МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ
Белорусский национальный технический университет
Кафедра «Иностранные языки»

ЭЛЕКТРОННЫЙ УЧЕБНО-МЕТОДИЧЕСКИЙ КОМПЛЕКС ПО УЧЕБНОЙ ДИСЦИПЛИНЕ ИНОСТРАННЫЙ ЯЗЫК (английский)

для специальности:
7-07-0712-02 «Теплоэнергетика и теплотехника»

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Перечень материалов

1. Теоретическая часть (материалы по грамматике).
2. Практическая часть: текстовые материалы с заданиями, направленными на формирование и развитие языковых и коммуникативных умений.
3. Блок контроля знаний.
4. Учебная программа дисциплины «Иностранный язык (английский)» для специальности 7-07-0712-02 «Теплоэнергетика и теплотехника».

Пояснительная записка

Целью разработанного ЭУМК является формирование иноязычной коммуникативной компетенции будущего специалиста, что позволит ему применять иностранный язык в качестве средства общения в профессиональной и социально-бытовой сферах деятельности в условиях межкультурной коммуникации, что является показателем высокой квалификационной подготовки.

Представленный ЭУМК способствует, не только удовлетворению индивидуальных образовательных потребностей обучающихся и повышению образовательного процесса в целом, но и созданию условий для формирования интеллектуально развитой личности будущего специалиста, которой присущи социальная и гражданская активность, приверженность университетским ценностям и традициям, стремление к профессиональному самосовершенствованию, сознательному участию в научной, экономической и социально-культурной жизни страны.

Особенности структурирования и подачи учебного материала

ЭУМК содержит четыре раздела: теоретический, практический, контроля знаний и вспомогательный.

В теоретическом разделе ЭУМК представлены материалы, в состав которых входит информация по грамматике английского языка в объеме, предусмотренном учебной программой дисциплины. Это дает возможность обучающимся изучить основные грамматические явления, освоить правильность их использования в речи. Также в теоретическом разделе дается глоссарий наиболее распространённых терминов, аббревиатуры и глаголы по энергетике и бизнесу, речевые клише для выражения собственного мнения, обсуждения проблем, представления презентации, описания тенденций и процессов и др.

Практический раздел ЭУМК включает в себя аутентичные текстовые материалы с заданиями, направленными на формирование и развитие языковых и коммуникативных умений студентов (адекватное понимание материала, быстрота переключения с одного языка на другой, правильное языковое оформление мыслей и использование лексических единиц в речи). Материал содержит широкий комплекс упражнений, направленных на усвоение и активизацию в речи изученных лексических единиц, речевых формул и клише, наиболее часто используемых для описания разнообразных

процессов производства электроэнергии и энергосбережения, в ситуациях повседневного общения, а также на изучение и закрепление грамматических явлений английского языка.

Блок контроля знаний содержит контрольные задания различной тематики для оценки приобретенных языковых и грамматических знаний. Данный раздел обеспечивает возможность самоконтроля обучающегося, его подготовки к текущей и промежуточной аттестации, самооценки результатов освоения учебной дисциплины.

Во вспомогательном разделе находится программа по учебной дисциплине «Иностранный язык (английский)», ключи к контрольным заданиям, список литературы.

Рекомендации по организации работы с ЭУМК

ЭУМК имеет четкую структуру, каждый текст в практическом разделе имеет предтекстовые и послетекстовые задания. Учебно-методический комплекс по дисциплине «Иностранный язык (английский)» для студентов специальности 7-07-0712-02 «Теплоэнергетика и теплотехника» предназначен как для аудиторных занятий, так и для самостоятельной работы обучающихся.

Оглавление

1.ТЕОРЕТИЧЕСКАЯ ЧАСТЬ

PRONOUNS
Местоимения. Разряды местоимений

Местоимение – часть речи, которая указывает на лицо, предметы, на их признаки, количество, но не называет их: I – я, who – кто, which – который, this – этот, these – те, some – несколько и другие. Местоимение обычно употребляется в предложении вместо имени существительного или имени прилагательного, иногда – вместо наречия или числительного.

John learns English. He likes it. – Джон учит английский. Он ему нравится.

He is a doctor. Everybody knows him. – Он врач. Каждый знает его.

По своему значению и грамматическим признакам местоимения делятся на следующие разряды:

– личные (I, you, he, she, it, we, you, they);

– притяжательные (my, your, his, her, its, our, your, their; mine, yours, his, hers, its, ours, yours, theirs);

– возвратные (myself, yourself, himself, herself, itself, ourselves, yourselves, themselves);

– указательные (this, these, that, those, such);

– вопросительные (who, what, whose, which);

– неопределенные (some/any, somebody, someone, something, anybody/anyone, anything, one);

– отрицательные (no, none, nobody/no one, nothing, neither);

– обобщающие (all, every, everybody, everything, both, either, other, another, each) и другие.

Характеристики личных, притяжательных, возвратных и указательных местоимений

Личные местоимения в именительном падеже	Личные местоимения в объектном падеже	Притяжательные местоимения	Абсолютная форма притяжательных местоимений	Возвратные местоимения	Указательные местоимения	
					ед. число	мн. число
I	me	my	mine	myself	this – этот	these – эти
you	you	your	yours	yourself	that – тот	those – те
he	him	his	his	himself		
she	her	her	hers	herself		
it	it	its	its	itself		

we	us	our	ours	ourselves
you	you	your	yours	yourselves
they	them	their	theirs	themselves

Местоимения-определители

Much	много – с неисчисляемыми существительными: much time, much money, much water, much snow, much milk, much food.
Many	Много – с исчисляемыми существительными: many books, many students, many houses, many trees, many flowers, many rivers.
Little	мало – с неисчисляемыми существительными: little time, little money, little water, little snow, little milk, little food.
Few	мало – с исчисляемыми существительными: few books, few students, few houses, few trees
A little	немного: I have a little time. Wait a little. There is a little water.
A few	несколько: There are a few chairs in the room. I want to tell you a few words.

Some/any — неопределенные местоимения, которые обозначают неизвестное (предположительно небольшое) количество каких-то предметов или некоторое количество вещества, материи, жидкости и т.п. Они обычно ставятся вместо артикля и определяют существительное, стоящее после них.

Some употребляется в утвердительных предложениях с исчисляемыми существительными во множественном числе и обозначает «несколько» или «некоторые»:

- *I know some famous Russian writers. Я знаю несколько знаменитых российских писателей.*

Some используется в утвердительных предложениях с неисчисляемыми существительными и обозначает «немного» или «некоторое количество»:

- *We bought some coffee in the shop. Мы купили немного кофе в магазине.*

Any употребляется в вопросительных предложениях вместе с исчисляемыми существительными в значении «какие-либо», «какие-нибудь» и вместе с неисчисляемыми существительными в значении «скольконибудь»:

- *Have you got any interesting English magazines to read? У вас есть какиенибудь интересные английские журналы (почитать)?*

ADJECTIVES. DEGREES OF COMPARISON

Прилагательные. Степени сравнения прилагательных

Прилагательными называют слова, обозначающие свойства или качество предметов, например: large – большой, blue – голубой, simple – простой. В предложении они обычно выполняют функцию определения к существительному или именной части составного сказуемого, например:

It was early spring. Была ранняя весна.

The weather is cold. Погода холодная.

Прилагательные в английском языке не изменяются ни по родам, ни по падежам, ни по числам. Сравните: a long street – длинная улица, a long table – длинный стол, long tables – длинные столы.

Как и в русском языке, в английском языке различают три степени сравнения прилагательных: положительную, сравнительную и превосходную. Положительная указывает на качество предмета и соответствует словарной форме, т.е. прилагательные в положительной степени не имеют никаких окончаний: difficult – трудный, green – зелёный. Часто, когда говорят о равной степени качества разных предметов, употребляют союз "as ... as – такой же ... , как" или его отрицательный вариант "not so ... as – не такой ... , как".

The line AB is as long as the line CD.

Линия AB такая же длинная, как и линия CD.

Если нужно указать, что один предмет обладает более выраженным признаком по сравнению с другим предметом, то употребляют прилагательное в сравнительной степени, которое образуется путѐм прибавления суффикса "-er" к основе прилагательного, состоящего из одного или двух слогов, например:

short – shorter короткий – короче

Обратите внимание, что на письме конечный согласный удваивается, чтобы сохранить закрытый слог:

hot – hotter горячий – горячее

А если основа прилагательного оканчивается на букву "-y" с предшествующим согласным, то при прибавлении суффикса "-er" буква "-y" переходит в "-i": dry – drier сухой – более сухой

При сравнении разной степени качества употребляется союз "than" – чем.

The line AB is longer than the line CD.

Линия AB длиннее, чем линия CD.

Сравнительная степень прилагательных, состоящих из более, чем двух слогов, образуется при помощи слова "more – более":

useful – more useful

полезный – более полезный

The Russian language is more difficult than the English one.

Русский язык сложнее английского.

Если нужно указать, что один предмет обладает более выраженным признаком по сравнению с другим предметом, то употребляют прилагательное в сравнительной степени, которое образуется путѐм прибавления суффикса "-er" к основе прилагательного, состоящего из одного или двух слогов, например: short – shorter короткий – короче

Обратите внимание, что на письме конечный согласный удваивается, чтобы сохранить закрытый слог:

hot – hotter

горячий – горячее.

А если основа прилагательного оканчивается на букву "-y" с предшествующим согласным, то при прибавлении суффикса "-er" буква "-y" переходит в -i": dry – drier (сухой – более сухой).

При сравнении разной степени качества употребляется союз "than" – чем.

The line AB is longer than the line CD.

Линия АВ длиннее, чем линия CD.

Сравнительная степень прилагательных, состоящих из более, чем двух слогов, образуется при помощи слова "more – более":

useful – more useful

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The Russian language is more difficult than the English one.

Русский язык сложнее английского.

Превосходная степень указывает на высшую степень качества предмета и образуется при помощи суффикса "-est" от односложных и двусложных прилагательных или слова "most – самый" от некоторых двусложных и более длинных прилагательных. Причѐм при прибавлении суффикса "-est" сохраняются те же правила, что и для суффикса "-er". Поскольку данный предмет выделяется из всех прочих подобных ему предметов по своему качеству, то перед прилагательными в превосходной степени обычно употребляют определённый артикль "the": Превосходная степень указывает на высшую степень качества предмета и образуется при помощи суффикса "-est" от односложных и двусложных прилагательных или слова "most – самый" от некоторых двусложных и более длинных прилагательных. Причѐм при прибавлении суффикса "-est" сохраняются те же правила, что и для суффикса "-er". Поскольку данный предмет выделяется из всех прочих подобных ему предметов по своему качеству, то перед прилагательными в превосходной степени обычно употребляют определённый артикль "the":

large – the largest

большой – самый большой

hot – the hottest

горячий – самый горячий

dry – the driest

сухой – самый сухой

useful – the most useful

полезный – самый полезный.

It's the most difficult rule of all.

Это самое трудное правило из всех.

В английском языке существует ряд прилагательных, которые образуют степени сравнения не по общим правилам. Некоторые из них приводятся ниже в таблице.

Положительная степень	Сравнительная степень	Превосходная степень

good – *хороший*	better – *лучше*	(the) best – *самый лучший*
bad – *плохой, плохо*	worse – *хуже*	(the) worst – *самый плохой*
much, many –*много*	more – *больше*	(the) most – *больше всего*
little – *маленький, мало*	less – *меньше*	(the) least – *меньше всего*
well – *хорошо*	better –*лучше*	(the) best – *лучше всего*
far – *далеко*	farther, further– *дальше*	(the) farthest, furthest *дальше всего.*

Многие наречия (в основном наречия образа действия) имеют степени сравнения: положительную, сравнительную и превосходную, которые образуются также как и степени сравнения прилагательных.

Положительная ступень	**Сравнительная степень**	**Превосходная степень**
1. Односложные наречия и наречия **early**		
fast – быстро	**faster** – быстрее	**(the) fastest** – быстрее всего
soon – скоро	**sooner** – скорее	**(the) soonest** – скорее всего
early – рано	**earlier** – раньше	**(the) earliest** – раньше всего
2. Наречия, образованные от прилагательных при помощи суффикса – ly		
clearly – ясно	***more* clearly** – яснее ***less* clearly** – менее ясно	**(the) *most* clearly** – яснее всего **(the) *least* clearly** – наименее ясно

3. Наречия **well** – хорошо, **badly** – плохо, **much** – много, **little** – мало, **far** – далеко образуют степени сравнения от других корней

well – хорошо	**better** – лучше	**(the) best** – лучше всего
badly – плохо	**worse** – хуже	**(the) worst** – хуже всего
much – много	**more** – больше	**(the) most** – больше всего
little – мало	**less** – меньше	**(the) least** – меньше всего
far – далеко	**farther** – дальше **further** – дальше	**(the) farthest** – дальше всего **(the) furthest** – дальше всего

The article.

Артикль

Артикль служит определителем имени существительного, он передает значение определенности и неопределенности в существительном и при этом собственного, отдельного вещественного значения не имеет.

Неопределённый артикль **a (an)** – перед словами, начинающимися с гласной) может сочетаться только с существительными в единственном числе. Определенный артикль происходит от числительного **one** и употребляется:

– в значении *один.*

Wait a minute! We walked a mile or two.

– означает *один из многих, какой– то, любой.*

Have you a sister or a brother? A cow gives milk. A ball is round.

– употребляется с существительными, обозначающими время, скорость, вес, расстояние

a minute, a pound, a hundred, a million.

Определённый артикль **the** происходит от указательного местоимения **that.** Употребляется перед существительными как в единственном, так и во множественном числе.

Определённый артикль употребляется, когда:

– из ситуации или контекста ясно, какое именно лицо или предмет имеется ввиду;

They went to the station. Close the window and turn on the light.

– после существительного имеется определение, выделяющее лицо или предмет из ряда им подобных;

The book that (which) I gave you yesterday is very interesting.

– перед существительным стоит определение, выраженное: порядковым числительным;

January is the first month of the year.

– прилагательным в превосходной степени;

This is the biggest building in our town.

– словами same, right, very, only и др. ;

Are we on the right road? Do you eat the same food every day?

– существительное обозначает предмет, единственный в своем роде или в определенной ситуации;

The moon moves round the Earth. The sun shines by day in the sky.

– существительное обобщает весь класс подобных лиц (предметов).

The clown first appeared in the English circus.

The horse is a useful domestic animal.

Артикли не употребляются:
– перед неисчисляемыми существительными.
I like milk. The socks are made of thick grey wool.
– перед существительными в значении обращения.
Good morning, sweet child!
– перед названиями времен года.
Summer is my favourite season. When winter comes, the weather gets cold.
– перед названиями приемов пищи.

We have breakfast and supper at home, but we don't have dinner at home.

– перед существительными, обозначающими общественные учреждения.

