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English for Power Business

Английский для бизнеса в сфере энергетики

Электронное учебное пособие
по дисциплине «Иностранный язык (английский)» для
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Электронное учебное издание предназначено для организации профессионально-ориентированного обучения английскому языку студентов специальности «Теплоэнергетика и теплотехника». Представленный дидактический комплекс направлен на освоение профессиональной лексики, развитие навыков разговорной и письменной речи.

ПРЕДИСЛОВИЕ

Предлагаемое учебное издание предназначено для организации методического обеспечения учебного процесса по дисциплине «Иностранный язык (английский)» для студентов, обучающихся по специальности «Теплоэнергетика и теплотехника». Содержание учебного пособия охватывает вопросы энергоменеджмента, применения энергосберегающего оборудования, материалов и технологий, энергетических экспертиз. Учебное издание предназначено как для аудиторной, так и для самостоятельной работы обучающихся.

Пособие включает в себя десять разделов по темам: Introduction to the Power Business, Fossil Fuels, Renewable Energy Sources, Markets and Customers, Energy Efficiency Measures, Smart Grid, Protecting the Environment, The Energy Audit, The Nuclear Issue, The Future of Energy. Базой для составления электронного учебного издания послужили аутентичные тексты и диалоги. Наряду с текстами в каждом разделе предлагается комплекс упражнений, способствующий активному усвоению лексики, корректному употреблению терминов, повторению некоторых аспектов грамматики, а также позволяющих проверить общее понимание прочитанного. В результате освоения материала пособия студентам предоставляется возможность усвоить необходимый объем лексики для монологической и диалогической речи в энергетической сфере.

Для полного понимания учебного материла издание снабжено словариком технических терминов и слов из упражнений, при переводе которых могут возникнуть трудности у обучающихся.

Что касается лексического наполнения упражнений, большое количество аутентичных предложений и текстов с технической и академической лексикой было включено в учебное пособие. Это позволит расширить словарный запас студентов и будет способствовать повышению уровня профессионально ориентированного обучения будущих специалистов.

СОДЕРЖАНИЕ

Unit 1. INTRODUCTION TO THE POWER BUSINESS

Active Vocabulary

Nouns and noun phrases	to educate – информировать
plant – электростанция	to focus on – сосредоточиться на
lignite – бурый уголь	to generate – вырабатывать
электростанция	to liberalize – либерализовать
flow – поток	to ensure – обеспечивать
fuel – топливо	to set up – устанавливать
quantities - количество	to illuminate – освещать
requirement – потребность	to distribute – распространять
overhead lines – воздушные линии	to claim – утверждать
consequence – последствия	to tackle – решать
nightmare scenario – кошмарный	**Adjectives**
сценарий	profitable – выгодный
emissions – выбросы	questionable – сомнительный
grid fees – сетевые сборы	primary – основной
state-of-the-art – уровень развития	versatile – универсальный
drawback – недостаток	enormous – огромный
benefit – преимущество	**Adverbs**
issue – проблема	dramatically – стремительно
Verbs and verbal phrases	inevitably – неизбежно
to produce – производить	differently – иначе
to reduce – снижать	

Work with a partner. Sort the fuels and energy sources below into the correct category. Can you add any more to the lists?

fossil fuel(s)	renewables	nuclear fuel(s)

(hard) coal uranium wind gas
sun oil biomass lignite

Now answer these questions.

1. What fuels and sources are used at your company, or the companies you do business with?

2. Which one is used most?
3. Where do these fuels come from?
4. Which are imported?

1. Match these different power plants to their descriptions.

1. hydro power plant	**a.** a traditional type of power plant which burns a solid, black fossil fuel
2. solar power plant	**b.** a power plant which pumps water back uphill into a reservoir during periods of low demand
3. nuclear power plant	**c.** a plant which uses the flow of water from a reservoir to generate electricity
4. wind power plant	**d.** a power station utilizing the natural flow of water in a river for generating power
5. gas-fired power plant	**e.** type of power plant that uses uranium as its primary fuel
6. run-of-river power plant	**f.** a power plant which uses the natural flow of air to generate electricity
7. coal-fired power plant	**g.** a fossil fuel power plant which burns a solid, dark brown fuel
8. lignite-fired power plant	**h.** a power plant that generates electricity utilizing energy from the sun
9. pump-storage power plant	**i.** a power station which burns gas as its primary fuel

2. Listen to a phone call between a journalist, Colin Maitland, and the public relations officer of the company ELEC, Maria Berger. Complete the journalist's notes.

ELEC'S fossil fuel use ……(1) and ……(2);

Power plants and loads
Lignite-fired plants for ……(3) load; Gas-fired plants for ……(4) and peak-load ranges;
Gas plants also used to supply ……(5)

Technology to protect environment
ELEC say they have ……(6) equipment installed in their plants.

Altrath plant, near Berlin
Commissioned in ……(7) but has been ……(8) since then.

Wind generation

Company building more power stations, but difficult to get ……(9) in some countries. ELEC views criticism that these ……(10) the countryside as 'exaggerated'.

What other questions would you expect the journalist to ask?

3. Match the two parts to make phrases from the dialogue. Then listen again to check your answers.

1. Base	A. equipment
2. Company	B. fuels
3. Electricity	C. heating
4. Energy	D. mix
5. Fossil	E. policy
6. Power	F. production
7. District	G. station
8. State-of-the-art	H. load

Match the expressions you have just formed to the following definitions.

9 …… …… = the generation of electrical power
10 …… …… = energy sources such as gas, oil and coal but not water and wind
11 …… …… = the power level at which basic demand and consumption is covered
12 …… …… = apparatus of the latest technological level
13 …… …… = the different primary fuels and sources used for energy production
14 …… …… = a plan of action chosen by a business or firm
15 …… …… = a plant in which electricity is produced
16 …… …… = a system of distributing heat in one centralized location, often linked to a power plant

4. Work with a partner. The journalist Colin Maitland needs further information about ELEC's power plants, but the public relations officer is away. Use phrases from the box below for his call.

TELEPHONING FOR INFORMATION	
Introductions	Who/What/When/Where/Why/How ...?
Hello.... This is ... speaking.	What about ...?
Good morning. Is that...?	
Hi..., it's... here.	**Asking for repetition**
Asking for information	Sorry, I didn't quite catch that.
I need some information about the sort	Would you mind repeating that?
the fuels (energy sources) ...	**Positive response**

I'd like to have some (more) information about the location of the plant.	Sure. No problem. I'd be happy to.
Can/Could you give me more information about the load?	**Negative response** I'm afraid I can't help you there.
Can/Could you please tell me about the capacity?	I'm afraid not.

DID YOU KNOW?

In English-speaking cultures, being polite is very important; this particularly applies to communication in business. For example, the phrase 'I was wondering ...' can be used for requests, as in 'I was wondering if you could send the information again.' Phrases such as 'I'm afraid', 'Well actually', and 'Unfortunately' are used to introduce something negative or make complaints. Look at these examples:
May I smoke?
Well actually, it is forbidden in this building.
I'm afraid the last bill was not accurate.
Not using such phrases can be seen as being too direct.

5. Read what people say about different fuels and energy sources. Which bubble is mainly about the following?

- □ 1. public perception of energy and the energy industry
- □ 2. the effects on the environment of different sources of energy
- □ 3. the availability of renewable sources
- □ 4. the reliability and efficiency of fossil fuels

Coal and lignite are the most reliable fuels. We'll depend on them more as gas and oil disappear. There may be a few problems with emissions, but these can easily be solved. They're also very versatile and can be used to produce electricity and heat our homes efficiently.

Fossil fuels are harmful; think how they affect our atmosphere and countryside. We can't build our future energy planning on them. We have to think differently. The sun is a clean energy source, and the potential for providing us with power is enormous! What's more we can install solar cells on buildings, which will reduce the requirement for large power stations.

Solar power is good as far as it goes, but what do you do when the sun isn't shining? In some countries there are often cloudy skies, and in some countries there are only four hours of sunlight per day in winter. Wind on the other hand is always at our disposal - more than the sun anyway. We can use this source to cover our needs.

The most important thing is to educate people about energy. It may be true that fossil fuels and other sources have some drawbacks, but there are many positive aspects. We should focus on informing people; how they see energy is important.

Say which of the above statements you agree with. Use phrases from below.

EXPRESSING OPINIONS AND AGREEMENT OR DISAGREEMENT

Giving your opinion	**Agreeing**	**Asking for opinions**
I think/feel (that)...	Quite right.	What do you think?
In my opinion...	That's true.	How do you see it?
In my view...	I quite agree.	
Clarifying	**Disagreeing**	
So you're saying ...	Yes, but...	
You mean...	Actually, I think...	
What do you mean exactly by ...?	To be honest...	
	I don't quite agree.	

6. Work with a partner. How do you rate these different types of power plant on a scale from 1 (good) to 6 (very poor/bad)? Use the phrases on page 8.

Power Plant Type	**Rating**				
	Public perception	Effects on environment	Availability of primary fuel/source	Reliability	Efficiency
Hydro power plant					
Solar power plant					
Nuclear power plant					
Wind power plant					
Gas-fired power plant					
Lignite-fired power plant					
Biomass-fired power plant					

Compare your results with other students and give reasons for your rating.

7. ELEC is creating some basic educational publicity material. Complete these statements with expressions from the box, and then number the statements in the correct order.

connection distribution network facility municipal utility transmission network overhead lines supplier

□ a And that is how the power eventually reaches you, via the …… that links your home to the network.

□ b From the power station, high-voltage electricity enters what we call the ……

□ c The utility transmits, distributes and delivers electricity (and possibly gas) from a …… which it owns and operates to the final customer. Delivery is via what we call the …… .

□ d This supplier is the company from whom you, the customer, get your energy. It is often a …… owned by a city or town.

□ e This is a system of transmission towers and …… through which the electricity makes its way to the …… .

8. Complete this text from ELEC's website with the correct form of the verb.

The Players of the Power Business

From generator to supplier to customer

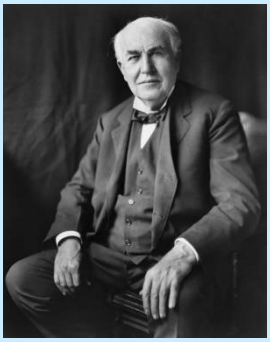
Electricity (1) is generated (generate) by power stations and (2) ……. (feed) into the high-voltage transmission network. Via transmission towers and overhead lines it (3) ……. (transport) to the local supplier, an organization which (4) ……. (own) by the municipality or the regional subsidiary of a larger power company. This local supplier is normally the first point of contact for the customer. Connections (5) ……. (organize) by this company, and power (6) ……. (deliver) to the customer.

Customer choice and the role of the regulator

In some countries the supplier can (7) ……. (choose) by the customer as some markets (8) ……. (liberalize). In order to ensure that there is fair competition, some states have set up regulators. Their main task is to ensure that there is non-discriminatory third-party access. The grid fees that the operators charge for using the networks (9) ……. (also control). When prices (10) ……. (increase) by the supplier, this (11)…….(also monitor) by the regulator.

DID YOU KNOW?

The first practical generator was built by Thomas Edison, the famous inventor. He used it to provide electricity for his laboratory and then later to generate power for the first New York street to be illuminated by electric lamps. Unlike most AC (alternating current) generators of today, Edison's apparatus produced DC (direct current).



9. Find a word or expression in the text in exercise 8 which means the same as the following.

1. pylon
2. a company owned by a parent company
3. country
4. to watch and check continuously
5. to make certain
6. grid
7. to demand an amount of money for goods or services

10. Complete this table and then the text below with the correct word or expression.

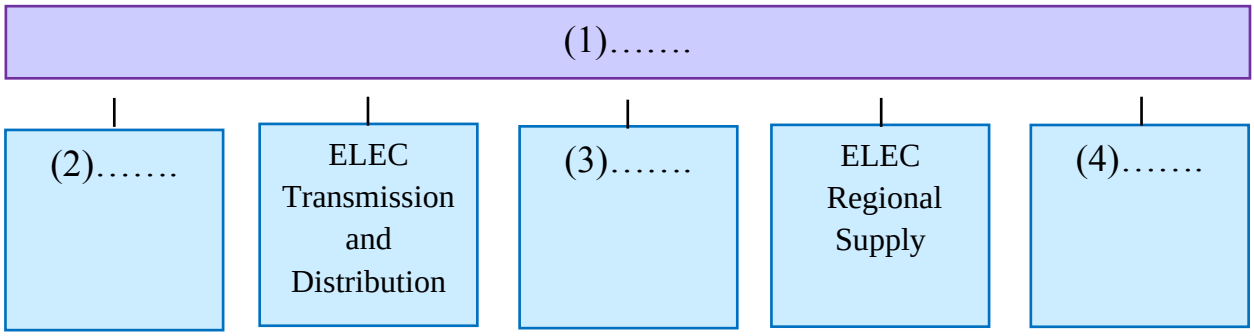
	Noun	Verb	Company/Person
1.	generation		generator
2.	transmission		
3.	sales		
4.		to distribute	
5.		to regulate	
6.		to liberalize	---
7.	supply		

Is the regulator the answer?

In European countries where the energy market has been liberalized, many energy customers are not pleased with the results of this (1) ……. process. They claim there are no real benefits. They see energy companies making large profits, firstly through the (2) ……. of power and then as grid operators when they charge outside companies high grid fees for the (3) ……. of electricity through their networks. Many see (4) ……. as the answer as this should force companies to consider their prices. This will probably make it less profitable to (5) ……. the final customer with electricity and gas. Each company's overall (6) ……. volume is set to decrease as more firms enter the market.

DID YOU KNOW?
In some countries, the company which operates a high-voltage grid is called the TSO (Transmission Systems Operator). The company which runs a distribution network is sometimes called the DSO (Distribution Systems Operator).

11. At a follow-up meeting to the phone call in exercise 2, Maria explains ELEC's structure to Colin. Listen to her explanation and complete this chart taken from ELEC's annual report. Then say which division the statements under the chart refer to.

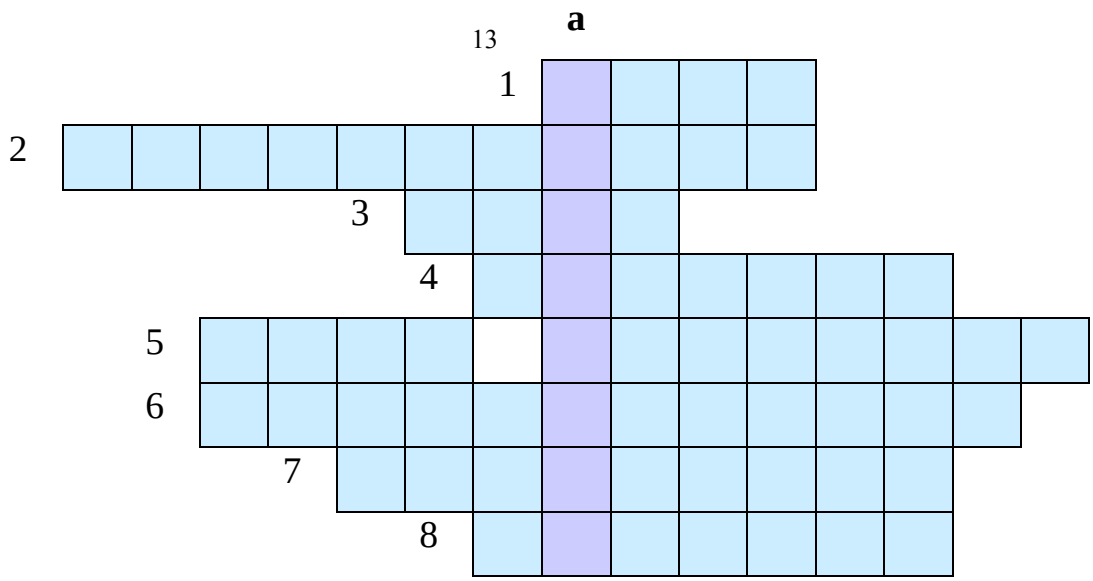


1. It has networks in many European countries.
2. It is a buying operation, procuring energy for the European supply company.
3. It procures gas from partners in Russia.
4. It is a company in its own right.
5. It runs opencast mines producing lignite and coal.
6. This division has a lot of subsidiaries each responsible for a specific geographical area.
7. This division is in the process of being consolidated under one management structure.

Now outline the structure of the company you work for or do business with. How does it compare to ELEC's structure?

12. Complete this puzzle with words from the unit, and find the person who buys electricity or gas in column a.

1. a fossil fuel used for generating electricity
2. a company which transports electricity to homes and businesses
3. the first of the three load levels; the other two are intermediate and peak
4. a company which runs a network system
5. a company that generates, transmits, distributes and supplies electricity or gas from Facilities which it owns and operates (2 words – 4, 8)
6. the process whereby a company transports electricity at high-voltage levels
7. a company which produces electricity
8. what a company is involved in when it buys and sells electricity or gas at the energy exchanges.



13. Which countries does your country import its gas from? Read this newspaper article and discuss the questions.

Gas in Crisis?

The world is changing fast. There is an energy crisis on the horizon for Europe. If we take natural gas as an example it would seem at first glance that countries such as Norway, Britain and the Netherlands have sufficient gas reserves to supply Europe for some time to come. However, this is misleading; most of these reserves will be used up over the next ten to twenty years. Even if more deposits are found in the North Sea or the Atlantic Ocean the problem will still not be solved. The continent must turn to Russia where there are huge quantities of gas underground. This country is in the happy position of being the gas giant of the world.

Other nations are also approaching Moscow to cover their energy requirements. The economies of countries such as China and India are expanding dramatically and they are going to need massive amounts of energy, which includes gas. Will there be enough of this commodity to satisfy the needs of Asia and Europe? This is by no means certain, and the consequence could be a shortage of gas imports, which could lead to power cuts in some European countries in the future.

There is one other source of gas-LNG, liquefied natural gas. This is transported by ship from such places as the Arabian Peninsula. Nevertheless, it is questionable if these supplies can ever be a realistic alternative to gas which is imported by pipeline; the simple fact is that the volumes shipped would never meet demand.

People are therefore right to be worried. Political leaders and companies must tackle this issue; we need a secure and reliable supply of gas for the long term. This inevitably means that wholesale prices will soar, but this is still better than the nightmare scenario of freezing in our homes or having no power for our industry.

OVER TO YOU

• Is there really a gas crisis? What do you think?

• What about oil and coal? Do you think there will be enough reserves for the future?

• How do you think China will develop its economy and how will it power its industry?
• How can your country ensure gas supplies?

Unit 2. FOSSIL FUELS

1. Pay attention to the following words:

fuel sources	- источник топлива
load [ləʊd]	- нагрузка
coal plants	- угольные заводы
competition	- соревнование
power plant	- электростанция
affordability [əfɔːdɪˈbɪlɪtɪ]	- доступность
reliability	- надежность
natural gas	- природный газ
drillers	- бурильщики
energy independence	- энергетическая независимость

2. Read the text.

Fossil Fuels

The place for us to start when we talk about primary fuel sources, for generation is fossil fuels. Fossil fuels are made from long dead plant and animal remains that lived millions of years ago.

You leave anything around that long and it decays. But add heat and a lot of pressure, and then just wait millions of years, and you have the recipe to make crude oil, coal or natural gas. Those are our fossil fuels. I think it's important to start here because most of our electricity generation has been and is still produced by some type of fossil fuel. It used to be mostly coal but now coal a natural gas are pretty much neck and neck. When I say coal, what comes to mind?

Probably, if we're playing award association game, you'd be thinking of maybe emissions or carbon footprint or pollutants. No doubt, coal has been villainized recently. So why is it that up until recently, most of our electricity has come from coal?

You know that customers value reliability and affordability, right? And coal was and is plentiful and affordable. It's also a highly reliable fuel source because it's easy to get and easy to transport. Think back to our last lesson when I talked about based and peak load. If we're applying those concepts here, it probably won't surprise you that coal makes a really good based load.

Once coal plants are built and ramped up, they generally stay on to make continuous and affordable power. Incidentally, China, the US, India, and Indonesia are still pretty reliant on coal.

Something else you need to keep in mind is that it's not just about opening our electric bill every month. Affordable electricity is also used in manufacturing. So if

you think about all the food and other stuff we buy and the pressure in competition to keep prices down, you can see, like coal was a darling for so long. It's really about what customers wanted.

A fast shift away from coal would mean a lot of based load to cover, and that means constructing more based load options. Can you see why people are concerned about the impact, on the price we pay for stuff if we don't get the timing right?

Looking back in the 70s and 80s, the power plants brought online were mostly coal fired and these based load plants are built to last. Right now, there are under 600 coal plants in the US but they're capable of producing a lot of electricity.

