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Unit 1. Hydropower

Text 1

Gabon Boosts Energy Power Generation (VOA)

Peter Clottey

Gabon has begun **upgrading** its electrical power and **distribution facilities** to meet industry and residential **demands**, **according to** a government official involved in the project. "There was **a high rise in demand** from the local population as well as industry," said Patrick Rodrigue Yalis Ongala, the director of electricity at Gabon's Ministry of Mining, Energy, Oil & Hydraulic Resources. "That's why the government decided **to upgrade [older] dams** and is now constructing new ones."

Officials say **energy demand** in the capital, Libreville, and **surrounding areas** is 183 Megawatts (MW). A report by the Oxford Business Group (OBG) notes demand is growing by up to 5 percent per year, which **includes** demands for electricity from **rural areas**.

But the U.S. Energy Information Administration (EIA) says only 36 % of all Gabonese **have access to** electricity, most of them in **urban areas**. The group says over 900,000 people, largely in the **countryside**, **lack access**.

The EIA says that while Gabon has "**vast potential to expand**" its hydroelectric power, "the country **lacks adequate infrastructure**," especially in rural areas, **to take advantage of** its **natural resources**. In its report, the Oxford Business Group noted that Gabon was already working with China to help finance a doubling of its electrical transmission lines, but mainly in the Libreville region.

Development experts also **note the importance** of rural **access to electricity**, saying it **spurs economic development** and **helps promote improvements** in healthcare and education.

To meet growing energy needs, the government is planning to build more power-producing dams, which the EIA says today account for only about 9 percent of all energy production. Most production now comes from the use of **petroleum** or from biomass and **waste**.

Ongala said the government's intention is **to increase overall electrical power production** from 374 MW to 1200 MW by 2020. He said **to meet that objective** not only by building new hydro-electric dams, but **gas powered plants** and a **heavy fuel power station**. "We are expecting 160 megawatts of energy, in which 75 percent will be dedicated to the Mwanda factory and **the rest** of the 25 percent will be for the population **network**."

Ongala said of one new project. "We are constructing another dam in the southern region to produce about 84 megawatts, and also in the northern side on the Okano River, which will produce 54 megawatts of electricity." China's Sinohydro Company will build the hydroelectric dam in Haut Ogooue province. The project began in late 2008, with **an estimated cost** of $ 374,259,849.Ongala **predicted** the new dam will produce electricity **to meet the country's energy needs**. And if **there's enough left over**, he said, power will **be exported to neighboring countries** in Central Africa.

Development specialists **welcome** the construction of hydroelectric plants **though** they note **provisions** should be included **to provide for** potential **erosion** or **the diversion of water** used by some communities for drinking or for agriculture.

The experts also say Gabon's plans – as with those for other African countries – will need **to provide for the improvement** of transmission facilities. In many countries, the electrical power infrastructure was built before independence and poorly **maintained** since. Much of that infrastructure is now **obsolete**.

The development experts say energy plans should be all **encompassing**. Rural areas need **to take advantage of alternative energy sources**, including **solar**, wind and biomass.

A. Find English equivalents for the following Russian ones:

1) начать модернизацию электрических и распределительных объектов; 2) удовлетворять энергетические потребности населения; 3) в соответствии / согласно; 4) потребление электроэнергии со стороны местного населения; 5) модернизировать старые плотины и строить новые; 6) спрос на электроэнергию в столице и близлежащих районах; 7) сельская местность; 8) доступ к электроэнергии; 9) недостаток доступа к электроэнергии в городских и сельских районах; 10) огромные возможности; 11) увеличивать мощность гидроэлектростанции; 12) стране

не хватает надлежащей / соответствующей инфраструктуры; 13) воспользоваться природными ресурсами; 14) отмечать важность доступа к электричеству в сельской местности; 15) способствовать экономическому развитию; 16) развивать здравоохранение и образование; 17) для удовлетворения растущих энергетических потребностей; 18) использовать нефть и отходы для производства электроэнергии; 19) увеличение общего производства электроэнергии; 20) для достижения цели; 21) газоэлектростанция; 22) электростанция, работающая на тяжелом топливе; 23) энергетическая система / сеть электроснабжения; 24) оценочная стоимость проекта; 25) экспортировать электроэнергию в соседние страны; 26) обеспечить меры предосторожности; 27) предусматривать модернизацию линий электропередач; 28) вышедший из употребления / снятый с эксплуатации; 29) поддерживать / обслуживать / содержать в исправности; 30) использовать альтернативные источники энергии.

B. Word building

A	B
1. upgrade (v)	_____(n), _____ (n)
2. distribite (v)	_____ (n)
2. _____ (v)	demand (n)
4. access (v)	_____(n)
5. _____ (adj)	importance (n)
6.develop (v)	_____ (n)
7. _____ (v)	promotion (n)
8. improve (v)	_____(n)
9. produce (v)	_____ (n)
10. _____ (v)	electricity (n)
11. export (v)	_____ (n)
12. _____ (adj)	neighbour (n)
13. _____ (v)	diversion (n)
14. intend (v)	_____ (n)

C. Answer the questions to the text

1. Why did Gabon's government decide to upgrade its electrical power and distribution facilities?
2. What is the energy demand in Libreville and surrounding areas?
3. How many Gabonese have access to electricity? How many people lack access?
4. Why is it important to develop rural access to electricity?
5. What are the basic sources of energy production in the country nowadays?
6. How does the government intend to increase overall electrical power production from 374 MW to 1200 MW by 2020? How is the energy to be distributed?
7. How much electricity will the new dam produce? What countries is the power expected to be exported to?
8. What should be done to provide for potential erosion or the diversion of water?
9. Why is much of the country's infrastructure obsolete nowadays?
10. What alternative energy sources should the rural areas of the country take advantage of?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. According to a government official involved in the project Gabon has begun constructing fossil fuel power plants.
2. With a high rise in demand from the local population and industry the government decided to upgrade older dams and to construct new ones.

3. Energy demand is growing by up to 25 percent per year, which includes demands for electricity from urban areas.

4. About 36 % of all Gabonese have access to electricity while over 900,000 people, largely in the countryside, lack access.

5. Gabon has an adequate infrastructure to take advantage of its natural resources.

6. According to development experts rural access to electricity spurs economic development and helps promote improvements in healthcare and education.

7. Most of Gabon's power production nowadays comes from the use of alternative energy sources.

8. The government intends to increase overall electrical power production from by building new hydro-electric dams, gas powered plants and a heavy fuel power station.

9. The new hydroelectric dam in Haut Ogooue province will produce electricity to meet the country's energy needs.

10. Gabon's electrical power infrastructure was poorly maintained since it had been built; much of the infrastructure is now obsolete.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. To meet growing industry and residential **energy needs** Gabon has begun **improving** its electrical power and distribution facilities

2. With a high rise in **energy needs** from the local population and industry the government decided **to develop** older **dikes** and to **build** new ones.

3. About 70% of all Gabonese, largely in the **rural areas, have no** access to electricity.

4. With Gabon's **immense** potential **to develop** its **water power**, the country lacks adequate infrastructure, especially in **rural areas**, **to make use of** its natural resources.

5. The experts **pay attention to** rural access to electricity that helps **stimulate developments** in **medicine** and education.

6. The government's **purpose** is to **extend** overall electrical power production from 374 MW to 1200 MW by 2020 by **building** new hydro-electric **dikes** and gas powered **plants**.

7. 75 percent of **power** produced will **serve for** the Mwanda factory and the 25 percent **left over** will be for the population **energy system**.

8. The new **dike** is expected to produce **power** to meet the country's **energy needs**.

9. Gabon's plans of **improving** its electrical power facilities will need **to make provisions for the development** of transmission facilities as much of country's infrastructure is **out of use** now.

10. **Rural areas** need **to make use of** alternative **power** sources, including solar, wind and biomass.

2. Complete each sentence with a word from the box

access	advantage	urban	electricity
energy	lack	demands	sources
expand	promote	provide	upgrade
petroleum	facilities	diversion	population

1. To meet industry and residential energy _____ Gabon has begun upgrading its electrical power and distribution _____.

2 The government decided to _____ older dams because there was a high rise in demand from the local _____ and industry.

3. According to officials _____ demand in the capital of Gabon and surrounding areas is 183 Megawatts (MW).

4. Most of Gabonese having _____ to electricity live in _____ areas.

5. Over 900,000 people, largely in the countryside, _____ access to electricity.

6. Gabon is known to have vast potential to _____ its hydroelectric power.

7. Rural access to _____ spurs economic development and helps _____ improvements in healthcare and education.

8. Most production of electricity in Gabon nowadays comes from the use of _____ or from biomass and waste.

9. Development specialists note provisions should be included to _____ for potential erosion or the _____ of water used by some communities for drinking or agriculture.

10. Rural areas need to take _____ of alternative energy _____, including solar, wind and biomass.

3. Complete the sentence with the appropriate word

1. Global energy _____ has greatly risen in the last 150 years in step with industrial development and population growth.
2. Over 1.2 billion people – 20% of the world's population – are still without _____ to electricity worldwide, almost all of whom live in developing countries.
3. In India, 404 million people _____ access to the energy needed for lighting, mechanical power, transport and telecommunications.
4. Southern Asian countries account for 42% of the total number of people without access to electricity worldwide, 92% of whom live in _____ .
5. Renewable energy is energy obtained from _____ – these resources include moving water, wind, biomass, solar, geothermal, and ocean energy.
6. A wide range of energy-producing technologies and equipment have been developed to _____of natural resources.
7. A clean renewable energy resource derived from the waste of various human and natural activities is called _____ .
8. The electrical power infrastructure was poorly maintained since it had been built. It needs _____ .
9. If there's enough power left over, it will be exported to _____ in South Africa.
10. The new _____ being constructed in the southern region will produce 54 megawatts of electricity.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) a Gabonese speaking about his / her poor life because of energy problem;
2) a member of Gabon Government speaking about the necessity of upgrading the country's electrical power and distribution facilities;
3) an economist speaking about economic benefits of the dam upgrading for Gabon;
4) an environmental expert speaking about possibility of erosion and diversion of water used by some communities for drinking and agriculture;
5) other.

Text 2.

China's Environment Ministry Approves Huge Hydro Dam (VOA)

Reuters

BEIJING – China's **environment** ministry has given the **go-ahead** for the **construction** of what will become the country's tallest **hydroelectric dam despite acknowledging** it will have an **impact on** plants and rare fish.

The dam, with a **height** of 314 meters (1,030 feet), will **serve** the Shuangjiangkou hydropower project on the Dadu River in southwestern Sichuan province. To be built over 10 years by a subsidiary of state power firm Guodian Group, it is expected to cost 24.68 billion yuan ($4.02 billion) in **investment**.

The ministry, in a statement issued late on Tuesday, said an **environmental impact** assessment had **acknowledged** that the project would **have** a **negative impact on** rare fish and flora and **affect** protected local **nature reserves**. Developers, it said, had pledged to take "countermeasures" **to mitigate the effects**. The project still **requires** the formal **go-ahead** from the State Council, China's cabinet.

China **aims to raise the share of non-fossil fuels** in its **energy mix** to 15 percent by 2020, up from 9.4 percent in 2011. Hydropower is expected to make the biggest **contribution**. It has vowed **to speed up** construction of dams in the 2011-2015 period after slowing it down following the **completion** of the **controversial** Three Gorges project in 2006.

The Three Gorges Dam, which **serves** the world's biggest hydropower station on the Yangtze river, **measures** 185 meters. The 300-m Nurek dam in Tajikistan in Central Asia is the world's highest, though other taller dams are now under construction. China's tallest dam now, at 292 meters, is the Xiaowan Dam on the Lancang River, also known as the Mekong.

On completion, the Sichuan project will have a total **installed capacity** of 20 gigawatts (GW), with **annual power generation** to **exceed** 7 billion kilowatt-hours (kWh). The government said this year that hydropower capacity was expected to **reach** 290 GW by 2015, up from 220 GW at the end of 2010. It also said it would begin building a controversial project on the undeveloped Nu River in Yunnan province.

Guodian was one of a number of state-owned firms criticized by China's national audit office last week for starting work on projects not yet been **approved** by the central government. The office said by the end of 2011, the company had **invested** nearly 30 billion yuan in 21 unapproved projects. The Huaneng Group, China's biggest power company, was also criticized for **launching** construction of the Huangdeng hydropower plant before **receiving** the government's go-ahead. ($1 = 6.1428 Chinese yuan)

A. Find English equivalents for the following Russian ones:

1) дать разрешение на строительство плотины гидроэлектростанции; 2) дамба / плотина высотой 314 метра; 3) воздействие / влияние на окружающую среду; 4) отрицательное / негативное воздействие на природу; 5) наносить ущерб заповедникам; 6) смягчить последствия; 7) требовать формального разрешения; 8) увеличить долю не ископаемого топлива в энергетической структуре; 9) вклад; 10) ускорить строительство плотины; 11) завершение спорного проекта; 12) установленная мощность; 13) ежегодное производство электроэнергии превысит 7 миллиардов киловатт-часов; 14) одобрить проект; 15) инвестировать / вкладывать деньги в строительство гидроэлектростанции; 16) начать строительство, не получив разрешения правительства.

B. Word building

A	B
1. _____ (adj)	environment (n)
2. acknowledge (v)	_____ (n)
3. invest (v)	_____ (n)
4. require (v)	_____(n)
5. _____ (v)	aim (n)
6.impact (v)	_____ (n)
7. _____ (v)	share (n)
8. generate (v)	_____(n)
9. complete (v)	_____ (n)
10. _____ (v)	contribution (n)
11. approve (v)	_____ (n)
12. _____ (v)	installation (n)

C. Answer the questions to the text

1. What has China's environment ministry given the go-ahead for?
2. What project will the dam serve? What investment will the project require?
3. What environmental impact will the country's tallest hydroelectric dam have on plants and rare fish? Will it affect China’s protected local nature reserves?
4. What kind of power is expected to make the biggest contribution in the share of non-fossil fuels in China’s energy mix?

5. Which functioning dams are considered to be the highest ones in the world?

6. What total installed capacity will the Sichuan project have when completed? What capacity is it expected to reach by 2015?