School, hospital, prison.

Употребление / неупотребление артикля с именами собственными

Определенный артикль the

географические названия и части света	the North Pole, the east, the west и др.
названия рек	the Volga, the Thames, the Nile
названия озер (без слова lake)	the Ontario
названия морей и океанов	the Black sea, the Pacific Ocean
названия горных цепей	the Urals, the Alps, the Caucasus
названия пустынь	the Sahara, the Karakum
названия каналов	the Panama Canal, the English Channel
названия некоторых государств и республик (со словами republic,	the USA, the Russian Federation, the United Kingdom

Kingdom, state, federation)	
названия большинства газет	the Times, the Washington Post
фамилии, называющие всю семью	the Browns, the Forsytes
названия достопримечательностей	the Kremlin, the Hermitage

Артикли не употребляются

названия городов и стран	Moscow, New York, London
названия гор	Everest, Kilimanjaro
названия улиц и площадей	Downing Street, Red Square
имена	Tomas Smith, Ivan Petrov
дни недели, месяцы	Monday, Sunday, February, June
виды спорта, научные области знаний	basketball, hockey; sociology, physics

THE VERB

Глагол

Глагол – часть речи, которая обозначает действие или состояние лица или предмета. Глагол в английском языке обладает гораздо более сложной, чем в русском, системой видовременных форм. Эта система охватывает личные формы (**finite forms**) и неличные формы (**non-finite forms**).

Личные формы глагола выражают следующие категории: лицо, число, время, вид, залог, наклонение. Личная форма, как и в русском языке, в предложении всегда употребляется в функции сказуемого.

We live in Belarus. – Мы живём в Беларуси.

They write letters every day. – Они пишут письма каждый день.

Do you hear what he is saying? – Вы слышите, что он говорит?

Основные глагольные формы

I	II	III	IV
Инфинтив **Infinitive** ***to write*** ***to develop***	Прошедшее нопределённое время **Past Indefinite** ***wrote*** ***developed***	причастие II **Participle II** ***written*** ***developed***	причастие I **Participle I (-ing** форма) ***writing*** ***developing***

Инфинитив представляет собой неличную форму глагола, которая только называет действие. Он не имеет ни лица, ни числа и соответствует неопределѐнной форме глагола в русском языке. В словаре глагол даѐтся обычно в форме инфинитива. Формальным признаком инфинитива является частица **to**.

По способу образования II u III формы все глаголы английского языка делятся на правильные (стандартные) и неправильные (нестандартные).

I	II	III	IV
to ask	**asked**	**asked**	**asking**
to write	**wrote**	**written**	**writing**

Времена английского глагола. Действительный залог

Употребление		Образование
Indefinite	**Present**	глагол в личной форме
показывает действие как факт (обычное, повторяемое)	**Past**	
	Future	
Continuous	**Present**	**to be + ing**
показывает действие как процесс	**Past**	
	Future	
Perfect	**Present**	**to have +** причастие II
показывает действие, законченное до определённого момента в настоящем, прошедшем и будущем	**Past**	
	Future	
Perfect Continuous	**Present**	**to have been** + ing
показывает действие, начатое некоторое время назад и все ещё продолжающееся или только что закончившееся	**Past**	
	Future	

TYPES OF QUESTIONS IN ENGLISH

Типы вопросов в английском языке

Основные типы вопросов, используемые в английском языке:

– общий (general)

– специальный (special)

– альтернативный (alternative)

– разделительный (tag)

1. Общий вопрос относится ко всему предложению в целом, и ответом на него будут слова «yes» или «no»:

– *Do you like cheese? – Yes, I do.*

– *Are you a schoolboy? – No, I am not.*

– *Have you seen this film? – Yes, I have.*

Порядок слов в общем вопросе:

1) вспомогательный (модальный, глагол-связка) глагол;

2) подлежащее (существительное или местоимение);

3) смысловой глагол (или дополнение).

2. Специальный вопрос относится к какому-нибудь члену предложения или их группе и требует конкретного ответа:

– *What is your name? – My name is Jim.*

– *Where do you live? – I live in London.*

Порядок слов в специальном вопросе:

1) вопросительное слово (what, where, who, when, how и т.д.);

2) вспомогательный (модальный, глагол-связка) глагол;

3) подлежащее;

4) смысловой глагол;

5) дополнения, обстоятельства.

Обратите внимание: в специальных вопросах, обращенных к подлежащему в Present u Past Indefinite не употребляется вспомогательный глагол to do (did) и сохраняется прямой порядок слов:

Who wants to live forever?

3. Альтернативный вопрос предполагает выбор из двух возможностей:

Do you like coffee or tea? – Вы любите кофе или чай?

Альтернативный вопрос начинается как общий вопрос, затем следует разделительный союз or и вторая часть вопроса.

4. Разделительный вопрос (Tail or Tag Question) состоит из двух частей. Первая часть представляет собой повествовательное предложение, вторая, отделенная от первой запятой, – краткий вопрос (tail – «хвостик»):

You like tea with sugar, don't you? – Вы любите чай с сахаром, не так ли?

Обратите внимание: глагол во второй части разделительного вопроса должен, как правило, соответствовать глаголу в первой его части:

You are a student, aren't you?

You have a brother, haven't you?

You like cheese (play football, drink water и т. д.), don't you?

(В последнем случае глагол *to do* будет использоваться со всеми глаголами, по отношению к которым он будет вспомогательным).

Если в повествовательной части разделительного вопроса содержится утверждение, то во второй – отрицание. Если в повествовательной части – отрицание, то во второй части – утверждение:

You don't like fish and chips, do you?

Past Indefinite (Simple)

Прошедшее неопределенное время

The Past Indefinite (Simple) Tense (прошедшее неопределенное время) обозначает действие, совершившееся или совершавшееся в прошлом, не связанное с настоящим; описывает ряд последовательных действий в прошлом, описывает обычные, повторяющиеся действия в прошлом.

Форма Past Indefinite правильных глаголов образуется путем прибавления к основе инфинитива окончания –ed. Форме Past Indefinite неправильных глаголов соответствует II форма глагола в соответствующих глагольных рядах, приводимых в специальных таблицах (см. таблицы неправильных глаголов).

We went to the cinema yesterday. He arrived in London last year.

Утвердительная форма		Отрицательная форма		Вопросительная форма	
I He, she, we, you,	worked (wrote)	I did not work	did not = didn't (write)	Did I	work (write) ?

they

Past Indefinite употребляется с наречиями ago – тому назад, (month ago – месяц тому назад, three days ago – три дня тому назад), long ago – давно, the other day – на днях (в прошлом), yesterday – вчера, the day before yesterday – позавчера, last – прошлый (last week на прошлой неделе, last month в прошлом месяце, last year в прошлом году); с указанием даты или периода времени в прошлом (in July в июле, in 1990 в 1990 году и т.д.).

THE FUTURE INDEFINITE (SIMPLE)

Будущее неопределенное время

The Future Indefinite (Simple) Tense (будущее неопределенное время) употребляется для выражения однократного или повторяющегося обычного действия или ряда последовательных действий в будущем.

I will go to the theatre with you. In winter Nick will walk in the country every Sunday.

Future Indefinite образуется при помощи вспомогательного глагола shall для 1– го лица единственного и множественного числа и will для всех остальных лиц и инфинитива без частицы to знаменательного глагола (shall/will + ask).

Утвердительная форма		Отрицательная форма		Вопросительная форма
I, we	shall	I, we	shall	Shall (will) I (we) go?
he, she, it,	will go	he, she, it,	will not go	
you, they		you, they	shall not = shan't; will not = won't	Will he (she, it, you, they) go?

Примечание. В современном английском языке существует устойчивая тенденция употреблять will для всех лиц, а в разговорной речи

употребляется, как правило, только сокращѐнная форма вспомогательного глагола с личным местоимением.

I will come (I'll come) to see you tomorrow. – Я навещу вас завтра.

На будущее время в предложении могут указывать обстоятельства времени: tomorrow – завтра, next week – на следующей неделе, next year – в будущем году, in a week – через неделю, in a few days – через несколько дней, one of these days – на днях.

В придаточных предложениях условия и времени вместо будущего времени употребляется настоящее. Придаточные предложения условия и времени вводятся союзами:

If – если after – после

when – когда till (untill) – до сих пор

before – до, перед as soon as – как только

THE PRESENT CONTINUOUS (PROGRESSIVE) TENSE

Настоящее продолженное время

The Present Continuous Tense (настоящее продолженное время) обозначает действие, происходящее в момент речи или в настоящий период времени; выражает будущее действие, когда налицо намерение совершить действие или уверенность в его совершении.

He is watching TV now. They are leaving Moscow next week. They are going to the south.

Сочетание Present Continuous глагола to go с инфинитивом часто употребляется для выражения намерения совершить действие.

They are going to spend next winter in Spain. He is going to take part in the competition.

Некоторые глаголы не употребляются в Present Continuous. Это глаголы, обозначающие чувственное восприятие (to see, to hear), умственную деятельность (to know, to believe, to remember, to understand, to forget); желания, чувства (to want, to wish, to like, to love, to dislike, to hate), принадлежности (to belong, to possess).

Present Continuous образуется при помощи Present Indefinite вспомогательного глагола to be и Participle I знаменательного глагола (окончание –ing) (am/is/are + sitting).

Утвердительная форма	Отрицательная форма	Вопросительная форма
I am working	I am not working	Am I working ?
He, she, it is working	He, she, it is not working	Is he (she, it) working?
We, you, they are work–ing	We, you, they are not working	Are we (you, they) working ?

I am = I'm; He is = He's; We are = We're; is not = isn't; are not = aren't

На длительный характер действия в Present Continuous могут указывать обстоятельства времени: now – сейчас, right now – прямо сейчас, at this moment – сейчас, в данный момент, today – сегодня, this week (month, year) – на этой неделе (в этом месяце, году).

THE PAST CONTINUOUS (PROGRESSIVE) TENSE

Прошедшее продолженное время

The Past Continuous Tense (прошедшее продолженное время) обозначает действие, происходившее в определѐнный момент в прошлом, который обозначен либо обстоятельством времени, либо другим действием в прошлом. При этом ни начало, ни конец длительного действия неизвестны. Подчѐркивается сам процесс действия, его продолжительность.

I was writing a letter to my friend at 5 o'clock yesterday.

I was writing a letter to my friend from 5 to 6 on Sunday.

I was writing a letter to my friend when my brother came.

I was writing a letter while my mother was cooking dinner.

Кроме того, Past Continuous может употребляться для выражения одновременных действий, протекавших в прошлом в один и тот же момент.

The children were playing while their mother was watching them. –

Дети играли, в то время как их мать наблюдала за ними.

As I was taking a shower, mother was cooking breakfast. –

В то время, когда я принимала душ, мама готовила завтрак.

Past Continuous образуется из сочетания вспомогательного глагола to be в Past Indefinite и Participle I знаменательного глагола (was/were + working).

Утвердительная форма	Отрицательная форма	Вопросительная форма
I, he, she, it was writing We, you, they were writing	I, he, she, it was not writing We, you, they were not Writing	Was I (he, she, it) writing? Were we (you, they) writing ?

was not = wasn't; were not = weren't

На длительный характер действия в Past Continuous могут указывать обстоятельства времени from six to seven – с шести до семи, all day long last Saturday – весь день в прошлую субботу, the whole day yesterday – весь вчерашний день и т.д.

THE PRESENT PERFECT TENSE

Настоящее совершенное время

The Present Perfect Tense (настоящее совершенное (перфектное) время) употребляется:

1. Для выражения действия, завершившегося к моменту речи. Время действия не указывается, важен сам факт совершения действия к настоящему моменту или его результат.

She has read this book. Она прочитала эту книгу. (Действие завершено к моменту речи).

В этом значении Present Perfect часто употребляется с наречиями just – только что, already – уже, yet – ещё, lately – недавно, recently – недавно.

The mail has just come. Почта только что пришла.

He has seen many films lately. В последнее время он посмотрел много фильмов.

2. Для выражения действия, которое завершилось, но тот период, в котором оно происходило, ещѐ продолжается и может быть обозначен

обстоятельствами времени today – сегодня, this week – на этой неделе, this month – в этом месяце, this century – в нашем веке и др.

I have written a letter this morning. Я написал письмо сегодня утром.

3. Для выражения действия, которое началось в прошлом и продолжается до настоящего времени.

I have known him all my life. Я знаю его всю жизнь.

I have known him for 2 years. Я знаю его 2 года.

He has not seen his parents since January. Он не видел своих родителей с января.

Present Perfect может употребляться с наречиями always – всегда, often – часто, seldom – редко, ever – когда-нибудь, never – никогда.

She has never been to London. Она никогда не была в Лондоне.

Have you ever been to Moscow? Вы когда-нибудь были в Москве?

Present Perfect образуется при помощи вспомогательного глагола to have в Present Indefinite и Participle II (Причастия II) смыслового глагола.

Утвердительная форма	Отрицательная форма	Вопросительная форма
I, we, have seen	I, we, have not seen	Have I (we, you, they) seen ?
you, they	you, they	
He, she, it has seen	He, she, it has not seen	Has he (she, it) seen ?

I have = I've; He has = He's; I have not = I haven't; He has not = He hasn't

PAST PERFECT TENSE

Прошедшее совершенное время

The Past Perfect Tense (прошедшее совершенное (перфектное) время) выражает прошедшее действие, предшествовавшее какому– то определенному моменту в прошлом или завершившееся до другого действия в прошлом, иначе говоря, предпрошедшее.

Past Perfect употребляется:

1. Для выражения прошедшего действия, которое уже совершилось до определенного момента в прошлом. Этот момент может быть указан обстоятельством времени: by 5 o'clock – к пяти часам, by Saturday – к субботе, by that time – к тому времени, by the end of the year – к концу года.

She had left by the 1 st of June. – Она уехала (еще) до первого июня.

I had cleaned the apartment by 5 o'clock. – К пяти часам я убрала квартиру.

2. Для выражения прошедшего действия, которое уже завершилось до другого, более позднего прошедшего действия, выраженного глаголом в Past Indefinite. В таких случаях Past Perfect употребляется главным образом в сложноподчиненных предложениях.

They had already gone when I arrived. – Они уже ушли, когда я появился.

Past Perfect часто употребляется в придаточных предложениях с союзами after – после того как, before – прежде чем, до того как.

Past Perfect образуется путем сочетания вспомогательного глагола to have в Past Indefinite и Participle II (Причастие II) знаменательного глагола.

ACTIVE AND PASSIVE VOICES.

Действительный и страдательный залоги в английском языке.

Залог – это форма глагола, которая показывает, является ли подлежащее предложения производителем или объектом действия, выраженного сказуемым. В английском языке имеется два залога: the Active Voice (действительный залог) и the Passive Voice (страдательный залог).