The median birth year of a US coal plant is 1972 and nine out of ten plants were actually built in the 1980s or before. The average retirement age of a coal plant is 58 years old. So it tells you a few things, that is a lot of the fleet is nearing retirement age and replacing them is a not a major reaction. It takes a lot planning to ensure we continue to get reliable and affordable energy. That being said, coal's environmental impact while improving with newer plans and the insulation of emission reduction technologies, still does negatively impact the environment. We can expect to see a shift away from coal. The big question is what is the right timing to protect affordability and reliability?

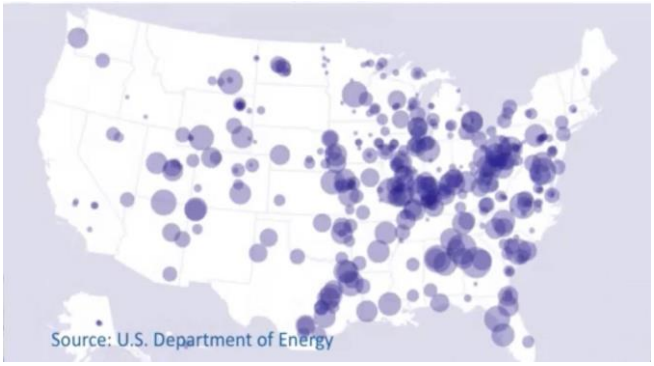
Amy Miller, an environmental expert at PNM, offered some great perspectives about the role of coal: «I think what the challenge is, is we all want to move toward cleaner resources. I haven't met anyone on any side of an energy issue that doesn't agree we should be moving toward cleaner more sustainable forms of energy. The argument usually occurs about how quickly we do it and at what cost».

There's no doubt that coal has definitely been in the crosshairs and while there's a lot of agreement that supporting a clean environment is critical, the timing is often at issue because the consequences could have a negative impact on all of us.

Now, let's look at the other fossil fuel that's used for generation, natural gas. It has also been getting a lot of attention lately but in a much different way. Natural gas plants have been used for electricity generation for a really long time. They're good for both handling based load and peak load. In fact, a lot of peaker plants which come online only occasionally to handle that high usage are natural gas plants. More recently they're being held up as a possible solution to balancing affordability, reliability, and environmental stewardship with the shift away from coal.

The latest projections from the US Energy Information Administration actually reports that 2016 is the year that gas overtakes coal generation in the US. Natural gas burns pretty cleanly and this isn't news. So then why is it that recently, it's been getting a lot more attention? Easy, it's because the costs have gone way down, and this hasn't always been the case. But here's the deal. The cost has gone down because gas that used to be hard or even impossible to get because it was located in *shale, meaning, it was trapped in tiny pore spaces of rock. But things have changed, drillers know that pumping the water down the well under pressure could fracture the shale and free the gas. This has been done since 1940s. Another process rolled out in the '90s but has become more advanced and has revolutionized accessing trapped fuel. It works by drilling down to where the shale is and then turning the well 90 degrees to through the shale. These techniques have unlocked enough natural gas to handle the US's needs for decades.

The pros are pretty obvious. Energy independence, inexpensive fuel, low emissions, and US companies economic success.



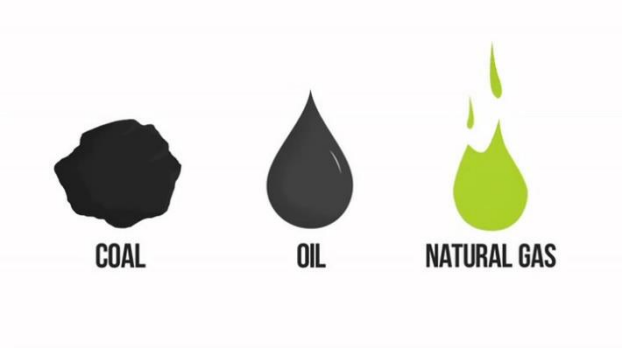
If you've looked at this map, you can see that new gas-fired electricity plants are being located right by those shale areas. So what's the catch? The fact that I used the word fracture and said 90 degrees probably clued you in to why natural gas is not without controversy either. The processes I described are fracking and horizontal drilling. And opponents are concerned about contamination from the fluid and earthquakes that can result from the processes. Now, we're not going to get too deep into this because it's beyond the scope of this course. But I want you to understand something that the general population likely doesn't. That there is a link between the low natural gas prices, electricity production and why things are the way they are.

— We're all, I think, as an industry reaping the benefits of record load natural gas prices. And you don't hear a lot of folks in the electric industry complaining about a sort of the nitro gas prices being in the cellar right now. We'd like to see that continue as long as possible. But that does have an immediate dollar for dollar impact on your bill. Those fuel costs, whether you're a municipal utility, whether you're real electric cooperative or whether you're an investor in utility fuel costs are passed on dollar for dollar to the customer. There's no margin on them. It's just indisputable, the impact this sort of fracking boom has had across the United States on the just the availability of natural gas nationwide. You have abundant supplies in the northeast, you have abundant supplies in the Dakotas. You have abundant supplies here in Colorado, in Texas, Oklahoma. Used to be, we were and this wasn't that long ago. We're talking six, seven years ago looking at shipping gas from the west to east. Now, it's flowing the other direction. It just cannot be over stated enough, I think. The impact it's had on the electric generation industry as you see just as an investment decision. Utilities nationwide going to natural gas as their fuel of choice because it is so abundant and it is so affordable compared it to other resources.

*shale (Сланец) – это камень, который широко используется в строительстве и декоре.

3. Answer the questions.

1. What natural energy sources do you know?
2. Which country is more dependent on coal?
3. What are the benefits of natural gas?
4. Why is coal still used in production?



4. Correlate the images with the definition.

●	A type of fossil fuel formed from parts of ancient plants underground.
▲	A mixture of gases formed in the bowels of the Earth.
★	Flammable, oily liquid, predominantly dark in color.
♥	Fuel can be formed from several sources, including forests, forest lands.
☺	The rock is formed as a result of natural processes of processing of marsh plants.
■	Fuel from plant or animal raw materials, from waste products of organisms or organic industrial waste.

5. Which of these fuels are natural and which are artificial.

wood, kerosene, peat, oil, coal, alcohols,
natural gas, kerosene, gasoline, alcohols, propane

6. Insert the missing words into the text.

energy sources, renewable, natural phenomena, high temperature, industrial revolution, fossil energy, earth's crust, living organism

Our world is constantly changing. The economic development that triggered the (1) ……. is forcing our society to develop. A fully industrial society in which economic development is linked to (2) …… .
The energy that a person consumes every day to perform all kinds of activities is obtained from different sources. Some of them are (3) …… and others are not. At the moment, our world is moving mainly with non-renewable energy sources that pollute the planet. (4) …… is obtained by burning some substances that come from the remains of plants and other (5) …… that have been decomposing for many years. Millions of years ago, these remains were buried under the influence of (6) ……. and the action of microorganisms. After they were buried in the (7) ……, they found themselves under conditions of pressure and (8) ……, which gave them their current characteristics.

7. Match the words from both columns to make word combinations. Translate them into Russian.

1.	drillers	a) a branch of heavy industry engaged in the extraction, processing and consumption of resources for their further consumption.
2.	ecology	b) primary processing processes not related to chemical changes in the product.
3.	propane	c) the science that studies everything that somehow interacts or affects living organisms.
4.	oil refining	d) the person controlling the mechanism for drilling wells.
5.	fuel energy	e) it is a combustible gas that is widely used in various spheres of human activity.
6.	recycling	f) reuse or return to circulation of industrial waste or garbage.

Unit 3. RENEWABLE ENERGY SOURCES

1. Pay attention to the following words:

solar panels	солнечные панели
conspicuous	выдающийся, заметный
renewable	восстанавливаемый
alternating current (AC)	переменный ток
direct current (DC)	постоянный ток
convert	преобразовывать
photovoltaic (PV)	фотоэлектричество
utility bill	счет за коммунальные услуги
community solar	солнечные панели общего пользования
manufacturing process	производственный процесс
incentive	стимул, побудитель
intermediate	промежуточный
bell shaped	колоколообразный
real estate space	имущество, пространство недвижимости
multi-purpose	альтернативно использовать
single access tracker	датчик одностанционного доступа
maintenance	техническое обслуживание
single axis tracker	одноосный трекер
properties	свойства
throttled	дросселированный
coal	уголь

Discuss the following questions!

- Can you name any alternative energy sources?
- What are the safest and cleanest sources of energy? What are renewable energy sources?
- Do you think you overpay for your utility bill? If you do, how can you change that?

2. Read the text

Solar Panels

Presenter:

- I know you've seen solar panels because they're one of the most conspicuous forms of energy right now. But do you know how a solar panel actually makes electricity? Basically, the sun hits the panel and then converts the photons into

electrons of direct current or DC electricity. These electrons float out of the solar panel and into an inverter. The DC power is then converted into alternating current, or AC. AC power is what's used when we plug in our stuff. The cost of PV has gone down, and that means it's grown a lot. Solar can take a lot of forms, from utility scale or large solar or community solar, that can power many homes and businesses. Two individual panels on folks' rooftops.

Jerry Marizza, New Energy Program Coordinator:

- Let's start with just rooftop solar and that's where individual homeowners will decide to purchase a solar system, put it on their house. Normally, they're trying to offset their utility bill that we send them and that process works really smooth because of the convenience of the meter that we use for those systems either goes forwards or backwards. And you can be sitting in your house watching television and your television's being supplied by the solar. And then a cloud comes over, and all of a sudden, you're being supplied by the grid. And you, inside your house, have no idea that that switch occurred, or it could occur many, many times. There's no switches or anything, there's no blinks, flickers, nothing. It's seamless as to how the energy is supplied to your various electrical appliances. And that is important because most people don't want to be inconvenienced; they don't want their television show interrupted because a cloud came over or anything like that, so that kind of convenience is very important. Those home's systems typically get a nice federal tax credit.

People do want to offset their utility bill, and that's primarily why they do that. Now, community solar, and just for a moment I'll brag that United Power was the first community solar in the state of Colorado back in 2009, but in that particular case, we have a remote location where we have a little solar farm, and consumers can actually purchase those panels, lease those panels. And all of the energy that, that panel makes is credited on their normal home bill. So it's as if the panel was sitting on their house, but it's not and the benefit to that is, and I don't know the exact percentages but I'll say that maybe 20 to 30% of the homes in our service territory are solar ready which means that they have enough roof space, southern exposure, and no shading. That means that various people that couldn't participate in the solar because they don't own a home could actually buy a panel, or lease a panel on the community solar farm, and participate in solar, get the credit as if it was in their home, and that's the other 70% that we were able to work with because of community solar. A pretty good idea, it allows everybody to participate in solar at some level no matter what.

And we like the utility scale too because it brings a lot of renewable generation onto the grid at the lowest possible cost which, at the end of the day, helps to keep our rates lower and stabilizes them over the 20 year period that this particular farm is in operation.

Presenter:

- As with wind, there's a lot of information out there that's taken out of context. Of course, saving the planet is a big reason people choose solar. Probably a bigger reason for consumers and businesses is that it costs them less. I say them because, like wind, there's more than meets the eye to it because of the subsidies in place to encourage adoption. Taxpayers and other rate payers are most often how these are funded.

Jill Engel-Cox, Director, Clean Energy Manufacturing Analysis Center:

- Really what we're seeing in solar energy is that the panels have dropped in, again 85% in price in the last eight so years and that's largely due to the fact that as the installations went up, the manufacturing processes improved to be less hands on and more automated, continuous process. So they're able to produce panels at a much, much lower price than they were before which then drives the price down for the installations, which then increases the installation and the economies of scale. So these types of early stage incentives help get the technology into the market and achieve these economies of scale until it can reach the, basically, grid parity and compete fully with other types of technologies.

Presenter:

- Of course like every other generation source, it's not without its faults. And I bet you know enough now to see what those might be. Like wind energy which is only available when the wind is blowing, solar panels only generate electricity while the sun shining. Evenings and cloudy days are a problem. So that whole base load backup issue remains with this type of electricity production.

Dan Hodges, Executive Director, American Public Power Association:

- Base load is critical and what that essentially means is power that's always on, always accessible day or night. I mean it doesn't take a rocket scientist to understand that when the sun is not out, you're not getting electrons from your solar panels. When the wind's not blowing, you're not getting electricity from the wind turbines.

Really, what base load is, is that power that's always on and always accessible throughout the day. Really, you get your physics folks in here that can talk to you about the need to sort of balance the system, that you need a constant supply of electrons on the system to keep it running and operating.

What's more important though than base load really is that sort of intermediate power, that power you can bring on when these renewable resources come on and come off. We need to have resources that we can call upon at a moment's notice to meet that gap, that energy demand. You can see it in hot summer days as the sun begins to set and the infamous Duck Curve, if you're familiar with that out of California, where your solar power starts to wane off but you're demand for the evening is starting to peak. They're not necessarily perfectly aligned. You need a resource to make up that gap and what we see in the space right now is that's natural gas. You have either peaking turbines or combined cycle units that you can dispatch quickly to sort of match and marry that gap, and the power that's either coming off or conversely when it comes on.

Jerry Marizza, New Energy Program Coordinator:

- We'll take a summer month like June, which has a lot of sunlight hours. This particular single access tracking field will basically come up to full

production around 7:30 in the morning, and it will stay there, if no clouds, but it'll stay there until 5:30, 6 o'clock at night. Maximum production during that entire period where the fixed panel system is more of the traditional bell shaped curve. It slowly comes up in the morning, and it basically peaks for about a three to four hour period, maybe between 11 and 2 PM is when its peak occurs and then it starts to go back down again. So, just being able to get more hours at a higher production is where that additional energy comes from.

Presenter:

- It also takes a lot of real estate space to generate electricity and many homes and businesses just don't have the room. Another complaint is you can't do much with the land that the solar panels are on. So you can't multi-purpose it like you can with wind. There are some ways around that with community and utility or large scale solar. I had the opportunity to visit a utility-scale solar project. Let's learn more about how utilities are integrating solar into their operations.

Jerry Marizza, New Energy Program Coordinator:

- Yeah, this is, actually I'm kind of excited, I don't want to get into a lot of technical detail, but this is a 13 megawatt solar field. It probably could serve maybe around 3,000 homes, their entire electric needs for the year.

It's on about 130 acres, and I believe there's about 160,000 solar panels associated with this. One of the unique features of at least this field is that it's a single access tracker. So, it actually follows the sun throughout the day. And because of that, it can get probably 20 to 30% more energy than a fixed panel system. And this is kind of the new wave of how these utility sized fields are being developed. Before it was a lot cheaper to just do the fixed panel.

The actual tracking device is a mechanical device that has moving parts where they can get dirty and need maintenance every once in a while, and it just wasn't cost effective to do the single axis tracker. Until now, and we are seeing with this field, it's been in operation for a couple of months now. But the production that this field offers us first is a fixed panel system that we did a couple years ago is remarkably different. Both good. One of the unique properties of this particular field is not only that it's a single axis tracker but it's a load following.

And what does that mean? Most solar fields are just plug and play.

You plug them in, whatever energy they produce goes on to the grid and gets dispersed among the homes and businesses in the general area. What happened here is we worked with our developer, which in this case was Silicon Ranch, so that because electricity has to be used when it's made, there is no storage out here. So if we don't have the load to use the energy, then these guys can't produce it.

And so, this particular field is not a plug and play, it's a throttled sort of field which is a bit unique in the industry. And so, if our load goes below the 13 megawatts that this field is rated, this field will actually throttle itself down to the 11 or 10 megawatt level to accommodate the load that happens to be on the lines at that time. Now when the load goes back up, the solar field comes back up, too. But that's a very unique thing that we worked with the Silicon Ranch, the developer on this project, to have that kind of load following, putting a throttle on a solar field. And again, that is kind of unique but very, very, very valuable to us as a utility. Obviously, we only make electricity with solar when the sun is shining. People still want to watch television at night. So we would, obviously, have to have some sort of other types of generation so that you could do that. And I think at the end of the day that is part of the solution as we move forward, is a balanced approach. We can't do 100% solar and wind.

We don't want to do 100% coal and natural gas. But that it's a combination of all those things that, put together, complement each other and provide the power to people as they want to use it.

3. **Match the words with the definitions**.

1. conspicuous	**a)** the thing people consider to be the most important part of a situation or discussion.
2. electricity	**b)** an electric current flowing in one direction only.
3. maintenance	**c)** an electric current that reverses its direction many times a second at regular intervals, typically used in power supplies.
4. intermediate	**d)** a form of energy resulting from the existence of charged particles (such as electrons or protons), either statically as an accumulation of charge or dynamically as a current.
5. alternating current	**e)** something so extraordinary or exceptional; something that is obvious and unavoidable to the sight or mind.
6. issue	**f)** to reduce the pressure by passing something from a smaller area to a larger one.

7. direct current	**g)** being between two other related things, levels, or points.
8. throttle	**h)** the act of keeping property or equipment in good condition by making repairs, correcting problems, etc.

4. **Translate the following words and word combinations into English**.

Компенсировать счета за коммунальные услуги; экологическая безопасность; быть востребованным у потребителя; полезность; федеральный налог; первая общественная солнечная электростанция; южное освещение; один из самых выдающихся видов энергии; промежуточная энергия; распределяться по домам и предприятиям; сдавать в аренду; субсидии, поощряющие адаптацию.

5. **Match the words with the pictures.**

CONSPICUOUS **SAFE** **CHEAP** **EXPENSIVE**

NATURE-FRIENDLY
RENEWABLE

HARMFUL **NATURAL**

6. **Complete the sentences below using words from the box.**

dependent	fossil	effectiveness
ash	environment	substances

1. Solar energy has the least negative impact on the …… compared to any other energy source.
2. Burning coal emits toxic and carcinogenic …… into air, water and land.
3. Solar panels are …… on sunlight to effectively gather solar energy.
4. When you burn charcoal in your grill at home, …… is leftover.
5. Innovations in quantum physics and nanotechnology can potentially increase the …… of solar panels and double, or even triple, the electrical input of the solar power systems.
6. Natural gas is a …… fuel.

Biomass and Geothermal

1. Pay attention to the following words:

biomass (energy)	биомасса
geothermal energy	геотермальная энергетика
primary	основной, первичный
feedstock	исходное сырье
electric utilities	электроэнергетическая компания
power plants	электростанции

2. Sort the fuels and energy sources below into the correct category. Can you add any more to the lists?

fossil fuel(s)	Renewables	nuclear fuel(s)

coal wind oil sun uranium gas biomass geothermal

3. Listen and read the text and find the answers to the following questions.

- What is biomass made of?
- How does geothermal produce energy?
- What are the benefits of using biomass and geothermal energy?

Renewables - Biomass and Geothermal

Presenter:

- If you're going to watch a topic area after this course, I would recommend keeping your eye on this one. I know this is one of the areas that's going to change a lot, and is going to be a catalyst for major change in the industry. Let's end our discussion of renewable energy with two energy sources that get very little attention. Biomass and geothermal. They're relatively small so we won't spend as much time on them but biomass is the oldest primary fuel source. If you remember, it's also what early electric local utilities competed against, and it's still around. Biomass works by using organic waste, whether wood or even animal waste. The biomass feedstock is then burned in a boiler and well, you know the rest.

Justin Flood, Manager Sustainability, Delta Electricity:

- So the biomass co-firing program involves principally taking wood fiber and adding it to the coal stream as we burn it in small percentages up to 5%, so that we can safely combust it in the boilers with the coal. In terms of greenhouse gas savings, roughly, for every ton of wood we burn, we generate a saving of just over one ton of carbon dioxide avoided from not burning coal.

So we have dedicated ourselves to develop technology that takes waste from another sector, puts that into something valuable so it can move on and keep adding societal and economic value.

Presenter:

- The benefits of biomass are that it uses stuff that would otherwise have not been very useful. Unless the waste is being produced on location, it has to be transported though. Incidentally, the pulp and paper industry is known for using this form of electricity generation with waste they generate on site. Geothermal energy also receives so much lesser attention than its brothers and sisters. You might not even know it if you saw it. It only accounts for about 3% of renewable energy electricity. It's not a new technology and it actually uses heat from the Earth's core. Here's how it works. Hot water is pumped from a deep underground well. The water comes back up to the surface and the temperature drops. This makes the water turn into steam and the rest is all about that spinning turban and then the generator.

Jill Engel-Cox, Director, Clean Energy Manufacturing Analysis Center:

- Geothermal uses the energy from the earth, typically it's in areas where they have volcanic activity or have the Earth's heat very close to the surface and it's heating up the water. So geothermal actually collects that heat and runs a steam turbine with it. The beauty of geothermal, where you have that resource, is that it is

a base load power. I mean it's a consistent power. It's not like solar and wind where you have to worry about when the sun is shining or the wind is blowing but geothermal is always going to be working. So there are some countries that are nearly 100% renewable because of geothermal power. So, and now we are starting to look at more advanced geothermals where you can work it with lower temperatures, different types of drilling, and different areas like that. So, geothermal has been a base power for many places, many locations for a long time and it's really starting to advance in some new locations and new technologies.

