Министерство образования
Республики Беларусь

БЕЛОРУССКИЙ НАЦИОНАЛЬНЫЙ
ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

Кафедра английского языка № 1

С. В. Острейко
А. М. Силицкая

ПОСОБИЕ ПО ПРАКТИЧЕСКОМУ КУРСУ НАУЧНО-ТЕХНИЧЕСКОГО ПЕРЕВОДА ДЛЯ СТУДЕНТОВ ЭНЕРГЕТИЧЕСКОГО ФАКУЛЬТЕТА

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Р е ц е н з е н т ы :
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Пособие включает 10 уроков, в которых рассматриваются лексические и грамматические аспекты перевода, аутентичные научно-технические тексты, направленные на формирование навыков перевода.

Предназначено для обучения переводу научно-технической литературы с английского языка на русский студентов энергетического факультета.

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Предисловие

Данная работа является практическим пособием по обучению переводу научно–технической литературы с английского языка на русский. Оно адресовано студентам энергетического факультета, овладевшими базовой грамматикой и лексикой английского языка. Пособие рассчитано на 36 часов.

Цель пособия – сформировать у студентов навыки и развить умения анализировать различные элементы текста, понимать и правильно переводить научно-технические англоязычные тексты по специальности.

Учебное пособие состоит из двух разделов и приложений. Первый раздел состоит из 10 уроков (Units). Каждый урок включает учебный текст с комплексом упражнений по анализу и переводу. Второй раздел содержит дополнительную подборку текстов без заданий. Он выполняет роль практикума в самостоятельной работе студентов. Приложения (Appendices) содержат: логико-грамматические лексические единицы, рекомендации по составлению реферата и аннотации.

Текстовый материал представлен аутентичными текстами, содержащими информацию об истории электричества, способах и проблемах передачи электроэнергии, принципах работы оборудования электростанций.

Упражнения, включенные в уроки, отражают лексические и грамматические особенности перевода. В систему лексических упражнений входят задания на перевод интернациональных и псевдоинтернациональных слов, беспредложных терминологических словосочетаний, многозначных и многофункциональных слов. Упражнения на словообразование ставят целью научить студента переводить слова, в состав которых входят префиксы и суффиксы, часто встречающиеся в научно-технической литературе.

В систему грамматических упражнений входят упражнения на перевод страдательного залога, модальных глаголов, инфинитива и инфинитивных конструкций, причастия и причастных оборотов, герундия,и др. Некоторые упражнения содержат краткую справку о правилах перевода тех или иных грамматических явлений.

Во второй раздел включены тексты из оригинальных журналов по специальности. Эти тексты рассчитаны на совершенствование навыков работы с политехническим и отраслевым словарем.

PART I

Unit 1

I. Определите значение данных слов и словосочетаний, используя англо-русский словарь.

amber	cardboard
friction	to soak
milestone	saline solution
to harness	to affect smth
jar	to pass
foil	coil
fluid	inductance
rod	to relate
to draw	in tribute to smb
to be prone to	mere
kite	

II. Проверьте по словарю произношение данных интернациональных слов.

Electricity, effect, to control, condenser, static, idea, result, experiment, magnetism, zinc, battery, compass, series, concept, motor, potential, induction.

III. Определите способ словообразования следующих однокоренных слов и переведите их на русский язык.

1. electron — electric — electrical — electrician — electricity, to electrify.
2. to discover — discovery — discoverer.
3. to produce — production — productive— productivity —producer to reproduce — to overproduce - to underproduce.

4. to observe — observable — observance — observant — observation — observational — observer.
5. to conduct — conductor — conductivity — conduction — conductive — superconductivity.
6. to insulate — insulated — insulating — insulation — insulator.
7. to control — control — controllable — controller.

IV. Просмотрите текст и найдите слова близкие по значению к данным. Переведите их на русский язык.

to originate from	to mean	to influence
to watch	constantly	
to suggest	to function	
to develop (3 synonyms)	to find	

V. Просмотрите текст и подберите антонимы к данным словам. Переведите их на русский язык.

charge	disconnect
similar	different
considerable	

VI. Проанализируйте и переведите на русский язык следующие существительные, образованные от глаголов с помощью суффиксов.

-ance: instance, resistance
-ence: existence,
-(a)tion: investigation, conduction, induction, solution.

VII. Переведите следующие словосочетания с причастием II в функции определения на русский язык. Помните, что причастие II переводится причастием страдательного залога совершенного и несовершенного вида с суффиксами-окончаниями: *-нный, -емый, -имый, -тый*.

a coating connected to a conducting rod
a rod passed through the insulated stopper
dissimilar metals separated by a salt solution
copper and zinc plates separated by cardboard
the first controlled source of electricity

VIII. **Переведите предложения на русский язык определительные причастные обороты с причастием I. Помните, что они могут переводится придаточным определительным предложением с союзом *«который»*, либо причастием действительного залога, оканчивающимся на *-щий, -вший*, в функции определения.**

the Latin term meaning "to produce from amber by friction"
an electrical condenser consisting of a glass jar
metal foil having the inner coating

IX. **Просмотрите текст и выделите предложения с причастием I в функции обстоятельства. Переведите предложения на русский язык. Помните, что английские обстоятельственные причастные обороты переводятся на русский язык**

1) деепричастным оборотом,

2) группой отглагольного существительного с предлогом при,

3) обстоятельственным придаточным предложением.

Например, предложение "Reading this article the student found out a lot of interesting facts" можно перевести:

1) Читая эту статью, студент обнаружил много интересных фактов.
2) Когда студент читал эту статью, он обнаружил…
3) При чтении этой статьи студент обнаружил…

X. **Переведите предложения на русский язык, учитывая, что относительное местоимение *which* в функции подлежащего придаточного предложения, характеризующего или дополняющего смысл всего главного предложения в целом, переводится местоимением *что*.**

1. The term has its roots in the Greek term "elector", which means beaming Sun.
2. Molecules possess kinetic energy, which means that they are in constant motion.

XI. **Переведите предложения на русский язык, учитывая, что они допускают перевод относительного местоимения** *what* **– как** ***то, что (того, что; тому что)***.

1. George Von Kleist invented what came to be called the “Leyden Jar”.
2. Leibnitz and his followers believed “natural measure of force” to be what is now known as kinetic energy, which formerly was often called “vital force”.

XII. **Дайте перевод на русский язык предложений с герундием в функции обстоятельства. Помните, что предлоги перед герундием имеют значение:** *in*—***при, во время, в процессе***; *by*—***путем, при помощи***; *on (upon)*—***по, после, при***; *through*—***благодаря, из-за.*** **Герундий переводится отглагольным существительным. Герундий с предлогом** *without* ***(без)*** **часто переводится отрицательной формой деепричастия.**

1. Without knowing what it was, the effects of electricity have been observed in nature for centuries.
2. In 1820 Hans Christian Oersted discovered the magnetic effects of a current by observing that electrical current affected the needle on a compass.
3. Joule had difficulty in persuading British scientists in the truth of caloric theory.
4. Upon being heated to a high temperature many metallic compounds are decomposed.

XIII. **Выполните перевод всего текста.**

Early History of Electricity

The word electricity comes from the Latin term electricus, meaning “to produce from amber by friction.” This term also has its roots in the Greek term “elector”, which means beaming sun. Without knowing what it was, the effects of electricity have been observed in nature for centuries.

Modern milestones in the discovery and harnessing electricity began in 1729 with Stephen Gray's discovery of the conduction of electricity.

In October of 1745, George Von Kleist discovered that electricity was controllable and invented what came to be called the “Leyden

Jar." It is an electrical condenser consisting of a glass jar coated inside and outside with metal foil, having the inner coating connected to a conducting rod passed through the insulated stopper.

Starting in 1747, Benjamin Franklin worked with static charges in the air and noted that their existence suggested the existence of an electrical fluid that could possibly be composed of particles.

In 1750 Franklin discovered that lightning was the same as electrical discharges, and proposed the idea of lightning rods that would draw this charge away from homes, making them safer and less prone to fires. In 1752, Franklin reported the results of his famous kite experiments to the Royal Society.

In 1799 the Royal Institution of Great Britain was founded. It provided important support for the investigation of electricity and magnetism. The same year, Alessandro Volta proved that electricity could be created using dissimilar metals separated by a salt solution. Volta used copper and zinc plates separated by cardboard that was soaked in a saline solution to produce this effect. Stacking these cells on top of one another, he devised the first electric battery, the first continuous and controlled source of electricity.

In 1820 Hans Christian Oersted discovered the magnetic effects of a current by observing that electrical currents affected the needle on a compass. A few weeks later, Marie Ampere discovered that a coil of wires acts like a magnet when a current is passed thorough it.

In 1827 Joseph Henry began a series of electromagnetic experiments and discovered the concept of electrical inductance. He also built one of the first electrical motors. That same year, George Simon Ohm working in the field of current electricity discovered the conduction law that relates potential, current, and circuit resistance. In tribute to him, the Ohm, denotes the unit of electrical resistance.

In 1831 Michael Faraday discovered electromagnetic induction. He explained that it was necessary to have a change in a magnetic field to create current, and that its mere presence was not enough.

These milestones marked the beginning of the field of electricity and electrical engineering that are continuously being further developed.

XIV**. Составьте письменный реферат текста.**

Unit 2

I. **Определите значение данных слов и словосочетаний, используя англо-русский словарь.**

to deliver a lecture
alternating current
disclosure
power transmission
grid
to take place
critical
porcelain
pin-type
insulator
engineered
oversight
via
approximately
to install
transmission lines
mast

II. **Проверьте по словарю произношение данных интернациональных слов.**

Transmission, patent, infrastructure, hydroelectric, limit, generator, industrialization, economic.

III. **Определите способ словообразования следующих однокоренных слов и переведите их на русский язык.**

1. industry — industrial — industrialize — industrialized — industrialization.
2. to generate — generator — generation.
3. to use — to reuse — use — usage — user — useful — usefully — usefulness — misuse.
4. to transmit — transmitter — transmission.
5. occasion — occasional — occasionally.

IV. **Просмотрите текст и найдите слова близкие по значению к данным. Переведите их на русский язык.**

speech
discovery (2 synonyms)
to occur (to happen)
application
to set up
dielectric

V**. Просмотрите текст и подберите антонимы к данным словам. Переведите их на русский язык.**

useless
low
to forbid
different
to be destroyed (3 antonyms)

VI. **Проанализируйте и переведите на русский язык следующие существительные и прилагательные, образованные с помощью следующих префиксов**.

tele-: telegraph, telephone, television;
inter-: international, interaction, interconnection;
hydro-: hydroelectric, hydropower;
sub-: subsystem, subdivision, submarine, subtransmission.

VII.**Переведите следующие терминологические словосочетания**. **Помните, что в беспредложном терминологическом словосочетании главным словом является последнее, все слова, стоящие слева от него, играют второстепенную роль — роль определения. Перевод беспредложных терминологических словосочетаний надо начинать с главного слова.**

Example: transmission line – линия передачи

disk insulator
porcelain pin-type insulator
power transmission line
three-phase alternating current
three-phase alternating current power transmission

VIII**. Переведите следующие словосочетания с причастием II в функции определения на русский язык.**

insulators used for telegraph and telephone lines
generators engineered and installed under Tesla's technical oversight
a lecture entitled *A New System of Alternating Current Motors and Transformers*

IX**. Переведите на русский язык определительные причастные обороты с причастием** I.

a lecture describing the equipment
the first transmission using high voltage
alternating current power transmission running from Brauweiler

X. **Переведите предложения на русский язык, обращая внимание на перевод страдательного залога.**

Страдательный залог при переводе может быть передан:

а) кратким страдательным причастием прошедшего времени с суффиксом *–н* или *–т* (с вспомогательным глаголом быть или без него), т.е. русским страдательным залогом;
б) глаголом на *–ся* в соответствующем времени, лице и числе;
в) глаголом действительного залога в соответствующем времени, 3-м лице мн. числа, являющимся частью неопределенно-личного предложения:

The experiments *were made* last year.

а) Опыты *(были) проведены* в прошлом году.
б) Опыты *проводились* в прошлом году.
в) Опыты *проводили* в прошлом году.

1. In that year, a 25 kV transmission line was built between Lauffen at the Neckar and Frankfurt.
2. Initially transmission lines were supported by porcelain pin- type insulators.
3. The first large scale hydroelectric generators in the USA were installed at Niagara Falls.
4. The masts of this line were designed for eventual upgrade to 380 kV.
5. Electricity is usually sent over long distance through overhead power transmission lines.
6. A power transmission system is sometimes referred to colloquially as a "grid".

XI. **Предложенный вариант перевода третьего абзаца текста содержит ошибки. Найдите их и отредактируйте перевод.**

The rapid industrialization in the 20th century made electrical transmission lines and grids a critical part of the economic infrastructure in most industrialized nations. Initially transmission lines were supported by porcelain pin-type insulators similar to those used for telegraph and telephone lines. However, these reached a practical limit of 40 kV. In 1907 the invention of the disc insulator by Harold W. Buck of the Niagara Falls Power Corporation and Edward M. Hewlett of General Electric allowed practical insulators of any length to be constructed, which allowed the use of higher voltages. The first large scale hydroelectric generators in the USA (engineered and installed under the technical oversight of Nikola Tesla) were installed at Niagara Falls and provided electricity to Buffalo, New York via power transmission lines.

Быстрая индустриализация в 20-ом столетии сделала электрические линии передачи и сетки критической частью экономической инфраструктуры в наиболее промышленно развитых нациях. Первоначально линии передачи поддерживались изоляторами типа булавки фарфора, подобными используемыми для телеграфа и телефонных линий. Однако они достигли практического предела 40 кВ. В 1907 изобретение изолятора диска Гарольдом В. Баком (Ниагара Фолз Пауэр Корпорейшн) и Эдвардом М. Хюлеттом (Дженерал Электрик) позволило практическим изоляторам любой длины быть построенными, который позволил использование более высоких напряжений. Первые крупномасштабные гидроэлектрические генераторы в США (проектируемые и установленные под технической надзором Никола Теслы) были установлены в Ниагарском водопаде и провели электричество к Буффало, Нью-Йорк через линии передачи энергии.

XII**. Выполните перевод всего текста.**

History of Power Transmission Grid

In an AIEE Address, May 16, 1888, Nikola Tesla delivered a lecture entitled *A New System of Alternating Current Motors and Transformers*, describing the equipment which allowed efficient generation and use of alternating currents. Tesla's disclosures, in the form of patents, lectures and technical articles are useful for understanding the history of the modern system of power transmission.

The first transmission of three-phase alternating current using high voltage took place in the year 1891 on the occasion of the international electricity exhibition in Frankfurt. In that year, a 25 kV transmission line, approximately 175 kilometres long, was built between Lauffen at the Neckar and Frankfurt.