7. Why were some China's firms and power companies criticized by China's national audit office?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. China's environment ministry has banned (forbidden? Prohibited) the construction of the hydroelectric dam as it will have an impact on plants and rare fish.

2. The dam, with a height of 314 meters, will serve the Sichuan hydropower project and is expected to cost $4.02 billion in investment.

3. The environmental impact assessment had acknowledged that the project would have a negative impact on rare fish and flora and affect protected local nature reserves.

4. China aims to raise the share of fossil fuels in its energy mix to 95 percent by 2020; diesel power stations are expected to make the biggest contribution.

5. China's tallest dam now, with a height of 292 meters is known as the Mekong.

6. On completion, the Sichuan project will have a total installed capacity of 10 gigawatts, with annual power generation to exceed 7 million kilowatt-hours.

7. The Huaneng Group, China's biggest power company, launched the construction of the Huangdeng hydropower plant after receiving the government's go-ahead.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. China's environment ministry has given the **permission** for the construction of the country's tallest hydroelectric dam **notwithstanding** the **admission** it will have a negative **effect** on plants and rare fish.
2. The **dike**, with a height of 314 meters, **is designed for** the hydropower project on the Dadu River in southwestern Sichuan province.
3. The project is known to **damage** (harm) protected local **reserved areas** and have a negative **influence on** rare fish and flora.
4. China **purposes to increase** the share of non-fossil fuels in its **power system** to 15 percent by 2020.
5. **Waterpower engineering** is expected to make the biggest contribution in China's **power network**.
6. Hydropower capacity of the **dike** is expected to **increase** up to 290 GW by 2015.
7. China's biggest power company **has started** construction of the hydropower **station** without **getting** the government's **permission**.

2. Complete each sentence with a word from the box

impact	contribution	investment	serve
fuels	plants	dam	nature
affect	share	height	go-ahead

1. China's environment ministry has given the _____ for the construction of the country's tallest hydroelectric _____.
2. The dam, with a _____ of 314 meters, will _____the Sichuan hydropower project.
3. China aims to raise the _____ of non-fossil _____ in it power system to 15 % by 2020.
4. Environmental experts are sure the hydroelectric dam will have a negative _____ on rare fish and _____.
5. Hydropower is expected to make the biggest _____ in China's energy mix.
6. The project is sure to _____ China's protected _____ reserves.
7. The dam is expected to cost about $4 billion in _____ .

3. Complete the sentence with the appropriate word

1. The building company launched the construction of a new swimming-pool without receiving a _____ from local authorities.
2. Environmental experts say the Zeya hydropower station has a negative _____ on rare plants and fish of the Amur region.
3. The dam being constructed in China will _____ its protected local nature reserves.
4. The dam of the Bureya hydropower plant, biggest in the Far East of Russia, is a 140 meters _____.
5. China aims to raise the _____ of non-fossil fuels in its energy mix to 15 percent by 2020.
6. China needs $4 billion in _____ for constructing its highest dam.
7. A protected area of importance for wildlife, flora, fauna or features of geological or other special interest is called a _____ .

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) China's environment ministry who has given the go-ahead for the construction of the country's tallest hydroelectric dam;
2) a member of China Government speaking about the necessity of hydropower dam constructing on the Dadu River in southwestern Sichuan province;
3) an economist speaking about economic benefits of the dam construction for China;
4) an environmental expert speaking about a negative impact of hydro power dam constructing on rare fish and flora;
5) the dam's project manager speaking about the possibilities to mitigate the effects of affecting protected local nature reserves;
6) other.

Text 3

Ethiopia Continues Dam Construction (VOA)

Marthe van der Wolf

ADDIS ABABA – Ethiopia and Egypt have been in a diplomatic dispute for weeks over the construction of what will be Africa's largest **hydro-electric dam** – impacting the waters of the Nile River. But with Egypt facing political turmoil at home, attention has also **been diverted** from this **controversial** project.

The massive construction of the Great Ethiopian Renaissance Dam continues **despite** sometimes angry protests from Egypt. At issue is – diverting part of the Blue Nile since May.

The recently ousted Egyptian government feared the **diversion** would **impact** the Nile River **flow** – on which it is heavily dependent.

All of this will be a **reservoir** with 74 billion cubic meters of Nile waters. Ethiopia said it will gradually **fill the reservoir** in the coming years, leaving Egypt **questioning** how the reservoir can be filled **without affecting the water flow**, especially during periods of **drought**.

Simegnew Bekele, one of the dam's project managers, said better water management by both Egypt and Ethiopia will be the key. "The water will flow through these **culverts permanently**. Those culverts will be part of the dam, which will be embedded, which will have gates and during any **low flow** the water will **pass through** the culverts because it will **be installed** at the normal **riverbed** level. We cannot change the normal riverbed level," he explained.

Ethiopia is proceeding with construction even as **environmental experts** and diplomats continue **to work out** Nile River **resource management** among affected countries.

The Great Ethiopian Renaissance Dam will make Ethiopia Africa's biggest **power exporter** in the next four years – producing 6000 megawatts of **hydroelectric power**. The dam will be 1708 meters long, 145 meters high and will **be equipped with** two **powerhouses**. Potential buyers of the electricity **include**

Somalia, Uganda and even possibly Egypt.

The dam will be **completed** in 2020 at a cost of close to $5 billion.

A. Find English equivalents for the following Russian ones:

1) крупнейшая плотина гидроэлектростанции; 2) отвлекать внимание от спорного / дискуссионного проекта; 3) продолжать строительство несмотря на протесты; 4) водозаборное сооружение / водоотвод; 5 повлиять на течение реки; 6) постепенно заполнять бассейн водохранилища; 7) не влиять на поток воды; 8) периоды засухи; 9) водопропускное сооружение / кульверт; 10) слабый поток; 11) монтировать / устанавливать кульверты на уровне русла реки; 12) эксперты по охране окружающей среды / экологи; 13) рациональное использование природных ресурсов / управление ресурсами; 14) крупнейший экспортер электроэнергии; 15) оснащать / оборудовать; 16) электростанция; 17) завершить строительство плотины.

B. Word building

A	B
1. _____ (n)	construct (v)
2. diversion (n)	_____ (v)
3. _____ (v)	impact (n)
4. _____ (v)	affect (n)
5. management (n)	_____ (v)
6.flow (v)	_____ (n)
7. _____ (v)	installation (n)
8. export (v)	_____(n)
9. equip (v)	_____ (n)
10. complete (v)	_____ (adv)

C. Answer the questions to the text

1. What is the matter of the diplomatic dispute between Ethiopia and Egypt?
2. What does the Egyptian government fear?
3. How many cubic meters of Nile waters will the reservoir of the Great Ethiopian Renaissance Dam contain?
4. Why will the water of the Nile River pass through the culverts even during any low flow?
5. What will make Ethiopia Africa's biggest power exporter in the next four years? How much hydroelectric power will it produce?
6. Which countries are among the potential buyers of Ethiopia's electricity?

D. True or False? (Use the facts and the keywords from the text to prove your viewpoint)

1. The matter of the diplomatic dispute between Ethiopia and Egypt is the construction of Africa's largest hybrid solar-combustion power plant.
2. Egypt is heavily dependent on the Nile River flow and the government fears the diversion of Blue Nile will impact it.
3. Egypt is sure the reservoir can be filled without affecting the water flow, even during periods of drought.
4. The culverts will be installed at the normal riverbed so that the water will pass through them even during any low flow.
5. The Great Ethiopian Renaissance Dam is expected to be equipped with a powerhouse.
6. The construction of Africa's largest hydro-electric dam will be completed in 2015 at a cost of close to $15 billion.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. The massive construction of the Great Ethiopian Renaissance Dam **goes on in spite of** angry protests from Egypt.
2. Egypt is **doubting** how the reservoir of the **dike** can be filled without **impacting** the water flow.
3. The **dike** will **be set up** at the normal riverbed level and the water will **constantly run through** the culverts even during any low **stream**.
4. While **environmentalists** and diplomats continue **to develop** Nile River resource management among affected countries, Ethiopia is proceeding with the construction of Africa's largest hydro-electric **plant**.
5. The Great Ethiopian Dam will **be outfitted with** two **electric power plants**.
6. The **dike** of Africa's largest hydro-electric power **station** will be **constructed** in 2020.

2. Complete each sentence with a word from the box

power	impact	electricity	riverbed
culvert	plant	droughts	reservoirs

1. The _____ in East Africa in 1999-2000 had a serious _____ on the hydroelectric facilities in the region.
2. In South Africa, the government has introduced a policy of free _____ up to a certain number of units, designed to make it affordable for all.
3. A power station or power _____ is a facility for the generation of electric _____.
4. Five thousand years ago, the craters of extinct volcanoes in Arabia were used as _____ by farmers for their irrigation water.
5. Structure that allows water to flow under a road, railroad, trail, or similar barrier is called a _____ .
6. The area between the banks of a river ordinarily covered by water is a _____.

3. Complete the sentence with the appropriate word

1. In Sri Lanka large _____ have been created by ancient kings in order to save the water for irrigation.
2. South Africa, Ghana and Zambia are the biggest _____ of power on the continent.
3. Ghana's hydroelectric facilities were adversely affected by _____ during the late 1990's.
4. The biggest dam in the country is _____ with two power stations.
5. According to the International Energy Agency South Africa is the seventh biggest producer of _____ in the world.
6. The government fears the dam is sure to _____ the river flow especially during periods of drought.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) a member of the Ethiopian Government speaking about the necessity of hydro power dam constructing on the Nile River;

2) an economist speaking about economic benefits of the dam construction for Ethiopia;

3) an environmental expert speaking about potential consequences of hydro power dam constructing on the Nile River;

4) the dam's project manager;

5) other.

Unit 2. Geothermal power

Text 1

Kenya's Geothermal Industry Grows (VOA)

By Roopa Gogineni

NAIROBI – With Kenya's proximity to the Great Rift, once **a hotbed of volcanic activity**, the country is **the biggest producer of geothermal energy** on the continent. **Currently** 13 percent of the national **grid** is powered by this **renewable energy**, but **untapped geothermal fields** have the potential **to cover** all of Kenya's **power needs**, and then some.

Near the Kenyan town of Naivasha, Isaac Kirimi treks up a steaming hillside. Kirimi is a drilling superintendent with KenGen, Kenya's leading power company. "This is like a live volcano! You can easily convince someone you're in hell," he said.

The rocks underfoot are still soft. He looks for a small bushy **plant known as geothermal grass**, which thrives in high ground temperatures. "It is normally used by scientists **to give them an indication** of where there is potential for **geothermal resources**," said Kirimi. "A scientist is like a wild person. You are imagining things and now trying to transfer that imagination. And try **to convince** someone **to invest in** that is not very easy."

Investing in renewable energy

Today, more than 30 years after KenGen built its first geothermal plant in the area, **investment** in renewable energy is booming. KenGen, with government support, **is ramping up geothermal production.**

"**The cost of drilling** can be **prohibitive**: the drilling costs, the power plant costs, and interconnecting all of these **wells**. Once you do that, you have nothing else to do for the next 25 years…**except** build another one. But we know the **source** is the center of the earth, so there will always be energy," said Geoffrey Muchemi, a development manager at KenGen.

For now, a majority of Kenya's energy needs are met by hydroelectric power. But hydropower **is diminished** during **rain shortages**, **leading to** Kenya's regular **blackouts**.

To harness geothermal energy, wells are first dug more than two kilometers into the **earth's surface**. **The steam** released by the wells is monitored for several months. If it's exploitable, hot water and steam **are extracted from** the well. The steam travels through pipes to a power plant, where it **is converted into** electrical energy. The water is re-injected into the earth.

Displacement fears

Near the wells, KenGen is also developing a geothermal spa. It features a large pool with mineral-rich waters, modeled after the Blue Lagoon in Iceland where many KenGen engineers studied.

But not all Kenyans **support** the expansion of geothermal energy. Reuben Sempui **belongs to** a Masaai **community** on Mt. Suswa, the site of a proposed geothermal project. "The Masaai live inside the outer crater rim. In the inner crater rim, nobody lives there," Sempui explained. "So these are the manyattas [homesteads] where the Masaai live."

Sempui's community **faces displacement** if the project goes ahead. Members of the community **are negotiating** with KenGen, **demanding employment opportunities** and **a share** of **the revenue** generated by the well.

A. Find English equivalents for the following Russian ones:

1) очаг вулканической активности; 2) крупнейший производитель геотермальной энергии; 3) в настоящее время; 4) энергетическая система; 5) питаться от возобновляемых источников энергии; 6) неиспользованные геотермальные области; 7) удовлетворять потребности в электроэнергии; 8) растение, известное как геотермальная трава; 9) дать знак / сигнал; 10) геотермальные ресурсы; 11) убедить кого-либо вкладывать деньги / инвестировать во что-либо; 12) увеличивать / наращивать геотермальное производство; 13) непомерно высокая стоимость бурения; 14) скважина; 15) за исключением / кроме; 16) источник; 17) сокращаться во время нехватки дождей; 18) вести к отключениям электроэнергии; 19) извлекать пар из скважины; 20) преобразовывать пар в электрическую энергию; 21) поддерживать; 22) принадлежать сообществу; 23) столкнуться с

угрозой переселения; 24) вести переговоры, требовать возможности трудоустройства; 25) часть доходов.