Страдательный залог употребляется, когда исполнитель действия очевиден или несуществен или когда действие или его результат более интересны, чем исполнитель. Страдательный залог образуется с помощью глагола to be в соответствующем времени и III формы глагола (причастие II).

Утвердительная форма		Отрицательная форма		Вопросительная форма
I, we	had done	I	had not worked	Had I worked (done) ?
You	had worked	You	had not done	Had you worked (done)?
He, she,		He, she		Had he (she, it) worked?

it | It, they | Had they worked (done)?

They

Страдательный залог употребляется, когда исполнитель действия очевиден или несуществен или когда действие или его результат более интересны, чем исполнитель. Страдательный залог образуется с помощью глагола to be в соответствующем времени и III формы глагола (причастие II).

Passive voice

	Indefinite	**Continuous**	**Perfect**
Present	(Am is are) + being V3	(Am is are) + being V3	have (has) + been + V3
Past	(was were) + V3	(was were) + V3	had + been + V3
Future	(shall will) + be V3		(shall will) +have + been V3

Сравним действительный залог со страдательным залогом:

Active Voice

Tom delivers the mail. Том доставляет почту.

Passive Voice

The mail is delivered by Tom. Почта доставляется Томом.

Как и в русском языке, существительное, играющее роль дополнения в предложении действительного залога, в предложении страдательного залога становится обычно подлежащим. Если в оборотах со страдательным залогом указан производитель действия, то в русском языке он обозначается творительным падежом, а в английском ему предшествует предлог by. Употребление времени в английском страдательном залоге принципиально не отличается от его употребления в действительном залоге.

Следует обратить особое внимание на перевод глаголов с предлогом в страдательном залоге. Наиболее распространѐнные из этих глаголов:

hear of – слышать о
laugh at – смеяться над
look after – присматривать за (кем– либо)
look at – смотреть на
rely on – полагаться на
send for – посылать за
speak of (about) – говорить о
pay attention to – обращать внимание на
take care of – заботиться о

The book is much spoken about. Об этой книге много говорят.
He can't be relied on. На него нельзя положиться.

В русском переводе не все глаголы сохраняют предлог:
to listen to – слушать что-либо, кого-либо
to look for – искать что-либо
to provide for – обеспечить кого-либо, чем-либо
to explain to – объяснять кому-либо
He was listened to with great attention. Его слушали с большим вниманием.

MODAL VERBS

Модальные глаголы

В отличие от других глаголов, модальные глаголы не обозначают действия или состояния, а лишь передают отношение говорящего к действию, выраженному инфинитивом. Модальные глаголы могут показывать, что говорящий рассматривает действие как возможное, желательное, необходимое, сомнительное, допустимое, требуемое и т.д.
I can't go with you. – Я не могу идти с вами.
We must go now. – Теперь нам надо идти.
Модальные глаголы отличаются от других глаголов рядом особенностей:
1. Они не изменяются по лицам и не имеют окончания –s в 3– м лице единственного числа.
2. У них нет неличных форм – инфинитива, причастия и герундия, а следовательно, нет и аналитических видовременных форм.
3. За исключением глаголов can (could) и may (might) имеют только одну форму.
4. Инфинитив смыслового глагола, следующий за модальными за исключением глагола ought, употребляется без частицы to.
5. В вопросительном и отрицательном предложениях они употребляются без вспомогательного глагола. В вопросительном предложении перед подлежащим ставится сам модальный глагол, в отрицательном отрицание not присоединяется к модальному глаголу.
Наиболее употребительны следующие модальные глаголы:

Can (could) выражает:
– умение, физическую и умственную возможность, способность (*Can you skate?);*
– возможность выполнения действий при соответствующих обстоятельствах *(You can see the forest through the other window);*
– разрешение или просьбу (*Can you use your car? You can use my car*);
– сомнение и неуверенность (*Can it be true?);*
– невероятность (*It can't be true).*

May (might) выражает:
– разрешение (*May I borrow you pen?);*
– предположение с оттенком неуверенности (*He may be ill);*
– неодобрение или упрек (*You might have helped me).*

Must выражает:

– обязательность совершения действия (*You must talk to your son about his future);*

– запрещение *(He must not leave his room for a while);*

– предположение, граничащее с уверенностью *(Your father must be eighty now).*

to have to выражает:

– обязанность (*He had to do it);*

– отсутствие необходимости *(You don't have to go there).*

to be to выражает:

– долженствование, необходимость как результат договоренности (*We are to discuss it next time).*

Should и ought to выражают:

– моральное обязательство (*You should (ought to) be always polite.);*

– порицание прошлого действия (*You should (ought to) have helped me).*

– совет (*You should (ought to) see a doctor);*

– предположение (*He should (ought to) be at home).*

ТАБЛИЦА НЕПРАВИЛЬНЫХ ГЛАГОЛОВ

Infinitive	**Past simple**	**Past participle**	**Перевод**
arise	arose	arisen	подняться
awake	awoke	awaked; awoke	будить; проснуться
be	was; were	been	быть
bear	bore	born; borne	родить
beat	beat	beaten	бить
become	became	become	становиться
befall	befell	befallen	случиться
beget	begot; begat	begotten	порождать
begin	began	begun	начинать
bend	bent	bent; bended	наклоняться (в стороны)
bind	bound	bound	связать
bite	bit	bit; bitten	кусать
bleed	bled	bled	кровоточить
bless	blessed	blessed; blest	благословлять
blow	blew	blown; blowed	дуть
break	broke	broken	(с)ломать
breed	bred	bred	выращивать
bring	brought	brought	приносить
broadcast	broadcast	broadcast	распространять
build	built	built	строить
burn	burnt; burned	burnt; burned	жечь; гореть
burst	burst	burst	взорваться

buy	bought	bought	покупать
can	could	could	мочь, уметь
cast	cast	cast	кинуть, лить металл
catch	caught	caught	ловить, хватать, успеть
choose	chose	chosen	выбирать
cleave	clove; cleft; cleaved	cloven; cleft; cleaved	рассечь
cling	clung	clung	цепляться; льнуть
come	came	come	приходить
cost	cost	cost	стоить
cut	cut	cut	резать
dare	durst; dared	dared	сметь
deal	dealt	dealt	иметь дело
dig	dug	dug	копать
dive	dived; dove	dived	нырять; погружаться
do	did	done	делать
draw	drew	drawn	рисовать, тащить
dream	dreamt; dreamed	dreamt; dreamed	грезить; мечтать
drink	drank	drunk	пить
drive	drove	driven	водить (машину etc.)
eat	ate	eaten	кушать; есть
fall	fell	fallen	падать
feed	fed	fed	кормить
feel	felt	felt	чувствовать
fight	fought	fought	сражаться; бороться
find	found	found	находить
fit	fit	fit	подходить по размеру
fly	flew	flown	летать
forbear	forbore	forborne	воздерживаться
forbid	forbad; forbade	forbidden	запрещать
forecast	forecast; forecasted	forecast; forecasted	предсказывать
foresee	foresaw	foreseen	предвидеть
forget	forgot	forgotten	забывать
forgive	forgave	forgiven	прощать
freeze	froze	frozen	замерзать
gainsay	gainsaid	gainsaid	отрицать; противоречить

get	got	got	получать
give	gave	given	давать
go	went	gone	идти
grave	graved	graved; graven	гравировать
grind	ground	ground	точить; молоть
grow	grew	grown	расти
hang	hung; hanged	hung; hanged	вешать
have	had	had	иметь
hear	heard	heard	слушать
hew	hewed	hewed; hewn	рубить; тесать
hide	hid	hidden	прятать(ся)
hit	hit	hit	ударять; попадать в цель
hold	held	held	держать
hurt	hurt	hurt	причинить боль
input	input; inputted	input; inputted	входить
inset	inset	inset	вставлять; вкладывать
keep	kept	kept	хранить; содержать
know	knew	known	знать
lade	laded	laded; laden	грузить
lay	laid	laid	класть; положить
lead	led	led	вести
lean	leant; leaned	leant; leaned	опираться; прислоняться
learn	learnt; learned	learnt; learned	учить
eave	left	left	оставить
lend	lent	lent	одалживать
let	let	let	позволять
lie	lay	lain	лежать
light	lit; lighted	lit; lighted	освещать
lose	lost	lost	терять
make	made	made	делать; производить
may	might	might	мочь; иметь возможность
mean	meant	meant	подразумевать
meet	met	met	встретить
pay	paid	paid	платить
put	put	put	класть
quit	quit; quitted	quit; quitted	покидать; оставлять; выходить

read	read; red	read; red	читать
rebind	rebound	rebound	перевязывать
ring	rang	rung	звонить
rise	rose	risen	подняться
rive	rived	riven	расщеплять
run	ran	run	бежать; течь
saw	sawed	sawn; sawed	пилить
say	said	said	говорить; сказать
see	saw	seen	видеть
seek	sought	sought	искать
sell	sold	sold	продавать
send	sent	sent	посылать
set	set	set	ставить; устанавливать
sew	sewed	sewed; sewn	шить
shake	shook	shaken	трясти
shave	shaved	shaved; shaven	брить(ся)
show	showed	shown; showed	показывать
shred	shred; shredded	shred; shredded	кромсать; расползаться
shrink	shrank; shrunk	shrunk	сокращаться; сжиматься; отпрянуть
shut	shut	shut	закрывать
sing	sang	sung	петь
sink	sank	sunk	опускаться; погружаться; тонуть
sit	sat	sat	сидеть
slay	slew	slain	убивать
sleep	slept	slept	спать
slide	slid	slid	скользить
smell	smelt; smelled	smelt; smelled	пахнуть; нюхать
speak	spoke	spoken	говорить
speed	sped; speeded	sped; speeded	ускорять; спешить
spell	spelt; spelled	spell; spelled	писать или читать по буквам
spend	spent	spent	тратить
spill	spilt; spilled	spilt; spilled	проливать
split	split	split	расщепить(ся)
spoil	spoilt; spoiled	spoilt; spoiled	портить
spread	spread	spread	распространитьс я

spring	sprang	sprung	вскочить; возникнуть
stand	stood	stood	стоять
stave	staved; stove	staved; stove	проламывать; разби(ва)ть
steal	stole	stolen	красть
stick	stuck	stuck	уколоть; приклеить
strew	strewed	strewn; strewed	усеять; устлать
swell	swelled	swollen; swelled	разбухать
swim	swam	swum	плавать
swing	swung	swung	качаться
take	took	taken	взять; брать
teach	taught	taught	учить
tear	tore	torn	рвать
tell	told	told	рассказывать; сказать
think	thought	thought	думать
thrive	throve; trived	thriven; trived	процветать
throw	threw	thrown	бросить
thrust	thrust	thrust	толкнуть; сунуть
tread	trod	trod; trodden	ступать
wake	woke; waked	woken; waked	просыпаться; будить
waylay	waylaid	waylaid	подстерегать
wear	wore	worn	носить (одежду)
wind	wound	wound	заводить (механизм)
write	wrote	written	писать

GLOSSARY

balance sheet

A financial statement listing the value of assets, equity and liabilities of a company at a particular date.

baseload

The minimum amount of electricity delivered and required over a specific period.

capacity

The maximum amount of electricity that can be generated from a power station or set of power stations.

collusion

Secret and improper talks between two or more companies, usually to fix prices.

commodity

Any product such as gas or electricity which can be bought or sold.

condenser

An apparatus which turns steam into water.

connection

Equipment which links a building with the local electricity or gas network.

cooling tower

A large circular structure at a power plant through which water is circulated to reduce its temperature.

core business

The main field of activities or operations of a company.

current assets

Things of value to a company which it uses in its normal day-to-day operations such as cash and materials.

decentralized energy system

Equipment which produces power for a nearby house, building or small community without the need for long-distance transportation of electricity.

denox plant

An apparatus at a power station which breaks down nitrogen oxides.

desulphurization plant

An apparatus at a power plant which removes sulphur oxides.

disinvestment

The withdrawal or reduction of capital investment.

distribution

The local transportation of electricity or gas from the main network to the final user.

district heating

A system for distributing heat, produced in a centralized plant, to homes and offices.

due diligence

A careful investigation of the financial and business situation of a company which may be taken over.

efficiency

A ratio between the output of a power station and the energy input, usually expressed as a percentage.

emissions trading

A system of buying and selling credits or allowances regarding CO2 quotas in order to reduce the overall amount of pollution.

energy mix

The combination and proportions of primary fuels and sources used for electricity production.

expropriation

The taking of property from a private owner by the state or government, usually through compulsory purchase.

fixed asset

An object such as a building or power plant owned and utilized by a company for long-term use;

it is not expected to be turned into cash.

flue gas

Exhaust gases such as sulphur oxides, nitrogen oxides and carbon dioxide which are produced in the combustion process at a power plant.

force majeure

An unavoidable event over which the parties who have signed a contract have no influence, e.g. bad weather conditions or a strike.

fossil fuel

Hydrocarbons such as gas, oil or coal used for producing electricity.

fuel cell

An apparatus which produces electrical current from a reaction between hydrogen and oxygen.

generation

The production of electrical power.

global warming

An increase in the average temperatures of the earth's atmosphere.

greenhouse gas

A gas such as CO2 which causes the warming of the earth's atmosphere through its absorption of solar radiation.

grid

A network of pipelines, cables or overhead lines.

hydrogen economy

A concept for the future in which fossil fuels are replaced by hydrogen gas for energy production and industrial activities.

industrial customer

A company that buys and uses electricity or gas for manufacturing.

interim storage

A facility for holding (nuclear) waste for a limited period before it is moved to a final location.

intermediate/medium load

The amount of electricity delivered and required over a specific period between base and peak loads.

key account manager

A member of sales staff who looks after a specific group of customers.

legislation

Laws, or the act of making them.

lobbyist

A person who acts for an organization and tries to influence politicians or other national decision makers.

municipal utility

A company owned by a city or town which transmits, distributes and delivers electricity and/or gas.

nationalization

The act of bringing a company under state ownership and control.

nuclear fission

A reaction in which nuclei of atoms split to release massive amounts of energy; uranium is the fuel used in this process.

nuclear fusion

A reaction in which nuclei of atoms fuse together to release massive amounts of energy.

peak load

The maximum amount of electricity delivered and required over a specific period.

power plant/station

A complex of buildings, machinery and equipment used for generating electricity.

profit and loss account

A financial statement of a company which shows its expenditures and income over

a period; these are balanced to show a

final profit or loss.

provisions

The money a company sets aside for future risk or use such as company pensions or the decommissioning of power plants.

pylon

A tall metal structure which carries an overhead line.

red tape

Another term for bureaucracy.

regulator

Organization or person who monitors and, if necessary, sanctions energy companies.

renewables

Primary energy sources such as wind, sun and water.

reprocessing plant

A facility in which nuclear waste is treated and processed.

residential/retail customer

A consumer who procures gas or electricity for home use.

retail price

The amount of money charged to the final user by energy companies for gas or electricity.

return on investment

The income that can be expected from an 1nvestment, usually expressed as a percentage.

spent fuel

Uranium that has been used up.

stack

A tall chimney at a power plant.

subsidiary

A company which belongs to a parent or holding company.

subsidy

Financial support for companies in an industry given by the government or state.

supply

The provision of gas or electricity to the final customer.

synergy

Combined advantages arising from the interaction of the companies involved in a merger or takeover.

transformer

Equipment which changes voltage levels of electricity.

transmission

The transport of electricity over long distances at high voltage.

transmission tower

A tall metal structure which carries overhead lines.

turbine

Equipment with a rotor which is driven by a jet of steam.

utility

A company which transmits, distributes and delivers electricity and/or gas.

waste disposal

The transporting, processing and recycling of unwanted substances.

watchdog

An organization working in the interests of customers which monitors the activities of energy companies, particularly regarding price.

wholesale price

The amount of money charged to companies which buy large volumes of gas or electricity; these companies then sell these commodities to the final customer.