The rapid industrialization in the 20th century made electrical transmission lines and grids a critical part of the economic infrastructure in most industrialized nations. Initially transmission lines were supported by porcelain pin-type insulators similar to those used for telegraph and telephone lines. However, these reached a practical limit of 40 kV. In 1907 the invention of the disc insulator by Harold W. Buck of the Niagara Falls Power Corporation and Edward M. Hewlett of General Electric allowed practical insulators of any length to be constructed, which allowed the use of higher voltages. The first large scale hydroelectric generators in the USA (engineered and installed under the technical oversight of Nikola Tesla) were installed at Niagara Falls and provided electricity to Buffalo, New York via power transmission lines.

The first three-phase alternating current power transmission at 110 kV took place in 1912 between Lauchhammer and Riesa, Germany. On April 17, 1929 the first 220 kV line in Germany was completed, running from Brauweiler near Cologne, over Kelsterbach near Frankfurt, Rheinau near Mannheim, Ludwigsburg-Hoheneck near Austria. The masts of this line were designed for eventual upgrade to 380 kV. However the first transmission at 380 kV was erected in Germany on October 5, 1957 between the substations in Rommerskirchen and Ludwigsburg-Hoheneck. In 1967 the first extra-high-voltage transmission at 735 kV took place on a Hydro-Quebec transmission line. In 1982 the first transmission at 1200 kV took place in the Soviet Union.

XIII**. Составьте письменную аннотацию текста.**

Unit 3

I. **Определите значение данных слов и словосочетаний, используя англо-русский словарь.**

capacity	deregulation
in the vicinity of	traction
bulk	traction current
delivery	contribute to
load	to span across
load center	demand
redundant	blackout
to be distinct from	sub-transmission

II. **Проверьте по словарю произношение данных интернациональных слов.**

Capital, design, to import, center, portion, function, extra, mathematical.

III. **Проанализируйте и переведите следующие слова с суффиксом** *-ly.*

Colloquially, usually, typically, normally, occasionally, extremely, insufficiently, practically, initially, densely, generally, costly, statistically.

IV. **Проанализируйте и переведите на русский язык следующие слова, образованные с помощью следующих отрицательных префиксов.**

de-: deregulation, decode, demagnitize
ir-: irresistible, irregular, irrelevant
dis-: disabled, disagree, discount

V. **Проанализируйте и переведите следующие предложения, выбрав правильное вариантное соответствие при переводе. Обратите внимание на то, что многозначные слова являются разными частями речи.**

1. The family designed the house for their own needs.

2. I'm doing a course in design and art.
3. He designed the perfect crime.
4. Deregulation of electricity companies in many countries has led to renewed interest in reliable economic design of transmission networks.
5. The machine is quite simple in design.
6. The instruments are designed for use in very cold conditions.
7. Voltages above 230 kV are considered extra high voltage and require different designs compared to equipment used at lower voltages.
8. The masts of this line were designed for eventual upgrade to 380 kV.

VI. **Переведите следующие предложения на русский язык, обращая внимание на разные значения слова** *due*.

1) due – должный, нужный, подходящий, обязанный;
2) due to – благодаря, из-за, вследствие;
3) due to – разработанный, представленный, предложенный (перед одушевленным существительным).

1. They paid due attention to the problem.
2. Due to the large amount of power involved, transmission normally takes place at high voltage.
3. Power is transmitted underground in densely populated areas but is usually avoided due to the high capacitive and resistive losses incurred.
4. The scheme due to Professor A. is of great interest.
5. This was due to the raise of temperature.

VII. **Переведите следующие предложения на русский язык, обращая внимание на разные значения слова** *because*.

1) because – так как (в начале фразы), потому что (в середине фразы);
2) because of – из-за, вследствие.

1. Because nearby loads are often correlated, imported electricity must often come from far away.
2. Facts do not cease to exist because they are ignored.

3. The company has lost its several customers because of its bad work.
4. Because of the irresistible economics of load balancing, transmission grids now span across countries and even large portions of continents.

VIII. **Переведите следующие терминологические словосочетания. Помните, что в беспредложном терминологическом словосочетании главным словом является последнее, все слова, стоящие слева от него, играют второстепенную роль — роль определения. Перевод беспредложных терминологических словосочетаний надо начинать с главного слова.**

load center
traction current
transmission path
transmission and generation functions
overhead power transmission line
system stability considerations

IX. **Переведите предложения, содержащие модальные глаголы. Постарайтесь правильно передать модальность при переводе.**

1. The maximum reliable capacity of each line may be less than the physical limit of the line.
2. Redundant paths and lines are provided so that power can be routed from any power plant to any load center.
3. Hot weather in the Southwest portion of the United States might cause many people there to turn on their air conditioners.
4. Because nearby loads are often correlated imported electricity must often come from far away.
5. The same year, Alessandro Volta proved that electricity could be created using "dissimilar metals separated by a salt solution."
6. The web of interconnections between power producers and consumers ensures that power can flow even if one link is disabled.

X. **Выберите правильный перевод**.

1) …single phase AC current is used as traction current for railway traction.
   a) …однофазный переменный ток используется так, как тяговый ток для железнодорожной тяги.
   b) …однофазный переменный ток используется в качестве тягового тока для железнодорожной тяги.
   c) …однофазовый переменный ток используется как тяговый ток для железнодорожной тяги.

2) This is distinct from electricity distribution which…
   a) Это отделено от распределения электричества, которое…
   b) Это отличается от распределения электричества, которое…
   c) Это отделяет от распределения электричества, которое…

3) …power can be routed from any power plant to any load center…
   a) …энергия может быть проложена от электростанции до любого узла нагрузки…
   b) …энергия может быть распределена от любой электростанции до узла нагрузки…
   c) …энергия может быть направлена от любой электростанции до любого узла нагрузки…

XI. **Выполните перевод всего текста.**

Electric Power Transmission

Electric power transmission is one process in the delivery of electricity to consumers. It refers to the 'bulk' transfer of electrical power from place to place. Typically power transmission is between the power plant and a substation in the vicinity of a populated area. This is distinct from electricity distribution which is concerned with the delivery from the substation to the consumers. Due to the large amount of power involved, transmission normally takes place at high voltage (110 kV or above). Electricity is usually sent over long distance through overhead power transmission lines. Power is transmitted underground in densely populated areas (such as large cities) but is typically avoided due to the high capacitive and resistive losses incurred.

A power transmission system is sometimes referred to colloquially as a "grid". However, for reasons of economy, the network is rarely a grid (a fully connected network) in the mathematical sense. Redundant paths and lines are provided so that power can be routed from any power plant to any load center, through a variety of routes, based on the economics of the transmission path and the cost of power. Much analysis is done by transmission companies to determine the maximum reliable capacity of each line, which, due to system stability considerations, may be less than the physical limit of the line. Deregulation of electricity companies in many countries has lead to renewed interest in reliable economic design of transmission networks. The separation of transmission and generation functions is one of the factors that contributed to the 2003 North America blackout.

AC power transmission

AC power transmission is the transmission of electric power by alternating current. Usually transmission lines use three phase AC current. In electric railways, sometimes single phase AC current is used as traction current for railway traction.

Today, transmission-level voltages are usually considered to be 110 kV and above. Lower voltages such as 66 kV and 33 kV are usually considered sub-transmission voltages but are occasionally

used on long lines with light loads. Voltages less than 33 kV are usually used for distribution. Voltages above 230 kV are considered extra high voltage and require different designs compared to equipment used at lower voltages.

Bulk power transmission

A transmission grid is a network of power stations, transmission circuits, and substations. Energy is usually transmitted within the grid with 3-phase alternating current (AC).

The capital cost of electric power stations is so high, and electric demand is so variable, that it is often cheaper to import some portion of the variable load than to generate it locally. Because nearby loads are often correlated (hot weather in the Southwest portion of the United States might cause many people there to turn on their air conditioners), imported electricity must often come from far away. Because of the irresistible economics of load balancing, transmission grids now span across countries and even large portions of continents. The web of interconnections between power producers and consumers ensures that power can flow even if one link is disabled.

XII. **Составьте письменный реферат текста.**

Unit 4

I. **Определите значение данных слов и словосочетаний, используя англо-русский словарь.**

power-line
fuel-burning
coal-fired
corona discharge
phase-shifting
capacitance
capacitor bank
resistive
to offset
inductance
impedance
fibre optic cable
ground conductor
common carrier
pilot-wire
utilities
stand-alone
reactive

II. **Проверьте по словарю произношение данных интернациональных слов.**

Corona, asynchronous, reactive, compensator, phase, factor, telecommunication, commercial, cable, structure.

III. **Проанализируйте и переведите на русский язык следующие прилагательные, образованные с помощью следующих суффиксов.**

-ant: significant, vacant, reluctant, redundant;
-ent: prominent, dependent, violent, frequent;
-able: controllable, reliable, available, variable;
-ous: asynchronous, onerous, ambitious, generous.

IV. **Переведите следующие беспредложные терминологические словосочетания, состоящие из существительного, причастия I (герундия) и существительного, на русский язык.**

fault-sensing protection relays
fuel-burning power plants
phase-shifting transformers
voltage regulating system
load balancing economics

V. **Переведите следующие терминологические словосочетания, состоящие из существительного, причастия II и существительного, на русский язык.**

water-filled pipe
coal-fired power plants
pressure-operated switch
keyboard-controlled machine

VI. **Переведите следующие беспредложные терминологические словосочетания, состоящие из существительных, на русский язык.**

construction cost
ground conductor
power-line carrier
long-distance transmission
country and customer requirements
transmission line impedance
electric power transmission organization

VII. **Переведите следующие предложения на русский язык, обращая внимание на разные значения слова** *since*.

1) since — *так как, поскольку* (если since вводит придаточное предложение);
2) since — *с* (перед любыми словами и словосочетаниями, указывающими время);
3) since — *с тех пор* (часто в сочетании со словом *then—since then*)

1. Since the power flow through an HVDC (high voltage DC) link is directly controllable, HVDC links are sometimes used within a grid to stabilize the grid against control problems with the AC energy flow.
2. Since the unit of a potential is called a volt, potential itself is called “voltage”.
3. The process has been used since its first announcement.
4. Leased circuits from common carriers are not preferred since availability is not under control of the electric power transmission organization.

5. Whether the circumstances have been changed since then is not known.

VIII. **Переведите следующие словосочетания с причастием II в функции определения на русский язык.**

the fuels used to make that electricity
for a given amount of power transmitted
the percentage of energy lost
the Pacific Intertie located in the Western United States

IX. **Переведите следующие предложения, обращая внимание на инфинитив в различных функциях.**

1. It is necessary to transmit the electricity at high voltage to reduce the percentage of energy lost.
2. Today transmission-level voltages are usually considered to be 110 kV and above.
3. Utilities add capacitor banks and other components throughout the system to control reactive power flow for reduction of losses and stabilization of system voltage.
4. It is often cheaper to import some portion of the variable load than to generate it locally.
5. As a result, there is economic pressure to locate fuel-burning power plants near the population centers that they serve.
6. When electrical energy is required to be transmitted over very long distances, it can be more economical to transmit using direct current instead of alternating current.
7. Much analysis is done by transmission companies to determine the maximum reliable capacity of each line.

X**. Переведите предложения на русский язык, обращая внимание на перевод страдательного залога.**

1. Long-distance transmission is typically done with overhead lines at voltages of 110 to 765 kV.
2. At high AC voltages significant amounts of energy are lost due to corona discharge and the capacitance between phases.
3. Transmission lines can also be used to carry data: this is called power-line carrier, or PLC.

4. PLC signals can be easily received with a radio for the longwave range.
5. Sometimes a stand-alone cable is used, which is commonly fixed to the upper crossbar.
6. In that country transmission operations and market operations are controlled by separate companies.

XI. **Выберите правильный перевод**.

1. In remote areas a common carrier may not be available at all.
   a) В отдаленных районах коммерческая сеть связи не может быть доступна всем.
   b) В отдаленных районах обычная сеть связи может быть доступна не всем.
   c) В отдаленных районах коммерческая сеть связи может быть не доступна совсем.
2. Protection of the transmission line from short circuits and other faults is usually so critical that…
   a) Защита линии передач от короткого замыкания и других ошибок обычно так критична, что…
   b) Защита линии передач от короткого замыкания и других неисправностей обычно настолько необходима, что…
   c) Защита линии передач от короткого замыкания и других неполадок обычно такая критическая, что…
3. Transmission and distribution losses in the USA were estimated at 7.2% in 1995 …
   a) В 1995 году в США потери при передаче и распространении составили 7.2% …
   b) В 1995 году в США потери при передаче и распространении оценивались в 7.2% …
   c) В 1995 году в США потери при передаче и распространении были оценены на 7.2% …

XII. **Выполните перевод всего текста.**

Long-distance transmission

Long-distance transmission of electricity is almost always more expensive than the transportation of the fuels used to make that electricity. As a result, there is economic pressure to locate fuel-burning power plants near the population centers that they serve. The obvious exceptions are hydroelectric turbines - high-pressure water-filled pipes being more expensive than electric wires. The unvarying portion of the electric demand is known as the "base load", and is generally served best by facilities with low variable costs but high fixed costs, like nuclear or large coal-fired power plants.

Losses

It is necessary to transmit the electricity at high voltage to reduce the percentage of energy lost. For a given amount of power transmitted, a higher voltage reduces the current and thus the resistive losses in the conductor. Long-distance transmission is typically done with overhead lines at voltages of 110 to 765 kV. However, at extremely high voltages, more than 2 million volts between conductor and ground, corona discharge losses are so large as to offset the advantage of lower heating loss in the line conductors.

Transmission and distribution losses in the USA were estimated at 7.2% in 1995, and in the UK at 7.4% in 1998.

In an alternating current transmission line, the inductance and capacitance of the line conductors can be significant. The currents that flow in these components of transmission line impedance constitute reactive power, which transmits no energy to the load. Reactive current flow causes extra losses in the transmission circuit. The fraction of total energy flow (power) which is resistive (as opposed to reactive) power is the power factor. Utilities add capacitor banks and other components throughout the system - such as phase-shifting transformers, static VAr compensators, and flexible AC transmission systems (FACTS) - to control reactive power flow for reduction of losses and stabilization of system voltage.

HVDC

High voltage DC (HVDC) is used to transmit large amounts of power over long distances or for interconnections between asynchronous grids. When electrical energy is required to be transmitted over very long distances, it can be more economical to transmit using direct current instead of alternating current. For a long transmission line, the value of the smaller losses, and reduced construction cost of a DC line, can offset the additional cost of converter stations at each end of the line. Also, at high AC voltages significant amounts of energy are lost due to corona discharge, the capacitance between phases or, in the case of buried cables, between phases and the soil or water in which the cable is buried. Since the power flow through an HVDC link is directly controllable, HVDC links are sometimes used within a grid to stabilize the grid against control problems with the AC energy flow. One prominent example of such a transmission line is the Pacific Intertie located in the Western United States.