4. Match different power plants to their descriptions.

1. solar power plant **2.** geothermal power plant **3.** nuclear power plant **4.** biopower plant	**a.** this plant produces electricity from the steam that is released during the combustion of organic waste, whether wood, animal waste **b.** type of power plant that uses uranium as its primary fuel **c.** a plant which uses steam to produce electricity. The steam comes from reservoirs of hot water found a few miles or more below the earth's surface **d.** a power plant that generate electricity utilizing energy from the sun

5. Complete this text from The National Geographic Society's website with the words from the box.

feedstock produces burned reduces
factories biomass energy fossil fuels

Direct Firing and Co-Firing

Biomass can be burned and used for (1) ____. Thermal conversion involves heating the biomass (2) _____ in order to burn, dehydrate, or stabilize it.

Most biomass feedstock are (3)_____ directly. The steam produced during the firing process powers a turbine, which turns a generator and (4)___ electricity. This electricity can be used for manufacturing or to heat buildings.

(5)_____ can also be co-fired, or burned with a fossil fuel. Biomass is most often co-fired in coal plants. Co-firing eliminates the need for new (6) _____ for processing biomass. Co-firing also eases the demand for coal. This (7)_____ the amount of carbon dioxide and other greenhouse gases released by burning (8)_____.

6. Put <u>this</u>, <u>these</u>, <u>that</u> or <u>those</u> into the sentences.

1. Electricity generated by geothermal energy helps conserve non-renewable fossil fuels. … reduces greenhouse gas emissions that pollute our air and water.

2. …was a lovely evening. Thank you very much.

3. Tell me what you think about …: I think geothermal energy is a clean, sustainable and affordable source of alternative energy.

4. It's not an easy question …days, but we can speculate on these topics.

5. I thought that biomass energy has enormous potential. What do you think about …?

6. Listen to …. You'll really like it.

7. Technology is a pair of eye glasses, which enables sight for … who need it.

7. Choose one of the following topics and speculate about it.

- Conditions under which renewables sources may become non-renewable.
- The problem of using only non-renewable fuel source.
- One advantage and one disadvantage of using coal, gas, biomass and Earth's heat as an energy source.

Unit 4. MARKETS AND CUSTOMERS

Active Vocabulary

Nouns and noun phrases

benefit – преимущество
household – домашнее хозяйство
agenda – повестка дня
circumstance – обстоятельство
issue – проблема
consumer – потребитель
decline – снижение
supplier – поставщик
supply – поставка
meter – счётчик
helpline – горячая линия
an industrial customer – промышленный заказчик
pulp and paper industry – целлюлозно-бумажная промышленность
requirement – требование
consequences – последствия
liability – ответственность
insurance – страхование
power surges – скачёк напряжения
outage – перерыв в работе, перебой
a surge – рост
distribution network – распределительная сеть
transmission grid – транспортирующая сеть

Verbs and verbal phrases

to established – установить
to doubled – удвоить
to fluctuated – колебаться
to fall sharply – резко упасть
out of action – вывести из строя
hit a low and then recover – достигать минимума, а затем восстанавливаться
to remain stable – оставаться стабильным
to level off – выровнять
to increase steeply – резко увеличиться
to rise steadily – неуклонно расти
to suggest – предлагать

Adjectives

current – текущий, нынешний
sudden – внезапный

Discuss the questions with a partner.

- Can you switch your gas or electricity supplier in your country?
- How easy is it to do? What would encourage you to do it, or prevent you from doing it?

Now decide how important the following factors would be if you wanted to switch your electricity and/or gas supplier.

The new supplier should:	Very important	No so important
1. offer a cheaper price than the current supplier.		
2. guarantee security of supply.		
3. supply both electricity and gas.		
4. take care of all formalities regarding the changeover from the old to the new contract.		
5. send clear and accurate bills.		
6. offer the customer different ways of paying bills (direct debit, credit card, etc).		
7. provide online services (e.g. for meter readings).		
8. give advice on energy efficiency.		
9. have a 24-hour helpline (call centre).		
10. have offices in the same town as my home.		

1. Work with a partner. How are these types of customer defined in the company you work for? Give examples for each one.

1. A residential/retail customer.
2. A business customer.
3. An industrial customer.

Discuss the following questions about industrial customers.

1. What are the largest five industries in your country or region? Use those listed below to help you. What are their products? Who are their clients?

Industries
Aluminium industry • chemical industry • steel industry • pharmaceutical industry • pulp and paper industry • plastic industry • textile industry • automotive industry

2. How are they supplied with power? Do some of them have their own power plants or are they supplied by other energy companies?
3. Which consume(s) the most energy? Rank them on a scale of 1-5 according to how much electricity consume.
4. What do large industrial companies want from energy companies?

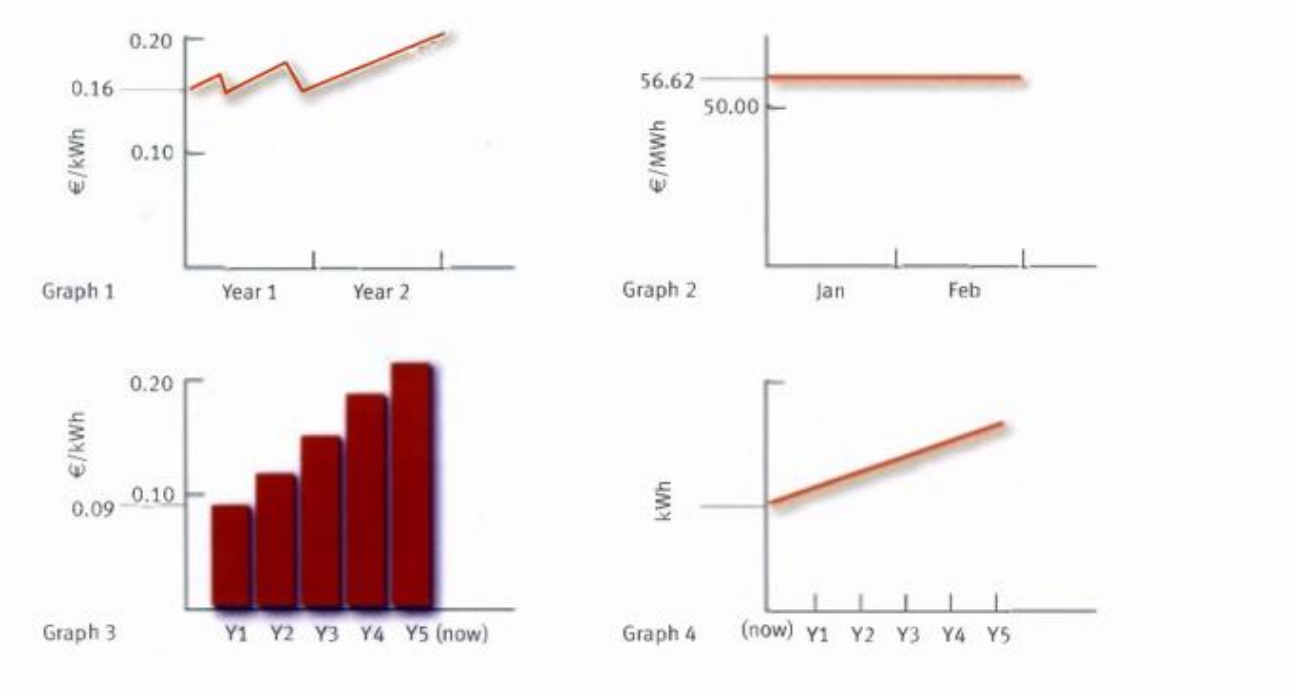
2. Paul Robben from AECP – the Associate of European Chemical Producers – is talking to Anna Smith from the energy company ELEC. You are sitting in on the meeting. Listen and say whether the following statements are true or false.

1. AECP has established an energy procurement unit.
2. Its aim is to harmonize the terms under which it does business with its various suppliers.
3. AECP wants there to me one key account manager at ELEC.
4. A key issue for AECP is security of supply.
5. AECP expects its requirement to remain constant.

Listen again and complete notes for the minutes of the meeting under the following headings.

1. Members of AECP	
2. Development of wholesale prices	
3. AECP's objectives	
4. Forecasts on AECP's futures energy consumption	
5. Next step	

3. These graphs show developments mentioned in exercise 2. What does each graph show? If you are not sure, listen to the dialogue again.

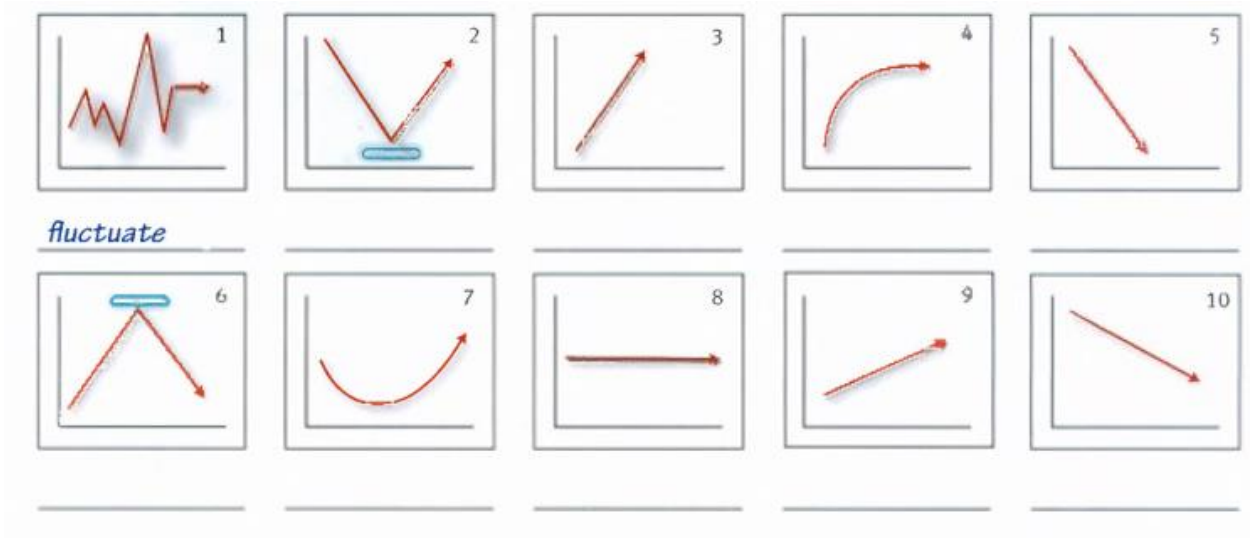


4. Match the statements that have the same meaning. Then decide which graph each pair refers to.

1. It's going to grow.	a. It's held steady.
2. It has remained stable.	b. It's been volatile.
3. They've doubled.	c. We expect it to rise.
4. It has fluctuated.	d. There's been a 100% increase.

5. Match the expression will each graph below. Add any expressions that you know.

decline • fall sharply • ~~fluctuate~~ • hit a low and then recover • remain stable • level off • fall back and then pick up again • peak and then fall back • increase steeply • rise steadily •



6. This graph shows the development of the EEX electricity spot price in 2021. Continue the following description. Use expressions from exercises 4 and 5.

The graph shows the development of the EEX electricity spot price in 2021. The price started at...

Choose a graph describing a trend from your own company on a subject that you are familiar with. Present it to the other students. Use phrases from the box.

DESCRIBING TRENDS, DEVELOPMENTS AND CONSEQUENCES	
The graph shows …	This led to …
You can see here that …	This resulted in …
This happened/occurred because…	This was due to …
We expected this change, but …	This happened as a result of …
Although there was a fall/rise …	This happened because of…

7. Write sentences describing developments and consequences, using phrases from the right-hand column of the box.

1. A surge in the gas price/harsh winter

_____

2. The economy picked up/increase in high-street spending

_____

3. A reduction in turnover/cost-cutting programme

_____

4. A power cut/collapse of the grid

_____

5. Consumers can choose their supplier/liberalization

_____

6. The volatile political situation/uncertainty in the market

_____

7. More wind farms have been built/financial support from the state

_____

_____

Now describe some developments and their consequences from your own company.

8. AECP and ELEC (see exercise 2) signed a contract about energy supply. But then Anna Smith received a phone call. Listen and decide which four statements describe the situation.

1. The weather has resulted in a crisis situation in the Netherlands.
2. The distribution network has gone down, but the transmission grid is unaffected.
3. The Dutch-German interconnector is out of action.
4. The problem has fortunately now been rectified.
5. Power is being fed in from France and Belgium.
6. There will be questions about liability and insurance.
7. AECP members may look for another supplier.

Complete this internal memo by Anna in a suitable way.

AECP crisis in Netherlands

Bad weather has disrupted supply to …… .They are, …… and operating on …… generators at present. …… are working to resolve the situation, but AECP has brought up the issue of …… and is talking about …… - even though it's clearly a question of …… .

DID YOU KNOW?

UCTE stands for the union for the co-ordination of transmission of electricity. The members of this association are the transmission systems operators in continental Europe stretching from Spain through to Poland and Greece. It ensures the synchronous operation of interconnected power systems. A similar organization, Nordel, exists in the countries of Scandinavia.

9. Match the expressions to the definitions.

1. circuit breaker	a. a unit which increases or decreases voltage levels.
2. force majeure	b. a sharp, temporary rise in current or voltage levels which can cause damage to electrical equipment.
3. power outage	c. equipment which protects electrical apparatus from a sharp rise current levels by switching off electrical current automatically.
4. power surge	d. loss of electrical power to an area.

5. substation	e. an unexpected or uncontrollable event; nobody is at fault or responsible for subsequent damage.

10. Complete this letter of complaint from Paul Robben to Anna Smith with the expressions from the box.

before writing this letter • dear Anna • he assured me • I look forward to hearing from you • I therefore suggest • may I remind you • I might add • we are extremely concerned • yours sincerely •

Association of European Chemical Producers

Energy Procurement Unit
Oranjeweg 118 • 3014 LA Rotterdam • Netherlands

Ms Anna Smith
ELEC international
Business sales unit
Hohewall 34
D-10423 Berlin
Germany

10 April 20...

…… (1)

I was somewhat dismayed to find out that just three weeks after I had signed the purchase contract with ELEC for our organization there was a sudden and complete breakdown in electricity supply to two of our members' production facilities in the Netherlands. …… (2) that under the terms of our agreement ELEC is obliged to guarantee security of supply.

…… (3) I spoke to one of ELEC's engineers. He went into great technical detail about power surges and outages in the surrounding areas. …… (4) that it was only due to our own circuit breakers that our plants were not severely damaged.

……. (5) that his team was working around the clock to remedy the situation. He implied it was force majeure; this remains to be verified.

…… (6) about the situation and are questioning whether ELEC can supply power to all our production locations throughout Europe.

…… (7) we meet to discuss this most unfortunate state of affairs. I propose this meeting should take place at our headquarters in Rotterdam next week on Tuesday, April 17th at 10.00 a.m.

…… (8).

…… (9).

Dr. Paul Robben
Managing Director AECP Energy Procurement Unit

Unit 5. ENERGY EFFICIENCY MEASURES

1. Pay attention to the following words:

energy efficiency	- энергоэффективность, энергосберегающий
portfolio	- папка, дело, портфель ценных бумаг
comparative analysis	- сравнительный анализ
benchmarking	- «бенчмаркинг» сопоставительный анализ на основе эталонных показателей как процесс определения, понимания и адаптации имеющихся примеров эффективного функционирования предприятия с целью улучшения собственной работы
HVAC	- отопление, вентиляция и кондиционирование
LED	- светодиод

2. Read the text.

Profitable Energy Efficiency Measures for Buildings

Buildings have been the main consumers of energy and the main producers of atmospheric carbon dioxide for many years. Now it has come to the point that energy efficiency measures are no longer something pleasant for buildings, but are an urgent problem. Energy-efficient solutions don't just help fight climate change. They also help to reduce energy and maintenance costs, create a competitive advantage.

What are energy-efficient measures? An energy-efficient measure can be called any machine, software, system, practice or upgrade that leads to an overall reduction in energy consumption without significantly affecting the level of service. For example, the introduction of a policy for the use of energy-efficient appliances across the entire portfolio or the implementation of intelligent modernization to improve energy consumption reporting.

<u>The five most beneficial measures to improve energy efficiency</u>

1. Comparative analysis and management of energy consumption. The first step to improving energy efficiency is to manage energy consumption more efficiently. The first step to improving energy management is a comparative analysis of energy consumption. Energy benchmarking helps you assess where you

are in terms of energy consumption. Once you know your actual energy consumption figures, you will be able to better assess the level of effort required to achieve the desired result. A comparative analysis will also help you establish a baseline and various thresholds for energy consumption. Alarms / notifications generated after threshold violations can be useful for identifying the causes of excessive consumption.

2. HVAC automation. Heating, ventilation and air conditioning are generally the largest consumers of energy in buildings. In a report for 2021, Sintef writes that 14% of the total energy consumption in mainland Norway is accounted for by commercial buildings (excluding industry). Energy is mainly used for the operation of technical systems such as heating, ventilation, cooling and lighting. Sintef has estimated the energy saving potential in Norwegian commercial buildings at 16 TWh in 2021.

According to the Department of Energy of the Australian government, air conditioners account for approximately 40% of the energy consumption of an office building. This is the main problem because in most buildings air conditioners continue to work with the same settings throughout the day.

3. Intelligent lighting. From light bulbs to wireless smartphone control; smart lighting can be implemented as energy efficiency measures in many ways. Smart LEDs not only have more durability and performance than their counterparts with incandescent lamps, but also consume much less energy.

Using an intelligent lighting system, you can set timers to turn off the light, turn it on or off from a smartphone app, and even adjust the light intensity settings for certain occasions. Some systems can also automatically detect the presence of people and turn the lights on or off accordingly. All this can lead to a significant reduction in energy costs.

4. Isolation. If your building's ventilation can maintain insulation, this shouldn't be a problem. A well-insulated building loses less warm air in winter and less cool air in summer. This leads to a significant reduction in overtime energy consumption.

5. Renewable energy sources. Renewable energy sources do much more for your building than just reduce its environmental impact. They enhance the company's reputation in the market and, most importantly, help reduce energy costs.

3. Consider the situation. It's a pretty hot August morning. The staff has installed the air conditioning system at full capacity, as a large number of people are expected. However, it starts to rain, and both indoors and outdoors the climate improves. But, since the HVAC settings are done every morning, it will continue to run at full speed, wasting a lot of energy. What solution to this problem would you suggest?

4. Energy costs fluctuate constantly. However, there are methods that will avoid this problem. Choose images with devices that can help with this:

a) 

b) 

c) 

d) 

5. Match the words with their definitions.

1) Benchmarking	a) a set of devices that allow lighting devices to work independently or with remote control
2) Intelligent lighting	b) comprehensive step-by-step comparison of indicators of economic activity of the enterprise according to different criteria
3) Energy efficiency	c) comparative analysis based on reference indicators as a process of identifying, understanding and adapting existing examples of effective functioning of an enterprise in order to improve its own work
4) HVAC	d) technologies for maintaining air parameters within the specified limits: temperature, humidity and chemical composition in indoor areas
5) Comparative analysis	e) using less energy to ensure the same level of energy supply for buildings or manufacturing processes

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

1) Energy-efficient solutions don't just help fight climate change. They also help to reduce energy and maintenance costs.

2) Energy management systems can reprogram the air conditioning system in real time depending on changes in employment, indoor and outdoor climate and weather forecast.

3) A well-insulated building loses warm air in winter and cool air in summer.

4) Some intelligent lighting systems can also automatically detect the presence of people and turn the lights on or off accordingly.

5) Maintenance costs increase greatly with the use of solar panels.

Air Leakage

1. Pay attention to the following words:

cracks and holes	трещины и отверстия
cold draughts	холодные сквозняки
fossil fuels	ископаемое топливо
mold	плесень
subsequent targets	последующие цели
air permeability	воздухонепроницаемость
airtightness	герметичность
air infiltration	инфильтрация воздуха
gaps	зазоры
plasterboard	гипсокартон
skirting	плинтус

2. Read the text.

What is Air Leakage?

Air leakage is where conditioned air enters and leaves a building uncontrollably through cracks and holes. It is also known as infiltration and is totally different to ventilation, which is fresh air that enters a building in a controlled manner to exhaust excess moisture and reduce odours and stuffiness.

As Air Leakage is uncontrolled, too much air may enter the house during cold or windy weather, leading to excessive heat loss and the uncomfortable feeling of cold draughts.

Air Leakage plays a major part in the energy efficiency of buildings, and testing is necessary as a means of demonstrating that the air tightness targets used in building energy calculations have been achieved in reality.

In England and Wales, Air Tightness Testing has been mandatory since the 2006 Building Regulations for most dwellings and commercial projects.