USEFUL PHRASES AND VOCABULARY

EXPRESSING OPINIONS AND (DIS)AGREEMENT

Giving your opinion

I think/feel (that) ...
ln my opinion ...
In my view …

Clarifying

So you're saying ...
You mean ...
What do you mean by …?

Agreeing

Quite right.
That's true.
I quite agree.

Disagreeing
Actually, I think ...
To be honest ...

I don't quite agree.

DISCUSSING IN A MEETING

Proposing

Couldn't we just ...?
What if we ...?
Why don't we ...?

Asking for agreement/disagreement

Do we all agree on that?
Does anybody object to this?
Who's in favour of this proposal?

Showing concern

I have some reservations/concerns about ...
Actually, I don't think that's a good idea.

Emphasizing

I'd again like to point out that ...
I know I keep going on about this, but ...

CHAIRING A MEETING

Opening the meeting

Can we now agree on the overall procedure?
First of all, I think we should establish 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.

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.
This graph shows ...
You can see here that ...

Comparing factors

First of all ...
Firstly ..., secondly ..., thirdly ...
On the one hand ... , on the other hand ...

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.

Flnishing

That completes my overview (of ...).
So, to summarize/sum up ...
Thank you for your attention.

DESCRIBING TRENDS

It grew/ rose /increased /picked up/recovered / peaked.
It fell/ declined/hit a low.
It fluctuated/was volatile.
It remained stable.
This happened/ occurred because ...
We expected this change, but...
Although there was a fall/rise ...

This was due to ...
This was because of ...

DESCRIBING A PROCESS

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

TELEPHONING FOR INFORMATION

Introductions

Hello … This is … speaking.
Hi …, it's … here.

Asking for information

I need some information about …
I'd like to have some (more) information about ...
Can/Could you give me more information about ...?
Can/Could you please tell me (about) ...?
Who/What/When/Where/Why/How …?
What about ...?

Asking for repetition

Sorry, I didn't quite catch that.
Would you mind repeating that?

Positive response

Sure.
No problem.
I'd be happy to.

Negative response

I'm afraid I can't help you there.
I'm afraid not.

REPLYING TO INVITATIONS

Accepting

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 ...

DEALING WITH COMPLANTES

Reassuring

We are taking this matter very seriously.
I can/would also like to assure you that ...
We are making every effort to ...
We are doing our utmost/all we can to …

Not accepting responsibility

I fully understand your concern but ...
I would like to stress that ...
These are circumstances beyond our control.
Nevertheless, ...
That's quite impossible.

USEFUL VERBS

to commission (ввести в эксплуатацию) This power plant **was commissioned** last year.
to comply with (соответствовать, подчиняться) Energy companies have to **comply with** all rules
to condense (конденсировать(ся)) Steam **condences** into water at the power station.
to convert DC **is converted** into AC if necessary.
to decommission (списать, перевести в резерв) Some plants **were decommissioned** as they were not economic.
to deplete (истощать, исчерпывать) Coal stocks **have been depleted** due to a rise in consumption
to disinvest (сокращать инвестирование) Unwanted activities **will be disinvested.**
to dismantle (демонтировать) **A** nuclear plant has to **be dismantled** at the end of its life.
to dispose of (распоряжаться имуществом) Some companies **dispose** of waste by burning it.

to distribute (распределять) Gas **is distributed** throughout Europe from fields in the North Sea.
to emit (выделять, излучать) Many harmful gases **are emitted** from power stations.
to exceed (превышать) Emissions must not **exceed** certain levels.
to fluctuate (колебатся, меняться) Wholesale price **have been fluctuating** over the past year.
to generate (генерировать) Electricity **is generated** at our power stations.
to lay off (увольнять) Many employees **were laid off** after the takeover.
to merge (объединяться) Two utilities **have merged** to form a new company.
to monitor (контролировать) Our image in the media **is being monitored** by management.
to operate (управлять) The TSO **operates** the transmission grid.
to phase out (постепенно сокращать) Some countries wish to **phase out** nuclear power.
to pollute (загрязнять) Generators that **pollute** too much must buy credits or allowances
to procure (добывать) Our company **procures** large quantities of gas.
to regulate (регулировать) Some countries **regulate** the energy market through price controls.
to reprocess (подвергать переработке) Nuclear waste **is reprocessed** before final storage.
to retrofit (модифицировать) Our older plants **have been retrofitted** to bring them up to standard.
to subsidize (субсидировать) The coal industry **is subsidized** through state support.
to supply (поставлять) We **supply** gas to a number of different companies.
to switch (переключаться, менять) Many residential customers **switched** suppliers because of high prices.
to transmit (передавать) Electricity **is transmitted** through the grid.

ABBREVIATIONS, ACRONYMS, AND NUMBERS

Abbreviations and acronyms

ACER Agency for the Co-ordination of Energy Regulators
AEP Association of Energy Producers
AC alternating current
CCGT combined cycle gas turbine

CCPP	combined cycle power plant
CCT	clean coal technology
CEO	chief executive officer
CFO	chief financial officer
CHP	combined heat and power
CO	carbon monoxide
CO2	carbon dioxide
DC	direct current
Dept	department
DSO	distribution systems operator
EASEE	European Association for the Streamlining of Energy Exchange
EC	European Commission
EEX	European Energy Exchange
EU	European Union
GHG	greenhouse gas
GPA	Gas Producers Association
H	hydrogen
IAEA	lnternational Atomic Energy Authority
IAHE	lnternational Association for Hydrogen Energy
IEA	lnternatioпal Energy Agency
IGCC	integrated gasification combined cycle
Inc	incorporated
IPP	independent power producer
ISO	international Standards Organization
ITER	lnternational Thermonuclear Experimental Reactor
LNG	liquefied natural gas
Ltd	limited
Misc	miscellaneous
NOx	nitrogen oxides
NGO	non-governmental organization
O2	oxygen
OECD	Organization for Economic Cooperatioп and Development
PLC	public limited company
p.a.	per annum
PV	photovoltaic
Q	quarterly
RAP	remote area power supply
REEF	Renewable Energy Equity Fund
SO2	sulphur dioxide
TSO	transmission systems operator
WTO	World Trade Organization
A	amperes
bbl	barrel
bn	Billion(1 000 000 000)

°C	degrees Celsius (centigrade)
GW	gigawatt
Ha	hectare
Hz	hertz
J	joule
kW	kilowatt
kWh	kilowatt-hour
l	litre
m	million(1 000 000)
m	metre
m^3	cublc metres
m^2	square metres
MW	megawatt
T	ton
TCE	tons of coal equivalent
TW	terawatt
V	volt, voltage
W	watt
Ω	ohm

Numbers

356	three hundred (and) fifty-six
1,356	one thousand three hundred (and) fifty-six
1,256,349	one million two hundred (and) fifty-six thousand three hundred (and) forty-nine
1,356	one **point** three five six
1,035	one **point zero/nought** three five

mega	1 000 000	10^6	ten to the power of six
giga	1 000 000 000	10^9	ten to the power of nine
tera	1 000 000 000 000	10^{12}	ten to the power of twelve

Money

€1,356,59	one thousand three hundred (and) fifty-six euros fifty-nine
$10m	ten million dollars
Y10 bn	ten Billion yen

Years

2000	two thousand
2009	two thousand and nine
2010	twenty ten
2015	twenty fifteen
2020	twenty twenty

2.ПРАКТИЧЕСКАЯ ЧАСТЬ

UNIT 1. THE POWER

INTRODUCTION TO THE POWER BUSINES

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

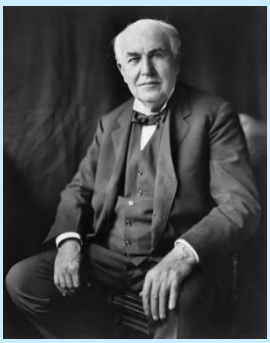
8. Complete this text from ELEC's website with the correct form of the verb.

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		

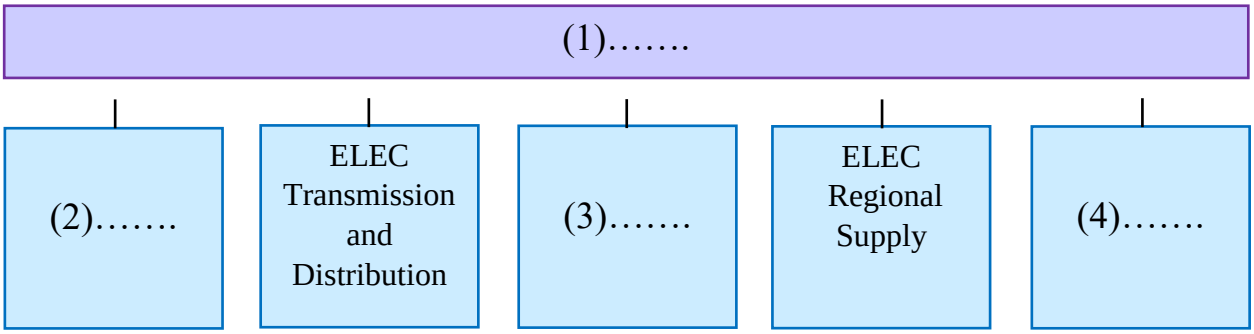
Is the regulator the answer?

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.



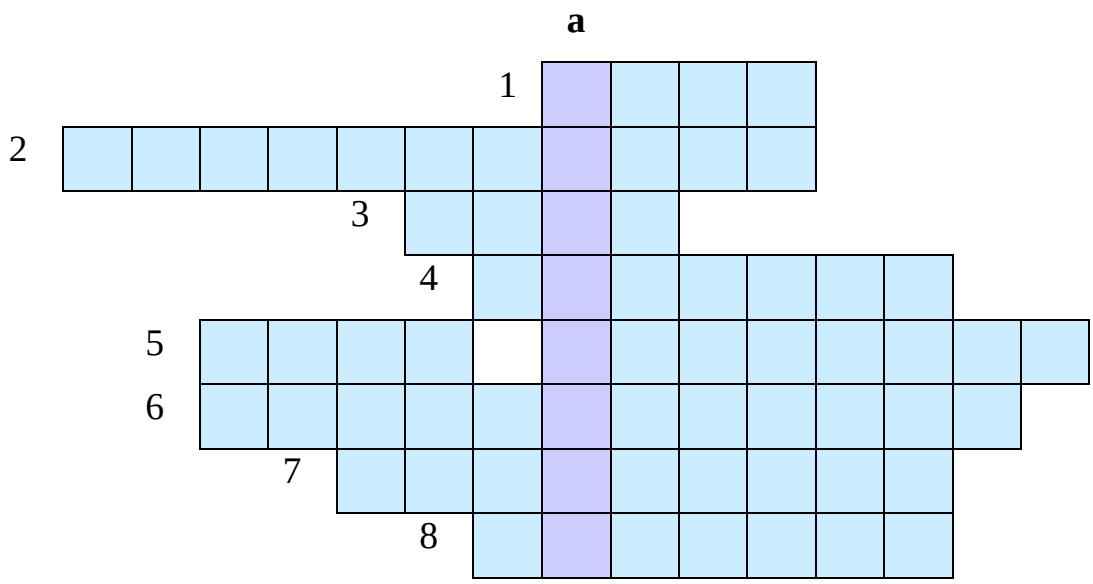
1. It has networks in many European countries.
2. It is a buying operation, procuring energy for the European supply company.
3. It procures gas from partners in Russia.
4. It is a company in its own right.
5. It runs opencast mines producing lignite and coal.
6. This division has a lot of subsidiaries 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?

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

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?

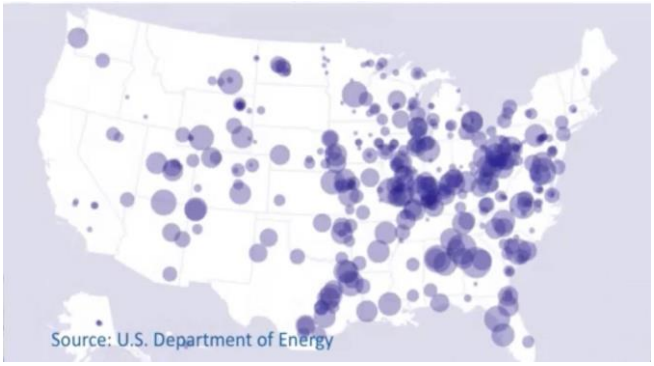
Amy Miller, an environmental expert at PNM, offered some great perspectives about the role of coal: «I think what the challenge is, is we all want to move toward cleaner resources. I haven't met anyone on any side of an energy issue that doesn't agree we should be moving toward cleaner more sustainable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



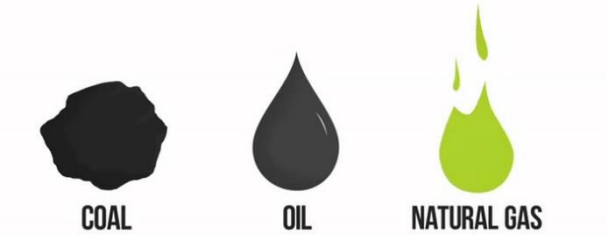
If you've looked at this map, you can see that new gas-fired electricity plants are being located right by those shale areas. So what's the catch? The fact that I used the word fracture and said 90 degrees probably clued you in to why natural gas is not without controversy either. The processes I described 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. ENERGY AS A FIELD OF ACTIVITY

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 [4].

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	**a.** this plant produces electricity from the steam that is released during the combustion of organic waste, whether wood, animal waste
2. geothermal power plant	**b.** type of power plant that uses uranium as its primary fuel
3. nuclear power plant	**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
4. biopower plant	**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, these, 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 CUSTOMER

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?