B. Word building

A	B
1. activity (n)	_____ (adj)
2. current (n, adj)	_____ (adv)
3. _____ (v)	cover (n)
4. _____(v)	investment (n)
5. produce (v)	_____(n)
6.prohibit (v)	_____ (n)
7. _____ (v)	interconnecting (n)
8. exploit (v)	_____(adj)
9. _____ (v)	release (n)
10._____ (v)	extraction (n)
11.support (v)	_____ (n)
12. negotiate (v)	_____ (n)
13. employ (v)	_____ (n)
14. _____ (v)	share (n)

C. Answer the questions to the text

1. Why is Kenia considered to be the biggest producer of geothermal energy on the continent?
2. What kind of renewable energy has the potential to cover all of Kenya's power needs?
3. What is KenGen? When did it build its first geothermal plant in the area? Why is it ramping up geothermal production nowadays?
4. What kind of power covers the majority of Kenya's energy needs today? What is the reason of Kenya's regular blackouts?
5. Why is the steam released by the wells monitored for several months?
6. Why do not all Kenyans support the expansion of geothermal energy in the area?
7. What do the members of Masaai community face if the project goes ahead? What do they demand from KenGen?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. Kenia is the biggest producer of geothermal energy on the continent.
1. Currently Kenia's national grid has the potential to cover all of Kenya's power needs.
2. Today KenGen, Kenya's leading power company, is reducing geothermal production.
3. Hydroelectric power is a stable source of energy.
4. Steam extracted from the wells travels to a power plant where it is converted into electrical energy.
5. The members of a Masaai community support the expansion of geothermal energy in the area.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. Nowadays 13 percent of Kenia's national **power system** is **supplied** by geothermal **sustainable** energy.

2. The so-called geothermal grass, which thrives in high ground temperatures, gives the scientists **a sign** of where there is potential for geothermal **reserves.**

3. The drilling **expenses**, the power **station** costs, and **complexation** all of these **holes** (скважина / буровая скважина – нефтегаз.словарь) are too **excessive,** said Geoffrey Muchemi, a development manager at KenGen.

4. Hydropower which covers a majority of Kenya's energy needs today, **is reduced** during **rain lacks**, leading to Kenya's regular **power failures**.
5. Steam **withdrawn from** the **hole** travels through pipes to a power **station**, where it **is transformed into** electrical energy.
6. The Masaai live inside the outer crater rim, the **location** of a proposed geothermal project. The community faces **resettlement** if the project goes ahead.
7. Members of the community are negotiating with KenGen, demanding **job** placement prospects and a part of the profits generated by the well.

1. Complete each sentence with a word from the box

plant	sources	grid	energy
electric	wind	water	potential
needs	resources	cover	power

1. An electrical _____ consists of generating stations that produce electric _____ , high-voltage transmission lines and distribution lines that connect individual customers.
2. Renewable energy is energy generated from natural _____ – such as sunlight, _____ , rain, and geothermal heat.
3. Kenia's untapped geothermal fields have the potential to _____ all of its power _____ .
4. A power _____ is a facility for the generation of _____ power.
5. Scientists foresee a lot of _____ in alternative energy _____.
6. Hydropower is generated by using electricity generators to extract _____ from moving _____.

1. Complete the sentence with the appropriate word

1. Geothermal energy falls under the category of _____ source because the water is replenished by rainfall and the heat is continuously produced inside the earth.
2. The flowing waters in the rivers can be a good _____ of alternative energy.
3. With 70% of the earth's surface covered with water, a great amount of _____ can be produced by placing turbines at strategic locations under strong currents.
4. An interconnected network for delivering electricity from suppliers to consumers is called an electrical _____ .
5. Many countries are demonstrating considerable interest in exploring new energy _____ .
6. _____ is the use of geothermal heat to generate electricity.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) a representative of KenGen convincing to invest in renewable energy;
2) a Kenyan speaking about his / her poor life because of energy problem;
3) an engineer describing the mechanism of geothermal energy production;
4) the members of a Masaai community who is against the expansion of geothermal energy in the area;
5) other.

Text 2

Kenya Moves Full-Steam Ahead on Geothermal Production (VOA)

Kenya **is expanding** plans to become one of the **world's top geothermal power producers** with the start of **explorations** at a site called Menengai.

The government **is also aiming to** make geothermal Kenya's main power **source**. Menengai, in Kenya's Rift Valley, may **hold the clue** to **boosting** the country's electricity production.

Kenya is already Africa's largest producer of **geothermal power**. It was the first country on the continent **to drill for** geothermal energy. Last year, the International Geothermal Association **ranked** Kenya as the world's 10th largest producer of geothermal power, calling the country's potential "massive". But

that was before the first **well** opened at Menengai earlier this year.

Ruth Musembi, public relations manager at Kenya's Geothermal Development Company, says explorations so far are **exciting**. “When you get the first well – being eight megawatts, then that tells you something," she said. "The second well which has **discharged** – the temperatures are very high, they are almost over 300 degrees. That tells you that this is not an ordinary **geothermal field**. It’s going to be a major, major **breakthrough** for this country in terms of electricity.”

Experts **estimate** that the site alone **contains** some 1,600 megawatts, or about 300 megawatts more than Kenya’s **entire energy use**. The first phase of the Menengai Geothermal Project is expected to **contribute** 400 megawatts to Kenya’s **power grid** by 2016, an **increase** of 30 percent.

Geothermal energy comes from the **earth’s core**, made up of **molten rock**, or magma. Temperatures there are **extremely** high. In some areas, the magma is closer to the earth’s **surface**, heating up layers of rock that **contain pores** of water. Some of this water **rises** to the surface in the form of **hot springs** and **geysers**. **Steam** is trapped within the rock layers and **can be accessed** through **drilling**. The steam is then **harness**ed to produce electricity.

Africa’s Rift Valley is an ideal **location** for geothermal energy. “Basically, you can drill for geothermal anywhere, but it will be very **expensive** because we’ll have to drill very far down," explained Ruth Musembi. "But in the Rift Valley, the heat has come closer to the surface, so when you drill about two-and-a-half [or] three kilometers, you **are able to** get the **heat source**. In other places, probably you will go many kilometers.”

Kenya’s Rift Valley contains 14 geothermal sites. Officials estimate that there are between 7,000 to 10,000 megawatts of potential geothermal energy in Kenya.

Hydro-electricity has long been Kenya’s **primary** power source. But massive **deforestation** and other factors **have led to decreasing rainfalls** and the **drying up** of rivers and lakes, making hydroelectric power **less of an option**.

Kenyan Vice President Kalonzo Musyoka told at a recent conference in Nairobi that **increasing the use** of geothermal power is the **key** to Kenya’s **development**. “Power produced from geothermal **resources** is a **sure means** of **improving** our peoples’ **quality of life**," he said. "Besides, with the Kenya Vision 2030 **angling for** an industrialized economy, **novel sources** of electric energy must be found **in order to** power factories and **processing** lines.”

Currently, more than 80 percent of Kenya’s population does not have **access** to electricity.

A. Find English equivalents for the following Russian ones:

1) расширять / увеличивать планы; 2) ведущий производитель геотермальной электроэнергии в мире; 3) намереваться сделать Кению основным источником геотермальной энергии; 4) увеличивать производство электроэнергии в стране; 5) крупнейший производитель геотермальной электроэнергии; 6) пробурить первую скважину; 7) геотермальные области; 8) крупнейшее достижение / прорыв; 9) оценивать / подсчитывать приблизительно; 10) потребление электроэнергии; 11) единая электроэнергетическая система страны; 12) земное ядро, состоящее из расплавленной горной породы / магмы; 13) очень высокая температура; 14) поверхность земли; 15) слои / пласты горной породы, содержащие поры воды; 16) подниматься на поверхность в виде горячих источников и гейзеров; 17) получить доступ к пару, находящемуся в горных породах; 18) идеальное местоположение; 19) тепловой источник; 20) основной источник энергии; 21) уничтожение лесов / вырубка леса; 22) вести к уменьшению количества осадков и высыханию рек и озер; 23) делать гидроэнергетику менее важной / существенной; 24) увеличивать потребление геотермальной энергии; 25) ключ к развитию страны; 26) энергия, полученная из геотермальных источников; 27) верное средство улучшить качество жизни; 28) найти новейшие источники электроэнергии; 29) энергия для электростанций и производственных линий; 30) иметь доступ к электричеству.

B. Word building

A	B
1. _____ (v)	expansion (n)

2. produce (v)	_____ (n)
3. explore (v)	_____ (n)
4. aim (v)	_____(n)
5. _____ (v)	drilling (n)
6.estimate (v)	_____ (n)
7. contribute (v)	_____ (n)
8. improve (v)	_____(n)
9. extreme (adj)	_____ (adv)
10. _____ (v)	access (n)
11. _____ (v)	location (n)
12. forest (n)	_____ (n)
13. _____ (v)	use (n)
14. develop (v)	_____ (n)
15. improve (v)	_____ (n)
16. _____ (adv)	current (adj)

C. Answer the questions to the text

1. What plans is Kenya expanding with the start of explorations at a site called Menengai?
2. Why may Menengai hold the clue to boosting Kenya's electricity production?
3. Kenya is the world's 10th largest producer of geothermal power, isn't it?
4. Why is Menengai going to be a major breakthrough for Kenia in terms of electricity?
5. How much energy does the site of Menengai alone contain? Is it enough to meet Kenia's energy demand?
6. How much energy is the first phase of the Menengai Geothermal Project expected to contribute to Kenya's power grid by 2016?
7. Where does geothermal energy come from? How can steam trapped within the rock layers be accessed?
8. Why is Africa's Rift Valley considered to be an ideal location for geothermal energy? How many geothermal sites does Kenya's Rift Valley contain?
9. What factors make Kenia's hydroelectric power less of an option?
10. What is the key to Kenya's development, according to Kenyan Vice President Kalonzo Musyoka? Why?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. Kenya is expanding plans to become one of the world's top hydropower producers with the start of dam constructions at a site called Menengai.
2. The first country on the continent to drill for geothermal energy, Kenya is Africa's largest producer of geothermal power.
3. Being not an ordinary geothermal field, Menengai is going to be a major breakthrough for this country in terms of electricity.
4. Experts estimate that Menengai alone contains as much energy as would be enough to meet Kenya's energy needs.
5. Steam, trapped within the rock layers and accessed through drilling, is harnessed to produce electricity.
6. Africa's Rift Valley is an ideal location for geothermal energy because the heat source is close to the surface.
7. Massive deforestation and other factors have led to decreasing rainfalls and the drying up of rivers

and lakes, making Kenia's hydroelectric power less of an option.

8. Increasing the use of wind and solar power is the key to Kenya's development.

9. According to Kenyan Vice President Kalonzo Musyoka, power produced from geothermal resources is a sure means of improving peoples' quality of life.

10. Currently, more than 80 percent of Kenya's population has access to electricity.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. Kenyan government **intends to** make geothermal energy Kenya's main power **supply**.
2. Kenya is Africa's largest **generator** of geothermal **energy**.
3. Menengai's geothermal project is going to be the **main step forward** for this country in terms of electricity as the first **hole** opened at this site **generated** 8 megawatts of **energy**.
4. Experts **evaluate** that the site alone **encloses** about 300 megawatts more than Kenya's entire **power demand**.
5. Temperatures at the earth's core, made up of **magma**, are **exceedingly** high.
6. The Rift Valley is an ideal **site** for geothermal **energy** because one **can** get the **thermal** source quite close to the earth's surface.
7. Massive deforestation and other factors **resulted in reduction of** rainfalls and the drying up of rivers and lakes, making hydroelectric power, Kenya's **major** power **supply**, **less of relevance**.
8. **Extension** of **consumption** of geothermal **power** is the key to Kenya's **improvement.**
9. **Up-to-date supplies** of electric **energy** must be found **for** power factories and processing lines.
10. **At present**, more than 80 percent of Kenya's population does not have access to electricity.

2. Complete each sentence with a word from the box

source	contribute	well	breakthrough
geysers	field	deforestation	grid
source	location	surface	access
producer	means	explorations	resources

1. With the start of _____ at a site called Menengai Kenya is expanding plans to become one of the world's top geothermal power producers.
2. Kenia's government aims to make geothermal Kenya's main power _____ .
3. Before the first _____ was opened at Menengai Kenya was ranked as the world's 10th largest _____ of geothermal power.
4. Menengai is not an ordinary geothermal _____ . It's going to be a major _____ for this country in terms of electricity."
5. The first phase of the Menengai Geothermal Project is expected to _____ 400 megawatts to Kenya's power _____ by 2016.
6. Water containing in layers of rock rises to the earth's _____ in the form of hot springs and _____ .
7. Africa's Rift Valley is an ideal _____ for geothermal energy because the heat _____ is close the surface.
8. Massive _____ and other factors have led to decreasing rainfalls and the drying up of rivers and lakes, making hydroelectric power less of an option.
9. Power produced from geothermal _____ is a sure _____ of improving peoples' quality of life, according to Kalonzo Musyoka, Kenyan Vice President.
10. Currently, more than 80 percent of Kenya's population does not have _____ to electricity.

3. Complete the sentence with the appropriate word

1. Geothermal energy uses the heat in the Earth's core – either from rocks and water near the _____ or through drilling deep wells.

2. According to the International Energy Agency, 404 million people in India don't have _____ to electricity.
3. Hydropower is considered to be the leading source of renewable _____ .
4. Kamchatka is known for its famous Valley of _____ , the second largest concentration of _____ and hot springs in the world.
5. Temperatures at the earth's core, made up of _____ are extremely high.
6. Kenya's Rift Valley containing 14 _____ is an ideal location for geothermal energy.
7. Hydro-electricity has long been Kenya's primary power _____ , but with decreasing rainfalls hydroelectric power has become less of an option.
8. The first _____ opened at Menengai contributed 8 megawatts to Kenya's power grid.
9. With industrial _____ and population growth global demand for energy has risen.
10. At the center of the Earth is the _____, which has two parts. The solid, inner _____ of iron is surrounded by a liquid, outer _____ composed of a nickel-iron alloy.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) public relations manager at Kenya's Geothermal Development Company, explaining why Menengai project is going to become a major breakthrough for this country in terms of electricity;
2) a scientist explaining the mechanism of producing geothermal power;
3) an economist speaking about economic benefits of explorations at Kenya's Rift Valley;
4) a member of Kenyan government speaking about the use of geothermal power as the key to Kenya's development;
5) other.

Unit 3. Nuclear Power

Text 1

China set to build 200 nuclear power plants: report

Beijing – China plans to build 200 new **nuclear power plants** and **speed up** the **construction** of 29 more as **part of efforts** to **cut** the high **level** of **emissions** generated by the **large-scale use of coal**.