Grid exit

At the substations, transformers are again used to step the voltage down to a lower voltage for distribution to commercial and residential users. This distribution is accomplished with a combination of sub-transmission (33 kV to 115 kV, varying by country and customer requirements) and distribution (3.3 to 25 kV). Finally, at the point of use, the energy is transformed to low voltage (100 to 600 V, varying by country and customer requirements).

Communications

Operators of long transmission lines require reliable communications for control of the power grid and, often, associated generation and distribution facilities. Fault-sensing protection relays at each end of the line must communicate to monitor the flow of power into and out of the protected line section. Protection of the transmission line from short circuits and other faults is usually so critical that common carrier telecommunication is insufficiently reliable. In remote areas a common carrier may not be available at all. Communication systems associated with a transmission project may use:

- Microwaves
- Power line carrier
- Optical fibres.

Rarely, and for short distances, a utility will use pilot-wires strung along the transmission line path. Leased circuits from common carriers are not preferred since availability is not under control of the electric power transmission organization.

Transmission lines can also be used to carry data: this is called power-line carrier, or PLC. PLC signals can be easily received with a radio for the longwave range.

Sometimes there are also communications cables using the transmission line structures. These are generally fibre optic cables. They are often integrated in the ground (or earth) conductor. Sometimes a stand-alone cable is used, which is commonly fixed to the upper crossbar. On the EnBW system in Germany, the communication cable can be suspended from the ground (earth) conductor or strung as a stand-alone cable.

XIII**. Составьте письменную аннотацию текста.**

Unit 5

I. **Определите значение данных слов и словосочетаний, используя англо-русский словарь.**

monopoly
commission
agreement
to operate
to elevate
cancer
correlation
the proximity of
to devise
wireless
onerous
wholesale
to beam
rectenna
to be fed
satellite
chairman

II. **Проверьте по словарю произношение данных интернациональных слов.**

Leukaemia, monopoly, radiation, voluntary, natural, standard, theory, problem, federal, regional, to demonstrate, business, operator, electromagnetic.

III. **Определите способ словообразования следующих однокоренных слов и переведите их на русский язык.**

1. to demonstrate — demonstrative — demonstrable — demonstration — demonstrator.
2. to establish — established — establishment.
3. to separate — separable — inseparable — inseparably — separate — separately — separation.
4. to operate — to cooperate — operational — operative — cooperative — operation — cooperation — operator.
5. to elevate — elevation — elevator.

IV. **Проанализируйте и переведите на русский язык следующие существительные, образованные с помощью следующих суффиксов.**

-ment: agreement, establishment, management;

-hood: childhood, brotherhood, motherhood;
-age: breakage, package, voltage, storage;
-ity: authority, electricity, capacity, density.

V. **Расшифруйте следующие аббревиатуры и переведите их**.

the USA	Independent Transmission System Operator
AC	Regional Transmission Organization
ISO	high voltage direct current
RTO	the Federal Energy Regulatory Commission
FACTS	Standard Market Design
MISO	the United States of America
FERC	alternating current
HVDC	Midwest Independent Transmission System Operator
DNA	flexible AC transmission systems
SMD	power-line carrier
PLC	deoxyribonucleic acid

VI. **Переведите следующие терминологические словосочетания, состоящие из причастия I и существительного, на русский язык.**

heating losses	superconducting cable
alternating current	controlling circuit

VII. **Переведите следующие терминологические словосочетания. Помните, что в беспредложном терминологическом словосочетании главным словом является последнее, все слова, стоящие слева от него, играют второстепенную роль — роль определения. Перевод беспредложных терминологических словосочетаний надо начинать с главного слова.**

solar power satellites
wireless power transmission
high load density areas
childhood leukaemia rates
wholesale electricity market operator
traction current converter plants
single phase traction power networks

VIII. **Переведите следующие предложения на русский язык, обращая внимание на различие в значении слов** *other, another, the other*.

1) other — другой, другие (какие-то, вообще); при самостоятельном употреблении имеет форму множественного числа *others*;
2) another — другой, еще один (всегда стоит перед существительным в единственном числе);
3) the other — другой, другие, все остальные (все те, которые остались); при самостоятельном употреблении имеет форму множественного числа *the others*.

1. One may use other methods.
2. Another method was tried.
3. The other methods were not useful.
4. Some studies support this theory, and others do not.
5. Another form of wireless power transmission has been studied for transmission of power from solar power satellites to the earth.
6. The current mainstream scientific view is that power lines are unlikely to pose an increased risk of cancer or other somatic diseases.
7. For the others the problem is more complicated.

IX. **Переведите следующие предложения на русский язык, обращая внимание на различие в значении слова** *that*.

1) **тот, та, то** — если *that* стоит перед существительным в единственном числе; указательное местоимение;
2) **который** — если *that* стоит после существительного; вводит определительное придаточное предложение;
3) **то, что** — если *that* стоит в начале предложения; вводит придаточное подлежащее;
4) **что** — если *that* стоит после сказуемого; вводит дополнительное придаточное предложение.

1. Regulatory Commission had issued a notice of proposed rulemaking setting out a proposed Standard Market Design (SMD) that would see the establishment of Regional Transmission Organizations (RTOs).

2. In that country transmission operations and market operations are controlled by separate companies.
3. Some have claimed that electromagnetic radiation from power lines elevates the risk of certain types of cancer.
4. The current mainstream scientific view is that power lines are unlikely to pose an increased risk of cancer or other somatic diseases.
5. That these decisions can be critical has been demonstrated by well-known scientists.

X. **Переведите следующие предложения на русский язык, обращая внимание на различие в значении слова** *present*.

1) present — a) присутствующий; b) настоящий, современный; c) имеющийся, данный;
2) to be present — присутствовать;
3) a present — подарок, презент;
4) to pre´sent — представлять, давать.

1. They were not present at the meeting.
2. The present situation is rather complicated.
3. In the present report we present the results of the simulation model.
4. It is argued by some that living near high voltage power lines presents a danger to animals and humans.
5. The project presented had many disadvantages.
6. What was your birthday present?

XI. **Переведите следующие словосочетания с причастием II в функции определения на русский язык.**

an increased risk of cancer
an unpopulated desert area
networks operated by the railways
equipment used at lower voltages

XII. **Предложенный вариант перевода третьей части текста содержит ошибки. Найдите их и отредактируйте перевод.**

Hidetsugu Yagi attempted to devise a system for wireless power transmission. Whilst he managed to demonstrate a proof of concept, the engineering problems proved to be more onerous than conventional systems. His work however, led to the invention of the yagi antenna.

Another form of wireless power transmission has been studied for transmission of power from solar power satellites to the earth. A high power array of microwave transmitters would beam power to a rectenna in an unpopulated desert area. Formidable engineering, environmental, and economic problems face any solar power satellite project.

There is a potential for the use of superconducting cable transmission in order to supply electricity to consumers, given that the waste is halved using this method. Such cables are particularly suited to high load density areas such as the business district of large cities, where purchase of a right of way for cables would be very costly.

Хидэцугу Йаги попытался изобрести систему для беспроводной передачи энергии. Он сумел продемонстрировать доказательство концепции, но технические проблемы, оказалось, были более трудными, чем обычные системы. Его работа, однако, привела к изобретению антенны Йаги.

Другая форма беспроводной передачи энергии была изучена для передачи энергии от солнечных спутников до земли. Мощный источник электропитания микроволновых передатчиков передавал бы электроэнергию к антенне со встроенным выпрямителем в безлюдной области пустыни. Огромная разработка, экологические, и экономические проблемы сталкиваются с любым солнечным проектом спутника.

Есть потенциал для использования суперпроведения кабельной передачи, чтобы поставлять электричество потребителям, при условии, что отходы сокращаются вдвое, используя этот метод. Такие кабели особенно подходят высоко для областей плотности груза типа делового района больших городов, где закупка права пути для кабелей была бы очень дорогостоящая.

XIII. **Выполните перевод всего текста.**

Electricity market reform

Transmission is a natural monopoly and there are moves in many countries to separately regulate transmission. In the USA the Federal Energy Regulatory Commission had issued a notice of proposed rulemaking setting out a proposed Standard Market Design (SMD) that would see the establishment of Regional Transmission Organizations (RTOs). The first RTO in North America is the Midwest Independent Transmission System Operator (MISO). MISO's authority covers parts of the transmission grid in the United States midwest and one province of Canada (through a coordination agreement with Manitoba Hydro). MISO also operates the wholesale power market in the United States portion of this area.

In July 2005, the new FERC chairman, Joseph Kelliher announced the end of SMD efforts because "the rulemaking had been overtaken by the voluntary formation of RTOs and ISOs" according to FERC.

Spain was the first country to establish a Regional Transmission Organization. In that country transmission operations and market operations are controlled by separate companies. The transmission system operator is Red Electrica de Espana (REE) and the wholesale electricity market operator is Operador del Mercado Iberico de Energia - Polo Espanol, S.A. (OMEL). Spain's transmission system is interconnected with those of France, Portugal, and Morocco.

Health concerns

It is argued by some that living near high voltage power lines presents a danger to animals and humans. Some have claimed that electromagnetic radiation from power lines elevates the risk of certain types of cancer. Some studies support this theory, and others do not. Most studies of large populations fail to show a clear correlation between cancer and the proximity of power lines, but a 2005 Oxford University study did find a statistically significant elevation of childhood leukaemia rates. Recent studies (2003) connect DNA-breakage with low level AC magnetic fields.

The current mainstream scientific view is that power lines are unlikely to pose an increased risk of cancer or other somatic diseases.

Alternate transmission methods

Hidetsugu Yagi attempted to devise a system for wireless power transmission. Whilst he managed to demonstrate a proof of concept, the engineering problems proved to be more onerous than conventional systems. His work however, led to the invention of the yagi antenna.

Another form of wireless power transmission has been studied for transmission of power from solar power satellites to the earth. A high power array of microwave transmitters would beam power to a rectenna in an unpopulated desert area. Formidable engineering, environmental, and economic problems face any solar power satellite project.

There is a potential for the use of superconducting cable transmission in order to supply electricity to consumers, given that the waste is halved using this method. Such cables are particularly suited to high load density areas such as the business district of large cities, where purchase of a right of way for cables would be very costly.

Special transmission grids for railways

In some countries where electric trains run on low frequency AC (e.g. 16.7 Hz and 25 Hz) power there are separate single phase traction power networks operated by the railways. These grids are fed by separate generators in some power stations or by traction current converter plants from the public three phase AC network. Sample transmission voltages include:

- 25 kV (United Kingdom)
- 25 and 50 kV (South Africa)
- 66 and 132 kV (Switzerland)
- 110 kV (Germany, Austria).

XIV. **Составьте письменный реферат текста.**

Unit 6

I. **Определите значение данных слов и словосочетаний, используя англо-русский словарь.**

generator
engine
to mount
standby
set
hand-portable
hand-cart
to tow
stationary
available
trailer-mounted
to disrupt
to supplement
disaster areas
rating
substitute
sewerage
amusement rides
traveling carnivals

II. **Проверьте по словарю произношение данных интернациональных слов.**

Combination, diesel, trailer, watt, hospital, context, carnival, model, yacht, transfer, starter, automatic, service, site, propane.

III. **Проанализируйте и переведите на русский язык следующие существительные и наречия, образованные с помощью следующих суффиксов.**

-or: generator, regulator, connector, propellor;
-er: starter, programmer, compiler, impeller;
-ly: generally, permanently, temporarily, especially.

IV. **Определите способ словообразования следующих однокоренных слов и переведите их на русский язык.**

1. to combine—combined—combination.
2. to supply—supplied—supply—supplier—supplies.
3. to connect—connected—connection, to disconnect—disconnected.
4. to install—installed—installation, to uninstall—uninstalled.

V. Просмотрите текст и найдите слова близкие по значению к данным. Переведите их на русский язык.

to be bought	to match
one	to provide
reserve	place

VI. Переведите следующие беспредложные терминологические словосочетания, состоящие из существительного, причастия I (герундия) и существительного, на русский язык.

automatic starting system
alternating current power
traveling carnivals
power generating units

VII. Переведите следующие беспредложные терминологические словосочетания, состоящие из существительных, на русский язык.

utility power
transfer switch
engine speed regulator
generator voltage regulator
utility power station
communication service installation
sewerage pumping station
standby power generator

VIII. Переведите следующие предложения на русский язык, обращая внимание на разные значения слова *as*.

1) as — *так как, поскольку* (если as стоит в начале предложения);
2) as — *как, в качестве* (если as стоит в перед существительным);
3) as — *по мере того как* (если as используется в предложении, сказуемое которого выражено глаголом, передающим длительное действие: to develop, to continue, to increase, etc).

1. Engine-generators produce alternating current power that is used as a substitute for the power.

2. These include small, hand-portable units that can supply several hundred watts of power, hand-cart mounted units, as pictured above, that can supply several thousand watts.
3. The smaller units tend to use gasoline (petrol) as a fuel.
4. As cool gas enters the hot zone it begins to heat.
5. As the world develops, new and more complicated devices are produced.

IX. **Переведите следующие предложения, обращая внимание на инфинитив в различных функциях.**

1. The generator voltage (volts), frequency (Hz) and power (watts) ratings are selected to suit the load that will be connected.
2. Standby power generating units often include an automatic starting system and a transfer switch to disconnect the load from the utility power source and connect it to the generator.
3. Small and medium generators are especially popular in third world countries to supplement grid power.
4. Engine-generators are often used to supply electrical power in places where utility power is not available and in situations where power is needed only temporarily.
5. An engine-generator is the combination of an electrical generator and an engine mounted together to form a single piece of equipment.

X**. Переведите предложения на русский язык, обращая внимание на перевод страдательного залога.**

1. Small generators are sometimes used to supply power tools at construction sites.
2. Trailer-mounted generators can be towed to disaster areas where grid power has been temporarily disrupted.
3. Hospitals, communications service installations, sewerage pumping stations and many other important facilities are equipped with standby power generators.
4. This combination is also called an engine-generator set or a genset.
5. Standby power generators are permanently installed and kept ready to supply power to critical loads during temporary interruptions of the utility power supply.

XI. **Предложенный вариант перевода последнего абзаца текста содержит ошибки. Найдите их и отредактируйте перевод.**

Standby power generators are permanently installed and kept ready to supply power to critical loads during temporary interruptions of the utility power supply. Hospitals, communications service installations, sewerage pumping stations and many other important facilities are equipped with standby power generators. Small and medium generators are especially popular in third world countries to supplement grid power, which is often unreliable. Trailer-mounted generators can be towed to disaster areas where grid power has been temporarily disrupted.	Резервные генераторы энергии постоянно устанавливаются и сохраняются готовыми поставлять власть к критическим грузам в течение временных прерываний сервисного электропитания. Больницы, сооружения обслуживания коммуникаций, канализация насосные станции и много других важных средств обслуживания оборудованы резервными генераторами энергии. Маленькие и средние генераторы особенно популярны в странах третьего мира, чтобы добавить мощь сетки, которая является часто ненадежной. Установленные трейлером генераторы могут буксироваться к областям бедствия, где власть сетки была временно разрушена.