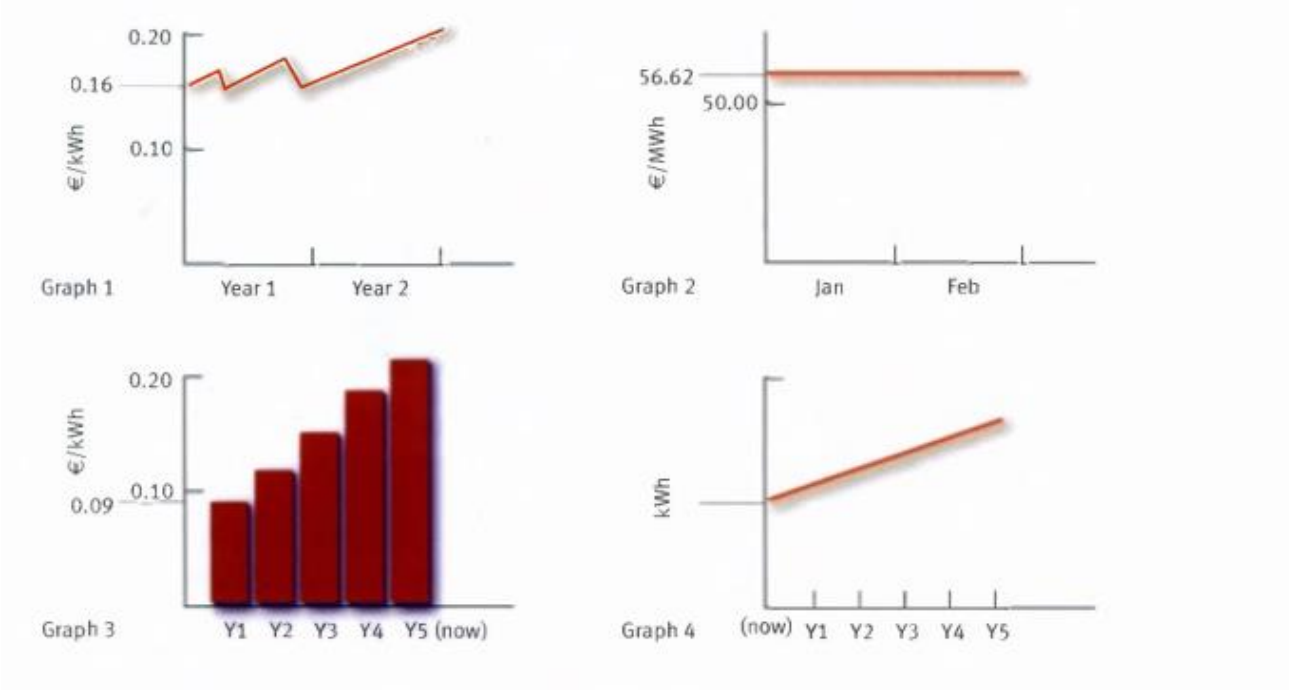
2. Paul Robben from AECP – the Associate of European Chemical Producers – is talking to Anna Smith from the energy company ELEC. You are sitting in on the meeting. Listen and say whether the following statements are true or false.

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.

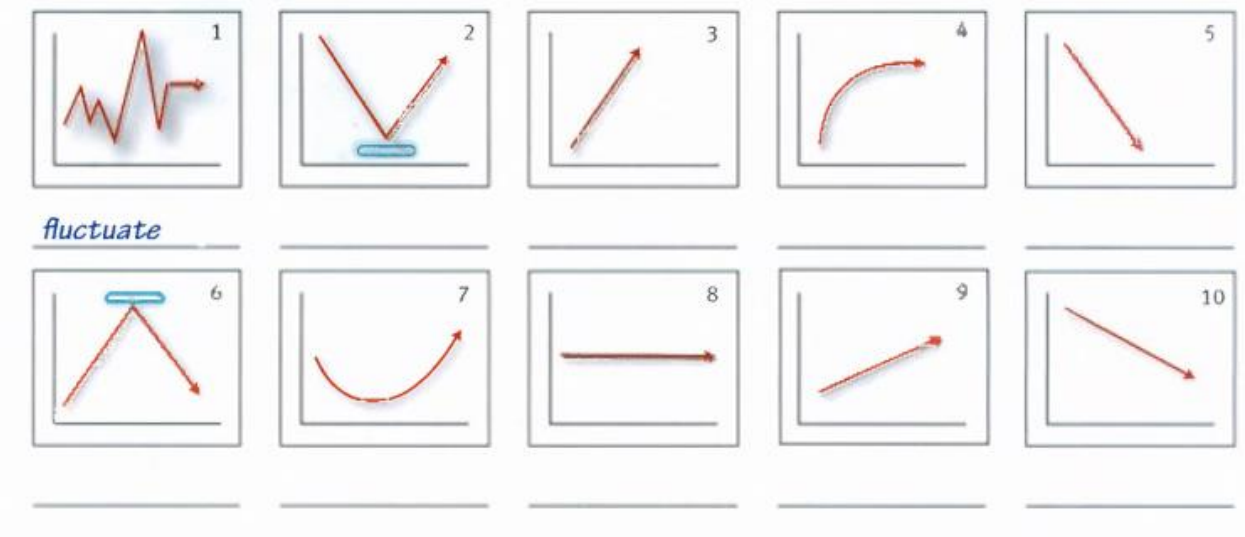


4. Match the statements that have the same meaning. Then decide which graph each pair refers to.

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 EFFICIENY 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 [5].

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].

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 s**houldn'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
It is not necessary to educate people on the issue of protecting the environment..	○	○	○
Cooking with gas is more environmentally friendly than cooking with electricity.	○	○	○
Consumers should be obliged to buy only energy-saving electrical equipment.	○	○	○
Fossil fuel power plants should be totally replaced by ones using renewable sources.	○	○	○
A speed limit of 90 km/h should be established throughout the European Union to conserve oil stocks.	○	○	○
People should be encouraged to use public transport and not use their car.	○	○	○
All houses and buildings should be checked each year for their energy efficiency.	○	○	○
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 a draw up 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	**Comparing factors**
Let me first introduce myself.	First of all …
I'm/My name is… .	Firstly … , secondly … , thirdly …
In this talk I want/would like to …	On the one hand … , on the other hand …
I'll begin by (+ *-ing form of verb*).	**Concluding**
I'm going to be covering …	That completes my overview(of …),
Let's start with (+ *noun*).	So, to summarize/sum up …
Introducing other factors or points	**Questions**
If I could now turn to …	Please don't hesitate to interrupt me if you have any questions.
Now, turning to…	
Let me move on to …	If you have any questions, I'll be pleased to answer them at the end.
Introducing graphs and diagrams	**Finishing**
I'd like you to look at this graph/diagram /(pie) chart/transparency/slide.	Thank you for your attention.

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

5.Global Warming-
All the Fault of Energy Companies

6.Green Tax for Step to Improve

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.)?

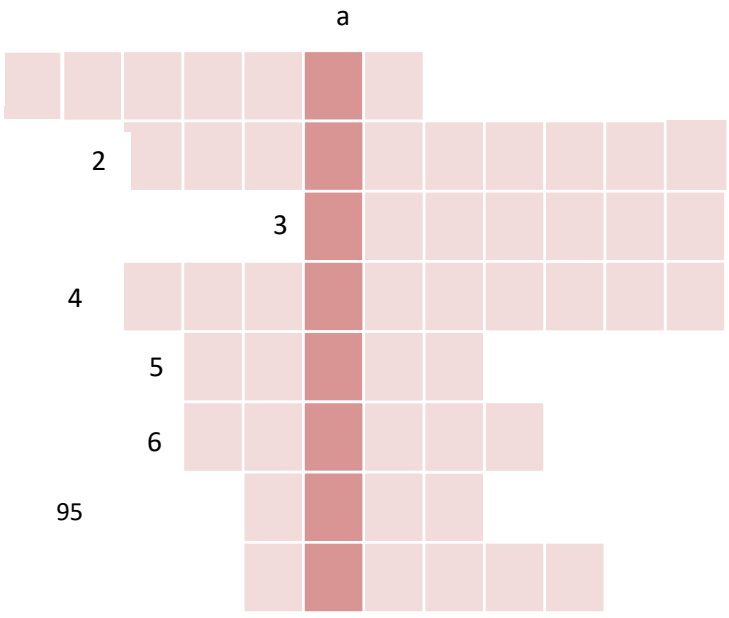
1. CO2
2. SO2
3. CHP

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. 7
5. A diagram with a horizontal and vertical axis.
6. The first element in CO2. 8
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 [7].

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

e) energy Audit	is engaged in conducting surveys of enterprises for the use of energy. 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

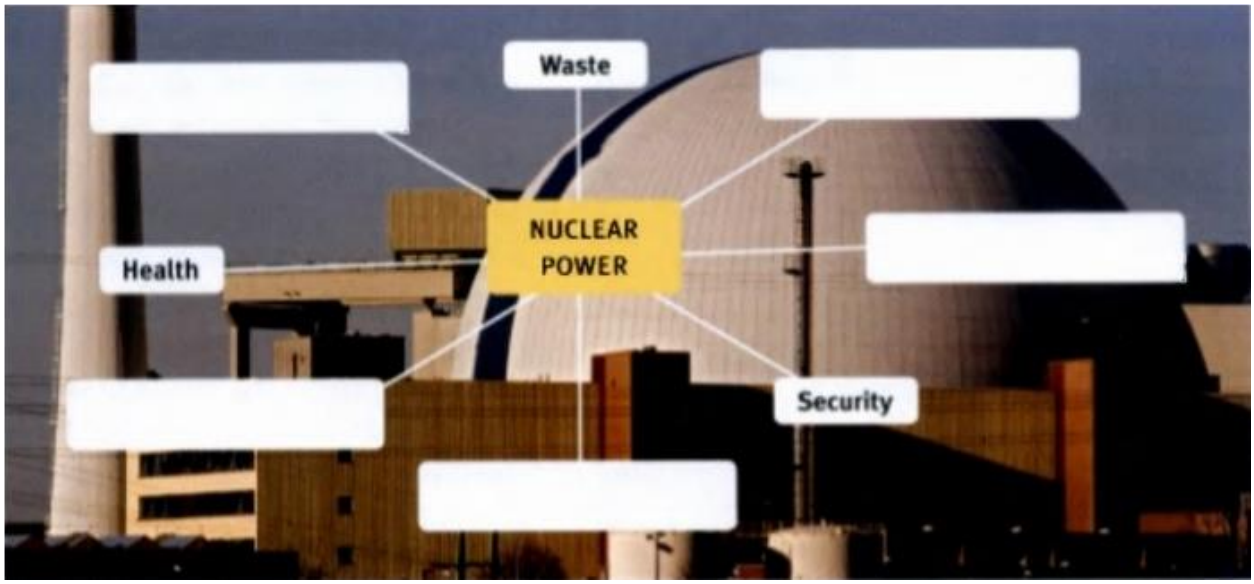
1. The expert analyzes the ____ , takes measurements and notes all the indicators useful for analyzing energy consumption.
2. After collecting the necessary data on the building and its uses, the expert in charge of the energy audit ____ them.
3. Following the analysis, the expert establishes a precise 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.

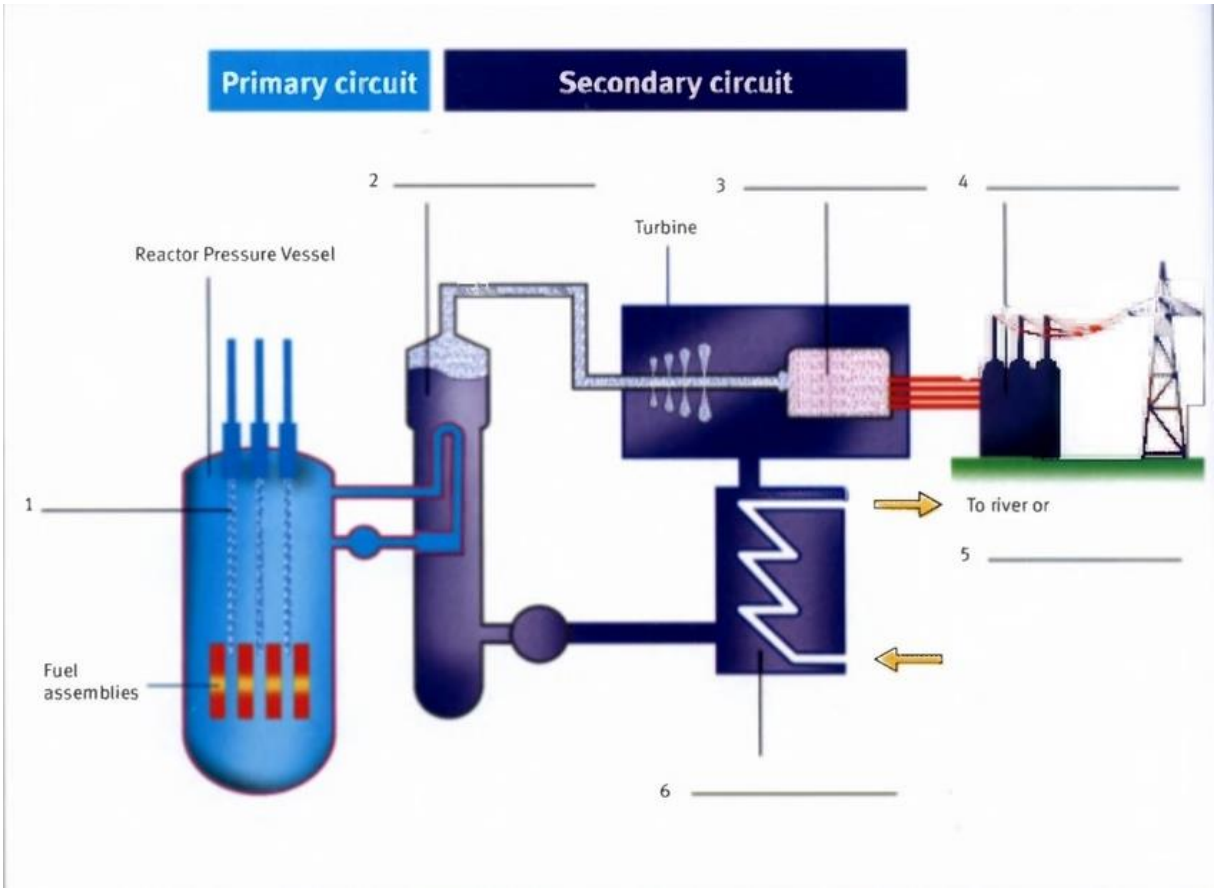
2. Uranium is the basis of nuclear energy. Work with a partner and put these sentences in the right order so that they describe the processes the uranium goes through.

□ **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.