China's **demand** for nuclear plants will **reach** 200, with four to six new projects being **approved** annually before 2015, said Jian Jingwen, deputy head of the **equipment** department at the State Nuclear Power Technology Corporation.

The number will touch 10 plants every year after 2020, Jian was **quoted** as saying by state-run *China Daily*.

China plans to **increase** nuclear **power generation capacity** from 10.7 gigawatts in 2010 to 160 gigawatts in 2040, the report said.

China is also **strengthening its efforts to develop clean energy**. When it comes to **finding a solution** to China's **air pollution** problem, experts and **environmental** officials are **unanimous** in their **belief** that nuclear power is the **way to go** even though **misgivings remain**, the report said.

China will also **account for** 40% of the **global net increase in nuclear capacity** between 2010 and 2040, the report said, quoting an international energy **outlook** released by the US Energy Information Administration.

A **total** of 29 atomic plants are being built after the Chinese government **lifted a ban imposed** after the Fukushima **nuclear plant disaster** in Japan.

Nuclear energy is **preferred** as China **is unable to bring down** the high **pollution levels** generated by **excessive use** of coal in most **manufacturing units**, officials say.

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A. Find English equivalents for the following Russian ones:

1) построить атомную электростанцию (АЭС); 2) ускорять строительство; 3) часть работы; 4) снижать уровень выбросов / загрязнения; 5) промышленное использование угля; 6) потребность в АЭС; 7) достигать; 8) одобрять проекты; 9) цитировать / ссылаться на; 10) увеличивать выработку атомной электроэнергии; 11) усиливать работу; 12) развивать экологически чистую энергию; 13) искать решение; 14) загрязнение воздуха; 15) эксперт по охране окружающей среды; 16) единогласный / единодушный; 17) мнение; 18) молодец! / так и надо! (восклицание в знак одобрения – разг.); 19) опасения; 20) нести ответственность / отвечать; 21) увеличение мощности атомной электростанции; 22) в совокупности / суммарно; 23) снимать запрет; 24) налагать запрет; 25) авария на АЭС в Японии; 26) предпочтительный; 27) быть не в состоянии; 28) снижать высокий уровень загрязнения; 29) чрезмерное использование угля; 30) промышленное предприятие.

B. Word building

A	B
1. speed (v)	_____ (n),
2. construct (v)	_____ (n)
3. cut (v)	_____ (n)
4. _____ (v)	emission (n)
5. use (v)	_____ (n)
6.demand (v)	_____ (n)
7. approve (v)	_____ (n)
8. _____ (v)	equipment(n)
9. increase (v)	_____ (n)
10. _____ (v)	generation (n)
11. _____ (v)	strength (n)
12. develop (v)	_____ (n)

13. clean (v)	_____ (adj)
14._____ (v)	pollution (n)
15.environment (n)	_____ (adj)
16._____ (v)	belief (n)
17. account (v)	_____ (n)
18._____ (n)	total (adj)
19._____ (v)	ban (n)
20.disaster (n)	_____ (adj)

C. Answer the questions to the text

1. Why does China plan to build 200 new nuclear power plants and speed up the construction of 29 more plants?
2. What are China's plans in point of nuclear power generation capacity?
3. Does China seek to develop clean energy?
4. What kind of power can become a solution to China's air pollution problem?
5. What percent of the global net increase in nuclear capacity will China account for between 2010 and 2040?
6. Why did the Chinese government impose a ban on the construction of its power plants?
7. Why is nuclear energy preferred in China?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. China plans to build 200 new hydropower plants and slows down the construction of 29 more stations.
2. Construction of new nuclear power plants is a part of efforts to cut the high level of emissions generated by the large-scale use of coal.
3. China's demand for nuclear plants will reach 200, with four to six new projects being approved annually before 2015.
4. China plans to decrease nuclear power generation capacity from 160 gigawatts in 2010 to 10.7 gigawatts in 2040.
5. China is also strengthening its efforts to develop clean energy.
6. Experts and environmental officials are unanimous in the belief that solar energy is a solution to China's air pollution problem.
7. A total of 29 atomic plants were shut after the Chinese government imposed a ban after the Fukushima nuclear plant disaster in Japan.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. China plans to build 200 new **atomic** power **stations** and speed up the **building** of 29 more plants.
2. **Construction** of new **nuclear** power **plants** is a part of efforts to **reduce** the high level of emissions **produced** by the large-scale **utilization** of coal.
3. China is also **intensifying** its efforts **to expand** clean **energy**.
4. When it comes to finding a solution to China's air pollution problem, the **ecologists** are sure that **atomic** power is the way to go even though **doubts** remain.
5. China will **account for** 40% of the global **power grid growth** in **atomic** capacity between 2010 and 2040.
6. 29 **atomic stations** are being built after the Chinese government lifted **a prohibition** imposed after the Fukushima nuclear plant **calamity** in Japan.

7. **Nuclear** energy is **favored** as China is unable **to cut** the high pollution levels generated by excessive **use** of coal in most manufacturing units.

1. Complete each sentence with a word from the box

efforts	capacity	pollution	disaster
emissions	construction	nuclear	solution

1. 200 new _____ power plants are to be built in China.
2. China speeds up the _____ of its 29 nuclear power plants.
3. Nuclear power plants construction is a part of _____ to cut the high level of _____ generated by the large-scale use of coal.
4. China plans to increase nuclear power generation _____ up to 160 gigawatts in 2040.
5. Nuclear power is a _____ to China's air pollution problem.
6. The construction of 29 atomic plants was banned after the Fukushima nuclear plant _____ in Japan.
7. Nuclear energy is preferred as China is unable to bring down the high _____ levels generated by excessive use of coal.

2. Complete the sentence with the appropriate word

1. Over 60 power _____ are currently being constructed in 13 countries including Taiwan, China, South Korea and Russia.
2. Most reactors currently planned are in the Asian region, with fast-growing economies and rapidly-rising electricity _____.
3. China is likely to supply components to US nuclear power _____ under construction as part of a bilateral co-operation agreement between the two countries.
4. Beijing plans to supply traditional ally Pakistan with two more nuclear _____ , worth some $9 billion.
5. China plans to ban new coal-fired power plants in three key industrial regions around Beijing to cut the country's air _____.
6. China plans to increase its use of_____ like wind and solar to 13% of total consumption by 2017.
7. Following a major earthquake, a 15-metre tsunami disabled the power supply and cooling of three Fukushima Daiichi reactors, causing a nuclear _____ on 11 March 2011.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) an environmental expert speaking about China's air pollution problem;
2) a power engineer speaking about the necessity of replacing coal-fired power plants by clean energy sources;
3) a member of China's Government speaking about the necessity of nuclear power plants construction as a solution to cut the high level of air pollution;
4) an economist speaking about economic benefits of the of nuclear power plants construction for China;
5) other.

Text 2

Pakistan Plans Nuclear Power Plant With China Amid Energy Woes

By Augustine Anthony

Pakistan plans to construct a civil nuclear power plant with China's help in the country's biggest city **to meet growing demand for energy**, Prime Minister Nawaz Sharif said today. "We and China are building this plant together," Sharif told a seminar in Islamabad that was televised live by state-run PTV. China has helped Pakistan build two **atomic reactors** at Chashma in Punjab province, and **is assisting** with two more under construction **at the same site**. The new plant would be the second in Karachi.

The government says the complex, which will **contain** two Chinese-built **nuclear reactors**, will cost $9.6 billion and will help **assuage the power crisis** that has **crippled daily life** and **slowed down** the national economy **development** in **recent** years. The reactors are expected to start **supplying** 2,200 megawatts to the **grid** by 2019. The complex is not the first energy **investment** on nuclear project in Pakistan that China has been **involved** with, but it will be **by far** the largest.

Sharif **regained power** for a record third time in a May election on a **pledge to end chronic power shortages** that have **weighed** on **growth** in the country's $231 billion economy. The IMF **approved** a $6.6 billion **loan** in September for the South Asian nation **to help stabilize** the economy, which has also been **hurt** by a Taliban **insurgency**.

Nuclear-armed Pakistan's **growing dependence** on **long-time ally** China **follows** years of **strained relations** with the U.S. **amid** the war in Afghanistan and American **drone attacks against** Pakistani **guerrillas** in the country's **tribal areas**. "Drone attacks on Pakistan are totally **unacceptable**," Sharif said during the speech at the seminar.

Even so, Pakistan **is seeking** a civil nuclear **agreement** with the U.S. similar to the one President George W. Bush **reached** with India in 2008 as it seeks **to do away with power cuts** lasting **as long as** 18 hours a day during **peak demand** in summer. Pakistan tested nuclear **devices** in 1998, after India **conducted similar** experiments.

Power outages in Pakistan **sparked violent** street **protests** around the nation in the past, and factories have had to **shutter** or **drastically reduce production** without a **steady supply**. **Blackouts contributed** to the **defeat** of former President Asif Ali Zardari's party in May. Sharif said in his party manifesto that his administration plans to **attract** $20 billion in **investment** to add 10,000 megawatts to the **grid** in five years.

Electricity interruptions, as well as **shortages** of natural gas, **sliced** two percentage points off **economic growth** in the fiscal year that ended in June 2012, the most recent year for which data is available from Pakistan's Planning Commission.

http://www.bloomberg.com

A. Find English equivalents for the following Russian ones:

1) строить атомную электростанцию; 2) удовлетворять растущую потребность в электроэнергии; 3) ядерный реактор; 4) помогать; 5) в этом же месте; 6) включать в себя / содержать два ядерных реактора; 7) успокаивать / утолять; 8) энергетический кризис; 9) ухудшать / портить повседневную жизнь; 10) тормозить развитие экономики; 11) в последние годы; 12) подача электроэнергии; 13) инвестирование ядерных проектов; 14) быть вовлеченным в; 15) явно / безоговорочно; 16) давать обязательство; 17) хронический дефицит электроэнергии; 18) определить экономический рост; 19) одобрить ссуду / заем; 20) стабилизировать экономику; 21) наносить вред / причинять ущерб; 22) восстание Талибан; 23) возрастающая зависимость; 24) давний союзник; 25) натянутые отношения с США; 26) на фоне войны в Афганистане; 27) нападение американских беспилотников на пакистанских партизан; 28) недопустимый / неприемлемый; 29) добиваться заключения соглашения в сфере ядерной энергетики; 30) добиться соглашения с Индией; 31) избавиться от; 32) отключение электроэнергии / прекращение подачи электроэнергии; 33) продолжаться до 18 часов в день; 34) пиковое потребление / пиковая нагрузка; 35) ядерное устройство; 36) проводить подобные эксперименты; 37) вызвать бурные уличные протесты; 38) значительно сокращать производство; 39) постоянная подача (электроэнергии); 40) содействовать / вносить вклад; 41) привлечь инвестиции; 42) электроэнергетическая система / электрическая сеть / единая энергосистема; 43) перерывы в электроснабжении; 44) дефицит / недостаток натурального газа; 45) экономический рост.

B. Word building

A	B
1. construct (v)	_____(n)
2. meet (v)	_____ (n)
3. _____ (v)	demand (n)
4. assist(v)	_____ (n)

5. contain (v)	_____ (n)
6. slow (v)	_____ (adj), _____ (adv)
7. _____ (v)	development (n)
8. recent (adj)	_____ (adv)
9. supply (v)	_____(n)
10. invest (v)	_____ (n)
11. _____ (v)	growth (n)
12. approve (v)	_____ (n)
13. _____ (v)	loan (n)
14. stabilize (v)	_____ (n)
15. hurt (v)	_____ (n)
16. _____ (v)	dependence (n)
17. _____ (v)	relation (n)
18. attack (v)	_____ (n)
19. accept (v)	_____ (adj)
20. _____ (v)	agreement (n)
21. _____ (v)	conduct (n)
22. violent (adj)	_____ (n)
23. reduce (v)	_____ (n)
24. produce (v)	_____ (n)
25. _____ (v)	contribution (n)
26. attract (v)	_____ (adj)
27. _____ (v)	interruption (n)
28. economic (adj)	_____ (n)

C. Answer the questions to the text

1. What for does Pakistan plan to construct a civil nuclear power plant in the country's biggest city?
2. Who helps Pakistan build nuclear power plants?
3. What will the new plant in Karachi help?
4. What amount of energy are the reactors expected to supply to the national grid?
5. Is the complex the first China's investment on nuclear project in Pakistan?
6. What helped Sharif regain power in a May election?
7. What is expected to help stabilize Pakistani economy? What has the economy been hurt by?
8. What are the reasons of strained relations between Pakistan and the USA?
9. Why is Pakistan seeking a civil nuclear agreement with the U.S?
10. What sparked violent street protests around the nation in Pakistan the past?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. Pakistan plans to construct a solar power plant with India's help to meet growing demand for energy in rural areas the country.

2. The complex will contain two nuclear reactors and will help assuage the power crisis that has crippled daily life and slowed down the national economy development in recent years.

3. The reactors are expected to start supplying 220 megawatts to the grid by 2029.

4. The complex is the first energy investment on nuclear project in Pakistan that China has been involved with.

5. Sharif regained power in a May election on a pledge to end chronic power shortages that have weighed on the country's economic growth.

6. Pakistani national economy was hurt by a long-term drought.

7. China and the U.S are nuclear-armed Pakistan's long-time allies.

8. Pakistan is seeking a civil nuclear agreement with the U.S.

9. Power outages in Pakistan sparked violent street protests and contributed to the defeat of former President Asif Ali Zardari's party in May.

10. Electricity interruptions as well as shortages of natural gas contributed to economic growth of the country.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. Pakistan plans to build a civil nuclear power plant with China's help in the country's biggest city to **cover** growing **need** for energy.

2. China has **helped** Pakistan build two **atomic** reactors in Punjab province, and **is helping** with two more under construction at the same **place**.

3. The complex will **include** two Chinese-built **nuclear** reactors and will **help mitigate** the power crisis.

4. The power crisis **worsened** daily life and **reduced** the national economy **growth** in recent years.

5. The **atomic** reactors are expected to start **providing** 2,200 megawatts to the **power network** by 2019.

6. Sharif **promised** to **cease** chronic power **lacks** that have weighed on **development** in the country's $231 billion economy.