XII**. Выполните перевод всего текста.**

Engine-generator

An engine-generator is the combination of an electrical generator and an engine mounted together to form a single piece of equipment. This combination is also called an engine-generator set or a genset. In many contexts, the engine is taken for granted and the combined unit is simply called a generator.

In addition to the engine and generator, engine-generators generally include a fuel tank, an engine speed regulator and a generator voltage regulator. Many units are equipped with a battery and electric starter. Standby power generating units often include an

automatic starting system and a transfer switch to disconnect the load from the utility power source and connect it to the generator.

Engine-generators produce alternating current power that is used as a substitute for the power that might otherwise be purchased from a utility power station. The generator voltage (volts), frequency (Hz) and power (watts) ratings are selected to suit the load that will be connected. Both single-phase and three-phase models are available.

Engine-generators are available in a wide range of power ratings. These include small, hand-portable units that can supply several hundred watts of power, hand-cart mounted units that can supply several thousand watts and stationary or trailer-mounted units that can supply over a million watts. The smaller units tend to use gasoline (petrol) as a fuel, and the larger ones have various fuel types, including diesel, natural gas and propane (liquid or gas).

Engine-generators are often used to supply electrical power in places where utility power is not available and in situations where power is needed only temporarily. Small generators are sometimes used to supply power tools at construction sites. Trailer-mounted generators supply power for lighting, amusement rides etc. for traveling carnivals.

Standby power generators are permanently installed and kept ready to supply power to critical loads during temporary interruptions of the utility power supply. Hospitals, communications service installations, sewerage pumping stations and many other important facilities are equipped with standby power generators. Small and medium generators are especially popular in third world countries to supplement grid power, which is often unreliable. Trailer-mounted generators can be towed to disaster areas where grid power has been temporarily disrupted.

XIII. **Составьте письменную аннотацию текста.**

Unit 7

I. Определите значение данных слов и словосочетаний, используя англо-русский словарь.

turbine	to scale up
steam	pressure-proof
to replace	to turn out
to reciprocate	lifetime
multiple	capacity
reversible	to punch
nozzle	casing
to apply	to occur
supersonic	failure
blade	to bypass
curved	to break apart
to mount	gear [giə]
to whip	spectacularly
stationary	to engage
to expand	robust
exhaust	to run up
seal	to be offset

II. Переведите следующие беспредложные терминологические словосочетания на русский язык. Помните, что главным словом в таких словосочетаниях является последнее, все слова, стоящие слева от него играют роль определения. Перевод беспредложных терминологических словосочетаний надо начинать с главного слова. Например:

1. Weight ratio
↓
Чего? ← коэффициент
↓
массы

Перевод: коэффициент массы.

2. Reciprocating piston steam engine

↓

какой? ← двигатель

↓

какой? ← паровой

↓

с поршнем возвратно-поступательного хода

Перевод: паровой двигатель с поршнем возвратно-поступательного хода.

1. linkage mechanism
2. heat engine
3. exhaust end
4. maintenance requirements
5. main steam stop valves
6. steam turbine shaft
7. precision manufacture
8. expensive and precise reduction gears
9. purchase cost

III. **Определите часть речи**. **Переведите цепочки однокоренных слов на русский язык**.

1. to heat – heater – heating – heated – superheated.
2. place – to place – to replace.
3. rotate – rotor – rotary – rotational.
4. improve – improvable – improvement – improved.
5. efficient – inefficient – efficiency – efficacy – effective – effectively.
6. generate – generation – generative – generator.
7. press – pressure – pressure-proof – pressing – pressurize.
8. expand – expansion – expansive.
9. direct – to direct – to redirect – direction – directional – directive – directly.
10. succession – successive – successor.
11. optimum – optimize – optimization.
12. require – required – requiring – requirement.
13. catastrophe – catastrophic – catastrophically.
14. precise – precisely – precision.

15. reduce – reduced – reducible – reduction.
16. control – to control – controllable – controlled – uncontrolled.

IV. Заполните таблицу. Приведите русские эквиваленты данных слов.

Интернациональные слово/слова, полностью совпадающие по значению в английском и русском языках (например: laboratory' centre)	Английское слово, которое шире по объему значений, чем сходное по форме русское слово (например: conductor - проводник, дирижер, а не только кондуктор; control - управлять, а не только контролировать)	Псевдоинтернациональные слова - слова, сходные по форме, но имеющие совершенно иное значение в английском и русском языках, (например: data - данные, а не дата; principal - основной, а не принципиальный)
1. 2. …	1. 2. …	1. 2. …

Energy, mechanism, thermal, generator, stage, process, stationary, atmospheric, centrifuge, vibration, design, problem, corrosion, system, critical, equivalent, control, extreme, variation, dynamo, operate.

V. Найдите в тексте и запишите примеры употребления прилагательных в сравнительной и превосходной степенях сравнения. Переведите на русский язык. Объясните разные способы образования степеней сравнения. Образуйте недостающие формы.

Положительная	Сравнительная	Превосходная
	Синтетический способ	
	+er	The +... est
1. 2. …		

Положительная	Сравнительная	Превосходная
	Аналитический способ	
	More +... Less +...	The most +... The least +...
1. 2. …		

VI. Укажите значения приставок в нижеприведенных словах. Определите, к какой части речи относятся данные слова, переведите их на русский язык.

Replace, supersonic, redirect, imbalance, superheated, uneven, disengaged, uncontrolled, overspeed.

VII. Расшифруйте данные сокращения.

PSI –
KW –
RPM –
R/min –
Hz –

VIII. Переведите на русский язык словосочетания с причастием в функции определения соответствующей формой русского причастия.

pressured steam
curved blades
generating capacity
superheated steam
uncontrolled acceleration

IX. Переведите на русский язык следующие определительные причастные обороты с помощью соответствующей формой русского причастия или определенного придаточного предложения. Например:

Phenomena occurring during the reaction...
Явления, *происходящие* во время реакции...
(которые происходят во время реакции)

We can use the method suggested by Spark
Мы можем использовать метод, *предложенный* Спарком
(который предложил Спарк)

engine invented by Thomas Newcomen and greatly improved by James Watt
blades mounted on a robot
steam exhausted through a nozzle into the air
force experienced by the blade
any water entering the blades

X**. Найдите в тексте и переведите на русский язык четыре предложения, где причастие I выполняет функцию обстоятельства. Помните, что причастие I в этой функции переводится соответствующей формой русского деепричастия.**

Например:

An acid gives rise to a salt and water reacting with a base
Кислота распадается на соль и воду, реагируя с основанием

XI**. Найдите в тексте предложения с обстоятельственным причастным оборотом, предшествующим союзом** *when* **и переведите их на русский язык. Помните, что такие причастные обороты могут переводиться:**
– деепричастным оборотом с соответствующей формой деепричастия;
– отглагольным существительным с предлогом *при;*
– обстоятельственным придаточным предложением.
Например:

1. *When carrying out* the experiment the scientist noted that…
   Проводя опыт, ученый заметил, что…
   При проведении опыта ученый заметил что…
   Когда ученый проводил опыт, он заметил, что...
2. *When heated* to 100% water boils
   Будучи нагретой до 100ºС, вода закипает
   При нагревании до 100°С вода закипает
   Когда воду нагревают до 100ºС, она закипает

XII. **Найдите во 2-м абзаце текста предложение с независимым причастным оборотом и переведите его на русский язык. (В данном случае независимый причастный оборот переводится самостоятельным предложением с союзом *причем).***

XIII. **В 4-м абзаце выделите предложение с герундиальным оборотом, и переведите его на русский язык. Герундиальный оборот переведите придаточным предложением с союзом *что* с предшествующим ему местоимением *то.***

XIV. **Полностью переведите текст на русский язык. Перевод 4-го абзаца выполнить письменно.**

Steam Turbine

1) A steam turbine extracts the energy of pressurized superheated steam as mechanical movement.

It has completely replaced the reciprocating piston steam engine (invented by Thomas Newcomen and greatly improved by James Watt) primarily because of its greater thermal efficiency and higher power to weight ratio. Also, because the turbine generates rotary motion, it is particularly suited to be used to drive an electrical generator - it doesn't require a linkage mechanism to convert reciprocating to rotary motion. The steam turbine is a form of heat engine that derives much of its improvement in thermodynamic efficiency through the use of multiple stages in the expansion of the steam (as opposed to the one stage in the Watt engine), which results in a closer approach to the ideal reversible process.

Principle of operation

2) In a steam turbine nozzles apply pressurized supersonic steam to a set of curved blades mounted on a rotor. Each blade whips the steam back in the opposite direction, simultaneously allowing the steam to expand a little. A stationary blade then redirects the steam towards the next set of blades toward the exhaust end with the gap between acting a nozzle. The process repeats in successive stages until the steam is exhausted at nearly atmospheric pressure. The moving blades are mounted radially on the rotor, while the stationary blades are mounted to the case of the turbine. Turbines always consist of a number of stages, with each stage being carefully optimised for the

pressure and volume of steam that it contacts. Because high pressure (several hundred psi) steam exhausted through a nozzle into the air travels so fast, the turbine, in order for it to be efficient, must rotate very fast. This requires that the rotor and its blades be well-balanced to protect it against vibrations, and creates difficulties with the seals around the rotor. The centrifugal force experienced by the blade is so strong that it must be carefully designed and made out of the strongest available materials to prevent it from failing catastrophically.

History and present

3) The modem steam turbine was invented by an Irishman, Charles A. Parsons, in 1884 whose first model was connected to a dynamo that generated 7.5 kW of electricity. His patent was licensed and the turbine scaled up shortly after by an American, George Westinghouse. A number of other variations of turbines have been developed that work effectively with steam. The *de Laval* turbine (invented by Gustaf de Laval) accelerated the steam to full speed before running it against a turbine blade. This was good, because the turbine is simpler, less expensive and does not need to be pressure-proof. It can operate with any pressure of steam. It is also, however, considerably less efficient. The Parsons turbine also turned out to be relatively easy to scale up. Within Parson's lifetime the generating capacity of a unit was scaled up by about 10,000 times.
4) Problems with turbines are now rare and maintenance requirements are relatively small. Any imbalance of the rotor can lead to vibration, which in extreme cases can lead to a blade letting go and punching straight through the casing. If water gets into the steam and is blasted onto the bladesrapid erosion of the blades can occur, possibly leading to imbalance and failure. When warming up a steam turbine for use the main steam stop valves before the boiler have a bypass line to allow superheated steam to slowly bypass the valve and proceed to heat up the lines in the system along with the steam turbine. Also a turning gear is engaged when there is no steam to the turbine to slowly rotate the turbine to ensure even heating to prevent uneven expansion. When first rotating the turbine by steam the turning gear is disengaged and the astern blades are normally used since they are more robust and not as critical. When a steam turbine

such as a turbo-generator is operating, any water entering the blades will likely result in the destruction of the thrust bearing for the steam turbine shaft. The control of a turbine with a governor is essential, as turbines need to be run up slowly, to prevent damage. Uncontrolled acceleration of the turbine rotor can lead to an overspeed trip, which causes the nozzle valves that control the flow of steam to the turbine to close. If this fails then the turbine may continue accelerating until it breaks apart, often spectacularly. Turbines are expensive to make, requiring precision manufacture and special quality materials. A steam turbine is only efficient when operating in the thousands of RPM range while most of the work it does rotates in the hundreds of RPM meaning that expensive and precise reduction gears must be used. This purchase cost is offset by much lower fuel and maintenance requirements and the small size of a turbine when compared to a reciprocating engine having an equivalent power.

XVI**. Составьте письменный реферат текста.**

Unit 8

I. **Определите значение данных слов и словосочетаний, используя англо-русский словарь.**

facility
reject
to employ
cogeneration
mover
fossil
peaker
overall
base load
amount
landfill
backup
outage
digester
cooling tower
chimney
hyperbolic
containment
dome
reciprocating engine
substantial
to reclaim
to suck
intake
aquatic

II. **Проверьте по словарю произношение данных интернациональных слов.**

Accurately, conversion, chemical, term, station, machine, magnetic, conductor, type, thermal, transform, mechanical, classify, operate, boiler, cycle, critical, atmosphere.

III. **Проанализируйте и переведите следующие слова с суффиксом** –ly.

Commonly, accurately, chiefly, typically, relatively, usually, frequently, actually, costly, significantly

IV. **Образуйте отсутствующие части речи. Переведите однокоренные слова на русский язык.**

	Существительное	Глагол	Прилагательное
1.		convert	
2.	power		
3.		rotate	
4.		conduct	
5.		combine	
6.		solve	
7.		cool	
8.		reinforce	
9.		employ	
10.		discharge	
11.	heat		

V. **Переведите следующие беспредложные терминологические словосочетания, состоящие из существительных и прилагательных, на русский язык.**

energy center
power plant
commonwealth English
steam power plant
cogeneration power plant
steam turbine generator
base load power plant
internal combustion piston engine
power outage
combustion turbine
low cost solution
opportunity fuels
water treatment plant
concrete containment dome
heat engine
heat exchanger
water body
water intake
water temperature

VI. **Переведите следующие беспредложные терминологические словосочетания, в состав которых входит причастие II на русский язык.**

fossil fueled power plants
natural gas fired plant
combined heat-and-power plant
combined cycle plant

VII. **Переведите данные словосочетания с причастием I и II в роли левого определения на русский язык**.

the most commonly used term
rotating machine
isolated communities
reinforced domes
reclaimed water
increased temperature
falling water

VIII. **Переведите следующие беспредложные терминологические словосочетания, состоящие из существительных, на русский язык.**

the energy source harnessed to turn the generator
the type of prime mover installed
a gas turbine fired by natural gas

IX. **Переведите предложения на русский язык, обращая внимание на перевод страдательного залога.**

1. "Power plant" is used to refer to the engine in ships, aircraft and other large vehicles.
2. In thermal power station mechanical power is produced by a heat engine…
3. Not all thermal energy can be transformed to mechanical power.
4. If reject heat employed as useful heat for industrial processes or district heating, the power plant is referred to as a cogeneration power plant.
5. Thermal power plants are classified by the type of fuel and the prime mover is tolled.
6. Older natural gas fired plant must be started and stopped slowly.
7. Reciprocating engines are usually fuelled by diesel oil, heavy oil, natural gas and landfill gas plants.
8. The water is taken in heated by the heat exchanger, and discharged back into the water body.
9. Some people worry about organisms killed when they are sucked into the water intake.

X. **Переведите предложения на русский язык, обращая внимание на перевод герундия.**

1. A generator is a rotating machine that converts mechanical energy into electrical energy by creating relative motion between a magnetic field and a conductor.
2. Microturbines and reciprocating engines are low cost solutions for using opportunity fuels.
3. This type of cooling saves a substantial amount of fresh water from being used to cool the plant.