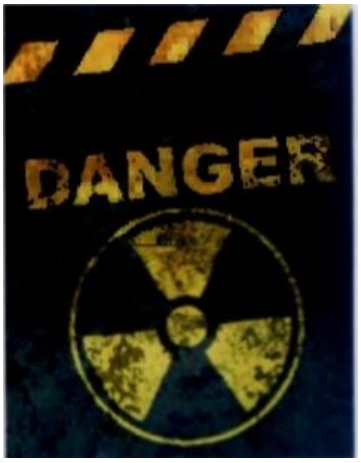
Listen again and take notes on the purpose and functions of these parts of the power station. You will need the notes for exercise 4.
1.The reactor pressure vessel
2.The primary circuit
3.The steam generator
4.The transformers

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.

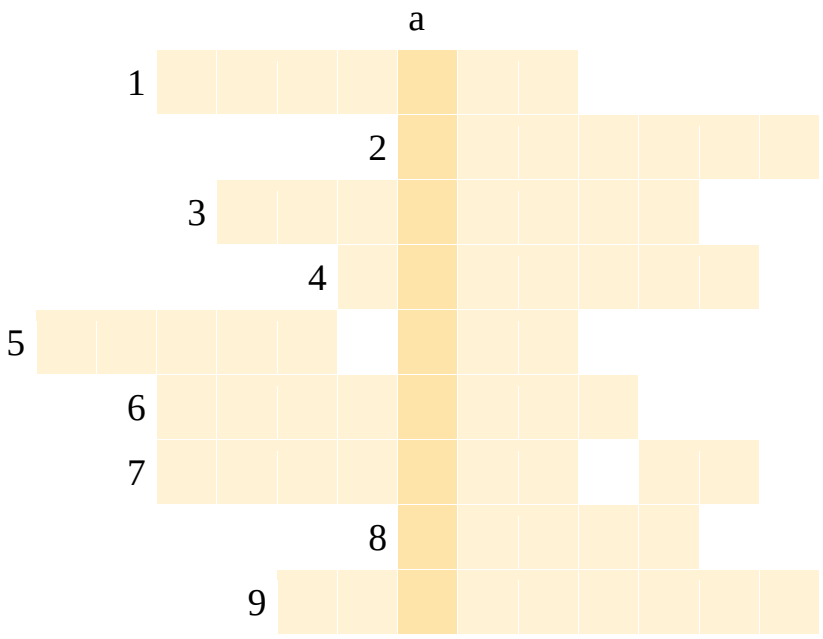
1. *Other jobs could be created if more money were invested in renewables*.
2. ……
3. ……
4. ……
5. ……
6. ……
7. ……
8. ……
9. ……
10. ……

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 a.

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?

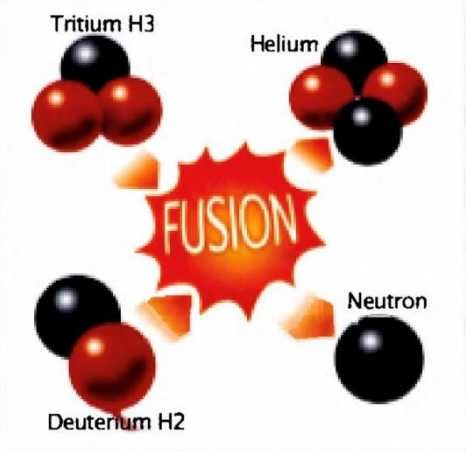
The International Atomic Energy Authority (IAEA) was established in 1957 and around 140 states are members of this organization.
Its main function is to promote safe, secure and peaceful use of nuclear technologies throughout the world.

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?

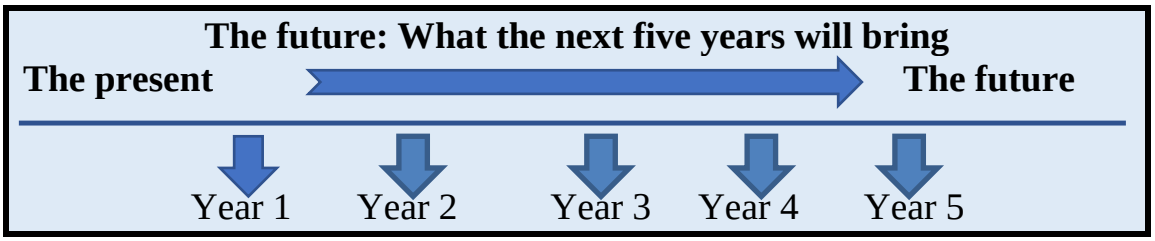
Give your reasons why or why not.

• 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
4) legal services	f) to establish benchmarks or yardsticks for an interdepartmental costing system
5) public relations (PR)	g) to harmonize pension schemes throughout the group
6) procurement	h) to identify inefficiencies in financial processes i) to implement new payroll processes j to make tests in fuel-cell technology
7) research and development (R&D)	k) to reduce the number of suppliers

8) sales and marketing	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.

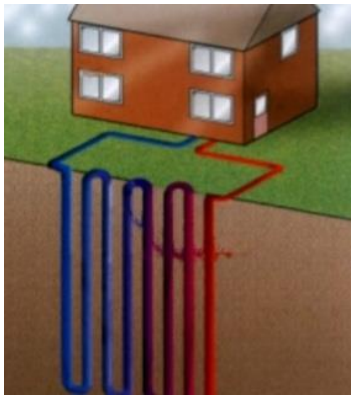
• attributable to • I am afraid • in addition •
• over and above this • to begin with •

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
……



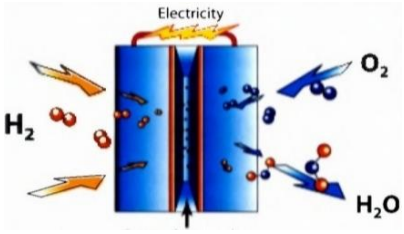
Do you agree with the points made? Give your reasons.

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 on page 49.

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 4 page 32.

- 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.

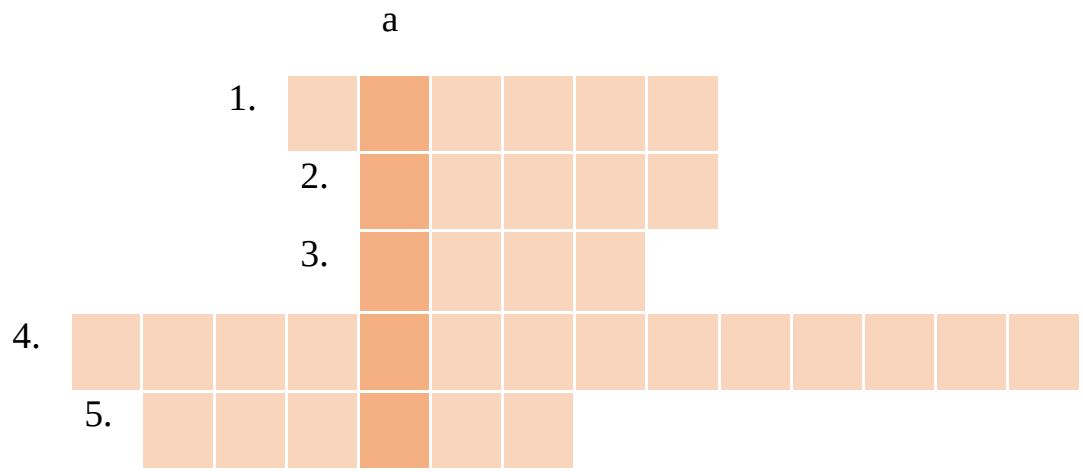
1. John indicates that the conference was interesting. _____
2. Steve agrees. _____

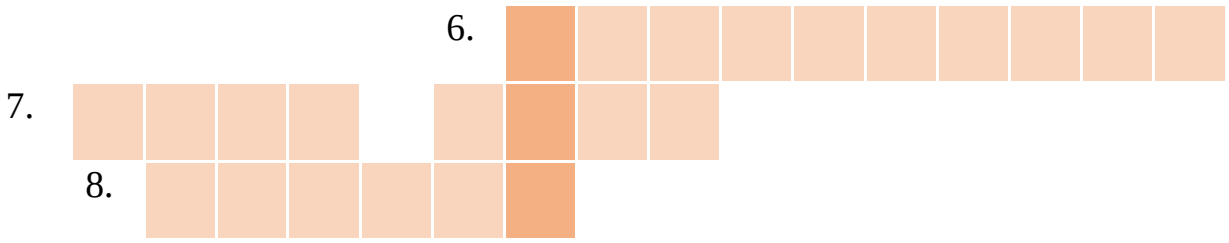
3. John suggests a drink at the bar. _____
4. Steve declines — he has to catch a plane. _____
5. John indicates disappointment; asks about Steve's arrival time at home. _____
6. Steve gives the time; indicates he must leave now. _____
7. John says goodbye; asks Steve to give regards to his colleague, 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.





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.

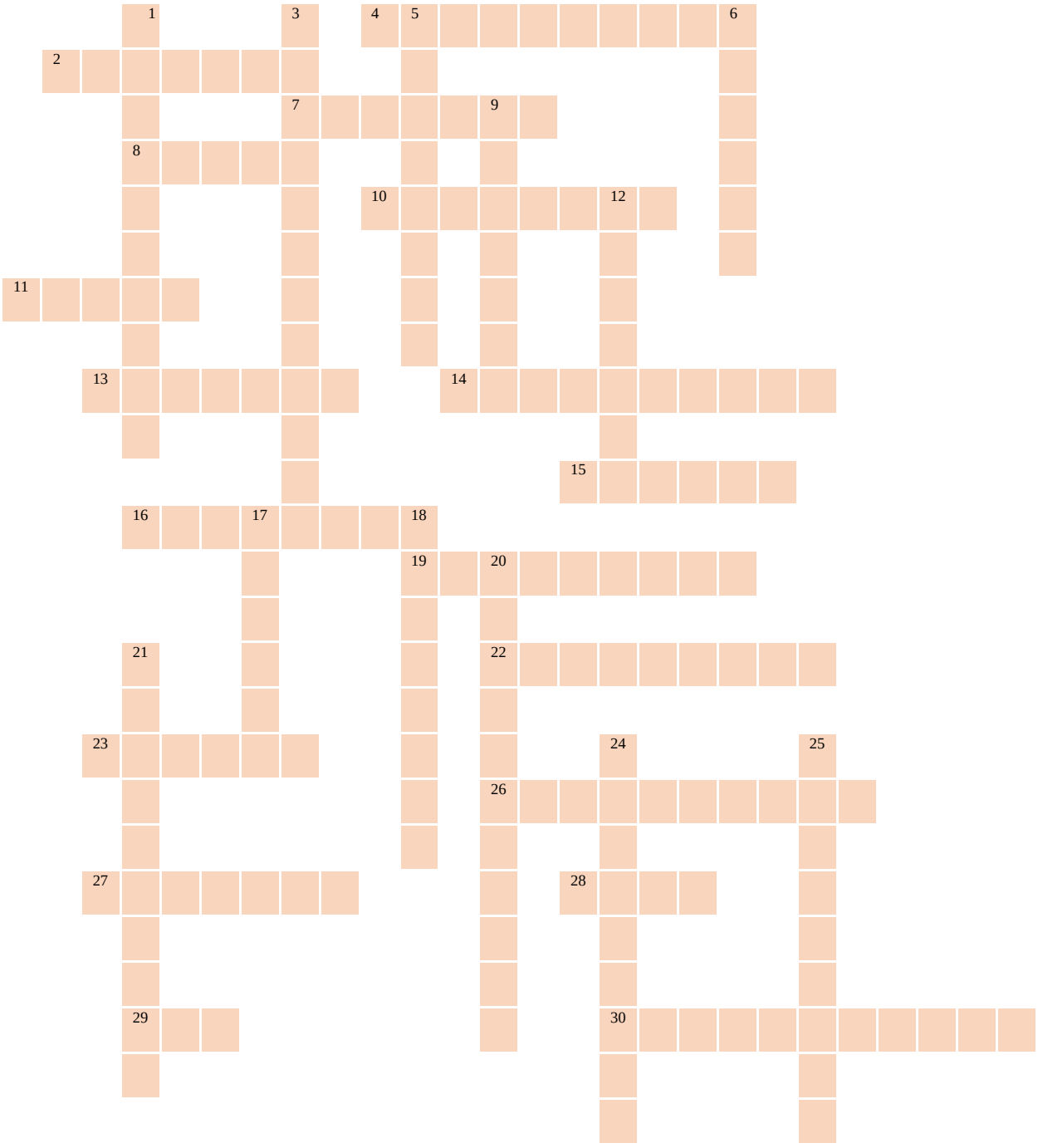
Across

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 , 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 . 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 focused 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.

3.КОНТРОЛЬ ЗНАНИЙ

Test 1

1. Relate the words to their meaning

1. flow 2. overhead lines 3. drawback 4. quantity 5. grid fees 6. to ensure 7. power plant 8. profitable 9. to claim 10. state-of-the-art	a) самое современное оборудование b) недостаток c) обеспечивать d) утверждать e) выгодный f) сетевые сборы g) воздушные линии h) количество i) поток j) электростанция

2. Read the following sentences and select the right words from the box.

• purpose • use • collect • electricity • essential • potential • power • advanced • distribute • strength

1. Power businesses are essential for providing _____ to homes and businesses.
2. Power companies operate large-scale _____ plants to generate electricity.
3. The _____ of power businesses is to provide reliable and affordable electricity.
4. To ensure constant power supply, power companies invest in _____ infrastructure.
5. Many small businesses have difficulty competing with the _____ of large, established companies.
6. Power plants _____ different energy sources to generate electricity.
7. Energy storage systems _____ energy from various sources and store it for later use.
8. A power company's job is to _____ electricity from power plants and deliver it to homes and businesses.
9. Safety and reliability are _____ aspects of power engineer's work.
10. Power engineers must be aware of _____ risks in their work environment.

3. Select the meanings of these words in which they are used in the text from exercise 2.

Scale

a) масштаб, размер, размах
b) шкала
c) чешуя

Plant

a) растение, растительность
b) завод, предприятие, фабрика
c) установка

Store

a) магазин
b) хранилище
c) запас

4. Are the statements true or false?

1. Solar energy is considered a renewable energy source.
2. The power system operates independently of power plants.
3. Hydropower generates electricity using the energy of ocean waves.
4. Nuclear energy leads to zero greenhouse gas emissions in the production of electricity.
5. Energy storage technologies such as batteries play a crucial role in balancing electricity supply and demand.
6. Wind power is an example of non-renewable energy.
7. The power grid is essential for the distribution of electricity.
8. Capacity refers to the speed at which electricity travels through wires.

5. Insert the required article.

The energy business is (1)____ branch of (2)____ economy related to (3)____ production, distribution, and sale of energy.

It includes companies engaged in (4)____ extraction, processing, and transportation of oil, gas, coal, as well as such renewable energy sources such as solar and wind energy.