7. The IMF **approved** a $6.6 billion **credit** in September for the South Asian nation to **help** stabilize the economy, which has been **damaged** by a Taliban **rebellion**.

8. Pakistan **is searching for** a civil nuclear **contract** with the U.S. similar to the one President George W. Bush **signed** with India in 2008 as it seeks **to get rid of blackouts**.

9. **Power outages** in Pakistan **caused** violent street protests around the nation in the past, and factories have had to **close** or drastically **decrease** production without a **stable supply**.

10. Electricity **disruptions** as well as **lacks** of natural gas **slowed down** the country's economic **growth.**

2 ***Complete each sentence with a word from the box***

reactors	development	plant	supply
supplying	dependence	investment	grid
attacks	reduce	agreement	cuts
pledge	demand	relations	outages
atomic	daily	crisis	shortages

1. Construction of a civil nuclear power _____ in Pakistan will help meet growing _____ for energy.

2. Two _____ reactors were constructed in Pakistan in Punjab province and two more reactors are currently under construction at the same _____.

3. The complex will contain two nuclear _____ and will help assuage the country's power _____ .

4. The power crisis has crippled _____ life and slowed down the national economy _____ .

5. The nuclear reactors are expected to start _____2,200 megawatts to the power _____ by 2019.

6. The complex is not the first China's energy _____ on nuclear project in Pakistan but it will be by far the largest.

7. Sharif regained power in a May election on a _____ to end chronic power _____

8. Nuclear-armed Pakistan's growing _____ on long-time ally China follows years of strained _____ with the U.S. amid American drone _____ against Pakistani guerrillas in the country's tribal areas.

9. Pakistan is seeking a civil nuclear _____ with the U.S. as it seeks to do away with power _____lasting as long as 18 hours a day during peak demand in summer.

10. Power _____ in Pakistan sparked violent street protests around the nation in the past, and factories have had to shutter or drastically _____ production without a steady _____ .

1. Complete the sentence with the appropriate word

1. A _____ is a system that contains and controls sustained nuclear chain reactions.

2. A nuclear power _____ is a thermal power station in which the heat source is a nuclear reactor.

3. Nuclear plant, like plants that burn coal, oil and natural gas, produce _____ by boiling water into steam

4. Nuclear energy is America's third-largest _____ of electricity after coal and natural gas.

5. The new Pakistani government faces all sorts of challenges, but its most immediate task is to bring an end to crippling power _____ .

6. Like many other problems that afflict Pakistan, the energy _____ is a product of years of steady neglect in a country of scarce resources, a growing population and poor management decisions.

7. Every day, millions of Pakistanis across the country have no access to _____, summer or winter.

8. Pakistani and U.S. _____ strained after the U.S. drone had killed the Taliban leader, Hakimullah Mehsud.

9. Thousands of people in Pakistan protest American _____ attacks inside Pakistani territory.

10. China remains a close _____ of Pakistan, and continues to offer assistance to the latter's nuclear program.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) a journalist speaking about Pakistan's plans to construct a civil nuclear power plant in the country's biggest city;

2) a representative of Pakistani government speaking about the complex that is expected to help assuage the country's power crisis;

3) an economist speaking about Pakistan's economic situation and the factors slowing the economy down;

4) a politician speaking about the necessity of a civil nuclear agreement with the U.S;

5) other.

Unit 4. Solar Power

Text 1

US Company to Increase Juba's Solar Power (VOA)

Simon Kasmiro

JUBA, SOUTH SUDAN — Central Equatoria state authorities **have signed a memorandum of agreement with** California technology start-up PV Tech Inc to build **a hybrid solar-combustion power plant** near the South Sudanese capital.

State Minister for Physical Infrastructure Samuel Suba signed the memorandum last week with PV Tech Inc.

"In a country where most **on-grid* and off-grid** electricity** is provided by diesel generators, this new **capacity** will be **a more stable and cheaper alternative**," PV Tech said in a statement.

According to the World Bank, less than one percent of South Sudanese have **access to** electricity. What power they do have tends to come from diesel generators.

Rajaf Payam, about three kilometers (1.8 miles) outside Juba, **is being eyed as a potential site for the solar plant**. The plant is expected to start by **producing 20 megawatts of power for** Juba. Suba said there was a possibility that it would **ramp up gradually to 150 megawatts**, which would be enough **to meet all of Juba's electricity needs**. The plant is also expected **to generate nearly 300 jobs**, and if everything goes to plan, PV Tech is expected to break ground on the project next month.

Juba has not had state-provided power since oil production stopped early last year amid a dispute with Khartoum over the transit fees Sudan was charging to carry South Sudanese crude through northern pipelines to export terminals.

Deputy Governor Manasseh Lomole Waya welcomed the new plant at the signing ceremony, but said the state is still looking at **developing other sources of power**, such as hydroelectricity, **to allow rural areas of Central Equatoria to be electrified**, too.

During a regional conference last month on the use of the Nile River for hydroelectric projects, South Sudan's Minister of **Irrigation** and Water **Resources**, Mayom Akech, announced that Juba had selected 16 sites along the Nile River to develop **dams** to be used for hydroelectric power. Lomole said **investors are still being sought for** those projects.

*on-grid electricity — в случае с солнечной батареей — это одновременное включение подачи энергии и солнца, и другого источника (для гибридных станций)

**off-grid electricity — выключение подачи от второго источника и использование только энергии от солнечной батареи.

A. Find English equivalents for the following Russian ones:

1) подписать соглашение с; 2) гибридная солнечная электростанция; 3) электроэнергия, получаемая от энергосистемы; 4) электрическая ёмкость; 5) более стабильный и недорогой источник электроэнергии; 6) согласно / в соответствии с; 7) рассматривается как возможное / потенциальное место для строительства солнечной электростанции; 8) производить электроэнергию для страны; 9) постепенно наращивать объем производства электроэнергии; 10) удовлетворить потребности в электроэнергии; 11) создать новые рабочие места; 12) развивать другие источники энергии; 13) электрифицировать / снабжать электричеством сельские районы; 14) дамба / плотина; 15) министр мелиорации и водных ресурсов; 16) искать инвесторов для проекта.

B. Word building

A	B
1. agreement (n)	_____ (v)
2. electricity (n)	_____ (v)
3. _____ (v)	generator (n)
4. _____ (v)	access (n)
5. solar (n)	_____ (adj)
6.produce (v)	_____ (n)

7. _____ (n)	investment (n)
8. sign (v)	_____(n)
9. use (v)	_____(n), _____ (n)
10. _____ (v)	irrigation (n)

C. Answer the questions to the text

1. What memorandum have Central Equatoria state authorities signed with California technology start-up PV Tech Inc?
2. How is most on-grid and off-grid electricity in South Sudan provided nowadays?
3. What kind of energy can become a more stable and cheaper alternative to electricity provided by diesel generators?
4. How much energy is a hybrid solar-combustion power plant expected to produce? How much energy would be enough to meet all of Juba's electricity needs?
5. What sources of power can allow to electrify rural areas of Central Equatoria?
6. How many sites had been selected along the Nile River to develop dams to be used for hydroelectric power?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. State authorities of Central Equatoria have signed a memorandum of agreement with California technology start-up PV Tech Inc to build a geothermal power plant near the South Sudanese capital.
2. Currently South Sudanese have access to electricity provided by diesel generators.
3. A hybrid solar-combustion power plant is expected to provide energy that would be enough to meet all of Juba's electricity needs.
4. The plant is also expected to generate nearly 300 jobs.
5. Juba has always had state-provided power as South Sudan is known for its oil production.
6. Investors are still being sought for developing other sources of power, such as hydroelectricity, that will allow to electrify rural areas of the country.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. A hybrid solar-combustion power **station** is expected to produce a more **steady** and **inexpensive** energy than electricity provided by diesel generators.
2. The **station** is expected to start by producing 20 megawatts of **energy** for the country and there is a possibility that it would **expand** gradually to 150 megawatts, which would be enough to **cover** all of Juba's electricity **necessities**.
3. The **station** is expected **to create** 300 **places of employment.**
4. The state is still looking at **evolving** other **power supplies**, such as hydroelectricity.
5. Juba had **chosen** 16 **places** along the Nile River to develop **dikes** to be used for hydroelectric **power**.

2. Complete each sentence with a word from the box

power	access	rural	alternative
dam	plant	energy	irrigation

1. _____ means to bring water to land through a system of pipes.
2. Today less than one percent of South Sudanese have _____ to electricity.
3. Solar _____ is known to be a more stable and cheaper _____ to electricity provided by diesel generators.
4. A barrier that impounds water or underground streams is called a _____ .

5. Solar ____ is produced by collecting sunlight and converting it into electricity.
6. A new hydropower _____ had been recently built on the River Nile in order to electrify _____ areas of Central Equatoria.

3. Complete the sentence with the appropriate word

1. According to the report made by the World Bank, 1.2 billion people around the world still have no _____ to electricity.
2. _____is the conversion of sunlight into electricity.
3. _____ produced by hydroelectric dams accounts for 20% of the world's total production of electrical energy.
4. A new solar plant constructed in the area is expected to cover all of the country's _____.
5. The state is looking at developing other _____ of power, such as hydroelectricity and solar energy.
6. South Sudan's Minister of Irrigation and _____made a report on the use of the Nile River for hydroelectric projects.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) a South Sudanese speaking about his / her poor life because of energy problem;
2) a representative of the World Bank who has invested in the construction of a hybrid solar-combustion power plant in South Sudan;
3) Minister of Irrigation and Water Recourses speaking about the use of the Nile River for hydroelectric projects;
4) a TV reporter speaking about building a hybrid solar-combustion power plant near the South Sudanese capital;
5) other.

Text 2

Google pumps $12M into African solar energy project

By Jolie O'Dell | VentureBeat.com,

In its billionth green energy **investment**, Google **has targeted** the Jasper **Power Project**, a South African **solar plant**.

The investment totals $12 million and **marks** the **search** company's first investment in Africa. This **sum** is part of a larger $260 million round including investors such as SolarReserve, a U.S. solar power developer; Intikon Energy, a South African **renewable energy** developer; and the Kensani Group, a South African empowerment investment firm.

The Jasper Power Project will be **an advanced photovoltaic plant capable** of **generating** 96 MW of **clean energy** for **residents** of South Africa. The project is **designed** not only **to meet the country's renewable energy goals** but also to **create long-term jobs** and economic **opportunity**.

"Back in 2008, South Africa **experienced a severe energy shortage**, which **resulted** in **blackouts** throughout the country and **slowed down** economic growth," writes Google energy and **sustainability** director Rick Needham today on the company blog.

"Since then the South African government has been actively supporting the growth of new sources of electricity to power the nation. … Given South Africa's position as an economic powerhouse in Africa, a greener grid in South Africa can set an example for the whole continent."

Previously, Google has made big investments in solar projects around the world. There's a $168 million investment in a Mojave Desert power tower, a $94 million investment in photovoltaic projects throughout California, a smaller $5 million round for a plant in Germany, and a $280 million deal for SolarCity, which went public the following year. All that is augmented by other investments in green energy particularly wind farms.

http://www.washingtonpost.com/business/technology/google-pumps-12m-into-african-solar-energy-project

A. Find English equivalents for the following Russian ones:

1) инвестирование / вложение капитала в возобновляемую энергию; 2) проект солнечной электростанции; 3) сумма инвестиций; 4) проектировщики / разработчики возобновляемой энергии; 5) современная фотоэлектрическая станция; 6) способный вырабатывать экологически чистую энергию; 7) жители Африки; 8) удовлетворять потребности страны в возобновляемой энергии; 9) создавать рабочие места; 10) экономическая возможность; 11) испытывать дефицит электроэнергии; 12) приводить к отключениям электроэнергии по всей стране; 13) замедлить экономический рост / развитие; 14) активно поддерживать развитие новых источников электроэнергии; 15) электростанция; 16) экологически чистая электроэнергетическая система может стать примером всему континенту; 17) ранее / предварительно; 18) миллионные инвестиции / вложения в фотоэлектрические проекты; 19) миллионный контракт; 20) увеличивать инвестиции в производство экологически чистой энергии.

B. Word building

A	B
1. invest (v)	_____(n)
2. target (v)	(n)
4. _____ (v)	renewable (adj)
4. _____(v)	generation (n)
5. _____ (v)	resident (n)
6. create (v)	_____ (n)
7. _____ (adj)	sustainability (n)
8. _____ (adj)	solar (n)
9. augment (v)	_____(n)
10. produce (v)	_____ (n)
11. _____ (v), _____(n)	deal (n)

C. Answer the questions to the text

1. What has Google targeted in its billionth green energy investment?
2. What does the investment totals $12 million mark?
3. What will the Jasper Power Project be? How much clean energy will it be capable of generating?
4. What is the project is designed to?
5. What slowed down the economic growth of South Africa?
6. What sources of electricity have active support from the South African government?
7. What green projects were invested by Google?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. Google has never made green energy investments.
2. The investment that totals $120 million, marks the search company's last investment in Asia.
3. The Jasper Power Project will be an advanced geothermal plant capable of generating 96 MW of energy for residents of Japan.
4. The project is designed to meet the country's renewable energy goals and to create long-term jobs and economic opportunity.
5. A severe energy shortage South Africa experienced in 2008 resulted in country's economic development.
6. Since 2008 the South African government has been actively supporting the growth of new sources of electricity to power the nation.
7. Before the investment in a South African solar plant Google has never made big investments in solar projects.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. With its green energy investment, Google **has started** the Jasper Power Project, a South African solar **station**.

2. The Jasper Power Project will be a **modern** photovoltaic **station able** of **producing** 96 MW of **renewable** energy for **the population** of South Africa.

3. The project is **aimed** to **cover** the country's **clean** energy goals.

4. The project of a solar **station** is expected to **produce** long-term **employments** for the **residents** of the country.

5. A severe energy **deficiency**, which **caused power cuts** throughout South Africa slowed down the country's economic **development**.

6. The South African government actively **maintains** the **development** of new sources of **power** to **electrify** the nation.