Airtightness is a key factor in building energy efficiency, and consequently is a feature of Government led initiatives to combat climate change through improvements in building energy performance. Heating buildings involves burning fossil fuels which contribute towards CO2 emissions and global warming. Reducing air leakage results in less heat loss, which in turn reduces the

amount a heating system must be used.

There are also health issues around airtightness – when a building has poor levels of controlled ventilation and high levels of uncontrolled air leakage this can cause excessive moisture and mold growth which can affect the occupier's health. Best practice advice is "Build tight, ventilate right".

Finally, high levels of air leakage can lead to moisture ingress into the building fabric, potentially resulting in very expensive repair costs.

With the new targets set out by the Government to reduce carbon emissions and improve the efficiency of the UK's buildings, all aspects of energy demand within a building, and in particular heat loss, need to be looked at.

In the past homes have been ventilated via natural air ventilation (both controlled, for example via air bricks, and uncontrolled via draughts), but this has been at the cost of high energy consumption for space heating. The introduction of stricter standards and regulations around efficiencies has now led to an increase in the need for higher levels of insulation, increased building airtightness and mechanical ventilation requirements.

As insulation requirements have increased, so too has the proportion of heat loss resulting from cold draughts. For highly insulated buildings heat loss resulting from gaps and cracks in the construction can be very significant indeed.

'Build tight – ventilate right' was a concept addressing airtightness. The proposition stated that dwellings should be designed and constructed to be as airtight as practically possible, but that they must also incorporate a 'planned' ventilation strategy. The paper emphasised that a building cannot be too 'air-tight', but it can be under ventilated.

It is common knowledge now within construction that poor ventilation is a serious issue. Excessive condensation can cause mould growth, leading to cosmetic and structural damage to the fabric of a building and can create extremely poor indoor air quality, which can lead to potential health issues for the building's occupants.

There is now a requirement for newly constructed buildings to pass an air test. This testing, and subsequent targets for air leakage, have been gradually phased in to cover just about all developments, under Parts L1A of the Building Regulations.

The assessment is done by air permeability testing – or air tightness, air infiltration or blower door testing – which measures the air leakage rate per hour per square metre of building envelope. The lower the air permeability rate, the more challenging it will be to pass.

To address the problem of a low design air permeability rate within a building, a continuous air barrier must be included within the detailed design. An air barrier is essentially a combination of materials and assemblies that restrict or prevent the passage of air through the building thermal envelope.

At every stage, from design and development to the build, all involved need to be informed about the importance of airtightness. It is crucial to make the design team, site management, trades and site labourers aware of their roles in achieving an airtight building. Airtightness should be referenced in subcontracts.

Site operatives must be clear on the location of the air barrier and its importance, and work should be sequenced to allow sealing to be carried out as the building is constructed – this will avoid having to carry out remedial measures late in the project.

Some of the areas that must be considered in design and build are:

Gaps around pipes, cables and boxing: Make sure all holes around pipes and cables where they penetrate the fabric are sealed – including gaps within intermediate floors, partition walls, boiler and cylinder units and toilet waste pipes as these could be leakage points for external air that has worked its way around the fabric. Sometimes gaps are concealed behind carpenters boxing – these should be permanently filled prior to carpenters boxing being installed.

Eaves cupboard doors and loft hatches : As these separate the heated dwelling from an unheated space they should be treated as external doors with the same level of sealing and latches.

Blockwork walls: these are permeable and, if left untreated, will not create an effective air barrier. Using wet plaster or adding a scratch coat prior to plaster-boarding will make this airtight.

Plasterboard: Drylining is notoriously susceptible to air leakage. Ensure that the plasterboard is continuous (i.e. there are no holes or gaps behind fitted units, sinks/baths, etc). Ensure the joints between boards are sealed and the plasterboard is correctly detailed at joints, corners, reveals and window sills.

Skirting: drafts and free air that gather and pass behind plasterboard will enter the dwelling at skirting level. Any areas of missing skirting can cause leakage and any gaps at the base of skirting should be filled with mastic or caulking.

Fitted units: there are usually gaps and holes to be concealed behind fitted units, such as in kitchens, wardrobes and bathroom units. These should be permanently filled prior to installation.

Light fittings & Plug sockets : holes around light fittings and pull cords in the ceiling need to be sealed. Downlights and plug sockets must be installed prior to the air leakage test being carried out.

3. Finish the sentences as it given in text.

1.	It is also known as infiltration and is totally different to ventilation, which is	a.	too has the proportion of heat loss resulting from cold draughts.
2.	In England and Wales, Air Tightness Testing	b.	is correctly detailed at joints, corners, reveals and window sills.

3.	As insulation requirements have increased, so too	c.	a continuous air barrier must be included within the detailed design.
4.	It is common knowledge now within construction that	d.	is fresh air that enters a building in a controlled manner to exhaust excess moisture and reduce odours and stuffiness.
5.	To address the problem of a low design air permeability rate within a building,	e.	carpenters boxing – these should be permanently filled prior to carpenters boxing being installed.
6.	At every stage, from design and development	f.	has been mandatory since the 2006 Building Regulations for most dwellings and commercial projects.
7.	Sometimes gaps are concealed behind	g.	poor ventilation is a serious issue.
8.	Ensure the joints between boards are sealed and the plasterboard	h.	to the build, all involved need to be informed about the importance of airtightness.

4. Say whether these sentences are true or false.

1. To address the problem of a low design air permeability rate within a building, a continuous air barrier must be included within the detailed design.
2. At every stage, from design and development to the build, it is not necessary that all involved should be informed about the importance of airtightness.
3. Airtightness shouldn't be referenced in subcontracts.
4. Air leakage is where conditioned air enters and leaves a building uncontrollably through cracks and holes.
5. Blockwork walls are impermeable and, if left untreated, will not create an effective air barrier.
6. Heating buildings involves burning fossil fuels which contribute towards CO2 emissions and global warming.

5. Match the words with their definitions.

1.pipes	a) a panel made of calcium sulfate dihydrate (gypsum) usually pressed between a facer and a backer
2.cables	b) a wooden board running along the base of an interior wall

3.plasterboard	c) a long tube of metal, plastic, used to convey water, oil, gas, etc
4.skirting	d) a fungal growth that forms and spreads on various kinds of damp or decaying organic matter
5.mold	e) an insulated wire or wires having a protective casing and used for transmitting electricity or telecommunication signals

6. Discuss these questions in pairs.

1. What can an uncontrolled air leak lead to?
2. What do you think is more important the airtightness of a building or its ventilation? Why?
3. Is it necessary to test newly constructed buildings for air leakage?

Unit 6. SMART GRID

1. Pay attention to the following words:

1.	meters	- счетчик
2.	power transformer	силовой трансформатор
3.	AMR (automated meter reading)	- автоматическое считывание
4.	AMI (advanced metering infrastructure)	показаний счетчика - развитая инфраструктура учета
5.	kicking it up a notchallocate	- перейти на новый уровень, поднять планку
6.	allocate	распределять

2. Read the text.

Smart Grid

What is Smart Grid and what effect can we expect it to have on the future of electric utilities? We hear about it a lot. If you were at a party, and asked 20 people, you probably would get 15 different answers about what Smart Grid is. And the other five people would probably back away, and look for someone else to talk to. I wouldn't, but some people would. I may or may not know this from personal experience.

Basically smart gird is all about combining providing electricity with information technology or IT. And this can happen almost anywhere along the grid structure, from generation to our meters as customers.

Why do this? Well, it's so the system can be monitored and controlled. And that means better efficiency, more reliability, and an easier time balancing demand with supply. There are many highly technical applications using powerful computing and information technology that helps manage operations and data. It's extremely technical, but these systems basically do things like help reduce electric losses along the system. And as you can imagine, less loss means a more efficient system, and that generally means less expense for the utility and customers, so it's a total win win.

Smart devices also can detect when there's an equipment fault. Because these faults can get isolated by the smart technology, power can be rerouted. This means greater reliability in general, and faster restoration if there is an outage. As you already know, our system is very old in some areas. In fact, General Electric reported that the average age of a power transformer in the US is 40 years old.

Smart technology makes it possible to get the most out of our aging equipment, because it can monitor, so little things don't become big things. And this helps a lot when planning to replace equipment.

You know that for over 100 years, electric utilities and customers had mostly a one way relationship. Electricity came from the utility to us, the customers. And information generally flowed one way too. The utility provided us information. We provided information. Basically just to let them know when we were out, or maybe to sign up for a program. You also know that this relationship is changing. The concept that has gotten regulators attention, is how smart technology can be used for demand optimization. You remember in an earlier module, we talked about how energy efficiency programs and other programs that reduce peak usage work, well this is kicking it up a notch. Fundamental to smart grid is smart meters, these are meters that are installed on your house and measure how much electricity your home or maybe your business uses. They do this in intervals of an hour or even less. If you compare this to an analog meter, those are read about once a month by a meter reader. Which is a person that would probably win any fitness track or fitness challenge he or she entered. If your gate is locked or Precious the pit bull is out, the utility typically has to do an estimated bill.

The information from the smart meter is sent back to the utility on an ongoing basis for monitoring. So not only do you get a more accurate bill, you also know that your liability is being monitored. Believe it or not, with old school meters, there's a reason why electric utilities used to tell you to call if you're out. Because they didn't always know. There are actually two electric smart meter types, one way, or ***automated meter reading***, AMR, which allows utilities to read meters for billing. And there's two way, or AMI, which stands for advanced metering infrastructure meters, and these allow utilities and customers to interact. So this allows smart consumption applications. And that's what AMI surpassed AMR and that occurred pretty rapidly.

The advanced technology like an automated meter reading, or now the basically, the AMI. So we have two-way communications to meters, is something that we didn't have five years ago, ten years ago. And now it means we're able to actually more fairly allocate the cost, and move them into the right areas with rate design. Which causes problems because everybody knows what we were and not necessarily where we are heading or what those real costs are.

This greater agility proves really helpful when we're looking at putting some of the less predictable renewable energy power onto the grid. As you know the more predictability we can build into this system, the easier time we have balancing customer need for electricity with supply. The US Energy Information Administration reported that there were about 58.5 million AMI meters in the US in 2014. 88% of those were on residential homes. Sounds like a no brainer, right? Not so fast. There are opponents to smart meters, and they have tried hard to put a

halt on them. The response of regulars has been more about giving customers who don't want them the ability to opt out, and keep their old analog meters. To present a balanced view why would people have an issue with these meters? Basically, it boils down to concern with health, privacy, and/or security. Kind of like those concerned about cell phones. Some people are concerned about the radiation coming from the radio frequencies that allow communications between the meter, utilities, and smart appliances, like a thermostat.

Even though our cell phones are largely glued to our ears and smart meters obviously are not, this is something that people are concerned about. And smart meters don't transmit data all of the time, only brief pulses.

3. Insert the necessary prepositions.

1. What is Smart Grid and what effect can we expect it to have … the future of electric utilities?
2. Basically just to let them know when we were out, or maybe to sign up … a program.
3. And now it means we're able to actually more fairly allocate the cost, and move them … the right areas with rate design.
4. This greater agility proves really helpful when we're looking … putting some of the less predictable renewable energy power onto the grid.
5. You remember in an earlier module, we talked about how energy efficiency programs and other programs that reduce peak usage work, well this is kicking it … a notch.

4. Say whether these sentences are true or false.

1. Smart devices can’t detect when there's an equipment fault.
2. Basically smart gird is all about combining providing electricity with information technology or IT.
3. The information from the smart meter is sent back to the utility on an ongoing basis for monitoring.
4. Smart meters transmit data all of the time, not only brief pulses.
5. Less electric loss means a more efficient system, that generally means less expense for the utility and customers.

5. Discuss these questions.

- Should we use the smart grid system in our country?
- What are the main advantages of this system?
- Do you think the concerns about AMI meters are justified?

6. Choose the right adjectives.

1. This time you need to think …… about which course you want to do.
   a) far careful
   b) much more carefully
   c) lot more careful
   d) far carefully
2. The scientists believe that temperatures could rise …… than previously predicted if emissions are not reduced.
   a) far higher
   b) much highly
   c) much more high
   d) a lot more higher
3. The noise from the motorway traffic was …… than I thought.
   a) much loudly
   b) far more louder
   c) a lot louder
   d) far more loud
4. He speaks English …… than Spanish.
   a) rapider
   b) far rapidlier
   c) much rapidly
   d) much more rapidly
5. Gradual changes are …… than sudden changes.
   a) far least traumatic
   b) much less traumatic
   c) less traumatically
   d) the least traumatic
6. You'll need …… shoes for walking around the city.
   a) far comfortably
   b) far more comfortabler
   c) far much comfortable
   d) much more comfortable
7. The situation is …… now and there is no simple solution to it.
   a) lot more complicated
   c) much more complicated
   b) much complicated
   d) farther more complicated
8. She is …… than the other students in the class.
   a) less more intelligent
   c) much intelligent
   b) much more intelligent
   d) least intelligent
9. It's common knowledge that the speed of light is …… the speed of sound.
   a) more faster than
   b) so faster as
   c) much faster than
   d) such fast as
10. Travelling by ferry is …… than by train.
   a) a lot more pleasant
   b) a lot most pleasant
   c) far pleasantest
   d) far most pleasant
11. Now that Andrew is married he has become ……
   a) much more responsible
   c) more less responsible
   b) far most responsible
   d) far least responsible
12. I have changed my job. Now I earn …… I used to.
   a) twice as much than
   b) twice so much of
   c) twice as much as
   d) twice that much than
13. The discussion became …… loud when the mayor suggested new taxes.
   a) far
   b) such
   c)terribly
   d) much

7. Choose the correct articles.

1. Once upon …… time …… little girl lived with her mother in … dark forest.
a) –, a, the b) a, the, –
c) a, a, a d) the, a, –
2. …… Columbus was one of …… first people to cross …… Atlantic.
a) –, –, – b) –, the, the
c) the, the, – d) The, –, the
3. …… success in some careers often depends on …… support of …… friends and relatives.
a) A, the, – b) –, the, –
c) –, –, – d) The, –
4. The grizzly bear, which can grow up to …… eight feet tall, has been called …… most dangerous animal of …… North America.
a) an, –, the b) –, the, the
c) –, the, – d) The, the, –
5. …… wind is blowing dust all …… way from …… West Africa.
a) The, the, the b) A, –, –
c) A, the, the d) The, the, –
6. …… city that has …… world's largest football stadium is …… Rio de Janeiro.
a) A, the, – b) The, the, the
c) The, the, – d) –, the, –
7. We took …… trip around London on top of…… double–decker and saw…… most of the famous sights.
a) the, the, – b) a, the, the
c) the, a, the d) a, a, –
8. It was …… unexpected disappointment for him to receive …… rejection letter from …… university.
a) an, the, a b) an, a, the
c) –, the. – d) –, the, the
9. …… Queen is going to visit Bath next week to open …… new hospital which has been built in …… Wellington Square.
a) The, the, – b) –, the, the
c) –, a, – d) The, a, the
10. I feel that …… hundred miles …… hour is too fast even on …… motorway.
a) a, the, the b) a, an, a
c) the, an, the d) –, an, a
11. Among …… five Great Lakes, only …… Lake Michigan is located entirely within …… territorial boundaries of the United States.
a) –, the, the b) –, the, –
c) the, –, the d) the, the, –
12. …… philosophers seem to think that …… life is …… mystery.
a) –, the, the c) The, –, –
b) The, a, – d) –, –, a
13. …… Arctic is the large area of …… land surrounding …… North Pole.
a) –, the, the b) the, –, the
c) the, –, – d) –, the, –

8. Insert the missing words.

Wind farms	nuclear	introduced	coal	electricity	needs
harmful production	solar panels	power plants	atomic bomb		

1. The main energy carrier in the world is …… .
2. The most environmentally friendly energy is …… .
3. Solar energy is not the “cleanest”, since the production of solar panels requires quite …… .
4. Tokelau is the only country in the world where a 100% of the energy consumed is generated by ……. .
5. Solar energy would be enough to cover all the ……. of humanity.
6. ……. account for about a 5% of all electricity generated in the world.
7. There are also tidal ……. that use, respectively, the energy of sea and ocean tides.
8. China ranks first in terms of ……. consumption among all countries of the world.
9. The word “energy" began to be used in the usual sense only at the beginning of the 9th century, and Thomas Jung ……. it into everyday use.
10. The average hurricane carries an order of magnitude more energy than a powerful ……. .

Unit 7 PROTECTING THE ENVIRONMENT

Do you agree or disagree with these ideas or are you not sure? Discuss your answers with a partner.

	Agree	Disagree	Not sure
1 It is not necessary to educate people on the issue of protecting the environment..	○	○	○
2 Cooking with gas is more environmentally friendly than cooking with electricity.	○	○	○
3 Consumers should be obliged to buy only energy-saving electrical equipment.	○	○	○
4 Fossil fuel power plants should be totally replaced by ones using renewable sources.	○	○	○
5 A speed limit of 90 km/h should be established throughout the European Union to conserve oil stocks.	○	○	○
6 People should be encouraged to use public transport and not use their car.	○	○	○
7 All houses and buildings should be checked each year for their energy efficiency.	○	○	○
8 A massive green tax should be put on long-distance air travel to protect the environment.	○	○	○

A leaflet entitled Energy Saving Tips in the Home is being developed. Write d suggestions for tips and compare them with the rest of the class. As a group best ones.

1. Anna Smith at ELEC received this email Invitation to a seminar. Complete the email with the expressions from the box.

by Invitation only • Could you please let me know • I would also be grateful • It is with great pleasure • It would be beneficial • Kind regards • please see attachment • to get to know•

Dear Ms Smith,
……[1] that we invite you to take part in the tenth International Forum for Energy to discuss the image of the energy industry. This three-day event will be taking place at the International Hotel in Dubai from May 5th-8th of this year(……[2] for more details).
Participation in this forum is ……[3], and the main topic will be public relations regarding the image of the energy industry as a whole, and how this image affects our business, Jane Hall, the CEO of ELEC, will be giving a talk on how ELEC is approaching the subject of public relations and the lessons we can learn from this experience. There will also be an opportunity ……[4] other delegates. ……[5] if you wish to attend this seminar by sending me an email? ……[6] if you could inform me about any other issues you may wish to raise during these three days. There will be an open forum on Thursday evening. May 6th, in which delegates can discuss topics which they feel are important for the industry ……[7] however, if delegates informed me about what they wish to discuss beforehand so that we can draw up a relevant agenda for the evening.
I look forward to hearing from you.
……[8],

Abdullah Al-Naimi

You are Anna. Write an answer to Abdullah Al-Naimi accepting the invitation. Ask him also to send the attachment again as it did not come through to you. Tell him that in the open forum you would like to raise the issue of biofuels. Use phrases from the box to help you.

REPLYING TO INVITATIONS

Accepting invitations

I was delighted to receive your kind invitation ....
Thank you very much for your kind invitation to take part in ....
I would very much like to attend.

Making requests

Would/Could you please ...?
I would be grateful if you could …
I would appreciate it if you could...

2. Read this extract from a brochure created for the forum. Decide whether the statements that follow are true or false. Correct the false statements.

International Forum for Energy

Dear Delegates, I am delighted to have the opportunity to speak to you all at the tenth International Forum for Energy. The main focus of my talk will be on how we are all ambassadors, not only for our companies or organizations but also

for our industry as a whole. We all need to be aware of the challenges that face us-particularly our image concerning the issue of the environment-and we all have to be more proactive regarding this matter.

ELEC statistics are representative of the industry as a whole and speak for themselves. 40% of our generating capacity is accounted for by lignite and coal, 25% try gas, 20% is attributable to nuclear energy, and just 15% accounted for by hydro and renewables. The industry is therefore seen by the public as one of the main culprits regarding climate change, air pollution, rising sea levels, and other environmental problems including the hole in the ozone layer.

This is despite the fact that we have invested a lot of effort and money in finding solutions. All fossil fuel plants have been fitted with desulphurization plants to reduce emissions of greenhouse gases such as sulphur dioxide - one of the main causes of acid rain. We have also developed combustion technology to decrease carbon dioxide emissions, and we have installed denox equipment to reduce nitrogen oxides. We are also heavily involved in emissions trading. There are many, particularly in the media and in politics, who would wish to highlight the negative aspects without even mentioning the measures that we have implemented over the last few years. This forum will give us all the opportunity to discuss the issues and challenges so that we are able to respond in a professional and appropriate manner.

I am sure that we will have some very interesting and thought-provoking discussions.

Jane Hall

1. People see the energy industry as "clean".
2. Gas is the least important source in the ELEC's energy mix.
3. Nuclear energy makes up 15% of generating capacity.
4. ELEC has invested a lot of money in technology to reduce emissions.
5. It is well known that a lot of measures to reduce emissions have been implemented.
6. Managers have to be able to answer questions concerning their companies environmental record.

DID YOU KNOW?

The term `manager' in the UK and USA covers a very broad range of positions. For example, a person who looks after customers could be called a `Customer Care Manager'– even if the person's position is relatively low in the company hierarchy. Another person who leads a department could be called `Department Manager'. In other languages the term has a more restricted meaning.