The energy business is one of (5)____ most important sectors of (6)____ global economy. In (7)____ energy business, there are many different types of companies engaged in various different energy production and distribution. Some companies are engaged in (8)____ oil and gas production, while others produce electricity from different renewable energy sources. There are also companies that are engaged in both transportation and distribution of energy, as well as companies that are engaged in research and development in (9)____ field of energy. There are many factors in (10)____ energy business that affect its development and prosperity. One of these factors is climate change and (11)____ growing need for renewable energy sources. Other factors, such as changes in (12)____ oil and gas prices, can also have ____ significant impact on (13)____ energy business. In general, (14)____ energy business is (15)____ important branch of (16)____ global economy, which provides energy to many other industries. It is also (17) ____ industry that is constantly changing and evolving to meet (18)____ changing needs and demands of society.

6. Read the text and make up five questions.

Energy business

The power business is the heartbeat of modern civilization, supplying the energy essential for our daily lives. This introduction provides a concise overview of the key facets within this dynamic industry.

At its core, the power business revolves around generating, transmitting, and distributing electricity. Diverse methods, from traditional fossil fuel-based plants to cutting-edge renewables like solar and wind, contribute to the global energy mix. This diversity reflects the industry's ongoing evolution, driven in part by a growing emphasis on sustainability.

Renewable energy sources have become pivotal in the power landscape, responding to the urgent need for environmentally friendly solutions. Solar, wind, and hydroelectric power are increasingly prominent, catalyzing a shift towards a more sustainable energy future.

Beyond generation, the power business extends its influence to transmission and distribution networks. Smart grids and advanced technologies play crucial roles in ensuring the efficient and reliable delivery of electricity to end-users, fostering a responsive and interconnected energy ecosystem.

Market dynamics significantly shape the power business. Regulatory frameworks, geopolitical influences, and economic trends impact investment decisions and operational strategies. Deregulation in certain regions has introduced competition, fostering innovation and efficiency.

Embracing digitalization, the power industry leverages smart technologies, data analytics, and the Internet of Things. These advancements not only optimize current infrastructure but also pave the way for future energy systems that are intelligent, resilient, and adaptable.

As the power business grapples with challenges ranging from cybersecurity threats to the imperative of sustainable practices, its ability to navigate these complexities will determine the trajectory of our energy future. In essence, the power industry stands as a cornerstone of progress, continually adapting to meet the demands of a rapidly evolving world.

7. Match parts of the sentences to check your guesses.

1. The power business, encompassing energy production and distribution	a. reflecting a growing commitment to cleaner and more efficient energy sources.
2. Introduction to the power business involves understanding diverse energy sources	b. including governments, private enterprises, and consumers, each contributing to its complexity.
3. Renewable energy projects, such as solar and wind power, are gaining prominence	c. is a critical sector influencing global economic sustainability.
4. The global power market is characterized by diverse stakeholders	d. including fossil fuels, renewables, and emerging technologies.

5. Introduction to smart grids and digital technologies is transforming	e. traditional power systems, enhancing efficiency, and facilitating better demand management.

8. Write down questions. Use the Present Continuous.

1. What / you / do / to reduce / energy consumption?
2. Why / they / install / solar panels?
3. What / cause / wind turbines / spin so fast?
4. How much / electricity / this wind farm / generate?
5. You / consider / switching / to an electric car?
6. What / renewable energy sources / use / in your community?
7. Your city / invest / in renewable energy projects?
8. How /a more / you / contribute / to the / transition / sustainable / energy system / towards?

9. Put the words in the correct order.

1. much / business / the / Do /about / know / power / you?
2. enough /produces/ The power plant / a /to/ power / electricity /small town.
3. with / business / electricity / and /deals/ /the/ generation / sector /distribution /of / The power

10. Choose the correct answer.

1. The new solar panels are incredibly efficient, ….. ?
    a) are they
    b) aren't they
    c) isn't it
2. Renewable energy sources, such as wind and solar, will play a crucial role in our future, ... they?
    a) won't
    b) will
    c) aren't
3. We aim to reduce our carbon footprint by 20% ... 2025.
    a) at
    b) by
    c) in
4. If I ... an energy company, I would invest in advanced storage technologies.
    a) am
    b) were
    c) was
5. Are you familiar with the benefits ... geothermal energy?

a) on
b) of
c) for

6. The wind turbines haven't generated much power today. They must still ... maintenance.
a) need
b) be needing
c) needs

7. If governments ... more incentives for clean energy, the transition would be smoother.
a) was providing
b) shall provide
c) were to provide

8. I'll meet you ... the power plant ... 9:00 AM.
a) in, at
b) at, on
c) at, at

9. John ... interested in exploring alternative energy solutions.
a) doesn't
b) not is
c) isn't

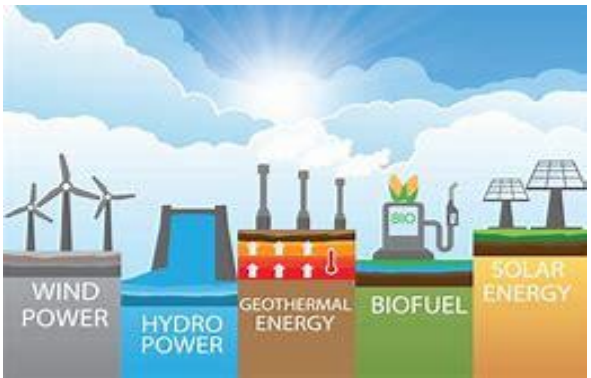
10. It's time for ... to invest in sustainable energy practices.
a) we
b) our
c) us

Test 2

1. Put the words from the box into the text.

from	of	on	such as	it	are	is

Renewable, or regenerative, "green" energy is energy from energy resources that are renewable or inexhaustible (1) ..… a human scale. The basic principle (2) ..… using renewable energy is to extract it (3) ..… processes constantly occurring in the environment or renewable organic resources and provide (4) ..… for technical use. Renewable energy (5) ..… obtained from natural resources (6) ..… sunlight, streams of water, wind, tides and geothermal heat, which (7) ..… renewable (replenished naturally), as well as from biofuels: wood, vegetable oil, ethanol.



2. Read the text and answer the questions.

Renewable energy is energy obtained from natural sources that are replenished faster than they are consumed. For example, sunlight and wind are

sources that are constantly replenished. Renewable energy sources are all around us. On the other hand, fossil fuels – coal, oil and gas – are non-renewable resources that take hundreds of millions of years to form. Fossil fuels, when burned for energy production, cause harmful emissions of greenhouse gases such as carbon dioxide. Renewable energy production generates much lower emissions than burning fossil fuels. The transition from fossil fuels, which currently account for the lion's share of emissions, to renewable energy sources is the key to solving the climate crisis. Renewable energy sources are now available.

1) What happens to fossil fuels when they burn?
2) How many years does it take to generate non-renewable resources?
3) Where does renewable energy come from?
4) What is the key to solving the climate crisis?

3. Is the statement true or false?

1) Renewable sources are sources that can be restored manually.
2) Coal and gas are renewable energy sources.
3) Humanity is trying to increase the use of solar, wind, and water energy.
4) The extraction of renewable energy resources pollutes the atmosphere very much.
5) Renewable energy sources may run out in the near future.

4. Translate these words from English:

1) mitigation
2) households
3) increasing
4) pollution
5) worldwide
6) supply
7) permit
8) consumption
9) large-scale
10) rural

5. Solve the riddle. What kind of energy is it?

1) The energy extracted from a star.
2) The energy produced by the forces of water.
3) Extraction of energy, at which the blades spin.
4) Extraction energy by burning trees.
5) Energy extraction, which uses animal power.

6. Put the words in the right order

1) Solar/using /produced /Solar/panels/energy/is
2) not/renewable/Gas/and/oil/energy/are/coal
3) never /energy/disappear/ Renewable/will/ sources.
4) energy/Humanity/renewable/sources/is/developing.
5) electricity/Hydro/a/plants/produce/a/lot/of/power/produce.

7. Read the text and make up five questions.

Solar energy is not a single energy technology, but a term that covers a diverse set of renewable energy technologies. Their common feature is that, unlike oil, gas, coal, and present forms of nuclear power, solar energy is inexhaustible. Solar energy can be divided into three main groups-heating and cooling applications, electricity generation, and fuels from biomass.

Heating and Cooling

The sun has been used for heating for centuries. The Mesa Verde cliff dwellings in Colorado were constructed with rock projections that provide shade from the high (and hot) summer sun but allow the rays of the lower winter sun to penetrate. Today a design with few or no moving parts that takes advantage of the sun is called passive solar heating. Beginning in the late 1970s, architects increasingly became familiar with passive solar techniques and, in the future, more and more new buildings will be designed to capture the sun's winter rays and keep out the summer rays.

Active solar heating and solar hot-water heating are variations on one theme, differing principally in cost and scale. A typical active solar-heating unit consists of tubes installed in panels that are mounted on a roof. Water (or sometimes another fluid) flowing through the tubes is heated by the sun and is then used as a source of hot water and heat for the building. Although the number of active solar-heating installations has grown rapidly since the 1970s, the industry has encountered simple installation and maintenance problems, involving such ordinary occurrences as water leakage and air blockage. Solar cooling requires a higher technology installation in which a fluid is cooled by being heated to an intermediate temperature so that it can be used to drive a refrigeration cycle. To date, relatively few commercial installations have been made.

8. Translate the sentences

1. Солнечная энергия является неисчерпаемым источником энергии.
2. Запасы газа, нефти, угля и современных форм атомной энергии не безграничны.
3. Солнечную энергию можно разделить на три основные группы.
4. Солнечное тепло использовалось для обогрева на протяжении многих веков.
5. Прибор с несколькими движущимися частями, который использует солнечные лучи, называется пассивным солнечным генератором.

6. Начиная с 1970-х годов, пассивное солнечное отопление стало широко известно проектировщикам домов.
7. Активный солнечный обогрев воды включает в себя трубки, вмонтированные на панелях и установленные на крышах домов.
8. Вода, которая проходит через трубки, обогревает дома и используется в качестве горячего водоснабжения.
9. С 1970-х годов число активных солнечных установок неуклонно росло.
10. Основной технической проблемой активных солнечных установок является утечка воды из труб.
11. На сегодняшний день число солнечных энергетических установок достаточно невелико.

9. Answer the questions

1. Is solar energy a single energy technology?
2. Is solar energy a term that covers a diverse set of renewable energy technologies?
3. What is the difference between solar energy and energy of oil, gas, coal, and present forms of nuclear power?
4. Is solar energy inexhaustible?
5. Has the sun been used for heating for centuries?
6. When did architects increasingly become familiar with passive solar techniques?
7. What does a typical active solar-heating unit consist of?
8. What are the main problems of solar heating and solar cooling systems?
9. Do you think that solar cooling requires a higher technology installation?
10. Is fluid heated to an intermediate temperature in solar cooling systems, and why?

10. Finish the sentence with appropriate words or phrases:

1. Solar energy is…
   a) a renewable energy b) a nuclear energy c) a steam power.
2. Solar energy is…
   a) very limited b) exhaustible c) inexhaustible.
3. Solar energy can be divided into…
   a) three main groups b) one main group c) five simple groups.
4. For centuries the sun has been used for…
   a) cooking b) heating c) mining.
5. Today a design with few moving parts that takes advantage of the sun is called…
   a) solar battery b) active solar heating c) passive solar heating.
6. A typical active solar-heating unit consists…
   a) of tubes b) of cubes c) of diodes.
7. Active solar-heating installations has grown a) after 1920s rapidly…
   b) since the 1970s c) before 1945
8. Solar-heating installations have problems, such as…

a) pollution b) water leakage c) air blockage.

Test 3

1. Choose the correct word or phrase to complete each sentence.

1. Burning fossil fuels releases carbon _____ into the atmosphere.
   a) oxide b) dioxide
   c) monoxide d) nitrogen
2. The _____ of natural gas is lower compared to coal.
   a) cost b) costs
   c) costing d) costed
3. Renewable energy sources, such as solar and wind power, are considered _____ alternatives to fossil fuels.
   a) eco-friendly b) environmentally
   c) ecological d) ecology

2. Match the synonyms.

1. to include	a) highly developed, complex
2. to increase	b) countryside, pastoral
3. to allow	c) enlarge, raise
4. to install	d) establish, set up, fix
5. natural	e) contain, consist of
6. rural	f) usual, normal, ordinary
7. advanced	g) let, permit

3. Make true sentences by matching the halves.

1. Over millions of years, the remains of these animals and plants were	a) removed from the ground, it is sent to a refinery by pipeline, ship, or barge.
2. Above the hole a derrick is	b) used to produce energy, to move merchandise and people, help make plastics, and do many other things.
3. Crude oil is also	c) built to house the tools and pipes going into the well.
4. After crude oil is	d) classified by the weight of its molecules.

5. At a refinery, different parts of the crude oil are	e) covered by layers of sand and silt.
6. Most petroleum products are	f) separated into useable petroleum products.

4. Combine the words from the column on the left with the suitable nouns from the column on the right.

1. transform	a) the various machines
2. run	b) pollution
3. cause	c) energy resources
4. reduce	d) energy
5. consume	e) more environmental damage

5. Complete each sentence with the correct form of the word in parentheses. Write your answer in the space provided.

1. Fossil fuels are (deplete) _____ resources that cannot be easily replaced.
2. Natural gas (produce) _____ fewer greenhouse gas emissions compared to coal.
3. The coal industry (provide) _____ job opportunities in many regions.
4. The process of extracting oil from the ground is called (drill) _____.

6. Read the following passage about fossil fuels and complete it with the correct form of the verbs in brackets.

Fossil fuels form from long-dead plant and animal remains that (1)…… (live) millions of years ago. If you leave anything around that long, it (2)…… (decay). 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. These fossil fuels (3)……. (be) the primary sources of energy for electricity generation for many years.

Coal (4)…… (be) the dominant fuel for electricity generation in the past. It (5)……. (be) plentiful, affordable, and easy to transport, making it a highly reliable fuel source. However, in recent years, natural gas (6)……. (become) increasingly competitive with coal. It (7)…….(burn) more cleanly and (8) ……(produce) fewer emissions compared to coal.

7. Complete each sentence with the appropriate word or phrase related to fossil fuels.

1. Fossil fuels are formed from the remains of (ancient plants / modern technology).
2. The burning of fossil fuels contributes to (air pollution / water conservation).
3. Renewable energy sources are a sustainable alternative to (natural gas / non-renewable resources).

8. Form the nouns from the following adjectives and verbs.

1. natural
2. efficient
3. independent
4. reliable
5. classified
6. to transform
7. to pollute
8. to convert
9. to differ
10. to produce

9. Use the phrases from ex. 4 to complete these sentences.

1. Cars, planes, trolleys, boats, and machinery also ___ into work.
2. There are many sources of energy that help to___ invented by man.
3. In the past century, it became evident that the consumption of non-renewable sources of energy had___ than any other human activity.
4. Their use significantly___ chemical, radioactive, and thermal___
5. The main problem isn't that we use energy, but how we produce and___

Test 4.