7. Various rounds and **contracts** Google has made **beforehand** were **enlarged** by other investments in **renewable** energy.

1. Complete each sentence with a word from the box

growth	goals	investment	sources
plant	shortages	residents	blackout

1. A _____ is a short- or long-term loss of the electric power to an area.
2. The Power Project is expected to produce electricity for the _____ of this country.
3. A severe energy _____ the country experienced in 2008 resulted in blackouts that slowed down economic _____ .
4. The project is designed to meet the country's renewable energy _____.
5. The South African government actively supports the growth of alternative _____ of electricity.
6. . An advanced solar_____ will be capable of generating 96 MW of clean energy.
7. Google has recently made a $94 million _____ in photovoltaic projects throughout California.

2. Complete the sentence with the appropriate word

1. Five years ago the country was suffering from power _____ that paralyzed its factories and halted mines.

2. Currently green energy _____in South Africa is surging.

3. Solar photovoltaic is known to be a sustainable energy _____ .

4. After hydro and wind power solar photovoltaic is now the third most important _____ energy source in terms of globally installed capacity.

5 The firm has recently won a _____ to build a 50 MW solar power plant project in the area.

6. _____ of many countries such as India, China and Africa still have no access to electricity.

7. The project is designed to _____ long-term jobs and economic opportunity.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) a journalist speaking about Google's investment in the Jasper Power Project, a South African solar plant;

2) a member of SolarReserve, a U.S. solar power developer explaining the reasons of green energy investments in South Africa;

3) Google energy and sustainability director speaking about South Africa's economic situation and the factors slowing it down;

4) a scientist speaking about possibilities of using alternative sources of energy on the continent;

5) other.

Unit 5. Wind Power

Text 1

GE to supply turbines for Kenya's biggest wind-power plant

Reuters

NAIROBI – General Electric (GE) has **won a contract** to **supply turbines** to a Kenyan **wind-power park**, set to be sub-Saharan Africa's largest **wind-generation project** outside South Africa, the US conglomerate said on Tuesday.

The 60.8MW Kinangop Wind Park **is set to come online** in the middle of 2015, and is one of several wind and **geothermal projects** in Kenya, where the government has **pledged** to **ramp up output to meet growing demand for** electricity. GE said it would **provide** 38 turbines, each with a 1.6MW **capacity**, to be **constructed** by Iberdrola Engineering.

The US company, which joins Danish wind firm Vestas in **supplying** Kenyan wind farms, did not **specify** the **value** of the contract.

Another **plant**, the 300MW Lake Turkana Wind Power project, is expected to **be completed** in 2016 and will **overtake** Kinangop as the biggest wind farm in Kenya.

The power plants are part of Kenya's plans to fill a **power supply shortfall**, which, **coupled with** a **dilapidated grid network**, means **frequent power outages** that **hamper** industry in East Africa's biggest economy.

With capacity of 1,664MW against a **maximum recorded demand** of about 1,410MW, Kenya is under pressure **to boost** power generation as its economy **is expected** to **expand** more than 5%.

http://www.engineeringnews.co.za

A. Find English equivalents for the following Russian ones:

1) Выиграть контракт; 2) поставлять турбины для ветровой электростанции; 3) крупнейший ветровой проект; 4) начинать работать; 5) геотермальный проект; 6) увеличивать выпуск / производство (энергии); 7) удовлетворять растущие потребности в электроэнергии; 8) обеспечивать / снабжать; 9) электрическая емкость / вместимость / объем; 10) строить / сооружать; 11) обеспечивать страну ветровыми электростанциями; 12) устанавливать стоимость контракта; 13) завершить строительство электростанции; 14) догнать / обогнать; 15) восполнить дефицит / недостаток электроснабжения; 16) в паре / наряду с; 17) ветхий / полуразрушенный; 18) энергосистема / сеть электроснабжения; 19) частые перебои в питании / прекращение подачи электроэнергии; 20) препятствовать развитию промышленности; 21) максимальный зарегистрированный спрос; 22) увеличивать производство электроэнергии; 23) увеличивать.

B. Word building

A	B
1. supply (v)	_____(n)
2. _____ (v)	generation (n)
3. set (v)	_____ (n)
4. _____(v)	meeting (n)
5. _____ (v)	demand (n)
6. provide (v)	_____ (n)
7. _____ (v)	construction (n)
8. specify (v)	_____ (adj)
9. value (v)	_____(adj)
10. couple (v)	_____ (n)
10. _____ (v)	dilapidation (n)
1. frequent (adj)	_____ (n), _____ (adv)
2. expect (v)	_____ (n)
3. expand (v)	_____ (n)

C. Answer the questions to the text

1. What is set to be sub-Saharan Africa's largest wind-generation project outside South Africa? Who has won a contract to supply turbines for it?
2. When is Kinangop Wind Park set to come online?
3. What projects are set to ramp up output to meet Kenia's growing demand for electricity?
4. What is the capacity of 38 turbines General Electric would provide for Kenia's Wind Park?
5. What plant is expected to overtake Kinangop as the biggest wind farm in Kenya?
6. What are frequent power outages that hamper industry in East Africa's biggest economy caused by?
7. Why is Kenia's economy expected to expand more than 5%?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. General Electric has won a contract to supply solar panels to a Kenyan solar and wind hybrid power plant.
2. Kenyan wind-power park is set to be sub-Saharan Africa's largest wind-generation project outside South Africa.
3. Kinangop Wind Park is one of several wind and geothermal projects in Kenya set to ramp up output to meet growing demand for electricity.
4. Kinangop Wind Park is expected to be the biggest wind farm in Kenya.
5. The power plants are part of Kenya's plans to fill a power supply shortfall.
6. Power supply shortfall coupled with a dilapidated grid network result in Kenia's frequent power outages that hamper industry in East Africa's biggest economy.
7. Notwithstanding the constructed plants Kenia cannot boost its power generation.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. General Electric has won **a deal** to **provide** turbines to a Kenyan wind-power **station.**
2. The 60.8MW Kinangop Wind **Park is to make a move** in the middle of 2015.
3. Kinangop Wind Park is meant to **increase production to cover** growing **need** for electricity.
4. General Electric would **supply** 38 turbines, each with a 1.6MW capacity, to be **built** by Iberdrola Engineering for Kenya's biggest wind-power **plant**.
5. Another **plant**, the 300MW Lake Turkana Wind Power project, is expected to be **finished** in 2016 and will **outrun** Kinangop as the biggest wind **farm** in Kenya.
6. **Regular** power **blackouts** in Kenia are caused by **energy** supply **shortage combined** with a **ramshackle** grid network.
7. With capacity of 1,664MW against a maximum recorded **requirement** of about 1,410MW Kenya is **to increase** its power production.

1. Complete each sentence with a word from the box

shortfall	project	capacity	expand
output	outages	turbines	demand
farm	contract	network	generation

1. General Electric has won a _____ to supply _____ to a Kenyan wind-power park.
2. Kinangop Wind Park is one of several wind and geothermal projects in Kenya set to ramp up _____ to meet growing _____ for electricity.
3. Lake Turkana Wind Power _____ is expected to overtake Kinangop as the biggest wind _____ in Kenya.
4. The power plants are part of Kenya's plans to fill a power supply _____.
5. Power supply shortfall coupled with a dilapidated grid _____ result in frequent power

_____ that hamper Kenia's industry.

6. With _____ of 1,664MW against a maximum recorded demand of about 1,410MW, Kenya is under pressure to boost power _____.

7. With boosting its power generation Kenia will _____ its economy to more than 5%.

2. Complete the sentence with the appropriate word

1. A wind _____ is a device that converts kinetic energy from the wind into electrical power.

2. A _____ farm is a group of wind turbines in the same location used to produce energy.

3. According to the World Bank, only 15 per cent of households in Kenia are connected to national power _____ .

4. Kenia's current installed _____ stands at about 1,600MW. The country plans to raise it up to 3,000MW by 2015.

5. A power _____ or blackout is a short- or long-term loss of the electric power to an area.

6. The pilot project by Kenya Power Lighting Company is expected to _____ outages experienced regularly in commercial and domestic power lines.

7. Though Kenya's _____ grid is reliable, the country still experiences an average of seven blackouts a month.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:
1) a representative of General Electric speaking about the terms and conditions of the contract;
2) a power engineer speaking about wind and geothermal projects in Kenya;
3) an economist speaking about Kenia's regular outages and their impact on the country's economy;
4) a scientist speaking about possibilities of using alternative sources of energy on the continent;
5) other.

Text 2

Clean Energy Least Costly to Power America's Electricity Needs

Jake Thompson

WASHINGTON – **Findings** show **carbon pollution** from **power plants** can be **cut cost-effectively** by using wind, **solar** and natural gas.

It's less costly **to get electricity** from **wind turbines** and **solar panels** than **coal-fired power plants** when climate change costs and other health **impacts** are **factored in**, **according to a new study** published in Springer's Journal of **Environmental** Studies and Sciences.

In fact – using the official U.S. government **estimates** of health and **environmental costs** from **burning fossil fuels** – the study shows it's cheaper to **replace** a typical **existing** coal-fired power plant with a wind turbine than **to keep** the old plant **running**. And new **electricity generation** from wind could be more economically **efficient** than natural gas.

The findings show the nation can **cut** carbon pollution from power plants in a cost-effective way, by replacing coal-fired generation with **cleaner options** like wind, solar, and natural gas.

"**Burning coal** is a very **costly** way to make electricity. There are more **efficient** and **sustainable** ways **to get power**," said Dr. Laurie Johnson, chief economist in the Climate and Clean Air Program at the Natural Resources Defense Council. "We can **reduce** health and climate change **costs** while reducing the dangerous carbon pollution **driving global warming**."

Johnson co-authored the study, "The Social Cost of Carbon: Implications for Modernizing our Electricity System," with Chris Hope of the Judge Business School, University of Cambridge; and Starla Yeh in NRDC's Center for Market Innovation. Power plants are the nation's **single** largest **source** of such pollution, **accounting** for 40 percent of our national carbon **footprint**.

"And yet, there are no federal **limits on the amount of carbon pollution our power plants may release**," said Johnson. "That's wrong. It doesn't make sense. It's **putting our future at risk**. We limit the

amount of **mercury**, arsenic, soot, and other **harmful** pollution from these plants. It's time to cut this carbon pollution."

President Obama has **vowed** to do that, using his authority under the Clean Air Act to **set** the first federal **limits** on the amount of carbon pollution power plants may release. Critics **claim** that could **raise costs**. But, in fact, it can reduce the **total cost** of electricity generation, the new study finds.

Carbon pollution **imposes** economic costs by **damaging** public health and driving **destructive climate change**. Working together, the White House Office of Management and Budget, the Treasury Department, the Department of Energy and eight other federal agencies put a dollar value on those damages, in an official figure called the "social cost of carbon" (SCC).

The SCC is used **to calculate** the **benefits** (i.e., avoided climate damages) of carbon pollution **reduction**. The administration puts the best estimate at $33 per ton of carbon pollution emitted in 2010.

The study also **included** government damage estimates from sulfur dioxide, a pollutant released simultaneously with carbon. Every year, sulfur dioxide **causes** thousands of **premature deaths**, **respiratory ailments**, heart **disease** and a **host of ecosystem damages**.

"Already, climate change is **contributing** to **record heat waves, floods, drought, wildfires and severe storms**," Johnson said. Such **extreme** weather **caused** more than $140 billion in damages in 2012. American taxpayers picked up nearly $100 billion of those costs, according to an NRDC report released in May, 2013."These damages are only likely to **increase** if nothing is done to reduce carbon pollution," concluded Johnson.

http://www.sciencedaily.com

A. Find English equivalents for the following Russian ones:

1) сократить / снизить загрязнение от угольных электростанций; 2) выгодно / рентабельно; 3) получать электричество с помощью ветрогенераторов / ветряных двигателей и солнечных батарей; 4) электростанция, работающая на угле; 5) воздействие на здоровье; 6) принимать во внимание; 7) согласно новому исследованию; 8) экологические затраты; 9) сгорание ископаемого топлива; 10) заменить существующую угольную электростанцию ветрогенераторами; 11) содержать / поддерживать; 12) производство электроэнергии с помощью энергии ветра; 13) эффективный/ результативный; 14) экологически чистые альтернативные источники энергии; 15) сжигание угля; 16) дорогостоящий; 17) эффективные и (экологически) устойчивые способы получения электроэнергии; 18) снизить затраты; 19) приводить к глобальному потеплению; 20) единственный источник загрязнения; 21) ограничения на количество выбрасываемого электростанциями углекислого газа; 22) подвергать своё будущее опасности; 23) вредный / опасный; 24) устанавливать предел; 25) увеличивать затраты; 26) наносить вред здоровью и вести к изменению климата; 27) подсчитывать прибыль от снижения загрязнения; 28) становиться причиной преждевременной смерти; 29) респираторные заболевания; 30) болезни сердца; 31) разрушение экологической системы; 32) сильная жара; 33) наводнение; 34) засуха; 35) пожар; 36) буря / шторм / ураган; 37) причинять убытки.