3. Read Jane Hall's message again. Find expressions that fit into these sentences.

1. The heating up of the atmosphere is caused by …… .

2. The main cause of damage to trees is …… . It has been estimated that more than 60% of forests are affected.
3. The …… in the …… over the South Pole and Australia has raised levels of ultraviolet radiation. This can cause severe sunburn.
4. …… is one of the emissions from a power plant burning fossil fuels.

5. Winter's are becoming milder and wetter, and average temperatures year-round are increasing. These are two major signs of …… …….
6. Generators that pollute too much can buy credits or allowances from other companies in a system of …… …… .
7. The emitting of harmful gases into the atmosphere is called …… .
8. The Netherlands is in danger of being flooded due to a rise in …… .
9. A …… …… is the equipment in a power plant which removes sulphur dioxide.

4. Listen to a presentation given by Jane Hall at the forum. In which order does she do the following?

- ☐ **a** describe ELEC's present perfomance
- ☐ **b** invite questions
- ☐ **c** mention future plans for new plants
- ☐ **d** raise the issue of lobbying
- ☐ **f** welcome delegates

New complete this summary by one of the delegates.
CEO Jane Hall's key point was the need to _____ at both a national and _____ level on the isssues of _____, so that all companies can _____ on the same basis.

5. Which of these phrases did Jane Hall use in her presentation? Listen again and check.

GIVING A PRESENTATION

Opening
Let me first introduce myself.
I'm/My name is… .
In this talk I want/would like to …
I'll begin by (+ *-ing form of verb*).
I'm going to be covering …
Let's start with (+ *noun*).

Introducing other factors or points
If I could now turn to …
Now, turning to…
Let me move on to …

Introducing graphs and diagrams
I'd like you to look at this graph/diagram /(pie) chart/transparency/slide.

Comparing factors
First of all …
Firstly … , secondly … , thirdly …
On the one hand … , on the other hand …

Concluding
That completes my overview(of …),
So, to summarize/sum up …

Questions
Please don't hesitate to interrupt me if you have any questions.
If you have any questions, I'll be pleased to answer them at the end.

Finishing
Thank you for your attention.

Now prepare and give a short presentatin on you job and the department in which you work. Use phrases from above.

6. Another speaker at the forum gives a talk on emissions trading and some research project. Listen to what he says and make notes.

Emissions trading

_____

_____

_____

Imagine you are representing your company at an international conference. Explane in your own words how emissions trading works.

7. At the conference you are asked the following questions. How would you answer?

1. *How do you see the overall image of the energy industry in your country as regards environment protection?*

2. How does the government in your country support protecting the environment? Are there any financial incentives?

3. *What precisely does your company do to protect the environment? Do you have any schemes like carbon capture or designing CO2 neutral plants?*

4. *How great is the impact of emission control costs on the price of electricity?*

5. *Does the cost of protecting the environment have any repercussions on the competitiveness of your country's economy in world markets?*

6. *What programmes, if any, does the company you work for have to help customers save energy?*

8. What do you think these newspaper articles are about? Write the first paragraph of each article. Then compare and discuss them with other members of the class.

1.Europe to Cut Greenhouse Emissions by 20%

2.Wind Power Not Reliable

4. The First Step to Improve Your Carbon Footprint

3.Environment Protection Costs Jobs

6.Green Tax for Step to Improve

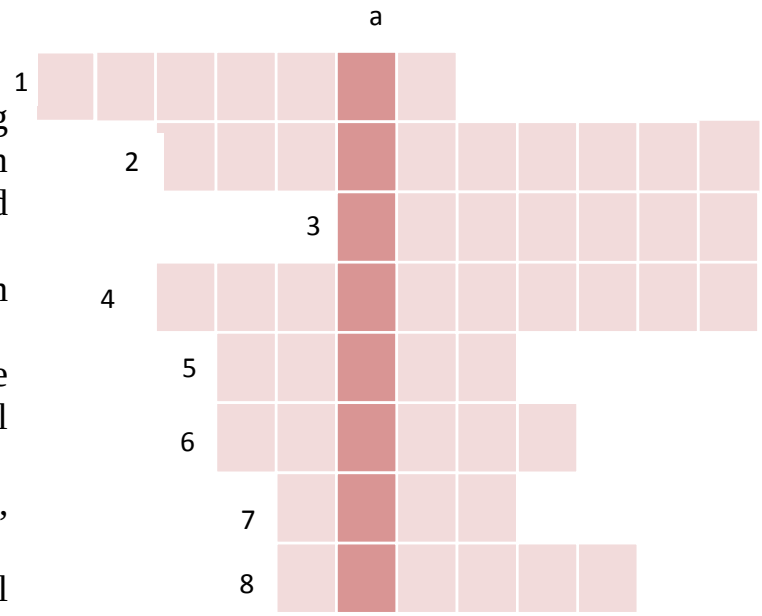
5.Global Warming-
All the Fault of Energy Companies

7. Coal Industry to Pay for CO2 Emissions

10. There are a lot of acronyms and abbreviations used in the energy industry. What do the following stand for, and in which context are they used (e.g. generation, emissions, etc.)?

1. CO2
2. SO2
3. CHP
4. V
5. UCTE
6. TSO
7. DSO
8. MW
9. kWh

11. Complete this puzzle with words the unite and find an essential function for most companies in column a.



1. What you do when you take and store a substance for a long period. you do it with carbon dioxide, for example, and pump it into the ground.
2. The type of gases which warm the earth's atmosphere.
3. Financial support from the state, usually for industrial purposes.
4. Energy sources such as wind, the sun, etc.
5. A diagram with a horizontal and vertical axis.
6. The first element in CO2.
7. The type of rain produced by some emissions from power stations and which badly affects trees.
8. To alter something or to make something different.

12. Which organization makes sure that emission limits are observed in your country? Read this newspaper article about the Kyoto Protocol and discuss the questions.

The Kyoto Protocol

The Kyoto Protocol is the name of an international treaty to reduce the amount of greenhouse gas emissions which came into effect in 2005. The signatories of this binding agreement are divided into two categories. so-called “Annex 1” and “Non-Annex 1” countries. The former comprises developed countries which made a commitment to cut greenhouse gas emissions to 5% below 1990 levels by 2008-2012. Under the terms of the agreement, the later had no actual mandatory greenhouse emission restrictions but were to be able to sell carbon credits on the international

market to Annex 1 buyers as part of any emission reduction project implemented in these countries. This was to be on a voluntary basis.

A number of counties did not ratify the treaty, notably the U.S.A-the largest emitter of greenhouse gases - and (initially) Australia. In addition, India and China, which have large populations and rapidly expanding economies, did not set emission limits, at least not under the terms of the Protocol. This was justified by the fact that these countries were not the main contributors of emissions during the process of the world's industrialization period i. e. the 19th and 20th centuries.

This brought the whole project into doubt in terms of reaching the targets envisaged. Indeed, some critics called the Kyoto Protocol flawed because in their view it favored some countries at the expense of others. Others said that the treaty should only be seen as a first step to manage greenhouse emissions on a global scale, and that stricter measures and limits should be implemented as soon as possible not just the developed one.

Since the Protocol came into force, the majority of politicians, economists and environmentalists have reached the view that if nothing is done to address climate change we will be heading for economic, social and environmental collapse throughout the word. This has led to further conferences aimed at drawing up a more binding treaty than the Kyoto Protocol.

- What do you think of the Kyoto Protocol? Did it set attainable goals?
- Are industrialized countries to blame for climate change? What about the position of energy companies?
- What about the position of China and India? Is it fair? Why, or why not?

Unit 8 THE ENERGY AUDIT

1. Pay attention to the following words:

advisor	консультант
efficiency	эффективность
obtain	получать, приобретать
costs	расходы, издержки
insulation	изоляция
airtightness	герметичность
determine	определять, устанавливать
cracks	трещины
equipment	оборудование
bills	счета
carbon	углерод

2. Read the text.

Understanding the Energy Audit: Why It's Worth Doing?

An energy audit can help reduce your carbon footprint by pinpointing trouble areas in your home or commercial building that may be wasting energy. And as you know, reducing your energy consumption can help save money on your energy bill.

An energy audit is completed at a residential or commercial building to determine its energy efficiency. Simply put, energy efficiency means using less energy to do the same job. The audit will provide you with a complete electricity consumption and energy efficiency assessment.

You can obtain important information regarding your energy usage and Energy Star rating from the audit report. With this information, you can identify and correct any energy usage issues to cut electricity costs. It's advisable to always undertake an energy audit before implementing a renewable energy system.

A registered energy advisor or energy auditor will conduct a home energy audit or business energy audit. In addition, energy auditors are responsible for completing energy efficiency assessments of commercial and non-commercial buildings.

There are three parts to an energy audit: evaluation, testing, and efficiency recommendations. Once the audit is complete, the auditor will provide you with a report outlining energy consumption, a final energy grading, and home improvement suggestions to cut energy costs on energy bills.

The Evaluation. A registered energy auditor will come to your home or business and conduct a walk-through of the inside and outside to determine your energy usage and problem areas.

While conducting their walk-through, they will analyze specific elements that contribute to your home's or business's overall energy efficiency.

The auditor will analyze the heating and cooling systems, or HVAC system, and your insulation levels, including the basement and exterior attic walls. In addition, they will measure and count how many doors and windows the building has and take external measurements.

Airtightness and other tests. The second part of an energy audit involves an airtightness test, also known as a blower door test. During this test, an energy auditor will determine how tight a building's envelope is by checking for air leakage in a house or business. During an airtightness test, an air sealing procedure is done. The auditor will seal the front door of the building, and they will place a large fan inside.

The testing fan will pull the interior air outside the building, which will force outside air to come through any cracks or holes. Often, these air leaks are easily felt with your hand, but most auditors will use feathers or incense to accurately determine where the cracks are located.

In addition to the airtightness test, an energy auditor will assess your business or home's energy use by conducting a thermographic scan. Moreover, they will use various energy usage equipment items to measure energy consumption, such as infrared cameras, surface thermometers, and furnace efficiency meters. Finally, the auditor will analyze past utility bills.

Recommendations to Improve Energy Efficiency. Once your residential or commercial building has been evaluated and testing has been completed, the energy auditor will provide you with a thorough list of recommendations regarding energy efficiency improvements you can undertake. If implemented, most of the recommendations will help you save money on utility bills.

Why is an energy audit important? Conducting a routine energy audit ensures you're reducing your carbon footprint and continuing to be energy efficient by continuously employing new energy conservation improvements. Here's a quick list of why an energy audit is important:

- An energy audit will identify energy-saving opportunities.
- It will help you understand your energy usage and ways to use energy better.
- An energy audit can identify safety concerns with electrical systems, wiring, and ventilation, thus making your home or business safer.
- It will increase a home's resale value.
- An energy audit will help you identify how to reduce carbon monoxide production in the home or business.

Two types of energy audits are available: a preliminary energy audit and a detailed energy audit. The type you choose will depend on your needs.

Preliminary energy audit: This type of audit is simply a data-gathering exercise that offers a preliminary analysis. Often the auditor will conduct this type of audit via a walk-through investigation. A professional energy auditor will utilize readily available data and limited diagnostic instruments to complete a preliminary energy audit.

Detailed energy audit: This type of audit is completed by a professional auditor who monitors, analyzes, and verifies energy use to establish problem areas and ways to implement energy efficiency improvements. They will present their findings and suggestions in a detailed technical report. Additionally, during a thorough energy audit, a professional energy auditor will use sophisticated instrumentation such as a flue gas analyzer, a scanner, and a flow meter.

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

1) It's advisable to always undertake an energy audit before implementing a renewable energy system.
2) energy auditors are not responsible for completing energy efficiency assessments of commercial and non-commercial buildings.
3) The second part of an energy audit involves an airtightness test, also known as a blower door test.
4) The audit will provide you with a complete electricity consumption and energy efficiency assessment.
5) If implemented, most of the recommendations will not help you save money on utility bills
6) There is one parts to an energy audit.

4. Match the words (A) and their definitions (B):

A	B
a)energy advisor	1) the process of collecting information on the use of energy resources in order to obtain reliable information about the volume of energy resources used
b) preliminary energy audit	2) a property of the object of control or its elements that excludes the penetration of gaseous and (or) liquid substances through them
c) airtightness	3) a set of phenomena caused by the existence, interaction and movement of electric charges.
d) electricity	4) this is a specialist in the field of energy, who is engaged in conducting surveys of enterprises for the use of energy.
e) energy Audit	5) This type of audit is simply a data-gathering exercise that offers a preliminary analysis

How Do I Conduct an Energy Audit of My Own Home?

If you don't want to pay for the services of a professional energy auditor and prefer to take a do-it-yourself approach, you can conduct a DIY energy audit of your home.

It will be helpful to keep a checklist of the areas that you have audited and note the problems you found. This list will assist you with prioritizing the energy efficiency upgrades you need to consider.

It's essential to remember that completing a do-it-yourself home energy audit will not be as reliable or credible as hiring a professional. Also, leave it to a pro if you're not sure about how to inspect or remedy a problem.

- Step One: Look for air leaks. The first step is to identify any drafty areas. Air leaks are often found at junctures between doors, windows, electrical outlets, walls, and ceilings. Should you locate a leak, consider sealing it with caulk or weather stripping.
- Step Two: Evaluate your home's ventilation. After you've looked for air leaks, evaluate your home's ventilation. If you burn fuel like natural gas, propane, or wood, you must ensure an adequate and healthy air supply.
- Step Three: Check your insulation levels. This step is pretty simple. You need to check your home's insulation levels by examining the insulation in your attic and around your heating and cooling systems. Lack of proper insulation causes higher energy usage, especially during the winter.
- Step Four: Evaluate your lighting. It might not seem like a big energy user, but the lighting in your house can cause sky-high energy bills. Switching to LEDs, energy-saving incandescent bulbs, or CFLs can help.
- Step Five: Check your appliances and electronics. One of the best ways to save energy in your home is by using energy-efficient appliances. That's why when conducting your energy audit, it's important to consider the types of appliances and electronics you have. Are they old and less efficient?

Energy audits are worth doing. They assess how energy-efficient your home or building is so you know where to make changes. You can save from 5–30% on your energy bills by implementing your auditor's suggestions. Plus, by making such changes, you can positively impact the environment and reduce your carbon emissions.

5. Complete the following table with the missing derivatives.

verb	noun	adjective
	help	
to protect		
to correct		
		assessable
improve		

		recommended
	provision	
		Valuable
	following	

6. Make questions and answer them.

1. energy / is / important / why / an / audit?
2. home / of / own / audit / you / conduct / an / energy / would / your?
3. audit / yourself / a / perform / you / master / would / call / or / an / energy?
4. is / during / what / energy / done / an / audit?
5. like / work / an / auditor / you / would / to / as / energy?
6. any / to / costs / is / way / there / reduce / heating?
7. do / environment / how / you / help / the?

ENERGY CONSUMPTION DATA

1. Pay attention to the following words:

energy consumption [kənˈsʌmpʃn] – потребление энергии
performance [pəˈfɔːməns] – производительность
repair work [rɪˈpeə wɜːk] – ремонтные работы
energy efficiency [ˈenədʒɪ ɪˈfɪʃnsɪ] – энергоэффективность
measurement readings [ˈmeʒəmənt readings] – показания измерений
energy audit [ˈenədʒɪ ˈɔːdɪt] – энергоаудит (анализ потребляемой энергии и того, как она потребляется)
thermal insulation [ˈθɜːməl ɪnsjʊˈleɪʃn] – теплоизоляция
sealing [ˈsiːlɪŋ] – герметизация

2. Read the text.

How does an energy audit is conducted?

The **energy audit** is a diagnosis aimed at measuring the energy performance of a building. Its purpose is to plan improvements in the energy efficiency of one or more buildings. It may involve conducting repairs or setting up systems for measuring and analyzing energy consumption. How does the energy audit is conducted? What are its main stages?

a) The definition of the purpose of the energy audit

Initially, the service provider in charge of performing the energy audit gathers all the necessary information, with a view to identifying improvements. This exchange time enables the auditor to identify the client's performance expectations and to understand how energy is consumed by the building itself, as well as the uses of its occupants.

The expert analyzes the building, takes measurements and notes all the indicators useful for analyzing energy consumption. He then looks at elements such as the heating method, the energy bill, the electrical equipment or even the devices for improving indoor air quality.

b) Analysis of the collected data

After collecting the necessary data on the building and its uses, the expert in charge of the energy audit analyzes them. By comparing the actual energy consumption data with the auditor's project and/or the regulations surrounding the energy transition, he conducts an in-depth study. To do this, he uses thermal calculation software.

Following the analysis, the expert establishes a precise evaluation of the building, making it possible to identify the main sources of energy consumption, but also each energy loss point, and to classify them in order of importance. It is on this thermal study that he will rely when presenting an energy performance optimization plan to the auditing company. This action plan includes a set of improvement scenarios that will be submitted to the company commissioning the audit in the form of a report. It enables the auditing company to plan actions to achieve energy savings.

c) Providing different scenarios for improving energy efficiency

The expert develops different scenarios corresponding to several possible improvements in the energy efficiency of a building or a company's building stock. Each aspect is developed in the report given to the auditor. This report can be consulted afterwards if the company chooses not to immediately execute all the recommended repair work and energy optimizations at the end of the audit.

To build the report, the expert takes into account both :

- the auditor's expectations, gathered at the first stage;
- the building's measurement readings;
- the results obtained during the analysis stage**.**

d) Estimating the cost of the energy consumption optimization plan

The financial analysis of the energy consumption optimization project is an integrated part of the energy audit. Its purpose is to estimate the cost of performing repairs or, if applicable, installing a solution to measure the building's energy consumption.

A specific and detailed financial analysis is developed in the engineering office for each improvement scenario. It gives an estimation of the cost of the optimizations to be planned and the potential return on investment for each of them. In addition, the auditing company may also have access to funding from the state, region or department, as well as local funding.

Energy efficiency in companies: what are the challenges?

The concept of energy efficiency refers both to the result (a building that consumes as little energy as possible for its own operation and that of its occupants) and the means implemented to achieve it (a set of actions to save as much energy as possible).

Aiming for energy efficiency means reducing the energy consumption of an entire system while maintaining the same end service. For a company, this means not lowering its production level, or the comfort of its employees. Energy efficiency means consuming more rather than consuming less.

If you represent a company and you want to reduce the cost of your energy expenses while participating in the energy transition movement, now is the time to implement a strategy to optimize your energy efficiency.

As with any strategy, your energy optimization plan must start with an assessment of your current consumption. Called an energy audit, this aims to analyze the energy consumed, and how it is consumed.

First, the energy audit provides a diagnosis of your company's overall energy situation today. Then, it is completed by a set of recommendations that should enable you to optimize your energy consumption, according to your objectives. Performing an energy audit is a common step for companies in all sectors of activity.

The building sector is the most energy-intensive sector in Europe. It is estimated to account for 40% of European energy consumption. It is therefore the sole focus of many energy optimization challenges. In addition, a large part of this energy is wasted due to the poor energy performance of the buildings constructed.

The energy efficiency of the building can be improved as early as the construction project phase. Thermal insulation, orientation of the building, efficient ventilation system, sealing work … the choices of the builder have an extremely important influence on the energy efficiency of the building.

More and more intelligent buildings are being created to meet new requirements for reducing energy consumption. These buildings are equipped with sensors. Associated with data reading tools, they make it possible to capture and analyze all consumption data at the same time. It is then easier to know what action to implement first.

For older buildings, the optimization of energy performance generally involves renovation. The installation of more efficient solutions in the heating system, for example, brings quick results in reducing energy consumption.

In addition to reducing the cost of energy bills, it also meets the requirements of energy transition, a real competitiveness criterion for companies. These few investments generally make it possible to achieve a satisfactory level of energy efficiency. When this is not the case, it is necessary to act on the use of different energies on a daily basis.

Improving a company's energy efficiency generally involves improving its electrical efficiency. We talk about electrical flexibility, which refers to the fact that a company uses electrical energy at a better time of day, without compromising its performance.

The company in question can join a common approach known as electrical effacement. How does it work? First of all, the head of the company commits to consuming less electrical energy during peak periods, when consumption is the highest. For example, for an industry, this may involve shutting down the most energy-intensive equipment for a few hours. In return, the company is paid by the electrical operator.

In industry, the term utility represents a unit of production or distribution of a fluid or energy carrier. In short, a utility produces or distributes the same type of energy, which will be used for several industrial production lines.

The energy audits performed for industrialists therefore consider utilities as important opportunities to create what are called energy deposits, i.e. points on which it is possible to perform energy optimizations without lowering efficiency.

For example, lighting can be an energy source. The energy optimization plan may well recommend the use of natural light during the day, or the installation of presence detectors to turn on the light only when necessary.