XI. **Выберите правильный вариант перевода.**

1. Hospitals and other critical facilities also use them to provide backup power in case of a power outage.
   a) Госпитали и другие критические сооружения также используют их для обеспечения резервной электроэнергии при прекращении подачи электроэнергии.
   b) Больницы и другие важные учреждения также используют их для обеспечения резервной электроэнергии в случае нарушения энергообеспечения.
   c) Больницы и другие решающие предприятия также используют их для обеспечения дублирующей электроэнергии в случае нарушения подачи электроэнергии.
2. Whenever possible, electric companies prefer to use cooking water from the ocean or a nearby lake or river.
   a) Когда это возможно, электрические компании предпочитают пользоваться охлаждающей водой из океана, близкого озера или реки.
   b) Когда бы это не было возможно, электрические компании предпочитают использовать охлаждённую воду из океана, соседнего озера или реки.

c) Всякий раз, когда это возможно, электрические компании предпочитают использовать охлаждающую воду из океана, соседнего озера или реки.

3. However, it can cause the temperature of the water to rise significantly.

a) Несмотря на это, это может служить причиной значительного повышения температуры.
b) Однако это может вызывать значительное повышение температуры.
c) Тем не менее, это может заставлять температуру воды значительно повышаться.

XII. **Выполните перевод всего текста.**

Power station

A power station or power plant is a facility for the generation of electric power. 'Power plant' is also used to refer to the engine in ships, aircraft and other large vehicles. Some prefer to use the term "energy center" because it more accurately describes what the plants do, which is the conversion of other forms of energy, like chemical energy, into electrical energy. However, "power plant" remains the most commonly used term in American English, while "power station" is the most common term in Commonwealth English.

At the center of nearly all power stations is a generator, a rotating machine that converts mechanical energy into electrical energy by creating relative motion between a magnetic field and a conductor. The energy source harnessed to turn the generator varies widely. It depends chiefly on what fuels are easily available and the types of technology that the power company has access to.

In thermal power stations, mechanical power is produced by a heat engine, which transforms thermal energy, often from combustion of a fuel, into rotational energy. Most thermal power plants produce steam, and these are sometimes called steam power plants. Not all thermal energy can be transformed to mechanical power, according to the second law of thermodynamics. Therefore, thermal power plants

also produce low-temperature heat. If no use is found for the heat, it is lost to the environment. If reject heat is employed as useful heat, for industrial processes or district heating, the power plant is referred to as a cogeneration power plant or CHP (combined heat-and-power) plant.

Thermal power plants are classified by the type of fuel and the type of prime mover installed. Nuclear power plants use a nuclear reactor's heat to operate a steam turbine generator. Fossil fueled power plants may also use a steam turbine generator. Natural gas fired plants may use a combustion turbine, known as a 'peaker', which provides rapid startup for peak loads, although older ones typically use steam turbine generators and must be started and stopped slowly. Combined cycle plants have a gas turbine fired by natural gas, with a steam boiler and steam turbine which use the exhaust gas from the gas turbine to produce electricity. This greatly increases the overall efficiency of the plant, and most new baseload power plants are combined cycle plants fired by natural gas. A relatively small amount of electric power is produced by internal combustion piston engines, also called reciprocating engines. These are usually fuelled by diesel oil, heavy oil, natural gas and landfill gas plants.

Reciprocating engines are used to provide power for isolated communities and are frequently used for small cogeneration plants. Hospitals and other critical facilities also use them to provide backup power in case of a power outage. Microturbines and reciprocating engines are low cost solutions for using opportunity fuels, such as landfill gas, digester gas from water treatment plants and waste gas from oil production.

Cooling towers are huge hyperbolic chimney-like structures that release the waste heat to the atmosphere. The very large cooling towers at nuclear power plants are often mistaken for the reactors, which are actually contained in thick, reinforced concrete containment domes that are typically much smaller. Cooling towers may be employed at any type of thermal power station, but large towers are found at either nuclear or fossil fueled stations. Geothermal, biomass and waste to energy plants tend to use smaller cooling towers. Whenever possible, electric companies prefer to use cooling water from the ocean or a nearby lake or river. The water is taken in, heated by the heat exchanger, and discharged back into the

water body. This type of cooling is less costly and more efficient, and it also saves a substantial amount of fresh water from being used to cool the plant provided wet cooling towers are being used. However, it can cause the temperature of the water to rise significantly. Although a small percentage of plants use reclaimed water, some people worry about the organisms killed when they are sucked into the water intake and the effects of the increased water temperature on the aquatic environment.

Other power stations use the energy from wave or tidal motion, wind, sunlight or the energy of falling water, hydroelectricity.

XIII. **Составьте письменную аннотацию текста.**

Unit 9

I. **Определите значение данных слов, используя англо-русский словарь.**

nuclear
range n, v
installation
fission
fissile
subcritical
moderator
to sustain
feasibility
to transmute
to decay
inherently
proliferation
fusion
obstacle
release, n
greenhouse
particulate
stockpiling
disastrous
maintenance
to decommission
to impose
controversial
to cease
dispute n, v
to claim
disposal
leakage

II. **Проверьте по словарю произношение данных интернациональных и псевдоинтернациональных слов. Приведите их русские эквиваленты**.

Constant, construction, reactor, commercial, isotope, uranium, plutonium, thermal, moderator, prototype, theoretical, demonstration, cycle, radioactive, emission, design, advocate, opponent, adequate.

III. **Определите к какой части речи относятся данные однокоренные слова, переведите их на русский язык.**

1. nucleus – nuclei – nucleate – nuclear.
2. construct – construction – constructional – constructor.
3. operate – operation – operational – operative – operator.
4. fissile – fission – fissionable.
5. moderate – moderation – moderator.
6. inherence – inherent – inherently.

7. sustain – sustained – sustaining – sustainable.
8. proliferate – proliferation – prolific – prolificacy.
9. fusible – fusibility – fusion.
10. maintain – maintained – maintenance.
11. controversy – controvert – controversial – controversialist.
12. significance – significant – signification – significative – signify.
13. compete – competition – competitive – competitor.
14. leak – leaking – leakage – leaky.

IV. **Проанализируйте и переведите на русский язык прилагательные, образованные с помощью следующих суффиксов**:

- al: experimental, commercial, operational, thermal, subcritical, theoretical, minimal, technical, controversial, essential;
- able: sustainable, considerable;
- ent: independent, different;
- ous: dangerous, disastrous, numerous.

V. **Подберите эквиваленты перевода следующих словосочетаний со словом** cost:

1. fuel costs	a) фактические затраты
2. capital cost	b) затраты на техническое обслуживание
3. finance costs	c) ориентировочная стоимость
4. maintenance costs	d) капитальная стоимость
5. running costs	e) расходы на топливо
6. actual costs	f) полные издержки
7. allowable costs	g) аварийные затраты
8. estimated cost	h) финансовые расходы
9. commercial costs	i) допустимые издержки
10. accident cost	j) текущие расходы

VI. **Переведите следующие терминологические словосочетания на русский язык.**

heat source	graphite-moderated reactor
base load stations	heavy water-moderated reactor
boiling water reactors	longer-lived radioisotopes
fission power reactor	faster-decaying materials
chain reactor	nuclear proliferation concerns

laboratory demonstration	construction period
construction cost	safety systems
feasibility studies	long-term storage
light water reactor	

VII. **Переведите предложения на русский язык, обращая внимание на определения, выраженные причастием I и причастием II.**

1. A NPP is a thermal power station in which the heat source is one or more nuclear reactors generating nuclear power.
2. Nuclear power plants are classified according to the type of reactor used.
3. Nuclear fusion offers the possibility of the release of very large amounts of energy with a minimal production of radioactive waste and improved safety.
4. There remain some obstacles to the generation of commercial electric power using nuclear fusion.
5. The quantity of waste produced is small.
6. The numerous safety systems required significantly increase running costs.
7. Disposal of spent fuel and other nuclear waste is an advantage of nuclear power.

VIII. **Переведите следующие предложения со словами-заместителями на русский язык. Помните, что слово-заместитель** that (those) **заменяет ранее стоящее существительное и переводится тем существительным, которое оно замещает, или опускается:**

The atomic weight of oxygen is greater than that of carbon. – Атомный вес водорода больше (атомного веса) углерода.

Слово-заместитель ранее стоящего существительного this (these) **переводится личным местоимением в именительном или косвенном падеже:**

This phenomenon is also of great interest; this involves the increase of… - это явление также представляет большой интерес; с ним связано увеличение…

1. Some installations have several independent units, and these may use different classes of reactors.
2. Nuclear waste is small in quantity compared to that generated by competing technologies.
3. The electron temperature is much greater than that of the gas as a whole.
4. Suppose that the total volume of the gas is k times that of the molecule.
5. There are two methods of measuring the conductivity of semiconductors. The first of these, which is used more commonly, has a number of advantages.
6. Two other very suitable temperatures are always generally available, those of melting ice and of boiling water.

IX. **Переведите предложения на русский язык, обращая внимание на перевод страдательного залога. Укажите время глаголов в страдательном залоге**.

1. Electricity was generated to the first time by a nuclear reactor on December 20, 1951.
2. … no prototype had been proposed or built to generate electric power by this means, although some laboratory demonstrations had been conducted.
3. Because most fast reactors have historically been used for plutonium production, they are associated with nuclear proliferation concerns.
4. More than twenty prototype fast reactors have been built all over the world.
5. Almost all the advantages and disadvantages are disputed in some degree by the advocates for and against nuclear power.

X. **Переведите предложения на русский язык, обращая внимание на значение модальных глаголов.**

1. Boiling water reactors can come down to half power at night.
2. Some of the plant-types below in the future may have passively safe features.
3. Fission power reactors may be further divided into three classes.
4. Fast reactors have the advantages that their fuel cycle can use all of the uranium in natural form.
5. Future designs may be small and modular.

6. Consequences of an accident might be disastrous.
7. The environment cannot be adequately protected from the risk of future leakages from long-term storage.

XI. **Определите синтаксическую функцию причастия** *claiming* **в предпоследнем и последнем предложениях. Как будет отличаться его перевод в различных функциях?**

XII. **Выполните полный письменный перевод всего текста на русский язык.**

Nuclear power plant

A nuclear power plant (NPP) is a thermal power station in which the heat source is one or more nuclear reactors generating nuclear power.

Nuclear power plants are base load stations, which work best when the power output is constant (although boiling water reactors can come down to half power at night). Their units range in power from about 40 MWe to almost 2000 MWe, typical of new units under construction in 2005 being in the range 600-1200 MWe.

As of 2005 there are 441 nuclear power reactors in operation around the world, which produce about one-sixth of the world's electric power.

History

Electricity was generated for the first time by a nuclear reactor on December 20, 1951 at the EBR-1 experimental station. On June 27, 1954, the world's first nuclear power plant that generated electricity for the commercial use was officially connected to the Soviet power grid at Obninsk, Kaluga Oblast, Russia. The Shippingport Reactor (Pennsylvania) was the first commercial nuclear generator to become operational in the United States – the construction cost was $72.5 million.

Nuclear power plants are classified according to the type of reactor used. However some installations have several independent units, and these may use different classes of reactor. In addition, some of the plant-types below in the future may have passively safe features.

Fission power reactors generate heat by nuclear fission of fissile isotopes of uranium and plutonium.

They may be further divided into three classes:

- Thermal reactors use a neutron moderator to slow or moderate the rate of production of fast neutrons by fission, to increase the probability that they will produce another fission and thus sustain the chain reaction.
- Fast reactors sustain the chain reaction without needing a neutron moderator.
- Subcritical reactors use an outside source of neutrons rather than a chain reaction to produce fission. As of 2004 this was a theoretical concept, and no prototype had been proposed or built to generate electric power by this means, although some laboratory demonstrations and several feasibility studies had been conducted.

Thermal reactors are divided into:

Light water reactors (LWR)
Graphite-moderated reactors
Heavy water-moderated reactors

Although some of the earliest nuclear power reactors were fast reactors, they have not as a class achieved the success of thermal reactors.

Fast reactors have the advantages that their fuel cycle can use all of the uranium in natural uranium, and also transmute the longer-lived radioisotopes in their waste to faster-decaying materials. For these reasons they are inherently more sustainable as an energy source than thermal reactors. Because most fast reactors have historically been used for plutonium production, they are associated with nuclear proliferation concerns.

More than twenty prototype fast reactors have been built in the USA, UK, Russia, France, Germany, Japan and India, and as of 2004 one was under construction in China.

Nuclear fusion offers the possibility of the release of very large amounts of energy with a minimal production of radioactive waste and improved safety. However, there remain considerable scientific, technical and economic obstacles to the generation of commercial electric power using nuclear fusion. It is therefore an active area of research.

Advantages of NPP's are:

- Essentially no greenhouse gas emissions

- Do not produce air pollutants such as carbon monoxide, sulfur dioxide, mercury, nitrogen oxides or particulates
- The quantity of waste produced is small
- Small number of accidents
- Low fuel costs
- Large fuel reserves
- Ease of transport and stockpiling of fuel
- Future designs may be small and modular

Disadvantages are:

- Nuclear waste produced is dangerous for thousands of years
- Consequences of an accident might be disastrous
- Risk of nuclear proliferation associated with some designs
- High capital costs
- In the past long construction periods, imposing large finance costs and delaying return on investment
- High maintenance costs
- High cost of decommissioning plants
- Current designs are all large-scale

Nuclear power is highly controversial, enough so that the building of new nuclear power stations has ceased in Europe (except Finland). Almost all the advantages and disadvantages are disputed in some degree by the advocates for and against nuclear power.

The cost benefits of nuclear power are also in dispute. It is generally agreed that the capital costs of nuclear power are high and the cost of the necessary fuel is low compared to other fuel sources. Proponents claim that nuclear power has low running costs, opponents claim that the numerous safety systems required significantly increase running costs.

Disposal of spent fuel and other nuclear waste is claimed by some as an advantage of nuclear power, claiming that the waste is small in quantity compared to that generated by competing technologies, and the cost of disposal small compared to the value of the power produced. Others list it as a disadvantage, claiming that the environment cannot be adequately protected from the risk of future leakages from long-term storage.