B. Word building

A	B
1. _____(v)	pollution(n)
2. effective (adj)	_____ (adv)
3. electrify (v)	_____ (n)
4. _____(v)	study (n)
5. environment (n)	_____ (adj)
6. estimate (v)	_____ (n)
7. cost (v)	_____ (adj)
8. _____ (v)	replacement (n)

9. _____ (v)	existence (n)
10. _____ (v)	generation (n)
10. efficient (adj)	_____ (adv)
11.power (n)	_____ (adj)
12.reduce (v)	_____ (n)
13._____ (n)	harmful (adj)
14.damage (v)	_____ (n)
15.destruct (v)	_____ (adj)
16._____ (v)	cause (n)
17.contribute (v)	_____ (n)
18. _____ (v)	flood (n)
19.extreme (n)	_____ (adj)
20._____ (v)	increase (n)

A. Answer the questions to the text

1. How can carbon pollution from power plants be cut cost-effectively, according to a new study?
2. Is it less costly to get electricity from wind turbines and solar panels than coal-fired power plants? Why?
3. Why is new electricity generation from wind economically efficient?
4. What is the cost-effective way to cut carbon pollution from power plants?
5. What are more efficient and sustainable ways to get power as compared with burning coal?
6. What kinds of harmful pollution from the plants are limited?
7. Are there federal limits on the amount of carbon pollution the power plants release? What can the limits cause?
8. How does carbon pollution impose economic costs?
9. What is sulfur dioxide? What does it cause?
10. What does climate change driven by carbon pollution contribute to?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. Carbon pollution from power plants can be cut cost-effectively by using wind, solar and natural gas.
2. According to a new study it's less costly to get electricity from coal-fired power plants than wind turbines and solar panels.
3. It's cheaper to replace a typical existing coal-fired power plant with a wind turbine than to keep the old plant running.
4. There are no cost-effective ways the nation can cut carbon pollution from power plants.
5. Health and climate change costs can be reduced while reducing the dangerous carbon pollution driving global warming.
6. There are strict federal limits on the amount of carbon pollution the power plants may release.
7. President Obama has vowed to cut carbon pollution by setting the first federal limits on the amount of carbon pollution the power plants may release.
8. Carbon pollution imposes economic costs by damaging public health and driving destructive climate change.
9. Every year, sulfur dioxide causes thousands of premature deaths, respiratory ailments, heart disease and a host of ecosystem damages.

10. There is no evident connection between climate change and record heat waves, floods, drought, wildfires and severe storms.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. The **data** shows carbon **contamination** from power **stations** can be **reduced** cost-effectively by **deploying** wind, solar and natural gas.

2. When climate change **costs** and other health **effects** are **taken into consideration** it turns out that it's less **expensive** to **generate** electricity from wind turbines and solar panels than coal-fired power **stations**.

3. According to the official U.S. government **assessments** of health and **ecological** costs from burning fossil, it's cheaper to **substitute** a typical **existing** coal-fired power **plant** with a wind turbine than to keep the old plant running.

4. The **investigations** show new electricity **production** from wind could be more economically **effective** than natural gas.

5. Carbon pollution from power **plants** can be **reduced** in a **profitable** way by **substituting** coal-fired generation with **alternative energy sources** like wind, solar, and natural gas.

6. As burning coal is a very **expensive** way to **make** electricity there are more **effective** and **ecological** ways to get power.

7. Health and climate change **expenses** can be **cut** while **cutting** the dangerous carbon pollution **resulting in** global warming.

8. Setting federal **standards** on the **extent** of carbon pollution power **plants** may release can **increase** costs.

9. Carbon pollution imposes economic costs by **destructing** public health and **causing negative** climate change.

10. Damages **caused by** record **heat** waves, floods, drought, wildfires and severe **hurricanes** are likely to **increase** if nothing is done to **decrease** carbon pollution.

1. Complete each sentence with a word from the box

turbine	change	burning	replace
sustainable	causes	damaging	estimates
impacts	cut	drought	pollution
generation	coal-fired	destructive	wind
limits	costly	disease	electricity

1. Carbon _____ from power plants can be cut cost-effectively by using wind, solar and natural gas.

2. When climate change costs and other health _____ are factored in, it's less costly to get _____ from wind turbines and solar panels than coal-fired power plants.

3. According to the official U.S. government _____ of health and environmental costs from _____ fossil fuels it's cheaper to _____ a typical existing coal-fired power plant with a wind _____ than to keep the old plant running.

4. Electricity _____ from wind is more economically efficient than natural gas.

5. Carbon pollution from power plants can be _____ in a cost-effective way by replacing _____ generation with cleaner options like _____, solar, and natural gas.

6. Burning coal is considered to be a very _____ way to make electricity. There are more efficient and _____ ways to get power.

7. It’s necessary to set the _____ on the amount of carbon pollution the power plants may

release.

8. Carbon pollution imposes economic costs by _____ public health and driving _____ climate change.

9. Sulfur dioxide _____ thousands of premature deaths, respiratory ailments, heart _____ and a host of ecosystem damages.

10. Climate _____ contributes to record heat waves, floods, _____, wildfires and severe storms.

2. Complete the sentence with the appropriate word

1. Fossil fuel-fired power plants use natural gas, petroleum, coal or any form of solid, liquid, or gaseous fuel derived from such material for the purpose of generating _____ .

2. _____ is the increase of Earth's average surface temperature due to greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation.

3. Consequences of global warming include drought, severe _____ , wildfires, and melting of the polar caps.

4. _____ caused by global warming present greater risk of heat-related illness and death, most frequently among patients of diabetes who are elderly or very young.

5. Wind electricity is green, renewable energy and doesn't release any harmful carbon dioxide or other pollutants.

6. Power plants are the largest stationary _____ of carbon pollution in the United States: about one third of all greenhouse gas pollution in the U.S. comes from the generation of electricity by power plants.

7. A gas power station turns the chemical energy in _____ into electrical energy that can be used in homes and businesses.

8. Electricity _____ is the process of generating electrical power from other sources of primary energy.

9. _____ is an extended period when a region notes a deficiency in its water supply whether surface or underground water.

10. More than 135,000 people in Russia's Far East have been affected by unprecedented continuing _____ caused by heavy rains.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) an environmentalist speaking on carbon pollution resulting in global warming;

2) an economist speaking about possibilities of reduction of health and climate change costs while reducing the dangerous carbon pollution;

3) a representative of the US government speaking about the necessity of setting federal limits on the amount of carbon pollution power plants release;

4) a scientist speaking about possibilities of replacing a typical existing coal-fired power plant with alternative sources of energy;

5) other.

Unit 6. Biomass Energy

Text 1

World‘s largest biomass plant launched in Finland

Submitted by Editorial staff on

The world's largest **biomass gasification plant** has been **inaugurated** in Finland. Firm Vaskiluodon Voima Oy has **launched** the 140MW plant in Vaasa, which is expected **to cut coal use** by 40 per cent.

The technology for the plant has been **supplied** by Finnish **process technology** firm Metso. The company said the plant is **ground-breaking** because it is the first time **biomass gasification** has been **adopted on such a large scale** for the **replacement** of **fossil fuels.**

The technology of the new plant is based on Metso's **long-term development work**. Metso's **delivery includes fuel handling**, a **large-scale dryer** and a circulating **fluidized bed gasifier**, as well as **modification work** on an **existing coal boiler** and a Metso DNA automation system.

Jyrki Holmala, President of Metso's Power business line, said: "I'm sure that Vaskiluoto's **investment** in **increasing the use of renewable energy** will **draw major** international **attention**. **Coal powered plants** can **be made greener** and Vaskiluoto's plant **is leading the way**.

"Coal boilers still **account for the majority** of **power production** in the world," Holmala added. "Bio-gasification technology of this scale **offers** a new, **cost-effective option** for **increasing the share of biomass** and, consequently, for **significantly decreasing** the **use** of and **emissions** from coal."

The bio-gasification plant was constructed as **part of an existing coal-fired power plant**. The produced gas will **be combusted** along with coal in the existing **coal boiler**.

The contract for the new plant was announced in June 2011, and Metso **started the construction** at Vaskiluoto in April in 2012, which made the **construction phase** fairly short.

Mauri Blomberg, managing director, Vaskiluodon Voima, said: "The **operational experiences** so far **indicate** that the 140MW bio-gasification plant **functions** as planned, and the produced gas **burns cleanly** in the coal boiler and **reduces emissions**."

Nearly half of the coal used by the plant can **be replaced with gasified biomass**. This makes the **solution highly environmentally friendly**, **enables** the **flexible use of different fuels** and **significantly extends** the life of the **current** power plant.

"The **commissioning** of the gasification plant is **a major step** in our company's **target** of using mainly **domestic fuels** for **heat** and electricity production. This can be considered **a complete energy turnaround**," said Rami Vuola, chairman of the board of Vaskiluodon Voima.

The **recent** gasification **technology projects** are an **indication** of Metso's **strategy** of **offering energy solutions** in which technologies **related** to **fuel refining** have been **brought forth alongside traditional combustion**. In May 2012, a **similar event was held** in Lahti, Finland, with the inauguration of the world's first **waste gasification plant**.

http://www.renewable-energy-technology.net

A. Find English equivalents for the following Russian ones:

1) газогенераторная электростанция, работающая на биомассе; 2) открывать / вводить в действие; 3) произвести запуск; 4) снизить / сократить применение угля; 5) снабжать / поставлять; 6) операционная технология; 7) новаторский / революционный; 8) газификация биомассы; 9) принимать / брать на вооружение; 10) в большом масштабе; 11) для замены ископаемого топлива; 12) длительная технологическая разработка; 13) включать в себя; 14) подача топлива; 15) сушильный аппарат; 16) газогенератор с псевдоожиженным слоем; 17) работа по модернизации пылеугольного котла; 18) инвестирование; 19) увеличивать использование; 20) возобновляемая энергия; 21) привлечь внимание; 22) электростанция, работающая на угле; 23) экологически чистый; 24) быть первым / показывать пример; 25) являться причиной / нести ответственность / отвечать за; 26) выработка / производство электроэнергии; 27) предлагать прибыльные варианты; 28) увеличение доли биомассы; 29) значительно снизить применение угля; 30) загрязнение углем; 31) часть действующей электростанции на угле; 32) сжигать газ и уголь в имеющихся пылеугольных котлах; 33) начать строительство электростанции; 34) этап строительства; 35) опыт работы; 36) указывать / показывать; 37) функционировать; 38) чисто сгорать; 39) снижать / уменьшать

загрязнение; 40) заменить уголь газифицируемой биомассой; 41) принять благоприятное для окружающей среды решение;42) давать возможность гибкого применения различных видов топлива; 43) значительно увеличивать срок эксплуатации действующей электростанции; 44) ввод в эксплуатацию газогенераторной электростанции; 45) важный шаг; 46) применение бытового топлива для отопления и производства электроэнергии; 47) совершенно другой подход к производству электроэнергии; 48) современный проект; 49) предлагать решения; 50) очистка топлива; 51) сжигание топлива; 52) подобное событие; 53) газогенераторная электростанция, работающая на отходах.

B. Word building

A	B
1. gasify (v)	_____ (n), _____ (n)
2. inaugurate (v)	_____ (n)
3. cut (v)	_____ (n)
4. use (v)	_____(n), _____ (n)
5. supply (v)	_____ (n)
6._____ (adj)	technology (n)
7.adopt (v)	_____ (n)
8. replace (v)	_____(n)
9. _____ (v)	development(n)
10. _____ (v)	electricity (n)
11. deliver (v)	_____ (n)
12. _____ (v)	handle (n)
13. dry (n)	_____ (n)
14._____ (v)	modification (n)
15.exist (v)	_____ (n)
16._____ (v)	boiler (n)
17._____ (v)	investment(n)
18.renew (v)	_____ (adj)
19. _____ (adj)	attention (n)
20.lead (v)	_____ (n)
21.account (v)	_____ (n)
22._____ (adj)	majority (n)
23._____ (v)	production (n)
24._____ (adj)	effectiveness (n)
25.share (v)	_____ (n)
26._____ (v)	emission (n)
27. combust (v)	_____ (n)
2. construct (v)	_____ (n)
29._____ (v)	experience (n)
30.indicate (v)	_____ (n)
31.function (v)	_____ (n)

32.reduce (v)	_____ (n)
33. _____ (adj)	environment (n)
34. _____ (adj)	significance (n)
35.current (adj)	_____ (adv)
36.recent (adj)	_____ (adv)
37.relate (v)	_____ (n)

C. Answer the questions to the text

1. What plant has been inaugurated in Finland? What is the plant expected to?
2. Why is the plant considered to be ground-breaking?
3. What is the technology of the new plant based on? What does Metso's delivery include?
4. Why will Vaskiluoto's investment in increasing the use of renewable energy draw major international attention?
5. What accounts for the majority of power production in the world?
6. What does bio-gasification technology offer for increasing the share of biomass?
7. Why was the bio-gasification plant constructed as part of an existing coal-fired power plant?
8. What does replacement of the coal used by power plants with gasified biomass enable?
9. What is considered to be a major step the company's target of using domestic fuels for heat and electricity production?
10. What solutions does Metso's strategy offer?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. The world's largest solar power plant has been inaugurated in Finland.
2. The world's largest biomass gasification plant is expected to increase coal use by 40 per cent.
3. The plant is ground-breaking because it is the first time biomass gasification has been adopted on such a large scale for the replacement of fossil fuels.
4. Metso's delivery includes fuel handling, a large-scale dryer and a circulating fluidized bed gasifier, as well as modification work on an existing coal boiler.
5. Vaskiluoto's investment in increasing the use of renewable energy must draw major international attention to the problem of coal emission.
6. Biomass gasification plants account for the majority of power production in the world.
7. Metso's bio-gasification technology offers a cost-effective option for increasing the share of biomass and for significantly decreasing the use of and emissions from coal.
8. Operational experiences indicate that the produced gas burns less cleanly in the existing coal boiler so that it enlarges emissions.
9. Gasified biomass can replace nearly quarter of the coal used by the plant.
10. Metso aims at using mainly domestic fuels for heat and electricity production.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. The world's largest biomass gasification **station** was **commissioned** in Finland.
2. The **plant** is expected **to reduce** coal **deployment** by 40 per cent.
3. The **plant** is **innovative** because it is adopted for the **substitution** of fossil fuels**.**
4. Investment in **raising** the use of **sustainable** energy will **attract** major international attention.
5. Bio-gasification technology **suggests** a **profitable** option for **extension** the share of biomass and for significantly **reducing** the use of coal.
6. The bio-gasification **plant** was **built** as part of an existing coal-fired power plant where the produced gas will be **burnt** along with coal in the coal boiler.

7. The **working** experiences **show** that the bio-gasification **plant operates** as planned, and the produced gas **combusts** cleanly in the coal boiler and **decreases** emissions.

8. Nearly half of the coal **utilized** by the **plant** can be **substituted** with gasified biomass.

9. **Substitution** of coal with gasified biomass **makes possible** the flexible **deployment** of **various** fuels and significantly **prolongs** the life of the current power **plant**.

10. The **start-up** of the gasification **plant** is **a main** step in Metso's **objective** of using mainly domestic fuels for heat and electricity **generation**.