3. Guess the word according to its definition.

1. A diagnosis aimed at measuring the energy performance of a building - …
2. A layer in the structure that allows to reduce heat losses (increase the resistance to heat transfer), reduce heating costs in winter and cooling in summer, increase acoustic comfort - …
3. Ensuring complete impermeability to gases and liquids - …
4. Recovery; the process of updating a stale object - …
5. Points on which it is possible to perform energy optimizations without lowering efficiency - …

4. Complete the following table with the missing parts of speech.

Verb	Noun	Adjective
	diagnosis	
analyse		
		comparable
	measurement	
		improved

plan		
	estimating	
develop		
		optimized

5. Answer the questions.

1. What is the purpose of the energy audit?
2. What aspects does the expert take into account when compiling a report on improving the energy efficiency of a building?
3. How many percent of energy consumption is accounted for by the construction sector in Europe?
4. What does the pursuit of energy efficiency mean?
5. Where should your energy optimization plan start?
6. What is the purpose of the energy audit? What does it include?

6. Match the picture with its meaning.

1. 

2 

3. 

4. 

5. 

6. 

a) plan;
b) measure;
c) compare;
d) analyse;

e) thermal insulation;
f) sealing.

7. Paste words from the spreadsheet into the sentences by meaning. Put the words in the desired form, if necessary.

renovation	analyze	assessment
efficiency	audit	consumption
intelligent	energy	building

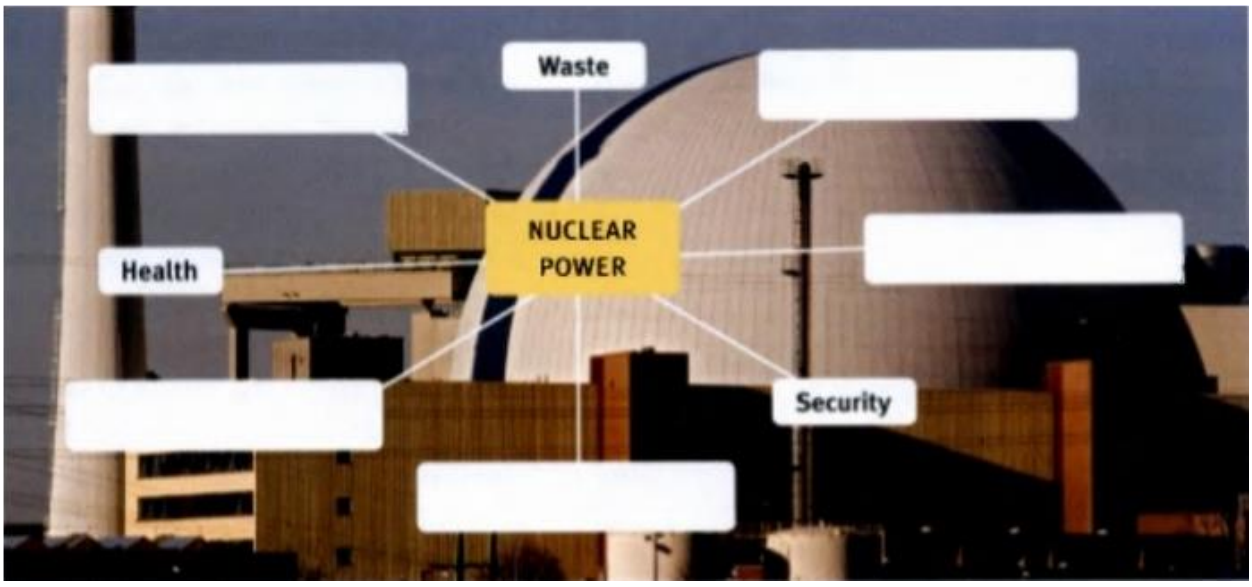
1. The expert analyzes the ____ , takes measurements and notes all the indicators useful for analyzing energy consumption.
2. After collecting the necessary data on the building and its uses, the expert in charge of the energy audit ____ them.
3. Following the analysis, the expert establishes a precise evaluation of the building, making it possible to identify the main sources of ____ consumption.
4. The expert develops different scenarios corresponding to several possible improvements in the energy ____ of a building or a company's building stock.
5. The financial analysis of the energy consumption optimization project is an integrated part of the energy ____.
6. Aiming for energy efficiency means reducing the energy ____ of an entire system while maintaining the same end service.
7. As with any strategy, your energy optimization plan must start with an ____ of your current consumption.
8. More and more ____ buildings are being created to meet new requirements for reducing energy consumption.
9. For older buildings, the optimization of energy performance generally involves ____.

Unit 9. THE NUCLEAR ISSUE

1. Pay attention to the following words:

issue -	проблема
equipment -	оборудование
regarding -	относительно
combustion -	сгорание
particularly -	особенно
concerning -	что касается
environmentally -	экологически чистый
treaty -	договор
signatories -	подписавшие стороны
comprise	включать в себя
commitment -	приверженность
justified -	оправданный
implemented -	реализованный
restrictions -	ограничения
attainable -	достижимый
established -	установленный
encouraged -	поощренный
suggestions -	предложения
attend -	посещать
statement –	заявление

What words do you associate with nuclear energy? Complete the diagram below, then compare and discuss your diagram with other members of your class.



1. How much do you know about nuclear energy? Work with a partner and complete this quiz.

1. Which country produces the most uranium for the world market?
   a. Russia b. USA c. Canada
2. Which country generates 75% of its electricity of nuclear power?
   a. France b. UK c. Germany
3. In which year did the accident occur in the Three Mile Island nuclear power plant?
   a. 1979 b. 1986 c. 1992
4. How many nuclear reactors are operated in Japan for the purpose of generating electricity?
   a. 35 b. 45 c. 55
5. In which country are there no nuclear power stations in operation?
   a. Finland b. Austria c. Czech Republic
6 When and in which country was the world's first full-scale commercial nuclear plant commissioned?
   a. 1951 in the USA b. 1956 in the UK c. 1962 in the former USSR

Now discuss these questions briefly in your group.

1 Is the image of nuclear power in your country generally positive or negative? Give some details.
2. Are new plants being built? If so, outline where this is being done.
3 Is nuclear power being phased out? If so, outline the reasons.
4 Are nuclear plants economically viable when compared with other types of power stations? State what you think.
5 What is the situation in your country concerning the storage and disposal of nuclear waste?

DID YOU KNOW?
The very first time that electricity was generated using a nuclear reactor was in 1951 at an experimental power plant near Arco, Idaho in the USA.

2. Uranium is the basis of nuclear energy. Work with a partner and put these sentences in the right order so that they describe the processes the uranium goes through.

□ **a.** After that, the uranium ore is crushed into a fine powder.
□ **b.** First of all, uranium is extracted from opencast or underground mining. The next step is fuel fabrication. The nuclear fuel is transformed into pellets.
□ **d.** This yellow cake is then enriched to increase the proportion of uranium 235,

which is essential in the nuclear fission process.

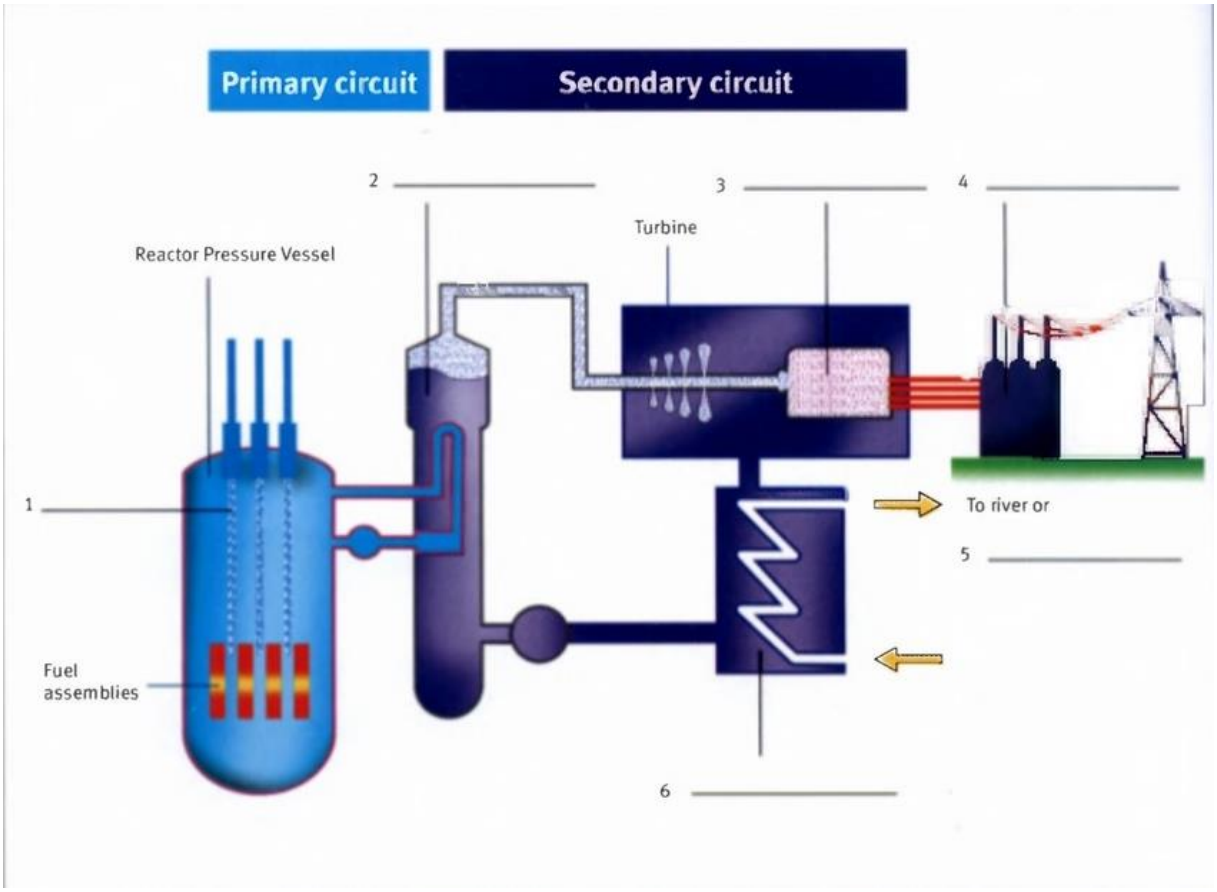
□ **e.** Finally, the spent fuel must be reprocessed and stored long term underground.

□ **f**. Following that, they are formed into rods and placed in the reactor pressure vessel.

□ **g.** In the reactor pressure vessel, heat is produced through a fissile reaction and eventually the uranium is used up.

□ **h.** After crushing, the powder is then purified; the substance at the end of this process is called 'yellow cake'.

3. ELEC's nuclear power division is considering entering into a joint venture with JEPCO, a Japanese power company. A guide is giving a group of visitors from JEPCO a tour of one of ELEC's nuclear power plants. Listen to this talk on its operation and label the diagram.



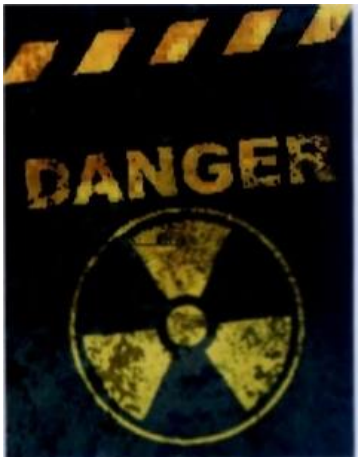
Listen again and take notes on the purpose and functions of these parts of the power station. You will need the notes for exercise 4.

1.The reactor pressure vessel
2.The primary circuit
3.The steam generator
4.The transformers
5.The condenser

4. Put yourself in the position of the guide in exercise 3. Use the diagram, your notes, and phrases from below to describe the whole process in your own words.

DESCRIBING A PROCESS
Firstly/First of all... After that... Following that... Finally... The next step/stage is.... Then... The final step...

5. Read these sentences from a publicity brochure describing the process of waste disposal. Put the sentences in the right order and link them with phrases from above.

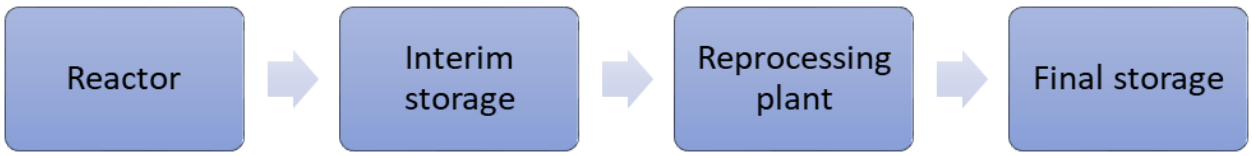


□ **a. …** The spent fuel rods are extracted from the reactor.

□ **b. …** The waste needs to be buried deep underground in a safe location.

□ **c. …** Eventually the spent fuel has to be reprocessed, so that it is transported to a reprocessing plant, such as Sellafield in the UK and La Hague in France. There it is vitrified and sealed in steel canisters.

□ **d. …** The waste is transferred to a site where interim storage is possible. There are a number of such sites in Europe.



6 A working group at ELEC is visiting JEPCO to find out about their arrangements for waste disposal, in order to formulate a new public relations strategy. Listen and note the key issues.

Storage and reprocessing … .

Long-term disposal … .

7. Match the two parts to make expressions from the discussion in exercise 6. Listen again if necessary.

1. public	**a.** measures
2. government	**b.** storage
3. disposal	**c.** plants
4. spent	**d.** fuel.
5. safety	**e.** facility
6. reprocessing	**f.** resistance
7. interim	**g.** disposal
8. waste	**h.** legislation

Now complete these sentences using the correct expression.

9. Companies which operate nuclear power plants must have a programme for ..… so that unwanted products can be dealt with safely.
10. There are facilities for ..... at nuclear power stations to store waste for a limited time until a permanent location can be found.
11. ..… is the uranium which has been used up.
12. The two most well-known ..… in Europe are Sellafield in the UK and La Hague in France.
13. Waste can be stored in a ….. .
14. There is a lot of ..… to nuclear power; some people just don't like it.
15. Other members of the public are not convinced of the ..… at nuclear power stations, and think radiation will leak into the atmosphere.
16. Many people have no trust in the politicians who draft new ….. regarding nuclear power.

8. ELEC and JEPCO have approached a firm of PR consultants, Finley Consultants, to advise them on a coherent PR strategy for their joint venture. Read this excerpt from the consultants' report.

This is a time of great opportunities for the nuclear energy industry. With the price of fossil fuels reaching an all-time high, the debate about peak oil, and the environmental concerns around fossil fuels, nuclear has a real chance of becoming the leading global power source. This really could be the end for fossil fuels. However, the nuclear industry, for historical reasons, has been viewed with suspicion by the general public. The Chernobyl disaster, as well as more minor incidents such as the recent uranium spillage in Bollene, France, contribute to the fact that people are still to be convinced that nuclear is the clean, safe power of the future.

The value of the JEPCO/ELEC alliance is based on being able to demonstrate that the combined experience of both companies, in Japan and Europe, will translate into secure nuclear power stations and safe, long-term waste management. The PR strategy should focus on the advances made to the construction of nuclear power, provisions for reprocessing waste in Japan, and the impact of new research on waste storage. This positive PR message, by showing voters that nuclear power is an energy that can be trusted, will help governments put forward the argument for the construction of new nuclear power stations.

JEPCOs Hiro Takayashi has requested a response from ELEC's Jane Hall to Finley Consultants' report from managers. Write him an email and include the following points.

1. Agree that nuclear power has a real opportunity to grow.
2. Disagree about this being the end for fossil fuels. There is plenty of coal. Political factors affect the price of oil, not just availability.
3. Stress that the PR strategy should highlight that the next generation of nuclear power stations will be built to resist terrorist attacks and powerful earthquakes.
4. Point out that it is important to admit that, so far, there is no totally safe way of storing nuclear waste for thousands of years, so that it remains a danger.
5. Suggest a meeting with lobbyists to discuss the next steps for the PR strategy.

9. Mary Brown, Jane Hall's secretary, phones Jacques Royale of the strategy unit to set up a time for a meeting to discuss the proposals. Put the dialogue into the right order.

- a Jacques Hello. Jacques Royale speaking.
- b Mary. OK, how about Tuesday, March 6th at three p.m.?
- c Jacques I could make four. Could you change it to four p.m.?
- d Mary. Hello, Jacques. Mary Brown here.
- e Jacques Let me check my diary. I'm afraid that's not so good as I've got a meeting with some members of the supervisory board most of Monday morning.
- f Mary. Yes, that's fine, four is also OK. I'll send everybody a quick email to confirm everything.
- g Jacques. Hi Mary. What can I do for you?
- h Mary. Yes. Bye, Jacques.
- I. Jacques. Great. Well, I'll probably see you next week.
- j. Mary. I'm phoning to set up a meeting between Jane and Mr Takayashi and the strategy unit to discuss the proposals made by Finley Consultants. Would next Monday at nine a.m. suit you?

2. Make a word according to the translation.

1. esuis (проблема) ;
2. semcnosr (потребители);
3. penmtoequi (оборудование);
4. islsof (ископаемое);
5. taerty (договор) ;
6. noiirtsetrcs (ограничения);
7. ellyatnorivnnem (экологически чистый);
8. cmopiress (включает в себя);
9. eceudr (уменьшить);
10. gindgrare (относительно);

10. The strategy unit has prepared a list of arguments for maintaining nuclear power. Work with a partner and rate them on a scale of 1-3 (1 = very important, 2 = important, 3 = not important). Then discuss results in the class.

Nuclear power should be maintained because	**Rating**
1 it safeguards jobs in the power industry. 2 it preserves expertise in nuclear technology. 3 it is difficult to replace the high proportion of power generated from nuclear fuel. 4 it reduces dependency on fossil fuels. 5 the targets of the Kyoto Protocol will not be met if nuclear power is phased out. 6 the phasing out of nuclear power is pointless as the waste produced from the past still has to be disposed of.	
7 it can be used as a 'bridge until new technologies are developed in the future. 8 the economy would go into recession without it because the kWh price would increase. 9 the world market price of uranium is not as volatile as other fuels. 10 the cost of decommissioning and dismantling plants is far too high even if energy companies have provisions for this purpose.	

Look at two or three websites of the main energy companies worldwide. What PR information on nuclear power do they offer? What could you add to the list above? How does your company communicate with opponents to nuclear power?

11. Work with a partner. What counter arguments can you think of to each of those in exercise 10? The first one is given as an example. Compare and discuss your counter arguments with the rest of the class.

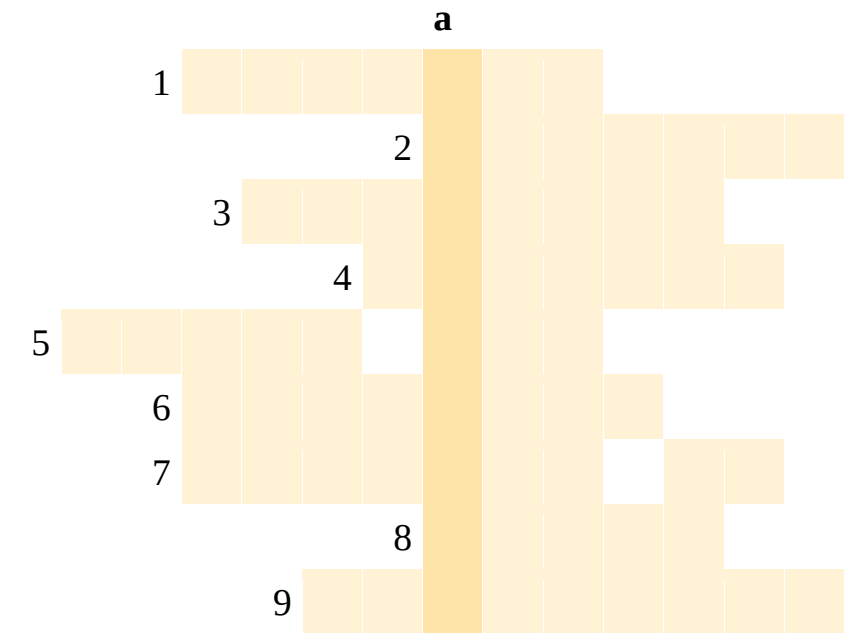
1. *Other jobs could be created if more money were invested in renewables*.
2. ……
3. ……
4. ……
5. ……
6. ……
7. ……
8. ……
9. ……
10. ……

12. Work in groups of three. Use the information below to do the role-play.
One outcome of the strategy meeting was a decision to set up training seminars aimed at helping employees respond to opponents of nuclear power. At one of the seminars, employees role-play a meeting between a chairperson (Partner A), an environmentalist (Partner B) and a representative of the energy industry (Partner C). Prepare your roles and act out the role-play.

