoing – той, що відбувається в даний час
strengthen – підсилювати; зміцнювати
reliance – залежність *(від використання чогось)*
shoulder – брати на себе
resident – житель
scale up – збільшувати масштаб
gain –1. збільшення 2. прибуток
end-use data – кінцеві данні споживання; показання
indication – показник
comprehensive – всебічний, повний, всеосяжний
severe – серйозний, важкий
disruption – порушення, зрив
tap – витягувати; використовувати; здобувати
widespread – поширений
envelope – оболонка; обшивка
refurbishment – відновлення, ремонт
energy control system – система управління електроживленням
wasteful – неекономний, марнотратний
daunting – лякаючий
underway – у процесі реалізації, розробки
awareness – усвідомлення
capacity – 1. здатність 2. потужність
enforce – впроваджувати
regulator – регулятор; регулюючий орган
exchange rate risk – валютний ризик
lender – кредитор
incentive – заохочення, стимул

Exercise 47. *Read, translate and give the gist of text 5.*

Text 5. Energy Efficiency Priorities for Ukraine

Ukraine is facing unprecedented energy security challenges as a result of ongoing geopolitical and financial crises. Improving energy efficiency across the economy could strengthen energy security by decreasing the country's reliance on fossil fuel imports, reduce pressure on public budgets that have historically shouldered billions of euros a year in energy subsidies, reduce costs to consumers, and improve the comfort and health of its residents.

Moreover, scaling up energy efficiency could also improve the competitiveness of Ukraine's industry. Ukraine's economy is one of the most energy intensive in Eastern Europe, Caucasus and Central Asia.

There is a large potential for energy efficiency gains in Ukraine. Although end-use data are still limited, current indications are that energy efficiency potential is greatest in the residential and industrial sectors. By implementing comprehensive and well designed polices that target energy efficiency measures at levels similar to those in the European Union, Ukraine could save up to 20.5 billion cubic meters (bcm) of gas per year. Given severe disruptions in coal production and electricity generation in the conflict regions and concerns about gas security, reducing energy consumption is a priority more than ever.

To tap this energy efficiency potential in Ukraine a package of measures will be needed. This includes such measures as widespread residential building envelope refurbishments, installation of building energy control systems and meters, replacement of inefficient appliances and equipment, information campaigns to reduce wasteful energy consumption and other programmes across sectors. Some of these measures can be put in place with immediate results; others will take more time.

Prioritising energy efficiency measures can be daunting, particularly given some of the challenges facing energy efficiency policy development in Ukraine. These challenges include: limited data on energy use by different sectors and subsectors; highly subsidized energy, although reforms are underway; little capacity for enforcing regulatory policies; low consumer and financial sector awareness of energy efficiency; asymmetrical information between regulators and energy companies; exchange rate risk for foreign lenders and investors; lack of incentives for energy companies to invest in energy efficiency.

Exercise 48. *Find English equivalents of the following word combinations in text 5.*

Безпрецедентна проблема енергетичної безпеки; результат поточної геополітичної та фінансової кризи; зміцнювати енергетичну безпеку; зменшувати залежність країни від імпорту викопного палива; зменшувати тиск на державний бюджет; енергетичні субсидії; поліпшувати комфорт та здоров'я громадян; конкурентоспроможність виробництва; підвищення ефективності використання енергії; кінцеві данні споживання; поточні показники; впроваджувати всебічну, добре продуману політику; суттєві перебої у видобутку вугілля; пакет заходів; широкомасштабний ремонт житлових будівель; заміна неефективного обладнання; зменшити марнотратне енергоспоживання; реформи у процесі реалізації; впроваджувати регуляторну політику.