XIII**. Составьте письменный реферат текста.**

Unit 10

I. **Определите значение данных слов, используя англо-русский словарь.**

to reclaim	to pelletise
feedstock	refuse, n
to harness	to enhance
residue	flue
disposal	to emerge
ash	obligation
landfill	reliance
to recover	to handle
anaerobic	to yield
digestion	to frustrate
incineration	stringent
robust	

II. **Прочтите и переведите следующие псевдо-интернациональные слова и слова с более широким объёмом значений, чем сходные по форме русские слова. Выберите правильный ответ или ответы из ряда значений справа**

original	исходный, первоначальный, оригинальный
construction	строительство, конструкция
technique	техника, технические приёмы, метод, способ
dramatically	драматически, резко
realize	понимать, осуществлять, реализовывать (продавать)
emission	выделение, распространение, эмиссия
control	контроль, управление, регулирование
scale	шкала, уровень, масштаб
capital	капитальный, главный

III. а) **Образуйте существительные от глаголов и переведите их**

-ion	to construct, to pollute, to digest, to extract, to incinerate, to separate, to regulate, to combust, to generate, to opt
-ation	to consider, to prepare

-ment to treat, to develop, to require, to environ, to manage
-iety to vary
-al to dispose

b) **Образуйте прилагательные от существительных и глаголов, переведите их.**

-al origin, biology, residue, clinic, industry, environment, tradition
-ible to combust
-able practice
-ant to signify, import
-ent to differ
-ive to complete, effect
-ful care

IV. **Переведите цепочки однокоренных слов.**

1. Apply – application – applicant – appliance – applicable –applied.
2. Construct – construction – constructional – constructor – constructive.
3. Residue – residual – residuary.
4. Digest – digestion – digestible – digestive.
5. Incinerate – incineration – incinerator – incinerated.
6. Derive – derivation – derivable – derivative.
7. Combust – combustion – combustibility – combustible.
8. Emit – emission – emissive.
9. Signify – significance – significant – significative.
10. Compete – competition – competitor – competitive.

V. **Переведите следующие беспредложные терминологические словосочетания на русский язык, обращая внимание на перевод слов в функции определения.**

waste material feedstock
treatment processes
air pollution control systems
landfill site
incineration technology
refuse derived fuel plant
electricity output
district heating systems
waste input
flue gas treatment technologies
emission requirements
health impact
waste delivery
gate fee
waste management options
waste management methods

VI. **Расшифруйте следующие сокращения. Приведите русский эквивалент**

EfW
RDF
UK
MW
NSCA

VII. **Переведите следующие словосочетания с причастием II в функции определения на русский язык.**

a specially licensed landfill site
the steam produced
mixed municipal wastes
improved use
significant capital costs involved
the required level of finance
an integrated approach

VIII. **Переведите следующие предложения на русский язык, обращая внимание на перевод сказуемого в страдательном залоге.**

1. A number of different techniques have already been developed for recovering EfW.
2. Over the last ten years the emissions from EfW plants have been dramatically reduced.
3. The old generation of incineration plants have all been closed or upgraded.
4. Careful contract preparation will be needed for all types of waste treatment.
5. EfW is highly regulated.

IX. **Переведите предложения на русский язык, обращая внимание на перевод модальных глаголов, на форму инфинитива.**

1. The ash that is left can also be made good use of.
2. The heat may also be utilised in district heating systems.

3. RDF is turning the combustible portion of waste into a fuel which can be stored and transported or directly used on the site.
4. EfW plants can produce between six and 40 MW of electricity.
5. Opponents of EfW worry that long-term contracts for waste delivery could frustrate future plans to cut waste or improve recycling.
6. No one technology can be the answer in all cases.

X. **Переведите предложение на русский язык, обращая внимание на перевод герундия.**

1. These plants are capable of reducing the volume of waste by as much as 90 percent.
2. The most common form of EfW is using incineration technology.
3. This involves burning residual waste (typically after separation for recycling and composting) in furnaces.
4. Other processes pelletise waste inputs for burning in a refuse derived fuel plant.
5. There pas been a significant level of interest in developing new plants.

XI**. Выполните полный письменный перевод всего текста на русский язык.**

Energy from waste

The term ‘energy from waste’ (EfW) covers a wide variety of combustion processes that reclaim energy from a waste material feedstock. It specifically refers to treatment processes that harness the calorific value in waste to generate electricity of heat – our energy. The process also serves to reduce the volume and weight of the original waste, leaving only a residue that requires disposal.

These plants are capable of reducing the volume of waste by as much as 90 percent and the weight by 75 percent. The ash that is left can also be made good use of in construction recycling applications, while the residues from the air pollution control systems require further treatment or disposal in a specially licensed landfill site.

A number of different techniques have already been developed for recovering EfW, including combustion gasification, pyrolysis and biological processes, such as anaerobic digestion and the extraction of

landfill gases, although the most common form of EfW is using incineration technology. This involves burning residual waste (typically after separation for recycling and composting in furnaces and includes a boiler and generator system to provide an electricity output from the steam produced. The heat may also be utilised in district heating systems. The technology itself is very robust and is able to process mixed municipal wastes and other waste streams, including clinical and industrial wastes. Other processes pelletise waste inputs for burning in a refuse derived fuel (RDF) plant. The Government has defined RDF as 'turning the combustible portion of waste, such as paper and plastics, into a fuel which can be stored and transported, or directly used on site to produce heat and or power.'

A key development of EfW has been through the evolution of environmental technology and regulation. Over the last ten years the emission from EfW plants have been dramatically reduced through enhanced regulation and improved use of flue gas treatment technologies. The older generation of incineration plants have all been closed or upgraded to meet the 1996 emissions requirements.

Presently the UK has 18 EfW plants, two of which are RDF plants, but there has been a significant level of interest in developing new plants that will utilise both the traditional technologies (incineration) and the 'emerging' technologies (pyrolysis, gasification), primarily to help the UK meet its obligation to reduce its reliance on landfill.

EfW plants that handle between 90,000 and 60,000 tonnes of waste per year can produce between six and 40MW of electricity. There is currently enough capacity to produce 203MW of power from UK EfW facilities which process a total of almost three million tonnes of municipal solid waste per year.

But EfW won't necessarily yield instant results for the plant operators. Because of the significant capital costs involved, contracts to receive waste at these sites are often for 20 years in order to realize the required level of finance and to retain competitive gate fees. Economies of scale are an important consideration in EfW projects and a larger plant can usually offer a lower gate fee per tonne to customers.

Opponents of EfW worry that long-term contracts for waste delivery could frustrate future plans to cut waste or improve

recycling. Careful contract preparation will be needed for all types of waste treatment in the future and EfW is no different in this respect.

Another area of concern regarding EfW is its emissions and their impact on people and the environment. Recent studies from the National Society for Clean Air, the Environment Agency and a Government report on the health impacts of all waste management show that EfW poses no greater risk than any other option. EfW is highly regulated and can be operated with low emissions. Whilst there is no such thing as a 'no risk option' for waste management, the controls that are in place are both stringent and effective. Emissions of dioxins, specifically, has been an area of concern.

In integrated approach involving a variety of waste management options will often form the best practicable environment option.

No one technology can be the answer in all cases. Often a mix of waste management methods will be needed to achieve the best results.

XII**. Составьте письменную аннотацию текста.**

PART II

Supplementary texts for reading and translating

Generating an Electric Current

The first method used in producing an electric current was chemical in nature. Credit for its discovery is given to an Italian physician named Aloisio Galvani One day while engaged in dissecting a frog, Galvani noticed the leg muscles contract whenever a nearby electric machine was in operation. Further investigation showed the same twitching effect to be obtained by simply connecting the nerve and muscle of the leg to dissimilar metals. But no such result was obtained if only one metal was used or if non-conductors were employed. There were obviously two possible sources of the phenomenon. Hither the current was set up at the junction of the two metals or it was a property of the animal tissues. Galvani favoured the latter view and in 1791 announced his discovery, attributing the current to what he called "animal electricity". The scientist is known to become so prejudiced in favour of his animal magnetism theory that it was quite impossible for him to view objectively later evidence which definitely contradicted it and finally caused it to be discarded.

Another Italian, Alessandro Volta, a professor of physics in the University of Pavia, established the true source of the electric current. He demonstrated that it could be produced by the action of dissimilar metals without the presence of animal tissue of any sort.

In the course of his experiments in 1800 he developed the first electric battery, a device known as a voltaic pile. Although he tried a number of different materials he found that the best results were obtained when he used silver and zink as the two metals. The pile consisted of a series of small discs of these and of cardboard, the latter having been soaked in a salt solution. Then he piled the discs up one on another in the order silver, zink, cardboard, and so forth, ending with zinc. By

connecting wires to the top and bottom discs he was able to get continuous electric currents which were of substantial size.

All the essentials of a modern electric cell or battery were presented in the voltaic pile. Developments since (hat time have been largely directed toward making cells more convenient to use and toward eliminating various undesirable chemical reactions.

Примечания:
credit for its discovery is given - честь его открытия принадлежит
twitching effect - эффект сокращения мышц
animal tissues - живая ткань

Faraday's Discoveries

Michael Faraday, who was born in 1791 and died in 1867, gathered together and set in order all the work of the scientists who had worked on electrical problems before him.

In 1823 he discovered how to make an electrical motor. In 1831 he built the first generator, then called it dynamo. The modern car has both a starting motor and a generator. The starting motor draws electric current from the car battery to start the powerful gasoline engine. The generator is driven by the gasoline engine to recharge the battery and to furnish electrical power for all the electrical conveniences in the car.

Faraday's experiments of August 29, 1831, gave us the principle of the electric transformer, without which the later discoveries of that fateful year could have little real practical application. For to convey the electric current over long distances, say to supply a town, or feed an electric railway, it is necessary to generate it at a very high voltage, or force. By means of transformers based on Faraday's induction coil discovery, it is simple for a current direct from a power-station of say 132.000 volts to be stepped down for the electric train to 600 volts and for household use to 240 volts. The procedure is quite simple. The current is fed into the transformer across the primary, or input coil, which corresponds to Faraday's right-hand coil on his induction ring. The resultant induced current is taken from the secondary, of output coil, which corresponds to Faraday's left-hand coil. If this secondary coil has more windings of wire than the primary coil, the voltage will be stepped down.

So the two related discoveries of 1831 provided not only the means of making electricity easily and cheaply, on as large a scale as required, without any cumbersome batteries, but also the way of using it in a safe and practical way.

In 1833 Faraday discovered the effects of passing an electric current through certain solutions, he called this effects the laws of electrolysis. This has made possible the refinement of metals, silver and gold plating, and the manufacture of many chemical products.

Electromagnetic Machines

Before Faraday's discoveries the only usable source of electricity was the galvanic battery, and it made possible some practical applications, including the electric light and the electric telegraph. But the practical supply of electricity on a large scale was only possible by the development of electromagnetic machines, generators and transformers. For the use of electricity to produce mechanical power where it is wanted, another electromagnetic machine — the electric motor — still remains the most effective method.

What made all this possible? It needed not only the discovery and understanding of the basic laws (by Faraday), but also the discovery of materials with suitable properties. It is really very fortunate, that high magnetic fields can be sustained in a material as cheap as iron. Without iron, the whole economics of electromagnetic machines and of electrical-power applications would be quite different.

The electromagnetic machine is still developing in other respects. Using iron, it is cheap to produce the magnetic field, but an important limitation is imposed by saturation. This limit can be overcome by using superconductors at very low temperatures to carry very high currents and produce much stronger magnetic fields — without using iron. This development opens up a new field for machine designs and applications, and it offers a different set of limits from those of the copper-iron machine. Nevertheless, the copper-iron machine is so simple and reliable that it is likely to continue for a very longtime as the main method of producing mechanical power.

For many applications, the dominant factors are not efficiency and power/weight ratio but convenience and cleanliness, and with electricity one is really buying convenience rather than power. It seems likely that

the main advances in domestic applications will be by developments of control and programming to give even greater convenience, a good present example being the automatic washing machine. The electric motor is a superb machine to provide power, and its applications must expand for that reason alone.

Примечание:
power/weight ratio - мощность на единицу веса (двигателя)
a voltaic pile - вольтов столб (гальваническая батарея)

The Development of Electric Motor

As early as 1822 Michael Faraday outlined the way in which an electric motor could work: by placing a coil, or armature, between the poles of an electromagnet; when a current is made to flow through the coil the electromagnetic force causes it to rotate.

In 1823 Faraday discovered how to make an electrical motor. In 1831 he built the first generator, then called it dynamo. The modern car has both a starting motor and a generator. The starting motor draws electric current from the car battery to start the powerful gasoline engine. The generator is driven by the gasoline engine to recharge the battery and to furnish electrical power for all the electrical conveniences in the car.

The Russian physicist, Jacobi built several electric motors during the middle decades of the XIX-th century. Jacobi even succeeded in running a small, battery-powered electric boat on the Neva river in St. Petersburg. All of them, however, came to the conclusion that the electric motor was a rather uneconomical machine so long as galvanic batteries were the only source of electricity. It did not occur to them that motors and generators could be made interchangeable.

In 1888, Professor Galileo Ferraris in Turin and Nikola Tesla in America invented, independently and without knowing of each other's work, the induction motor. This machine, a most important but little recognized technical achievement, provides no less than two-thirds of all the motive power for the factories of the world, and much of modern industry could not do without it. Known under the name of "squirrel-cage " — because it resembles the wire cage in which squirrels used to be kept—it has two circular rings made of copper or aluminium joined by a few dozen parallel bars of the same material, thus forming a cylindrical cage.

Although the induction motor has been improved a great deal and its power increased many times ever since its invention, there has never been any change of the underlying principle. One of its drawbacks was that its speed was constant and unchangeable. Some years later a two-speed induction motor was developed. The speed change was achieved.

Fossil Fuels

Coal, Oil and Gas are called "fossil fuels" because they have been formed from the fossilized remains of prehistoric plants and animals. '

They provide around 66% of the world's electrical power, and 95% of the world's total energy demands (including heating, transport, electricity generation and other uses).

Coal is crushed to a fine dust and burnt Oil and gas can be burnt directly Coal provides around 28% of our energy, and oil provides 40%.

Natural gas provides around 20% of the world's consumption of energy, and as well as being burnt in power stations, is used by many people to heat their homes. It is easy to transport along pipes, and gas power stations produce comparatively little pollution.

Other fossil fuels are being investigated, such as bituminous sands and oil shale.

The difficulty is that they need expensive processing before we can use them.

The steam that has passed through the power station's turbines has to be cooled, to condense it back into water before it can be pumped round again. This is what happens in the huge "cooling towers" seen at power stations.

Some power stations are built on the coast, so they can use sea water to cool the steam instead. However, this warms the sea and can affect the environment, although the fish seem to like it.

Advantages of fossil fuels are:

1. Very large amounts of electricity can be generated in one place using coal, fairly cheaply. 2.Transporting oil and gas to the power stations is easy.3.Gas-fired power stations are very efficient. 4. A fossil-fuelled power station can be built almost anywhere, so long as you can get large quantities of fuel to it.

Disadvantages of fossil fuels are:

1. Basically, the main drawback of fossil fuels is pollution. Burning any fossil fuel produces carbon dioxide, which contributes to the "greenhouse effect", warming the Earth. 2. Burning coal produces more carbon dioxide than burning oil or gas it also produces sulphur dioxide, a gas that contributes to acid rain. We can reduce this before releasing the waste gases into the atmosphere. 3.Mining coal can be difficult and dangerous. Strip mining destroys large areas of the landscape. 4.Coal-fired power stations need huge amounts of fuel, which means train-loads of coal almost constantly. In order to cope with changing demands for power, the station needs reserves. This means covering a large area of countryside next to the power station with piles of coal.

Fossil fuels are not a renewable energy resource. Once we've burned them all, there isn't any more, and our consumption of fossil fuels has nearly doubled every 20 years since 1900. This is a particular problem for oil, because we also use it to make plastics and many other products.