CHAIRING A MEETING	
Opening the meeting First of all, I think we should establish the overall procedure. Can we now agree on the overall procedure? The main objectives of the meeting are ... Does that seem acceptable to you? **Asking somebody to start** Would you like to start, John? John, would you like to kick off?	**Keeping to the agenda** OK, could we please come back to the agenda? I'm afraid that's not part of the discussion. **Asking for clarification** I don't quite follow. What do you mean by ...? I don't really get what you mean.

13. Complete this puzzle with words from the unit and find the word in column <u>a</u>.
1 A short-term, temporary, not permanent solution is an ... solution.
2 When you take a fossil fuel or ore from a mine, you ... it.
3 Getting rid of waste or putting it in storage is waste ....
4 The primary fuel used in nuclear power.
5 When you stop something gradually over a period, you ... it .... (2 words - 5. 3)
6 This is the place in the plant where nuclear fission takes place.

7 An expression which means to comply with, for example, a law or regulation (2 words - 6, 2)
8 We use this word to describe nuclear fuel which has been used up.
9 To decommission a plant and take it apart carefully piece by piece.

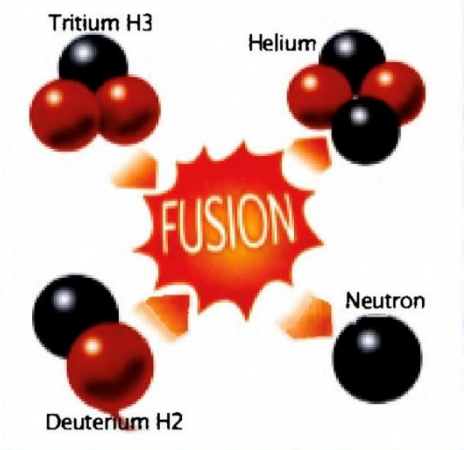


DID YOU KNOW?
The International Atomic Energy Authority (IAEA) was established in 1957 and around 140 states are members of this organization. Its main function is to promote safe, secure and peaceful use of nuclear technologies throughout the world.

14. How do you see the future of nuclear power? Read this newspaper article about nuclear fusion and discuss the questions.

NUCLEAR FUSION - THE WAY FORWARD?

The challenge for the nuclear power industry is to make the technology as safe and secure as possible. After all, most people have heard of the catastrophic effects of the accident at Chernobyl in 1986 - the repercussions of which can still be seen today, with radioactive fallout contaminating large areas of Ukraine, Russia and Belarus. There is also the contentious issue of dealing with the waste from the nuclear fission process, which has still not been adequately dealt with in most countries.



The question arises: can such waste be avoided in the first place? Not it would seem with nuclear

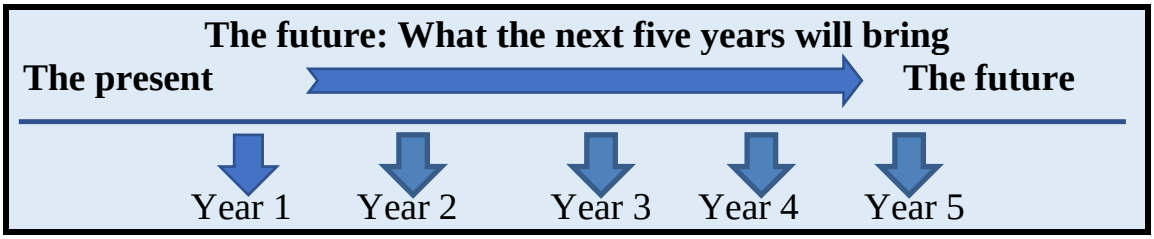
fission, but nuclear fusion could be the answer if it is ever successfully developed.
In this process isotopes of hydrogen - deuterium and tritium - have to be heated up to over 100 million °C. The atoms are thereby fused together thus releasing enormous amounts of thermal energy, which could then be harnessed to produce electricity. There are a number of benefits. No greenhouse gases are released, very little radioactive waste is produced - as is the case with nuclear fission - and furthermore the primary fuel is abundantly available on earth.
This technology, however, is still in its infancy. The EU, USA, China, India, Russia, Japan and South Korea have set up a project called ITER (the International Thermonuclear Experimental Reactor), which includes an experimental reactor in Cadarache, France. The goal of the project is to make fusion commercially viable.
But experts say it will take at least 30 years to achieve the target and there is also no guarantee of any success.
ITER has other critics too. Some environmental groups claim that the money invested in the project - around €10 billion - should be used to develop renewable energy, firstly because it is available today and secondly because it has a proven track record.

OVER TO YOU

• Do you think nuclear fusion can be developed successfully? State our reasons.
• Should countries cooperate to develop new technologies concerning energy production?
Give your reasons why or why not.
• Do you think the money invested in the ITER project should be spent elsewhere?
• Do you agree that renewables have a proven track record?

Unit 10. THE FUTURE OF ENERGY

How do you see the future? Look at the points given below and note down how you see developments over the next five years. Compare and discuss your ideas with other members of the class.



1) your own job responsibilities
2) the functions of the department you work in
3) the projections for your company's market (s)
4) the communication flow within your company
5) pay and conditions of the staff at your company
6) the core business of your firm
7) your company's image
8) innovations created or used by your company
9) the structure of your company

1. What are the functions of the departments listed below? Match the targets to the departments.

Departments	**Targets**
1) auditing	a) to acquire more industrial customers b) to be more proactive about negative media coverage
2) human resources (HR)	c) to bundle purchase volume d) to develop a sustainable sponsorship strategy for sport and cultural events
3) IT	e) to establish a computer helpline for staff f) to establish benchmarks or yardsticks for an interdepartmental costing system
4) legal services	g) to harmonize pension schemes throughout the group
5) public relations (PR)	h) to identify inefficiencies in financial processes i) to implement new payroll processes j to make tests in fuel-cell technology
6) procurement	
7) research and	

development (R&D) 8) sales and marketing	k) to reduce the number of suppliers I) to set up a loyalty-card system for retail customers m) to standardize contracts n) to upgrade software

2. Read the following email from a manager. Does John work in the procurement, trading or auditing department?

I am going to meet the CEO shortly as she has expressed concerns that we are still having some problems regarding accurate load planning. The accuracy of our forecasts for last year was disappointing. I would appreciate it if you could inform me of the reasons as you see them.

Regards,

John Baker

Now answer the email. Include the following points and use the expressions from the box. Each expression should be used once only.

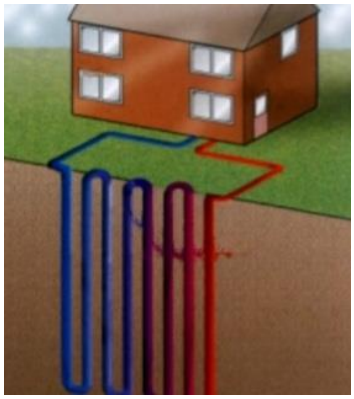
• attributable to • I am afraid • in addition •
• over and above this • to begin with •

1. Agree that forecasting was disappointing.
2. There was a sharp rise in consumption due to an unexpected economic upswing.
3. One power plant went out of action because of technical problems.
4. The Dutch/German interconnector was damaged at the beginning of the year.
5. Communication between departments must also be improved.

3. At an interdepartmental meeting, ELEC employees are discussing the future of energy supply. Listen and take notes for the minutes using the headings below.

Issues discussed

1 Long-distance electricity transmission
……
2 R&D department project
……
3 Geothermal heating
……
4 Hydrogen
……



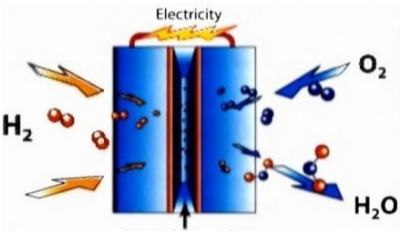
Do you agree with the points made? Give your reasons.

4. One of the participants at the meeting attends a conference on the future of energy supply. There is a workshop on the fuel cell. Not all conference participants work on the technical side, so an information sheet has been provided. Read this sheet and complete the flow chart.

The Fuel Cell

The fuel cell is actually quite an old technology having been invented by the British scientist William Grove in 1843. In this apparatus, electrical power is produced in a simple yet intriguing way. As can be seen from the diagram, there are two electrodes, the anode and the cathode, and in the middle of both there is a membrane ion conductor or electrolyte. Hydrogen gas is fed continuously over the anode while oxygen from the air passes over the cathode. The electrolyte is a partition which ensures that the two gases do not come into direct contact with each other. Through the chemical process in the fuel cell, hydrogen splits into hydrogen ions and electrons. The electrons then pass through an external circuit to the cathode depicted by this glowing bulb. Electrical current is produced in this way.

The hydrogen ions meanwhile pass through the membrane. They and the electrons then react with oxygen at the cathode to produce water or steam. Thus heat is also produced, and this too can be utilized.



The electricity produced is direct current, which can be converted into alternating current if required. In order to create large volumes of power, fuel cells are connected in series to form a stack.

The beauty of the fuel cell is that the only waste product is water, although it should be stressed that the waste depends on how hydrogen is obtained to begin with. If it is derived from sources such as natural gas, CO, will also be produced.

Fuel cells can primarily be used in remote areas where there is no connection to the grid. But developments in this technology could mean that heat and electrical power from fuel cells will also be harnessed in the future in cities, in decentralized energy-supply systems for homes, offices and factories. We could even have them in our cellars.

So is this the key to a vision of clean, cheap, plentiful energy supply? Does it spell the end for the power plant as we know it? This is unlikely as the volumes of power needed cannot be generated by the fuel cell alone. But there will be changes, and in twenty to thirty years' time fuel cells could be common in energy supply as well as in vehicles.

1) An uninterrupted stream of ….. passes over the anode while the ….. comes into contact with oxygen from the air.
2) Hydrogen is divided into ….. and ….. as a result of the chemical process.
3) An ….. then conducts the electrons to the cathode.
4) ….. pass through the membrane.
5) There is a ….. between the hydrogen ions, electrons and oxygen at the cathode and ….. or ….. is produced.
6) The type of electricity produced is DC (direct current), which can be turned into …..

5. How would you answer these questions in a discussion forum? Use information from the text and flow chart above, and phrases from Unit 9.

- I still don't really understand how it works. Can you explain in simple language?
- So what exactly are the advantages, and are there any disadvantages?
- Is this the answer to all our needs? Can you produce large volumes of energy like this?

Summarize the fuel cell's advantages and disadvantages in a table.

Advantages

waste mostly water or steam

Disadvantages

depending on...

Now summarize the advantages and disadvantages of solar panels, tidal power, fusion power or energy producing systems of your choice.

6. Delegates at the conference break for Lunch. Complete this conversation using words and phrases from the box. Then listen to the dialogue and compare your version with the audio.

actually • anyway • aren't they •
by the way • getting on • really • sure •
things • think of • to be honest •

John Hello Steve. Good to see you again.
Steve Hi John. How are (1) ……?
John Just fine. So, what did you (2)…… the talk on the fuel cell?

Steve All right, but (3) …… the speaker didn't really tell me anything new, although it was interesting.
John (4) ……? I thought it was quite informative. (5) ……, how are you (6) …… with your paper on hydrogen?
Steve (7) ……, I'm having a few problems. It's not easy to get all the necessary information. Some people aren't very cooperative.
John (8) ……? That must be quite frustrating.
Steve Yes, it is — but (9) …… . When I come to thin k about it, maybe you could help me with it. I mean, you have some good contacts.
John (10) …… . How can I help?

Did you know?

Small talk or conversation is essential in business for creating good rapport between people. It is used to build relationships, further networking, and establish a personal setting before a meeting takes place. Topics can be smaller business issues, sports, weather, etc. But subjects which are too personal should be avoided.

8. The conference programme contains a talk on *the hydrogen-based economy*. Look at these sentences. Do you think they are true or false (audio 15)?

	True	False
1. Production of hydrogen is comparatively cheap.	☐	☐
2. Greenhouse gases are avoided when hydrogen is produced via electrolysis.	☐	☐
3. The use of photovoltaic cells has no real advantage.	☐	☐
4. Storage of large quantities of the gas presents a major problem.	☐	☐
5. Hydrogen research projects are being well-funded by oil companies	☐	☐

Now listen to the talk and check your answers.

Did you know?

Hydrogen is the most abundant element in the universe accounting for 75% of the mass of stars and galaxies. On earth, it is found in many substances such as water or hydrocarbons, from which it can be isolated.

9. Your boss is expecting a report on the conference, and in particular the talk on the hydrogen economy. Write your report using the headings 1-4 and phrases from the box. Note that you should also include your recommendations about future research at your company regarding this technology.

1. Introduction
2. Pros
3. Cons
4. Conclusions and recommendations

Writing reports

Introduction	**Linking words**	**Recommendations**
The aim of this report is to ... This report aims to ... The objective of this report is to ...	Moreover, ... Furthermore, ... However, ...	It is suggested that ... It is recommended that ... It is advised that ...
Reporting	**Conclusions**	
It was pointed out that ... It was stated that ... It was established that ...	It was concluded that ... It was agreed that ... It was decided that ...	

10. The conference is over, and the delegates are leaving. With a partner make up a dialogue in a conversational style using these prompts. Then listen to the audio 15 and compare versions.

1. John indicates that the conference was interesting. _____
2. Steve agrees. _____
3. John suggests a drink at the bar. _____
4. Steve declines — he has to catch a plane. _____
5. John indicates disappointment; asks about Steve's arrival time at home. _____

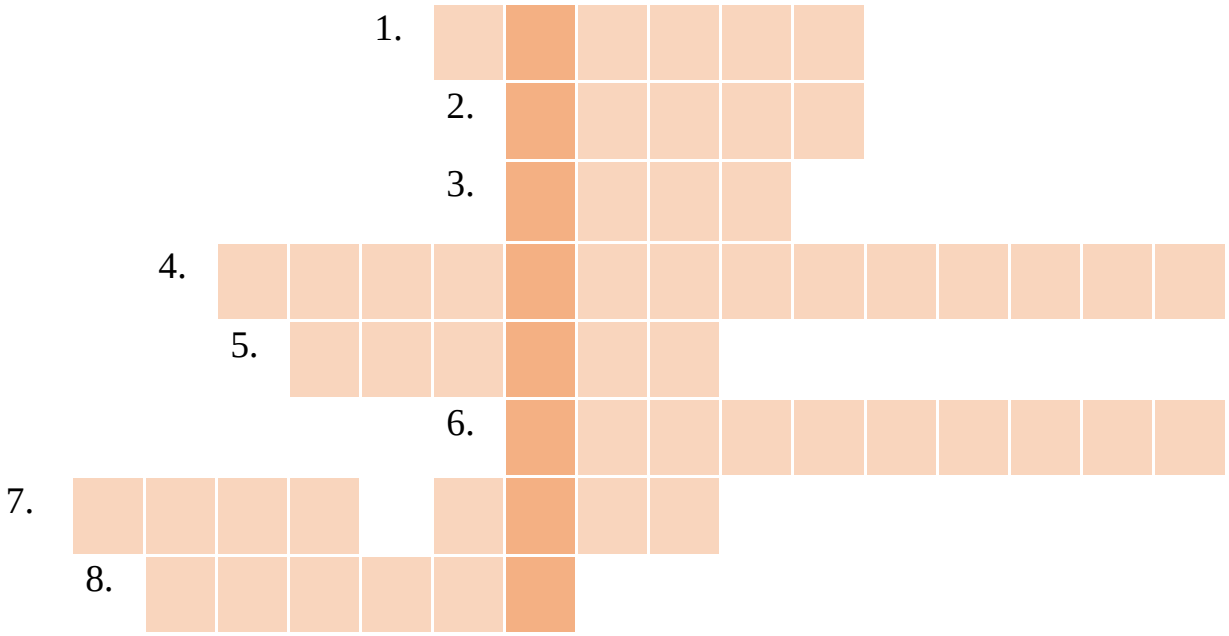
6. Steve gives the time; indicates he must leave now. _____
7. John says goodbye; asks Steve to give regards to his colleague, Sonia. _____
8. Steve responds and says goodbye. _____

11. Find out what research and development projects your company or a company you work with is doing. Get information from its website, annual report or other material. Present and discuss the main ones.

12. Complete this puzzle. What is the word in column a?

1. Hi! How are .....? — Great, thanks.
2. The hydrogen economy within twenty .....? I don't believe it.
3. How ..... does the water-pipe system have to be in the ground?
4. A cable which can conduct electricity with little energy loss.
5. A place which is far away, perhaps in the middle of nowhere, is ..... .
6. The type of energy that you get from under the ground.
7. An apparatus invented by William Grove which produces electricity. (2 words — 4,4)
8. An idea or picture of the future.

a



12. Do you know if there are international projects concerning energy? Read this newspaper article and discuss the questions

Lack of Vision

We are all aware of the crisis concerning energy. Climate change, constantly increasing demand, depleting reserves of primary fuels — the issues have become so familiar that we have become bored with the whole question. We are no longer prepared to listen. But the problem is not going to go away.

There seems to be a mass of short-term solutions to this long-term problem. But it is not just a question of getting on a bus and leaving the car at home, switching off lights and DVD recorders, or doing without a winter holiday. If we take a sober look at what is going on, there is a sense of something lacking. Where is the vision? This is not just a question to be put to energy companies and politicians, but to everyone. When are we going to get to grips with solving this most urgent of problems? What is needed is a change in people's long-term thinking.

Around 50 years ago, John F. Kennedy announced that the U.S.A would be able to put a man on the moon by the end of the decade. Similarly, there is now international willingness to cancel third-world debt. Why can we not create the same worldwide momentum to find new energy solutions? The hydrogen economy, fuel cells, even nuclear fusion: these are technologies which we can develop now for ourselves and for future generations.
Let's not leave the decision to the whims of the market. It is time to act now. With political will, vision, and by making a concerted effort, we can make a difference, and safeguard the livelihoods of future generations.

Over to you

• Do you agree there is a lack of vision in the energy industry? If so, what vision could be created?
• Is there a need to have international cooperation on the issue of the hydrogen-based economy? Give your reasons.

Test yourself!

See how much energy vocabulary you have learned.
Use the clues to complete the crossword puzzle.

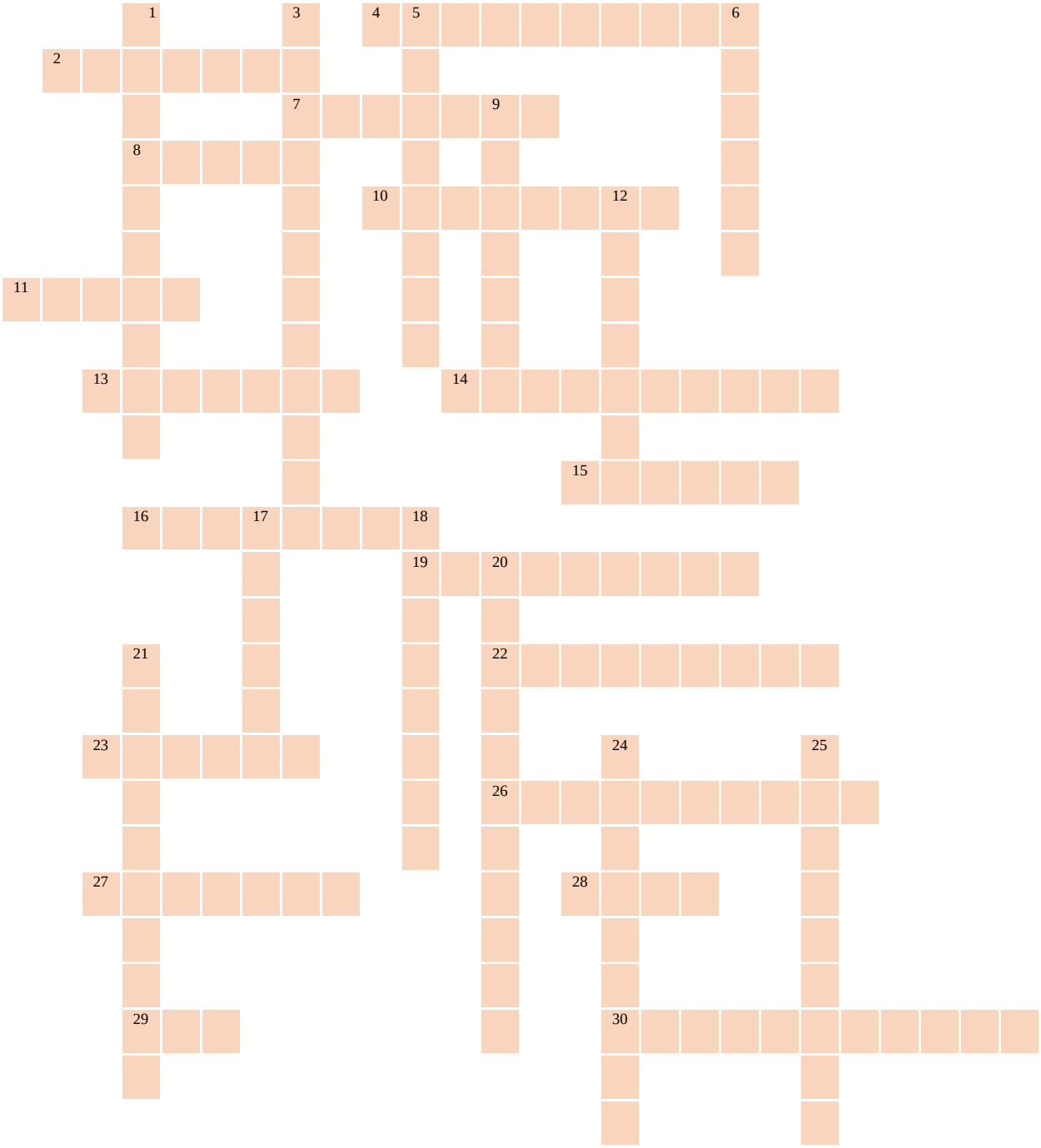
Across

2. Another word for *repository*, e.g. for nuclear waste.
4. A ... gas like $C0_2$ which causes climate change.
7. The development of a price or consumption.
8. You would probably find this in your cellar; it measures energy consumption.
10. The opposite of *stable*.
11. Some energy companies plan to ... out nuclear power and then stop production.
13. To release harmful substances into water or the atmosphere.
14. Money used to finance future business risks, e.g. company pensions or dismantling power stations.
15. This is the 'marriage' of two or more companies.
16. The opposite of *weakness*.
19. Another word for *benchmark*.
22. When you have an unpaid bill or owe money to somebody, this is a…
23. You will find these in the balance sheet — buildings, plants, cash, etc.
26. This word describes when something is good for you.
27. A supplier of gas and electricity to customers.
28. The network of lines or pipelines.
29. This kind of plant produces both heat and electricity.
30. Everything around you, particularly the countryside, water, forests, air, etc.