1. Complete each sentence with a word from the box

attention	combustion	existing	replacement
biomass	domestic	experiences	share
boiler	delivery	flexible	solution
cut	dryer	refining	target
combust	emissions	renewable	technology

1. The world's largest biomass gasification plant in Finland is expected to _____ coal use by 40 per cent.

2. The plant is ground-breaking because it is the first time _____ gasification has been adopted on such a large scale for the _____of fossil fuels.

3. Metso's _____ includes fuel handling, a large-scale _____ and a circulating fluidized bed gasifier.

4. Investment in _____ energy draws major international _____ to coal powered plants which can be made greener.

5. Bio-gasification _____ offers a cost-effective option for increasing the _____ of biomass and, consequently, for significantly decreasing the use of and _____ from coal.

6. The bio-gasification plant was constructed as part of an _____ coal-fired power plant to _____ produced gas along with coal in the existing coal boiler.

7. The operational _____ indicate that the bio-gasification plant functions as planned, and the produced gas burns cleanly in the coal _____ and reduces emissions."

8. The use of gasified biomass makes the _____ environmentally friendly, which enables the _____ use of different fuels and significantly extends the life of the current power plant.

9. The company's _____ is using mainly _____ fuels for heat and electricity production.

10. Metso's strategy offers energy solutions in which technologies related to fuel _____ are brought forth alongside traditional _____.

2. Complete the sentence with the appropriate word

1. As an alternative fuel to meet the world's growing energy needs _____ continues to attract a lot of attention.

2. Utilization of biomass resources to produce _____ is growing worldwide, but its gasification to produce biogas remains small-scale.

3. The use of biomass to generate heat power, fuels and chemicals is crucial in achieving energy independence and increasing our use of _____ energy sources.

4. _____ is a thermal conversion process in which both heat and a combustible product gas are produced.

5. Gasification technology clearly offers a new cost-efficient alternative to the operators of large coal power plants – increasing the _____ of biomasses, while simultaneously reducing coal emissions.

6. _____ produces heat, most commonly in a boiler to generate steam for production of electricity using a steam turbine.

7. Natural gas is one of the major combustion _____ used to generate industrial and utility

electric power, produce industrial process steam and heat, and heat residential and commercial space.

8. The gasifier at Vaasa will primarily use forest residues sources from the surrounding provinces, with the resulting biogas co-combusted with the coal in the power plant's _____ .

9. Some existing coal-burning plants are being modified so that they can simultaneously _____ biomass

10. Clean coal technology promises to mitigate the increasingly severe climactic effects of coal _____ .

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:
1) a journalist speaking about the construction of the world's largest biomass gasification plant in Finland;
2) a representative of Metso speaking about the technology of the new plant and modification work on an existing coal boiler and automation system;
3) a business investing in increasing the use of renewable energy;
4) an environmental expert speaking about a negative impact of carbon pollution;
5) other.

Text 2

Growth in bio-energy sector will lead to economic growth in rural areas: Alok Srivastava

New Delhi ,

New Delhi, Sep 11 (ANI): Ministry of New and **Renewable Energy** Joint Secretary Alok Srivastava on Wednesday said that **bio-energy** especially **biomass** has **a strong potential** in **rural areas** and **growth** in the sector will **lead** to economic growth in rural areas.

Addressing the Inaugural Session at the Bio-Energy Summit 2013, organized by the Confederation of Indian Industry (CII), Srivastava said: "It is also a **key off-grid solution:** and **solar** and **biomass hybrids** can be **deployed**. There is a **need for** a policy **push** for biomass as has been done for solar and wind and **support mechanisms** like incentives /**subsidies** /**tax holidays** need to be **put in practice**."

Suggesting some **solutions** across the different bioenergy segments, he said, "Companies need to be present across the **feedstock value chain** and mechanization in **collection and storage** is **critical**. To **distribute improved** cook **stoves**, MNRE is rolling out the National Biomass Cook Stoves Programme in the 12th Plan whereby 3.5 million cook stoves will be distributed."

Giving his perspective, Dr S C Sharma, OSD (Petroleum), Planning Commission, said, "The **conversion** of bio-energy to **liquid** and **gaseous fuels** has a strong potential to **reduce** the **impact** on the **current account deficit** and **replacement** of five percent of the **liquid fuels** by **biofuels** would **result in savings** of $5-6 billion **annually**."

"This **assumes significance** as last year, the oil and energy import bill was the highest at 120 billion dollars. The five percent **ethanol blending** which has been **mandated** by the government is **a step in the right direction** and **efforts** have to be made to **ensure** that ethanol blending is **remunerative**. To make **biodiesel competitive**, states need to provide **VAT exemption** on biodiesel," he added.

In the course of his welcome remarks, Pramod Chaudhari, Chairman, CII National Committee on Bio-Energy and Executive Chairman, Praj Industries Ltd, said, "Bio-based economy will not only help in **reducing dependency on** the rising fuel imports but **biomass based power production** also has the potential to provide distributed power at the rural **level**. However, bio-energy programs have not been at **par** with traditional **energy sources** and there are **challenges related** to commercial **sustainability**, **feedstock availability**, availability of **appropriate** technologies, appropriate financing and market linkages."

Emphasizing on the **need** for a strong policy push, he said, "While the Government has **put in** place policy levers for the **development** of this sector, more **remains** to be done. The growth of the bioenergy sector in India will **benefit** from the **formation** of a Task Force in this area."

K Krishan, Co-Chairman, CII National Committee on Bio-Energy and Chairman, MPPPL Renewable Energy Pvt Ltd concluded by saying, "There is a need to **efficiently utilize** the 140 million tons of biomass which is being used for cooking in the country."

"Also **biofuels** and bio methane can be used to **mitigate petrol imports** and the **current account deficit** given that the country **incurred** an oil import bill 15 billion dollars recently. **Bioenergy** can also address the issue of energy **access** and is a **clean source** of energy," he said.

Reiterating the importance of policy **imperatives** in this segment, he said, "Clearly, given all these **benefits**, there is a need to **focus on** bioenergy and as a step in this direction a separate Task Force on bioenergy is **critical**." (ANI)

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A. Find English equivalents for the following Russian ones:

1) возобновляемый источник энергии; 2) биоэнергетика; 3) иметь огромный потенциал; 4) сельские районы; 5) привести к экономическому росту; 6) возможность выхода за пределы энергосистемы; 7) использовать солнечную энергию и энергию биомассы; 8) необходимость политического продвижения / давления; 9) механизмы поддержки; 10) освобождение от уплаты налогов; 11) осуществлять / реализовывать; 12) предлагать решения; 13) сырье / перерабатываемое сырье; 14) цепочка начисления / создания стоимости; 15) сбор и хранение сырья; 16) улучшенный / усовершенствованный; 17) распределять / раздавать печи; 18) преобразование биологической энергии в жидкое и газообразное топливо; 19) дефицит текущего баланса; 20) замена жидкого топлива биологическим топливом; 21) вызывать / приводить к / иметь в результате; 22) ежегодная экономия; 23) важность / значимость; 24) поддержать производство пятипроцентного этилового спирта; 25) шаг в правильном направлении; 26) прибыльный; 27) конкурентоспособный; 28) освобождение от уплаты налога на добавленную стоимость; 29) снизить зависимость от импорта топлива; 30) производить электроэнергию из биомассы; 31) равенство; 32) традиционные источники энергии; 33) проблемы, связанные с доступностью сырья; 34) соответствующий / подходящий; 35) подчеркнуть необходимость политического продвижения; 36) выигрывать / извлекать пользу; 37) необходимость эффективного использования биомассы; 38) сократить импорт бензина; 39) доступ к электроэнергии; 40) важный / ответственный.

B. Word building

A	B
1. renew (v)	_____(adj)
2. grow (v)	_____(n)
3._____ (v)	deployment (n)
4. _____(v)	support (n)
5. push (v)	_____ (n)
6. _____(v)	practice (n)
7. _____ (v)	collection (n)
8. _____ (v)	storage (n)
9. distribute (v)	_____(n)
10. improve (v)	_____ (n)
10. _____ (v)	conversion (n)
11._____ (v)	reduction (v)
12. significance (n)	_____ (adj)
13. ensure (v)	_____ (n)
14. remuneration (n)	_____(adj)
15. _____(n)	competitive (adj)
16. exemption (n)	_____ (adj)

17. _____ (v)	dependency (n)
18. produce (v)	_____ (n)
19. relate (v)	_____(n)
20._____ (v)	sustainability (n)
21._____(adj)	availability (n)
22.develop (v)	_____ (n)
23._____ (v)	formation (n)
24. _____ (adj)	efficiency (n)
25. mitigate (v)	_____ (n)
26. _____ (v)	import (n)
27. benefit (v)	_____ (n)

C. Answer the questions to the text

1. What sources of energy have a strong potential in India's rural areas?
2. What hybrids can be deployed as a key off-grid solution, according to Ministry of New and Renewable Energy Joint Secretary Alok Srivastava?
3. What solutions has Alok Srivastava suggested across the different bioenergy segments?
4. What will replacement of five percent of the liquid fuels by biofuels result in?
5. Why has the five percent ethanol blending been mandated by the government? What measures should be taken to make biodiesel competitive?
6. What can help in reducing dependency on the rising fuel imports?
7. What challenges are bio-energy programs related to?
8. What will the growth of the bioenergy sector in India benefit from?
9. What can be used to mitigate petrol imports and the current account deficit?
10. Can bioenergy address the issue of energy access?

D. True or False? (Use the facts and the keywords from the text to prove and specify your viewpoint)

1. Geothermal energy has a strong potential in India's urban areas.
2. Solar and biomass hybrids can be deployed as a key off-grid solution.
3. There is a need for a policy push for biomass and some support mechanisms need to be put in practice.
4. Mechanization in the feedstock collection and storage as well as its value chain is critical.
5. The conversion of bio-energy to liquid and gaseous fuels has a strong potential to reduce the impact on the current account deficit.
6. The five percent ethanol blending hasn't been mandated by the government as it doesn't seem to be remunerative.
7. Bio-based economy is sure to increase dependency on fuel imports.
8. Bio-energy programs in India have been at par with traditional energy sources.
9. Biofuels and bio methane can be used to mitigate petrol imports and the current account deficit.
10. According to K Krishan, there is a need to focus on bioenergy as the growth of the bioenergy sector in India will benefit from the formation of a Task Force.

VOCABULARY EXERCISES

1. Rephrase the sentences using the word / words closest in meaning to a boldfaced one

1. Bio-energy has **big opportunities** in India's **countryside** and **development** in this sector will **conduce** to economic growth in the country.

2. Solar and biomass hybrids can be **used** as a **basic** off-grid **decision**.

3. There is a **necessity for** a policy **drive** for biomass and some **maintenance** mechanisms need to be **exercised**.

4. The mechanization in collection and storage of **input materials** is **vital**.

5. Whereby the National Biomass Cook Stoves Program 3.5 million **advanced** cook stoves will be **allocated** among the **residents** of the **countryside**.

6. The **transformation** of bio-energy to liquid and gaseous fuels has an **opportunity** to **decrease** the **influence** on the current account deficit.

7. **Dislacement** of five percent of the liquid fuels by biofuels is expected to **lead to** savings of $5-6 billion **yearly**.

8. Ethanol **production** is known to be **profitable**.

9. Bio-energy programs have not been at **equality** with traditional **power** sources and there are some **problems connected with input materials** availability and **accessibility** of appropriate technologies.

10. There is a **necessity** to **concentrate on** bioenergy because **development** in this sector will **result in** economic growth in **rural areas**.

1. Complete each sentence with a word from the box

conversion	solution	hybrids	par
savings	biomass	blending	stoves
support	fuels	development	imports
biofuels	potential	energy	direction

1. Bio-energy especially _____ has a strong potential in rural areas.
2. Growth in bio-energy sector will lead to economic _____ in rural areas.
3. Solar and biomass _____ can be deployed in bio-energy sector as a key off-grid _____ .
4. Subsidies and tax holidays need to be put in practice as _____ mechanisms for biomass.
5. Millions of improved cook _____ will be distributed in rural areas.
6. The _____ of bio-energy to liquid and gaseous fuels has a strong _____ to reduce the impact on the current account deficit.
7. Replacement of five percent of the liquid _____ by biofuels would result in _____ of $5-6 billion annually.
8. Five percent ethanol _____ is a step in the right _____ as it is considered to be remunerative.
9. Bio-energy programs have not been at _____ with traditional _____ sources.
10. _____ and bio methane can be used to mitigate petrol _____ and the current account deficit.

2. Complete the sentence with the appropriate word

1. In many developing countries biomass remains the only source of _____ for domestic use.
2. Wood remains the largest _____ energy source today.
3. _____ of biomass to biofuel can be achieved by thermal, chemical, and biochemical methods.
4. Biomass can be converted to usable forms of energy like methane gas or transportation fuels like _____ and biodiesel.

5. Bio-ethanol is a form of quasi-renewable energy that can be produced from agricultural _____ such as fruit, sugar cane, potato, sunflower, wheat.

6. The world's first biomass solar _____ power plant, Termosolar Borges, started operating in December 2012 in Spain.

7. Hybrid renewable energy power plants combine different renewable power _____ .

8. Due to the tropical conditions with rain showers blocking sunlight from solar-only plants and the supply shortages from drought conditions for biomass-only plants, a hybrid biomass and solar power plant can become a key _____ to the problem in India.

9. Plans are underway to build a _____ power plant that will run on rice in Thailand.

10. The world's largest biomass gasification plant in Finland has been adopted for the _____ of fossil fuels.

OVER TO YOU

E. Present your point of view on the problems and solutions discussed in the unit as if you were:

1) Minister of New and Renewable Energy speaking about a strong potential of biomass in rural areas;
2) Ministry of New and Renewable Energy Joint Secretary speaking about the National Biomass Cook Stoves Program;
3) an economist speaking what support mechanisms can be put in practice for development of bio-energy sector;
4) a scientist speaking about possibilities of deploying solar and biomass hybrids for energy production in rural areas;
5) other.

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