Hydrogen and Future Energy Sources

Fossil fuels were formed before and during the time of the dinosaurs - when plants and animals died. Their decomposed remains gradually changed over the years to form coal, oil and natural gas. Fossil fuels took millions of years to make. We are using up the fuels formed more than 65 million years ago. They can't be renewed; they can't be made again. We can save fossil fuels by conserving and finding ways to harness energy from seemingly "endless sources," like the sun and the wind.

We can't use fossil fuels forever as they are a non-renewable and finite resource. Some people suggest that we should start using hydrogen.

Hydrogen is a colorless, odorless gas that accounts for 75 percent of the entire universe's mass. Hydrogen is found on Earth only in combination with other elements such as oxygen, carbon and nitrogen. To use hydrogen, it must be separated from these other elements.

Today, hydrogen is used primarily in ammonia manufacturing, petroleum refining and synthesis of methanol. It's also used in some space program as fuel for the space shuttles, and in fuel cells that provide heat, electricity and drinking water for astronauts. Fuel cells are devices that directly convert hydrogen into electricity. In the future, hydrogen

could be used to fuel vehicles and aircraft, and provide power for our homes and offices.

Hydrogen can be made from molecules called hydrocarbons by applying heat a process known as "reforming" hydrogen. This process makes hydrogen from natural gas. An electrical current can also be used to separate water into its components of oxygen and hydrogen in a process called electrolysis. Some algae and bacteria, using sunlight as their energy source, give off hydrogen under certain conditions.

Hydrogen as a fuel is high in energy, yet a machine that burns pure hydrogen produces almost zero pollution.

Fuel cells are a promising technology for use as a source of heat and electricity in buildings, and as an electrical power source for vehicles.

Auto companies are working on building cars and trucks that use fuel cells. In a fuel cell vehicle, an electrochemical device converts hydrogen (stored on board) and oxygen from the air into electricity, to drive an electric motor and power the vehicle.

Although these applications would ideally run off pure hydrogen, in the near term they are likely to be fueled with natural gas, methanol or even gasoline. Reforming these fuels to create hydrogen will allow the use of much of our current energy infrastructure - gas stations, natural gas pipelines, etc. - while fuel cells are phased in.

In the future, hydrogen could also join electricity as an important energy carrier. An energy carrier stores, moves and delivers energy in a usable form to consumers.

Wind Energy

Wind can be used to do work. The kinetic energy of the wind can be changed into other forms of energy, either mechanical energy or electrical energy. This is one form of work. Farmers have been using wind energy for many years to pump water from wells using windmills. The Babylonians and Chinese were using wind power to pump water for irrigating crops 4,000 years ago, and sailing boats were around long before that. Wind power was used in the Middle Ages, in Europe, to grind corn, which is where the term "windmill" comes from. In Holland, windmills have been used for centuries to pump water from low-lying areas.

Today, the wind is also used to make electricity. The Sun heats our atmosphere unevenly, so some patches become warmer than others. These warm patches of air rise, other air blows in to replace them - and we feel a wind blowing. We can use the energy in the wind by building a tall tower, with a large propeller on the top. The wind blows the propeller round, which turns a generator to produce electricity. We tend to build many of these towers together, to make a “wind farm” and produce more electricity. The mote towers, the more wind, and the larger the propellers, the more electricity we can make.

In order for a wind turbine to work efficiently, wind speeds usually must be above 12 to 14 miles per hour. Wind has to be this speed to turn the turbines fast enough to generate electricity. The turbines usually produce about 50 to 300 kilowatts of electricity each. The best places for wind farms are in coastal areas, at the tops of rounded hills, open plains and gaps in mountains - places where the wind is strong and reliable. Wind is blowing in many places all over the earth. The only problem with wind is that it is not windy all the time. To be worthwhile, you need an average wind speed of around 25 km/h.

Isolated places such as farms may have their own wind generators. In California, several "wind farms" supply electricity to homes around Los Angeles. Most wind farms in the UK are in Cornwall and Wales.

Geothermal Energy

Geothermal Energy has been around for as long as the Earth has existed. The centre of the Earth is around 6000 degrees Celsius - hot enough to melt rock. Even a few kilometers down, the temperature can be over 250 degrees Celsius. In general, the temperature rises one degree Celsius for every 36 meters you go down. In volcanic areas, molten rock can be very close to the surface. Geothermal energy has been used for thousands of years in some countries for cooking and heating. The name "geothermal" comes from two Greek words: "geo" means "Earth" and "thermal" means "heat".

Today, people use the geothermal heated hot water in swimming pools and in health spas. Or, the hot water from below the ground can warm buildings for growing plants, like in a green house. In San Bernardino, in Southern California, hot water from below ground is used

to heat buildings during the winter. The hot water runs through miles of insulated pipes to dozens of public buildings which are heated this way.

Hot water or steam from below ground can also be used to make electricity in a geothermal power plant. A geothermal power plant is like in a regular power plant except that no fuel is burned to heat water into steam. The steam or hot water in a geothermal power plant is heated by the earth. It goes into a special turbine. The turbine blades spin and the shaft from the turbine is connected to a generator to make electricity. The steam then gets cooled off in a cooling tower.

Geothermal energy does not produce any pollution, and does not contribute to the greenhouse effect. But the big problem is that there are not many places where you can build a geothermal power station and you need hot rocks of a suitable type, at a depth where we can drill down to them. The type of rock above is also important, it must be of a type that we can easily drill through.

The first geothermal power station was built at Landrello, in Italy, and the second was at Wairekei in New Zealand. Others are in Iceland, Japan, the Philippines and the United States.

Hydro Power

When it rains in hills and mountains, the water becomes streams and rivers that run down to the ocean. The moving or falling water can be used to do work. Energy is the ability to do work. So moving water can be used to make electricity. Hydro means water. Hydro-electric means making electricity from water power.

For hundreds of years, moving water was used to turn wooden wheels that were attached to grinding wheels to grind (or mill) flour or corn. These were called grist mills or water mills. The first use of water to generate electricity was in 1882 on the Fox river, in the USA, which produced enough power to light two paper mills and a house.

Today, moving water can also be used to make electricity. Hydroelectric power uses the kinetic energy of moving water to make electricity. Dams can be built to stop the flow of a river. Water behind a dam often forms a reservoir. Dams are also built across larger rivers but no reservoir is made. The river is simply sent through a hydroelectric power plant.

The water behind the dam flows through the intake and into a pipe called a penstock. The water pushes against blades in a turbine, causing them to turn. The turbine spins a generator to produce electricity. The electricity can then travel over long distance electric lines to your home, to your school, to factories and businesses.

Nowadays there are many hydro-electric power stations, providing around 20% of the world's electricity. Hydro is one of the largest producers of electricity in the United States. Water power supplies about 10 percent of the entire electricity that we use. In states with high mountains and lots of rivers, even more electricity is made by hydro power. In California, for example, about 15 percent of all the electricity comes from hydroelectric. The state of Washington leads the nation in hydroelectricity. About 87 percent of the electricity made in Washington state is produced by hydroelectric facilities. Some of that electricity is exported from the state and used in other states.

Solar Energy

We have always used the energy of the sun as far back as humans have existed on this planet. As far back as 5,000 years ago, people "worshipped" the sun. Ra, the sun-god, who was considered the first king of Egypt. In Mesopotamia, the sun-god Shamash was a major deity and was equated with justice. In Greece there were two sun deities, Apollo and Helios. The influence of the sun also appears in other religions - Roman religion, the Druids of England, the Aztecs of Mexico, the Incas of Peru and many Native American tribes.

We know today, that the sun is simply our nearest star. Without it, life would not exist on our planet. We use the sun's energy every day in many different ways. When we hang laundry outside to dry in the sun, we are using the sun's heat to do work - drying our clothes. Plants use the sun's light to make food. Animals eat plants for food. Decaying plants hundreds of millions of years ago produced the coal, oil and natural gas that we use today. So, fossil fuels is actually sunlight stored millions and millions of years ago.

Indirectly, the sun or other stars are responsible for all our energy. Even nuclear energy comes from a star because the uranium atoms used in nuclear energy were created in the fury of a nova - a star exploding.

Solar energy can also be used to make electricity. Solar cells convert sunlight directly into electricity. They are made of semiconducting materials similar to those used in computer chips. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity. This process of converting light (photons) to electricity (voltage) is called the photovoltaic effect. In a sunny climate, you can get enough power to run a 100W light bulb from just one square meter of solar panel.

Solar cells provide the energy to run satellites that orbit the Earth. These give us satellite TV, telephones, navigation, weather forecasting, the Internet and all manner of other facilities.

three feet away - на расстоянии трех футов

Solar Thermal Heat

The major applications of solar thermal energy at present are heating swimming pools, heating water for domestic use, and space heating of buildings. For these purposes, the general practice is to use flat-plate solar-energy collectors with a fixed orientation (position).

Where space heating is the main consideration, the highest efficiency with a fixed flat-plate collector is obtained if it faces approximately south and slopes at an angle to the horizon equal to the latitude plus about 15 degrees.

Solar collectors fall into two general categories: no concentrating and concentrating.

In the no concentrating type, the collector area (i.e., the area that intercepts the solar radiation) is the same as the absorber area (i.e., the area absorbing the radiation).

In concentrating collectors, the area intercepting the solar radiation is greater, sometimes hundreds of times greater, than the absorber area. Where temperatures below about 200º F are sufficient, such as for space heating, flat-plate collectors of the no concentrating type are generally used.

There are many flat-plate collector designs but generally all consist of a flat-plate absorber, which intercepts and absorbs the solar energy, a transparent cover that allows solar energy to pass through but reduces

heat loss from the absorber, a heat-transport fluid (air or water) flowing through tubes to remove heat from the absorber, and a heat insulating backing.

Solar space heating systems can be classified as passive or active. In passive heating systems, the air is circulated past a solar heat surfaces and through the building by convection (i.e., less dense warm air tends to rise while more dense cooler air moves downward) without the use of mechanical equipment. In active heating systems, fans and pumps are used to circulate the air or the heat absorbing fluid.

Ocean Energy

The ocean can produce two types of energy: thermal energy from the sun's heat, and mechanical energy from the tides and waves.

Oceans cover more than 70% of Earth's surface, making them the world's largest solar collectors. The sun's heat warms the surface water a lot more than the deep ocean water, and this temperature difference creates thermal energy. Just a small portion of the heat trapped in the ocean could power the world.

Ocean thermal energy is used for many applications, including electricity generation. There are three types of electricity conversion systems: closed-cycle, open-cycle, and hybrid. Closed-cycle systems use the ocean's warm surface water to vaporize a working fluid, which has a low-boiling point, such as ammonia. The vapor expands and turns a turbine. The turbine then activates a generator to produce electricity. Open-cycle systems actually boil the seawater by operating at low pressures. This produces steam that passes through a turbine/generator. And hybrid systems combine both closed-cycle and open-cycle systems.

Ocean mechanical energy is quite different from ocean thermal energy. Even though the sun affects all ocean activity, tides are driven primarily by the gravitational pull of the moon, and waves are driven primarily by the winds. As a result, tides and waves are intermittent sources of energy, while ocean thermal energy is fairly constant. Also, unlike thermal energy, the electricity conversion of both tidal and wave energy usually involves mechanical devices.

A barrage (dam) is typically used to convert tidal energy into electricity by forcing the water through turbines, activating a generator. For wave energy conversion, there are three basic systems: channel

systems that funnel the waves into reservoirs; float systems that drive hydraulic pumps; and oscillating water column systems that use the waves to compress air within a container. The mechanical power created from these systems either directly activates a generator or transfers to a working fluid, water, or air, which then drives a turbine/generator.

Biomass Energy

Biomass is matter usually thought of as garbage. Some of it is just stuff lying around - dead trees, tree branches, yard clippings, left-over crops, wood chips, and bark and sawdust from lumber mills. It can even include used tires and livestock manure.

Your trash, paper products that can't be recycled into other paper products and other household waste are normally sent to the dump. Your trash contains some types of biomass that can be reused. Recycling biomass for fuel and other uses cuts down on the need for "landfills" to hold garbage.

This stuff nobody seems to want can be used to produce electricity, heat compost material or fuels. Composting material is decayed plant or food products mixed together in a compost pile and spread to help plants grow.

California produces more than 60 million bone dry tons of biomass each year. Of this total, five million bone dry tons is now burned to make electricity This is biomass from lumber mill wastes, urban wood waste, forest and agricultural residues and other feed stocks.

If all of it was used, the 60 million tons of biomass in California could make close to 2,000 megawatts of electricity for California's growing population and economy. That's enough energy to make electricity for about two million homes!

How biomass works is very simple The waste wood, tree branches and other scraps are gathered together in big trucks The trucks bring the waste from factories and from farms to a biomass power plant Here the biomass is dumped into huge hoppers. This is then fed into a furnace where it is burned. The heat is used to boil water in the boiler, and the energy in the steam is used to turn turbines and generators.

Using biomass can help reduce global warming compared to a fossil fuel-powered plant. Plants store carbon dioxide (C02) when they grow. C02 stored in the plant is released when the plant material is burned or

decays. By replanting the crops, the new plants can use the C02 produced by the burned plants. So using biomass and replanting helps close the carbon dioxide cycle. However, if the crops are not replanted, then biomass can emit carbon dioxide that will contribute toward global warming.

So, the use of biomass can be environmentally friendly because the biomass is reduced, recycled and then reused. It is also a renewable resource because plants to make biomass can be grown over and over.

Today, new ways of using biomass are still being discovered. One way is to produce ethanol, a liquid alcohol fuel. Ethanol can be used in special types of cars that are made for using alcohol fuel instead of gasoline. The alcohol can also be combined with gasoline. This reduces our dependence on oil - a non-renewable fossil fuel.