Exercise 49. *Match the synonyms*

1) demand	a) emit
2) encourage	b) throughout the world
3) research	c) compensate
4) bridge	d) numerous
5) conserve	e) need
6) release	f) severe
7) globally	g) implement
8) offset	h) investigate
9) novel	i) at the same time
10) multiple	j) innovative
11) grave	k) save
12) put in place	l) connect
13) simultaneously	m) promote

Exercise 50. *Distribute the recommendations below in the following columns to describe energy efficiency priorities for economy.*

Cross-sectoral	**Building**	**Appliances, Lighting and Equipment**	**Industry**	**Saving Energy**

Enhance capacity to collect and analyse energy data; phase-out inefficient lamps; improve the energy efficiency of building components and energy-using systems in existing buildings; promote energy efficiency for small and medium-sized enterprises; put in place complementary policies to support industrial energy efficiency; install high-efficiency street lighting; modernize district heating networks; monitor, enforce and evaluate policies; require and enforce building energy costs and energy performance certificates; consider emergency demand management; launch energy savings information campaigns; run appliance, lighting and equipment replacement programmes.

Exercise 51. *Write out of text 5 words that can function both as nouns and verbs. Translate the pairs.*

Exercise 52. *Put five types of questions on the following sentences.*

1. Energy efficiency is one of the main priorities on the agenda for EU-Ukraine cooperation. 2. The EU is supporting Ukraine in the implementation of energy sector reforms. 3. For the past 6 months, the EU has supported an information campaign entitled “Energy for your home” in five Ukrainian cities. 4. According to estimations, almost half of the Ukrainian population live in energy inefficient tower blocks.

Exercise 53. *Discuss the following questions in groups.*

1. What unprecedented energy security challenges is Ukraine facing today?
2.What energy efficiency measures should be prioritized for our country?
3. What can the government do to encourage people to save energy?

Exercise 54. *Read and entitle text 6. Translate the text in writing with the help of the notes below.*

Text 6.

The Energy Efficiency Fund has begun its work in Ukraine, and it will be a new and effective tool for implementing state energy modernization projects at the level of households and at the level of legal entities, according to the media liaisons department of the secretariat of the Cabinet of Ministers of Ukraine.

It is expected that the fund will provide funds for implementing thermal modernization projects, introducing effective monitoring and control systems, establishing effective heating and cooling systems and equipment, as well as replacing existing systems and equipment with more efficient ones. The form of providing funds will be a partial refund of the cost of measures on energy efficiency to individuals and legal entities.

As reported, all energy modernization projects would be implemented simultaneously with programs for the introduction of efficient consumption of resources, as well as a significant increase in the production of domestic natural gas.

According to government forecasts, over 3-5 years of the work of the Energy Efficiency Fund, annual gas saving due to efficient fuel use will reach at least 1.5 billion cubic meters and, at the same time, the launch of new production facilities based on the latest technologies will create an additional 75,000 new jobs.

Notes:

Legal entity – юридична особа
media liaisons department – відділ зв'язків із засобами масової інформації
refund – повернення *(грошей)*; відшкодування *(коштів)*
domestic – внутрішній; вітчизняний
annual – щорічний; річний

Exercise 55. *Make up key questions on text 6.*

Exercise 56. *Match the antonyms.*

1) increase	a) weaken
2) improve	b) extensive
3) strengthen	c) past
4) import	d) ignorance
5) enlarge	e) lowest
6) intensive	f) domestic

7) gain	g) worsen
8) current	h) consumption
9) greatest	i) export
10) similar	j) exclude
11) generation	k) rear
12) include	l) reduce
13) efficient	m) be over
14) widespread	n) loss
15) lack	o) asymmetrical
16) be underway	p) different
17) awareness	q) decrease
18) symmetrical	r) excess
19) foreign	s) inefficient

Exercise 57. *Compose a dialogue on the basis of text 6.*

Exercise 58. *Speak on:*

1. Energy saving and conservation.
2. Energy efficiency.
3. Way to increase energy conservation and efficiency.
4. Energy challenges of the 21st century.
5. Energy efficiency priorities for Ukraine.

CONTENTS

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