Down

1. To put a power plant into operation.
3. This is the decrease in value over time of an object (e.g. network, building etc.); the word is used in accounting.
5. To modernize a power station by equipping it with new parts.
6. This is what you do to uranium so that it can be used to generate electricity.
9. This is where nuclear reactions occur.
12. A kind of brown coal.
17. In the middle of nowhere.
18. A gas which could replace fossil fuels in the future.
20. An energy company must have this attribute to be able to supply gas and electricity all the time.
21. A kind of barrier in cables and lines which is not good for the flow of electricity.
24. This is what you do to nuclear waste before it is stored long term.

25. Not voluntary, compulsory.



TRANSCRIPTS

UNIT 1, EXERCISE 2

Maria ELEC Public Relations. Maria Birger speaking.
How can I help you?

Colin Oh hello, this is Colin Maitland. If you remember we spoke a few days ago...

Maria Yes, yes of course. Hello. Colin. How are you?

Colin Fine, thanks. And you?

Maria Fine, thanks. So what can I do for you today?

Colin Well, as I explained last time. I'm writing this series of articles on European utilities and I'd like to include ELEC in my reports.

Maria Yes, as I said. I'm happy to give you all the
support I can. Where would you like to start?

Colin Well, first I'd like some general information, and I was wondering if you could outline ELEC's energy mix first of all.

Maria Sure. Well, we have a number of fossil fuels which we use for electricity production - we mostly burn lignite and gas.

Colin Right.

Maria Yes, and our lignite-fired plants are used for
base load while the gas-fired ones cater for the intermediate, or medium, and peak load ranges.

Colin Mm, OK I've got that.

Maria Then we have a number of gas plants which are combined heat and power plants; we use them to generate electricity and also to supply district heating systems.

Colin Sorry, I didn't quite catch that, what sort of systems?

Maria District heating systems.

Colin Ah, yes.

Maria So those are the fossil fuel plants. Then we also have some nuclear plants which are also needed for base load.

Colin I see. Now what about the issue of emissions? I mean, the burning of fossil fuels produces these harmful emissions and environmental problems that people of course are very much aware of these days. Could you outline your company policy on this?

Maria We take this issue very seriously indeed. All our plants are fitted with state-of-the-art equipment to reduce harmful effects on the environment.

Colin Can you give me some exact figures?

Maria I'm afraid I can't help you there, but why don't I take you round one of our plants? You could then see exactly what we do.

Colin Yes, that would be great. Um, you have a number of power stations in your portfolio. What's me largest one?

Maria Well, in terms of installed capacity that would be Altrath near Berlin. It has four

600-megawatt units and can produce enough electricity to meet the needs of some two million people.

Colin I read up on that. It's relatively old, isn't it?

Maria Well, it was commissioned in 1979. but it's been retrofitted since then. Most of our other plants came on line in the 1980s and 1990s.

Colin What about wind?

Maria We're building more wind power stations although they are still quite controversial. It can be difficult to get planning permission in some countries. Not everyone is in favour of them as they say they spoil the countryside and create too much noise if you live near them.

Colin And what's your view on this?

Maria We believe these claims to be exaggerated.

UNIT 1, EXERCISE 11

Maria So you got the information about our power plants all right, did you?

Colin Yes, thank you. Your two colleagues were very helpful.

Maria Good. But now you'd Ike to know more about the structure of the company.

Colin That's right.

Maria OK. Well, this chart shows the overall set-up, and as you can see, ELEC has an unbundled structure. There's a holding company, ELEC Holding, with five divisions which are all active on the pan-European electricity and gas markets.

Colin Does that mean the divisions are companies in their own right?

Maria Yes, that's right, they are. On the far left here we have ELEC Power, which is our mining and generation division. Because, you see, in addition to our power plants we also have a number of opencast mines.

Colin OK, I didn't realize that.

Maria Yes, they produce lignite and coal, mostly in central Europe. ELEC Power also procures gas for the purposes of electricity generation from our partners in Russia and other countries.

Colin Russia, I see.

Maria Mm. But the next division is more focussed on western Europe, that's ELEC Transmission and Distribution, which has a large number of networks in Germany, Denmark, the UK, the Benelux countries, the Czech Republic, Slovakia and Spain, yes they're the main ones.

Colin But not all.

Maria No, by no means all. We are in fact in the process of consolidating this division under one management structure.

Colin Right.

Maria Then next is ELEC Trading, which is the youngest member of the ELEC family. This division procures large volumes of gas and electricity for our regional supply company - as well as for industrial companies and other utilities.

Colin So this is basically a buying operation.

Maria Yes, ELEC Trading's objective is to purchase these commodities at the cheapest price.

Colin OK. And the next division is ELEC Regional Supply, I see.

Maria Yes. it's called 'Regional', but in fact this is a Europe-wide operation. ELEC Regional Supply has a lot of subsidiaries each responsible for a confined geographical area. In this way we ensure customer proximity.

Colin A sound principle.

Maria Mm. Then finally, here on the far right, you can see the ELEC Shared Services division. This provides IT, human resources and legal services for the whole group.

UNIT 4, EXERCISE 2

Paul As I said on the phone, our association AECP represents a number of medium-sized chemical producers in Europe. We've recently pooled our requirements and set up an energy procurement unit to look into ways of reducing energy costs. I'm sure you know our industry depends on large inexpensive volumes of power to remain competitive. I mean kilowatt hour prices were very volatile over the last two years.

Anna Yes, but the wholesale price has remained stable over the last two months.

Paul That's true but we'd like to ensure that prices don't fluctuate again - at least for our members.

Anna Yes, I understand. How big is your organization?

Paul At the moment there are fifty medium-sized production locations in Europe, mostly in France, the Czech Republic and the Benelux countries, and we're looking for one supplier that can provide power for all of them.

Anna Well, that shouldn't pose any problems. What's the present situation for your members? I imagine they have contracts with local suppliers

Paul That's right. But there's a big difference in the conditions that each one offers. And the average procurement costs have doubled over the last five years, standing at around eighteen cents per kilowatt hour now.

Anna What's your price target?

Paul Before I mention that I'd also like to emphasize that security of supply must be of a very high standard. We just can't afford breaks in transmission. We'd also insist on good customer service with one ELEC key account manager responsible for the whole contract in Europe. That person would be our contact for all countries in which we operate. That covers our main objectives.

Anna With one contact at AECP?

Paul That's right.

Anna I'm sure we could offer something that would go along those lines but prices would depend on amounts supplied and the contract period.

Paul Well, energy consumption is sure to grow over the next few years, particularly when our organization expands. Other medium-sized companies are waiting to join.

Anna OK, I suggest then that ELEC looks into your overall consumption patterns over the last five years. That way we could make some accurate forecasts.

Paul Sounds good. We should start this process as soon as possible.

UNIT 4, EXERCISE 3

Marten We've got a real crisis on our hands, Anna.
Anna Oh, what's up?
Marten It's about that new international contract we have with the Association of European Chemical Producers. Our transmission grid's gone down in the Netherlands. It's due to the weather; the system has been affected by snow and ice and some of the transmission towers have collapsed. We've got teams out there working on repairs but it's going to take a while.
Anna OK, who's affected?
Marten There are two AECP production sites affected. They're totally cut off.
Anna OK, but surely we can compensate by feeding more power in from Germany through the interconnector for the time-being. I mean, we can use third-party access using another network.
Marten Well, it's not as simple as that, I'm afraid.
Anna Why not?
Marten The Dutch-German interconnector is also out of action. This means we can't supply the plants at all at the moment.
Anna So, how are they getting power?
Marten They've switched on back-up generators but it's only a temporary solution.
Anna Mm, I see. There are bound to be questions of liability and insurance. But it's obviously a case of force majeure.
Marten Yes, well I've been in touch with our contact at AECP, Paul Robben. He's very concerned about the situation to say the least and is worried about security of supply to all of the other production facilities in other countries, not only in the Netherlands. He says all AECP members see this development as very worrying and are thinking about looking for a new agreement with another supplier.
Anna OK. I'll get in touch with him as soon as possible to reassure him. I'm sure we'll sort it out somehow.

UNIT 7, EXERCISE 4

Jane Let me once more welcome you to the tenth international Forum for Energy. I'm going to be covering a number of issues in my talk, but please don't hesitate to interrupt me if you have any questions.

Let's start with the problem of the environment. There is room for improvement here, particularly if we consider that coal and gas account for most of our generating capacity, as is outlined in the forum brochure, which I'm sure you've all read. I'd like you to look at this pie chart which illustrates the point.

So. What about our company strategy regarding the future? As you know, our intention is to build more wind, hydro and clean coal plants. But in my

view such programmes are not the main issue, and so let me move on to the more crucial questions. We need to undertake a number of measures. First of all, we need to lobby governments at a national level on the key issues of emissions trading and subsidies. The aim must be that ail energy companies are able to do business within the same framework, and that the industry becomes more transparent as a whole. I'm convinced that we should be more proactive in influencing legislation made by national governments. If this is done then we can develop a clearer and more cohesive future strategy and vision That completes my overview, and I'd now like to go into the various questions in more detail. First let's take a look at...

UNIT 7, EXERCISE 6

Man My name Is Frank Rice and I'm in ELEC's generating division. In this talk I want to give you an outline of what we're doing in the areas of emissions trading and research. I'll start by summarizing how emissions trading works.

Many of you will be well aware of the processes involved, but for those managers and stall working in the non-related divisions this is how it works.

First of all, the general target is to reduce pollution, and to do this there are certain limits that we as power companies must stick to when it comes to the volume of greenhouse gases we can emit. We are allocated certain credits or allowances by governments; these allowances mean emissions must not exceed certain levels. Emissions trading is used when a power company gels into the situation that it exceeds the limits just outlined. The company must then buy credits from a company that pollutes less.

If there's more demand, the price for these allowances increases of course, so it becomes a market in itself. ELEC has been at the forefront of this process for a number of years now. If I could now turn to research, I'd like to outline some of the ways in which our company intends to reduce emissions. The first is carbon capture. Here, carbon dioxide is collected and then pumped deep underground, thus preventing it from reaching the atmosphere. But we are also working with specialist engineering firms to design power plant equipment that will cut CO2 emissions to almost zero. This technology's still at the research stage but it's hoped to have such a plant in operation in the next five to seven years.

Now, if you have any questions at this point I'll…

UNIT 9, EXERCISE 3

Guide Firstly I'd like to welcome you all on behalf of ELEC. Today I'll be showing you round one of our pressurized water reactors. This is the technology you use in your JEPCO 5 plant, isn't it?

Mr Takayashi Yes, that's right, though the majority of our plants use boiling water

reactors. As the next generation of power stations will be based on pressurized water technology, we felt that we could learn a lot by visiting an older version, such as this one, so that we can study where improvements can be made.

Guide OK, I'll talk you through the basics using this diagram on the screen and then we can decide which features you would like to look at more closely. If you look first at the left-hand side of the diagram, you can see the reactor pressure vessel which produces heat from nuclear fission. This occurs in the reactor core where the fuel assemblies are situated- they contain the actual uranium. Above these assemblies you can see the control elements. When these are fully lowered, nuclear fission is completely interrupted, the plant therefore operates at maximum output when they're withdrawn. All this is monitored and controlled by our expert teams in the central control rooms.

Now, it's important to realize that pressurized water reactors have two water circuits- the primary and secondary circuit, which are completely separated from each other. This prevents radiation from escaping, and so that's why they are relatively safe. In the first circuit, water transports the heat produced by nuclear fission in a closed circuit to the steam generator, where the heat is then transferred to the secondary circuit. So in the steam generator, heat from the primary circuit turns water of the secondary circuit into steam. This steam, I'd like to stress again, is totally non- radioactive due to the separation of the circuits. Any questions so far?

Mr Takayashi Yes, erm, how many fuel assemblies are there in the reactor?

Guide There are 193. Any more questions? No? OK, so the steam produced in the steam generator passes to and drives the turbine. This is connected to the generator which actually produces the electricity. From there the electricity is fed into the transformers, which raise voltage levels to the required 380 kV.

Now, if you look below the box with the turbine and the generator, you can see the condenser. In this part of the ptant, cooling water is used to transform the steam of the secondary circuit back to a liquid state. In a sense the cooling water forms a third circuit, but we don't in fact call it that. Anyway, this cooling water in the condenser transforms the steam of the secondary circuit back to water, which is then pumped back to the steam generator. The cooling water on the other hand can be discharged back into the river which you saw nearby the plant, or it's fed into the cooling towers. This depends on the level of the water's temperature.

Mr Tagayashi Excuse me, what's the output of the plant?

Guide The net output amounts to some 1.330 MW. Now. if you'll follow me...

UNIT 9. EXERCISE 6

Fiona OK, well before we can start formulating our own strategy on waste disposal, we would like to hear how JEPCO is dealing with this issue and

see what we can learn. Mr Takayashi has kindly agreed to talk us through their plans for the future. To start with, could you, Mr Takayashi, give us a rundown of what the key issues are?

Mr Takayashi Sure. Well, the first issue is the initial and interim storage of the high-level radioactive waste, and then we have reprocessing. For our purposes we can take these together. What happens at the moment, after the fuel is extracted from the reactor, is that the waste is initially stored next to power plants. There are a number of sites where interim storage of the spent fuel is possible, but this is of course no long-term solution, and eventually the fuel has to be treated at a reprocessing plant, such as Sellafield or La Hague. This has been a major problem for the public relations of our industry, especially from the Japanese point of view. Transporting our waste over long distances to these plants does not look good. Fortunately, we have now built a reprocessing plant here in Japan, in Rokkasho in Aomori prefecture. This should go some way towards improving our image worldwide. But alter reprocessing, waste still has to be transported again to where it is stored long term.

Marita So if l can summarize that, we have two problems: First the fact that the way we store waste at the moment is only a short-term measure, and then the problem of transport.

Mr Takayashi Right. But of course the really major challenge is what happens to the reprocessed fuel long term. We really do require a disposal facility for final storage.

Marita What would that entail?

Mr Takayashi Well, safety measures would require the waste to be buried deep underground away from any natural threats such as earthquakes - a big problem in Japan- and the like. I mean, the waste would be vitrified, but that wouldn't make it any less radioactive of course, but it would be more confined and compressed so that the danger of leakages would diminish. And it would then be buried under clay or granite.

Fiona And it's this question of final storage where there's most public resistance.

Mr Takayashi Yes, absolutely. Nobody wants anything like that in their backyard. In Japan we are currently working hard to identify suitable sites for burial.

Marita Security of course is also an issue for a lot of people. I mean they hear stories of uranium being stolen and are afraid this could happen anywhere.

Mr Takayashi Well, we of course have security teams at all our nuclear stations and storages to guard against any terrorist attack, as specified by government legislation. These security measures are very thorough and are strictly adhered to.

Fiona Yes, sure. And the next generation of nuclear reactors are being built to even stricter security regulations. Mr Takayashi, I would like to thank...

UNIT 10. EXERCISE 3

Anna Yes, that's right but there are also other very interesting new developments in that area. We've been monitoring for some time what seems to be the

beginning of a local energy approach, with cities across Europe wanting to bleak away from centralized energy systems. There are already some concrete plans to build smaller power stations in the vicinity of consumption, which would reduce the need for long-distance electricity transmission.

Mark Transmission issues are certainly something that should be on the agenda. One development that R&D Is looking at is how to reduce resistance and energy losses in the grid system through the use of superconductors. At the moment, the biggest problem is cooling the lines and cables to very low temperatures, which is expensive.

John And calls into question whether it'll ever be commercially viable.

Mark Sure. But it's something we mustn't lose sight of.

John No. no, of course. But going back for a moment to the movement towards local energy that Anna was talking about, there's also this trend towards harnessing geothermal energy by putting water-pipe systems a few metres below the surface of the ground.

Mark Dig a hole in your back garden and that's the end of your energy problems!

Jahn Well, underground ambient temperatures are pretty stable at around eight to ten degrees centigrade, and the idea that you can install your own system and save on heating costs is very attractive to home owners. I mean, as a consumer I'd certainly think of doing it.

Robin Yes, but where do wo as a company come in? And besides, that's more a small-scale thing. What we realty need to be looking at is the big scale, and I'm surprised nobody's mentioned hydrogen yet. I mean we've been talking for a long time about hydrogen replacing fossil fuels, but there are now scientists out there claiming that this really is just round the corner and that we'll be filling up our cars with hydrogen instead of gas, or petrol as you guys say, within the next ten to twenty years, I mean in addition to using it to generate electricity.

Anna Yes, I know, but I mean, isn't that...

UNIT 10. EXERCISE 6

John Hello Steve. Good to see you again.

Steve Hi John. How are things?

John Just fine. So, what did you think of the talk on the fuel cell?

Steve All right, but to be honest the speaker didn't really tell me anything new, although it was interesting.

John Really? I thought it was quite informative. By the way, how are you getting on with your paper on hydrogen?

Steve Actually, I'm having a few problems. It's not easy to get necessary information. Some people aren't very cooperative.

John Aren't they? That must be quite frustrating.

Steve Yes it is, but anyway. Come to think of it, maybe you could help me with it. I mean you have some good contacts.

John Sure. How can I help?

UNIT 10. EXERCISE 8

Speaker So welcome back. I hope you had a good lunch and are ready for an exciting new topic, because now I've like to move onto the issue of the hydrogen economy.

As I'm sure you know, some universities are undertaking R&D into finding a substitute for fossil fuel. Hydrogen seems to be the best candidate although at present production is quite expensive. The gas con be obtained from fossil fuels such as natural gas, but in this process CO*2* is released, which is not beneficial. Research is therefore focussed on producing hydrogen from water via electrolysis because the production of greenhouse gases can be avoided in this way. The only products are oxygen and hydrogen. One of the most interesting ways of doing this is to use photovoltaic cells. The current generated from these cells could be used for the purpose of electrolysis.

If we move on now to the possible applications, hydrogen could be used in a number of ways instead of hydrocarbons. Aircraft engines could be modified to burn the fuel. Road vehicles could also burn hydrogen in internal combustion engines with certain technical changes. The big advantage, again, would be that the combustion process produces no greenhouse gases. Hydrogen could also be utilized to power vehicles with electric motors in conjunction with fuel cells. And, again in combination with fuel cells, hydrogen could be harnessed for electricity production in decentralized energy systems.

Storage of the gas. however, is one of the biggest challenges. It can be stored in pressurized containers, but the problem is that the quantities needed for practical application are very large when compared with the fuels we use today This is particularly true for vehicles and aircraft. Weight would also pose a problem. But perhaps the biggest obstacle for this technology is the reluctance of governments and oil companies to support research. So, it would seem that whether the hydrogen economy ever becomes a reality will depend on the market.

UNIT 10. EXERCISE 10

John Well, that was an interesting conference, wasn't it?
Steve Yes, it was.
John So, how about a drink at the bar?
Steve Well, I'm afraid I have to catch my plane. I'm pressed for time.
John That's a shame. What time do you think you'll be getting back home?
Steve Around midnight if all goes well. So, look, I've got to go. It was good to see you again.
John Likewise. Well, see you around. Oh, by the way give my regards to Sonia.

Steve I'll do that. OK, see you.

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