APPENDICES

A. **Лексический справочник**

Принятые сокращения:
a — adjective (имя прилагательное)
adv — adverb (наречие)
conj — conjunction (союз)
n — noun (имя существительное)
num — numeral (имя числительное)
pl — plural (множественное число)
prp — preposition (предлог)
pron — pronoun (местоимение)
v — verb (глагол)

ABOUT adv — приблизительно; около, prp — о; об; относительно
about + инфинитив — вскоре
to be about + инфинитив — выражает будущность, намерение; переводится собираться

ABOVE adv — выше; a — указанный выше; prp — над; сверх

ALL
all along — везде, повсюду
all in all — в целом
ail but — почти; чуть не
at all — вообще; вовсе: совсем
if at all — если это вообще имеет место
not at all — нисколько; вовсе не; совсем не
first of all — прежде всего

ALLOW — позволять; давать; допускать
allow for — предусматривать; учитывать
with the allowance for — с учетом
make allowance for — учитывать; делать скидку, поправку на

ALREADY - уже

ALTHOUGH — хотя; хотя и

ANOTHER — другой
one another — друг друга

ANY —- какой-то; какой-нибудь; любой; всякий (в утвердительном предложении)
if any — если вообще имеется
not any longer=no longer — больше не
at any rate — во всяком случае

AS — как; в виде; в качестве; когда, по мере того как, так как; столь же; который

AS — после прилагательного пли наречия: каким бы
(как бы) + прилагательное (наречие) + ни был
as it is — после причастия II: поскольку
as it does — после причастия I: поскольку
as as — такой же… как; так же… как, столь же… как

BE (was, were, been) — быть; являться; *с обстоятельством места*: находиться; равняться + *число (величина)*; *с инфинитивом* или *придаточным предложением*: состоять в том, что (чтобы)
be + инфинитив — выражает модальность или будущее время; переводится следует (должен); можно будет
be of + существительное — иметь; представлять
be of importance — иметь значение
be of interest — представлять интерес
be of service — быть полезным
be of value — иметь значение; быть ценным
living being — живое существо
for the time being — временно; пока

BEFORE prp — до; перед; adv — до этого; перед тем;
conj — до того, как; перед тем, как
long before — задолго до; задолго до того, как
before long — вскоре
it is not long before — вскоре

BESIDES — кроме; кроме того

BOTH — оба
both and — как так и

BUT conj — но; prp — кроме; adv — только
but for — если бы не

BY предлог места — при; около; у; предлог времени —к; перед герундием — при помощи, путем; после глагола в страдательном залоге — указывает на действующее лицо или предмет

CAUSE n — причина; v — причинять, вызывать
cause + инфинитив.— заставлять; приводить к

CONCERN n — дело; интерес; забота; v — касаться; рассматривать; интересоваться
be concerned with — иметь дело с; касаться
as/so/in so far as...is concerned — что касается; поскольку речь идет о
concerned — рассматриваемый; затронутый; данный; о котором идет речь
concerning — относительно

CONSIDERATION — соображение; рассмотрение
give consideration to — учитывать, принимать во внимание
take into consideration — учитывать; принимать во внимание

DATA (pl.) — данные

DATE — число; дата

DEPEND
depend on (upon) — зависеть от; основываться
be dependent on (of) — зависеть от
depending on (upon) — в зависимости от

DO (did, done) — делать; *вспомогательный глагол для образования вопросительной и отрицательной формы* Present и Past Indefinite; *глагол-усилитель*, переводится: *все же, действительно, фактически, на самом деле; глагол — заместитель предшествующего глагола*
do away with — отказаться от чего-либо
have to do with — иметь дело с чем-либо
do without — обходиться без чего-либо

DUE a — должный; надлежащий
due to — из-за; благодаря; вызванный; обусловленный
due to + имя собственное — разработанный кем-либо
be due to — обусловливаться
be due to+ имя собственное — быть разработанным кем-либо

EACH — каждый
each other — друг друга
with each other — друг с другом

EFFECT n -- влияние; действие; v — осуществлять

E. G.. — например

EITHER — любой (из двух); один (из двух); оба
either or — …или … или

ENABLE — давать возможность

ENOUGH — достаточно

EVERY — все, всякий, каждый
every now and then (again) — время от времени
every time — всякий раз; всякий раз, когда
everybody, everyone, everything — все
everywhere — везде, повсюду

EXAMPLE
for example (for instance) — например

EXCEPT — кроме, кроме как
except for — кроме; кроме, как
except that — за исключением того, что; кроме того, что
except where otherwise stated — кроме особо оговоренных случаев
except where specially mentioned — кроме особо упомянутых случаев

EXTENT — степень
to an extent — до некоторой степени
to a large extent — в значительной степени
to some extent — до некоторой степени
to a small extent — в небольшой степени
the extent to which — то, насколько

FACT
the fact that — то, что; то обстоятельство, что
the fact is (that) — дело в том, что
in fact — фактически, на самом деле

FEW — мало
a few — несколько
few if any — мало; если вообще сколько-нибудь имеется

FIRST — впервые; сначала
at first — сначала
the first — первый
in the first place — во-первых
first of all — прежде всего

FOR prp — для; в течение; conj— ибо
for fear — чтобы не; из страха, из боязни
for a moment — на момент
for example I
for instance) ~ например
but for — если бы не
were it not for — если бы не

THE FORMER — первый

FROM ... TO — от … до

FURTHER — дальнейший, далее

HOW — как; насколько

HOWEVER - однако
however + прилагательное — как бы ни; какой бы ни

I. E. — т е.

IF — если; если бы; ли (перевод придаточного, *введенного союзом* if (ли), *следует начинать со сказуемого*)
if any — если вообще имеется
if at all — если это вообще имеет место
s if — как бы; как если бы; как будто бы

IMPLY — подразумевать; намекать; означать; заключать в себе

IN+**ГЕРУНДИЙ** – при

INCREASE BY — увеличиваться на (какую-либо величину)
increasingly — все более

IT — *личное местоимение*: он, она, оно; *указательное местоимение* это; *неопределенно-личное местоимение* (на русский язык не переводится)
it is that (which, who) — именно
it is not until (till) that — если until предлог: только; только после; если until союз: только тогда, когда

LAST — прошлый
the last — последней
at last — наконец
LATTER
the latter — последний

LIKE — подобно, как
be like — быть подобным
should (would) like — хотел бы
likely — вероятно; может
unlikely, not likely— маловероятно; вряд ли
likewise — таким же образом

LITTLE a — маленький; adv — мало
a little — немного
little, if any — мало, если вообще сколько-нибудь имеется

MAINLY — главным образом

MEAN (meant, meant) v — означать; предназначать(ся) для; подразумевать
mean a — средний
means n — средство
by any means — любым способом
by no means — никоим образом
by means of — при помощи; посредством
by which means — посредством чего

MEASURE n — мера; степень; v — измерять
in a measure — отчасти; до некоторой степени

MORE — больше
числительное + more — еще (один, два и т д.)
no more — больше не
once more — еще раз
the more so — особенно; тем более так

MOREOVER — кроме того; более того

MOST n большинство;
most + *прилагательное* или *наречие* — весьма; очень; большинство
most + *существительное* — большинство; большая часть
at most — самое большее; в лучшем случае
the most + прилагательное — самый; наиболее

MOSTLY — в основном

MUCH — много
much + сравнительная степень прилагательного —гораздо; значительно; несомненно
much the same — почти такой же
as much as + величина — (вплоть) до
so much — так сильно; так много

NECESSARILY — обязательно

NEED n — нужда; v — нуждаться; *как модальный глагол в вопросительных и отрицательных предложениях*: быть должным
be in need of smth — нуждаться в чем-либо
needless to say — нечего и говорить; не стоит и говорить; само собой разумеется

NEITHER — а также не; так же...не
neither (of) — ни один (из)
neither nor — ни … ни

NEXT a — следующий; соседний; будущий; adv —затем; далее; prp — рядом; около

NOR — также не, и... не
neither … nor — ни … ни

NOT — не
not at all — нисколько; вовсе не; совсем не
not only but (also) — не только во и (также)
not so as — не такой как; не так как;
не столь как not yet — еще не
not until — только; только после; только после того, как

not until after — только после того, как; только тогда, когда

NUMBER — число
a number of — ряд
the number of — число
a great number of — большое количество

OCCUR — иметь место; встречаться; протекать; приходить в голову; приходить на ум; решать

ONE num — один; pron — *заместитель существительного в ед. ч (ones — во ми.), переводится тем существительным, которое заменяет; неопределенно-личное местоимение в функции: а) подлежащего — не переводится, сказуемое передается неопределенно-личной формой:* one may — можно, one must — следует, one thinks — считают; б) *определения — не переводится*; в) *дополнения — не переводится*
one another — друг друга

OTHERWISE — иначе; в противном случае; в другом отношении; во всем остальном

OWING TO - благодаря

PER — на; за; в
per cent — процент
per day — в день

PRECISELY — точно; определенно

RATE n — степень; скорость
at any rate — во всяком случае

REGARD n — отношение; взгляд; v — считать; рассматривать; относиться
as regards, in regard (to), with regard (to), regarding — что касается; в отношении; относительно
regardless — независимо от; невзирая на

RESULT n — результат; v — возникать
result in — давать в результате; приводить к
result from — являться результатом; проистекать
resulting a — возникающий в результате
as a result — в результате

SAME
the same — тот же самый
much the same — почти такой же

SCARCELY — едва; едва ли

SINCE conj — так, как; с тех пор, как; adv — с тех пор; prp — с=после

SO — так; поэтому; таким образом; так же
so as (to) — так, чтобы
so as to — так (такой, настолько) что (чтобы)
so far — до сих пор
so far as, in so far as— поскольку; насколько; что касается
so far as … is concerned, in so far as.. is concerned — что касается;поскольку речь идет о
so long as — пока
so that — так, что
so to put it, so to say - так сказать

so …that — настолько … что
and so on, and so forth -- и так далее
not so … as — не такой… как; не так … как; не столь… как

STILL adv — все нее; однако; все еще; до сих пор; еще

SUCH
as such — как таковой
such as to — такой, что (чтобы)
such as to — такой что (чтобы)

THAN — чем
no sooner … than — не успел … как; как только
rather than — а не

THAT pron — тот (этот); *заместитель существительного переводится тем существительным, которое заменяет*; conj — что; то, что; чтобы; который
that is — то есть
that is to say — то есть; иначе говоря
is that — заключается в том, что (чтобы)
it is that (which, who) — именно
it was not until … that — (если until предлог) только после; (если until союз) только тогда, когда
now that — теперь, когда

THE — артикль; часто переводится этот; тот
the + *сравнительная степень прилагательного или наречия* — чем … тем (the sooner … the better — чем скорее … тем лучше); *сравнительная степень прилагательного или наречия (без артикля)* … the + *сравнительная степень прилагательного или наречия* — тем чем

THEN — тогда; затем
since then — с тех пор
until then — до того времени

THERE - там
there is — имеется; есть
there exists — существует
there is believed — полагают

THEREFORE – поэтому

THESE - эти; они
these are — (в начале предложения) вот

THIS —это
this is — (в начале предложения) вот

THOSE — те; заместитель существительного во мн. числе (переводится тем существительным, которое заменяет)

THOUGH — хотя; хотя и
as though — как бы; как если бы; как будто бы
even though — даже если; даже хотя
прилагательное или наречие + though — каким бы ни; как бы ни

THROUGH — путем; посредством; через

THROUGHOUT — повсюду; на всем протяжении

THUS — таким образом
thus far — до сих пор

TILL — до; пока не

UNLESS — если не
unless otherwise (specially) mentioned (stated, specified) — если не оговорено особо

UNLIKE
unlike + *существительное* — в отличие от
be not like, be unlike - отличаться
be unlikely, unlikely — маловероятное; вряд ли
not likely, not unlikely — довольно вероятно

UNTIL — пока не
until now — до настоящего времени
not until — только; только после
it was not until that — (если until предлог) только после; (если until союз) только тогда, когда

UP **TO** — до; вплоть до

WHAT — что; какой; то, что; каков

WHATEVER — какой бы ни; всякий, который; что бы ни; все, что; *после* any *усиливает any; после отрицания усиливает отрицание*, переводится *вовсе*

WHICH
which — что (если относится ко всему предложению)
which + существительное — этот; эта; это; все, кто

WHILE — в то время, как; тогда, как; хотя; хотя и
a while — короткий промежуток времени
for a while — на время
be worth while — стоить

WHOLE
as a whole, on the whole –в целом; в общем
it is … who — именно
whoever — кто бы ни; всякий, кто; все, кто

WHY
that is why — вот почему

WILL
at will — по желанию; произвольно

WITH
with the hope — в надежде

WITHIN — в пределах

WITHOUT — без; не (перед герундием)
without regard for — не учитывая
it goes without saying — не требует доказательства; само собой разумеется

WORTH — стоящий
be worth (while) — стоить

YET — однако; тем не менее; все же; еще
as yet — до сих пор
not yet — еще не

В. **Рекомендации по составлению реферата и аннотации**

Реферат – это сжатое изложение содержания статьи с основными фактическими данными, выводами и рекомендациями.

1. Реферат строится на основе ключевых фрагментов, выделенных из текста подлинника.
2. Реферат должен быть написан литературным языком с соблюдением сокращений широко употребляемых слов, обозначений и единиц физических величин.
3. В реферате должна быть использована научная терминология, принятая в научной литературе по или иной отрасли науки и техники.
4. Реферат должен объективно и точно отражать содержание первоисточника; нельзя вносить какие-либо изменения или дополнения по существу реферируемой работы; нельзя излагать собственную точку зрения или критические замечания, вступать в полемику с автором.
5. Начало реферата не должно повторять заглавие работы. Не следует прибегать к неясным формулировкам, а также к различного рода повторениям.
6. Текст реферата рекомендуется делить на абзацы.
7. Главная мысль в реферате должна быть конкретизирована и выделена.

Аннотация – это краткая характеристика работы с изложением наиболее важных положений.

1. Аннотация пишется своими словами, просто и кратко. Следует избегать сложных конструкций и предложений.
2. Изложение аннотируемой части рекомендуется начинать с существа вопроса, избегать повторения заголовка.
3. Не следует вводить аннотируемую часть дополнительными фразами типа: «Целью данной статьи является…», «По мнению автора…». Для обобщения информации рекомендуется использовать такие слова, как: «предлагается, описывается, излагается, сообщается…» и т.п.
4. Рекомендуется названия фирм, исследовательских центров, институтов, компаний давать в их оригинальном написании.
5. Следует использовать аббревиатуры и различные сокращения в соответствии с общепринятыми в справочной литературе.

Список выражений, рекомендуемых для написания реферата

1. The article (text) is head-lined…
   The head-line of the article (I have read) is …
2. The author of the article (text) is …
   The article is written by …
3. It is (was) published in …
   It is (was) printed in …
4. The main idea of the article (text) is …
   The article is about …
   The article is devoted to …
   The article deals with …
   The article touches upon …
   The article presents some results which illustrate …
5. The purpose of the article (text) is to give the reader some information on…; … is to compare (to determine) …
   The aim of the article is to provide the reader with some material (data) on …
6. The author starts by telling the readers (about, that) …
   The author writes (states, stresses, thinks, points out) that …
   The article describes …
   According to the article (text) …
   Further the author reports (says) that …
   The article goes on to say that …
7. The article is (can be) divided into 4 (5-7) parts.
   The first part deals with …
   The second part is about …
   The third part touches upon …
   The fourth part of the article includes the fact on …
8. In conclusion the article reads …
   The author comes to the conclusion that …
9. I found the article (text) interesting (important, dull, of no value, easy, (too) hard to understand…)

Список выражений, рекомендуемых для написания аннотации

It is described in short
…is introduced
It is shown that
…is given
It is dealt with
…is provided that
…is designed for
…is examined, is investigated
…is analysed
…is formulated
The need is stressed to employ…
Attention is drawn to…
Data are given about…
Attempts are made to analyse, to formulate…
Conclusions are drawn…
Recommendations are given…

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