1. Translate the words and find them in the box.

1. Проблема
2. Потребитель
3. Счетчик
4. Ответственность
5. Последствие
6. Горячая линия
7. Страхование
8. Поставка

s	y	p	p	l	y	o	c	w	i	c	b
i	g	s	a	i	d	v	o	a	n	k	e
a	r	p	f	a	i	z	n	k	s	h	g
s	h	e	x	b	z	f	s	r	u	e	y
u	q	t	c	i	s	s	u	e	r	l	b
x	r	e	n	l	p	u	m	w	a	p	m
h	q	e	f	i	z	b	e	a	n	l	s
s	k	m	e	t	e	r	r	t	c	i	f
e	d	c	k	y	a	u	h	t	e	n	w
c	o	n	s	e	q	u	e	n	c	e	s

2. Supply the correct preposition: of ,with, for, to, in, of, on, by.

The energy market is a dynamic and complex environment, with a wide range (1) ..... clients and stakeholders. From large industrial consumers to residential households, the energy market serves a diverse set of clients (2) ..... varying needs and demands.

Industrial clients often require large volumes of energy to power their operations, and they may have specific requirements (3) ..... reliability, price stability, and environmental sustainability. These clients often have sophisticated energy management strategies in place, and they may engage in long-term contracts with energy suppliers (4) ..... secure their energy needs.

Commercial clients, such as office buildings, retail stores, and restaurants, also have unique energy needs. They may prioritize cost savings, energy efficiency, and sustainability in their energy procurement decisions. Many commercial clients are also interested (5) ..... implementing renewable energy sources and energy management technologies (6) ..... reduce their carbon footprint and lower their operating costs.

Residential clients are another important segment (7) ..... the energy market. They rely (8) ..... energy for heating, cooling, lighting, and powering their appliances. Residential clients may have different preferences and priorities when it comes (9) ..... their energy supply, including cost, convenience, and environmental impact. Many residential clients are also interested (10) ..... adopting renewable energy solutions, such as rooftop solar panels or community solar programs.

In addition to these direct clients, the energy market also includes various intermediaries and service providers, such as energy retailers, brokers, and aggregators. These entities play a critical role (11) ..... connecting energy suppliers (12) ..... end-users, managing energy procurement and consumption (13) ..... behalf of clients, and providing value-added services such as energy efficiency audits and demand response programs.

Overall, the energy market is characterized (14) ..... diverse client needs and preferences, as well as a wide array (15) ..... market participants who play a crucial role(16) ..... meeting those needs. As the energy landscape continues to evolve (17) ..... technological advancements and changing regulatory frameworks, understanding and addressing the needs (18) ..... different client segments will be essential (19) .....success in the energy industry.

3. Read the following sentences and select the right words from the box.

benefit issue circumstance outage consequences decline liability helpline supplier supply meter insurance

1. The new energy-efficient appliances will _____ the household by reducing electricity costs.
2. Given the current _____, the switch to renewable energy sources is becoming increasingly necessary.

3. The environmental impact of energy consumption is a pressing _____ that needs to be addressed.
4. The _____ in traditional energy sources has led to a focus on alternative energy solutions.
5. The local _____ offers a range of renewable energy options for consumers.
6. The expansion of wind farms has increased the _____ of renewable energy in the region.
7. The smart _____ tracks energy usage and provides valuable insights for managing consumption.
8. The energy company provides a _____ for customers to address any inquiries or issues they may have.
9. Failing to address energy conservation can have long-term _____ for the environment.
10. The company took full _____ for the power outage caused by the equipment malfunction.
11. Homeowners are encouraged to consider _____ that covers damage from power surges.
12. The unexpected _____ left the entire neighborhood without electricity for several hours.

4. Put the words from the brackets in the correct form.

1. The company plans (to establish) a new branch in the upcoming fiscal year.
2. The sales (doubled) after the implementation of the new marketing strategy.
3. The stock prices (fluctuated) throughout the week, causing concern among investors.
4. Oil prices (fell sharply) due to the sudden increase in global supply.
5. The machinery went (out of action) following the power surge.
6. The market (hit a low and then began to recover), bringing relief to investors.
7. Despite the economic challenges, the currency (remained stable) against major currencies.
8. After months of rapid growth, the demand for the product started (to level off).
9. Following the announcement, the stock prices (increased steeply), surprising analysts.
10. The employment (rate rose steadily) over the past year, indicating positive economic trends.
11. The data (suggests) a potential increase in consumer spending in the current quarter.

5. Read the text and ask five questions to the text.

The energy market is a dynamic and complex environment, with a wide range of clients and stakeholders. From large industrial consumers to residential households, the energy market serves a diverse set of clients with varying needs and demands.

Industrial clients often require large volumes of energy to power their operations, and they may have specific requirements for reliability, price stability, and environmental sustainability. These clients often have sophisticated energy management strategies in place, and they may engage in long-term contracts with energy suppliers to secure their energy needs.

Commercial clients, such as office buildings, retail stores, and restaurants, also have unique energy needs. They may prioritize cost savings, energy efficiency, and sustainability in their energy procurement decisions. Many commercial clients are also interested in implementing renewable energy sources and energy management technologies to reduce their carbon footprint and lower their operating costs.

Residential clients are another important segment of the energy market. They rely on energy for heating, cooling, lighting, and powering their appliances. Residential clients may have different preferences and priorities when it comes to their energy supply, including cost, convenience, and environmental impact. Many residential clients are also interested in adopting renewable energy solutions, such as rooftop solar panels or community solar programs.

In addition to these direct clients, the energy market also includes various intermediaries and service providers, such as energy retailers, brokers, and aggregators. These entities play a critical role in connecting energy suppliers with end-users, managing energy procurement and consumption on behalf of clients, and providing value-added services such as energy efficiency audits and demand response programs.

Overall, the energy market is characterized by diverse client needs and preferences, as well as a wide array of market participants who play a crucial role in meeting those needs. As the energy landscape continues to evolve with technological advancements and changing regulatory frameworks, understanding and addressing the needs of different client segments will be essential for success in the energy industry.

6. Match the words with the definition.

1. Something that is advantageous or good; an advantage. 2. In the context of utility services, it refers to a device that measures the amount of a resource used, such as electricity, gas, or water. 3. A person or entity that purchases goods or services for personal use. 4. Sudden, short-lived increases in voltage that can cause damage to electronic devices and appliances. 5. In the context of electricity, it refers to the flow of electric charge. It is measured in amperes. 6. Happening quickly and unexpectedly. 7. Changed or varied irregularly in number or amount.	a) current b) meter c) consumer d) power surges e) benefit f) fluctuated g) sudden

7. Put the words in the correct order.

1) in / technical / surges / and / areas/ great / outages /detail /about /surrounding / He /power/went/into/the.
2) your/you/or/country/?/electricity/supplier/gas/switch/in/your/Can.
3) the/meter/my/had/troubleshoot/to/I/support/helpline/tech/call /to/ with/the/issue.

8. Say whether these sentences are true or false:

1. The symbol for current is I.
2. The electric current can flow only through liquids.
3. The current can be of two types: direct current and alternating current.
4. The alternating current flows in one direction.
5. A battery is the simplest source of power for the direct current.
6. Direct current finds wider application than alternating current.
7. Electrolytes don't change greatly when current passes through them.
8. One of the great advantages of alternating current is the ease with which voltage can be changed.

9. Choose the appropriate option.

1. I shall get up very early tomorrow…?
   a) shall I b) shan't I e) don't I
2. He ... school two years ago.
   a) finishes b) will finish c) finished
3. We will meet … 2 hours.
   a) at b) by c) in
4. If I ... you, I should choose the profession of an engineer.
   a)am b)were c)was
5. Are you getting ... the next stop?
   a) on b) of c) off
6. He hasn't come yet. He must still …
   a) work b) be working c) has worked
7. If I … rich, I would travel around the world
   a) was b) shall be c) were
8. I'll see you … the morning … 8.30
   a) in, at b) at, on c) at, in
9. Steve … ice-cream.
   a) doesn't like b) not likes c) don't likes
10. It's time for … to come.
   a) they b) their c) them

10. Put the verbs in the appropriate tense form.

By the time you receive this letter I (1. finish) ….. my final exams. He (2. write) 3 reports on an accident when his mother called. I don't think I (3. do) ….. these exercises by 3 o'clock. He was looking forward to a good meal at home, but Jill (4. go) ….. out. Your house looks nice. You (5. paint) ….. it? After we (6. discuss) ….. all details on the phone I wrote a letter about it. Before my 18th birthday I (7. not/be) ….. out of England. It is the easiest job I (ever/have) ….. . I fell better after I (8. take) ….. the medicine. I (9. not/be) ….. there for ages.

She (10. tidy up) ….. the flat before he comes. I was late. The teacher already (11. give) ….. a quiz when I came into the classroom. The workers (12. ship) ….. the goods before the telegram arrives. I am here for an hour. Where you (13. be) …..? When I got to the station, the 9 o'clock train (14. already/leave) ….. .

Test 5

1. Match the definition with the words in the box.

comparative	energy efficiency
airtightness mold	portfolio
comparative	fossil fuels

1. efficient (rational) use of energy resources
2. folder, file, portfolio of securities
3. basis for assessing company performance
4. ensuring that surfaces and joints of parts are impermeable to gases and liquids
5. a type of fungus that grows in damp, warm, and humid conditions
6. energy-containing materials that were formed from trees, plants or organisms during thousands of years of residence underground

2. Re-order the words to make sentences.

1. will be/chief/energy/engineer/I/the/and/safety
2. development/basis/technological/the/new/a/transition/to/energy/has/for/begun/already
3. as/did/when/manager/Rob/an/energy/working/start
4. very/say/I/that/energy/company/high/our/must/has
5. all/works/industry/William/world/in/and/the/over/the/travels/energy
6. helps/energy/reduce/a/management/costs/functioning/system

3. Complete the sentences with the relative pronoun (who, whose, where, when).

1. This is Jane … sister is my friend.
2. The café …we had dinner yesterday is very expensive.
3. That was a year …I entered institute.
4. That's the woman…is a famous actress.
5. My classmate ... is studying to become an energy manager, went to China for an internship.
6. Kate ... coursework in energy engineering was the best in the class, received her diploma.
7. She graduated from BNTU ... produces the best energy engineers in the country.

4. Choose the correct form of the verbs.

1. I go / goes / am going/ have gone jogging every morning.
2. My brother always is wearing / wears / has worn / has been wearing my clothes!
3. I'm tired. I didn't sleep / haven't slept / am not sleeping / doesn't sleep yet.
4. The cake tastes / is tasting / has been tasting / has tasted great. Can I have another piece?
5. The children are dirty. They have played / have been playing / play / are playing football since morning.
6. I go / am going / goes to submit documents to BNTU for energy engineering now.

5. Fill in the gaps with appropriate articles.

1. I have got ... pen. ... Pen is red
   1) a, the
   2) –, –
   3) –, the,
   4) an, the,
2. He is filled with ... energy. ... Energy management is his favorite area.
   1) an, –
   2) a, the
   3) –, –
   4) the. the
3. ... newer appliances conserve more energy.
   1) a
   2) an
   3) the
   4) –
4. Oil shortages have brought on ... energy crisis.
   1) a
   2) an
   3) –
   4) the

6. Complete the text with one word only in each gap.

What is Air Leakage?

Air leakage is where conditioned air enters and leaves a building uncontrollably through cracks and ... (1) It is also known as infiltration and is totally different to ventilation, which is ...(2) air that enters a building in a controlled manner to exhaust excess moisture and reduce odors and stuffiness. As Air Leakage is uncontrolled, too much air may enter the house during ... (3) or windy weather, leading to excessive heat loss and the uncomfortable feeling of cold draughts. Air Leakage plays a major part in the energy ...(4) 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 ... (5)

Airtightness is a key factor in building energy efficiency, and consequently is a feature of Government led initiatives to combat climate change through ... (6) in building energy performance. Heating buildings involves burning fossil ... (7) which contribute towards CO2 emissions and global warming. Reducing air leakage results in less heat loss, which in turn reduces the Air Leakage amount a heating system must be used.

7. Rank true/false.

1. The Harry Potter series of books are most often stolen from American stores.
2. Right now, humanity's needs are provided by 15 trillion watts of energy.
3. Diamonds can't burn.
4. Lightning is a discharge of electricity in the atmosphere, reaching tens of thousands of volts.
5. The education that our graduates receive is recognized by foreign companies and is highly valued by enterprises in the energy, housing and communal services.
6. Bruce Lee could do about 1500 push-ups in a row by two hands.

8. Put the verbs from the box in the past simple.

see	forget	give	travel	have	want	start	stay	be

1. Last year I... to China.
2. Did you ... dinner last night?
3. I ... to make my bed this morning because I was in a hurry.
4. They ... a movie yesterday.
5. We ... to go to out, but it ... raining.
6. We ... at Grand Hotel when we ... in Venice.
7. Who ... you this book about energy?

9. Form the nouns from the following adjectives and verbs.

1. energy efficient
2. to pollute
3. to convert
4. reliable
5. to produce
6. compact

10. Translate the text into English.

Выгодные меры по повышению энергоэффективности зданий

Здания на протяжении многих лет были основными потребителями энергии и основными производителями углекислого газа в атмосфере. Сейчас дошло до того, что мероприятия по энергоэффективности – это уже не что-то приятное для зданий, а актуальная проблема. Энергоэффективные решения не просто помогают бороться с изменением климата. Они также помогают снизить затраты на электроэнергию и техническое обслуживание, создать конкурентоспособную среду.

Test 6

1. Complete the following sentences: say what one calls a student of biology, physics, etc.

Example : *A student of biology….. . A student of biology is a biologist.*

1. A student of physics . . . . .
2. A student of biochemistry .
3. A student of biophysics . . . . .
4. A student of radiology . . . . .
5. A student of microbiology . . . . .
6. A student of physiology . . . . .
7. A student of theoretical science. . . . .
8. A student of psychology . . . . .
9. A student of mathematics . . . . .
10. A student of languages . . . . .
11. A man doing experimental work …..
12. A student of medicine . . . . .

2. Complete the article with the correct forms of the verbs.

Hydroelectric power (1) ….. (be) actually the most widely used renewable energy resource in the world. The first hydro project (2) ….. (power**)** just one single lamp in the late 1800s. More (3) ….. (come**)** on board soon after. By the turn of the 20th century, use because much more preferred all around the world. Right now, China, the US, and Brazil (4) ….. (lead) the way in hydro capacity. Hydro (4) ….. (consider) a great base load source, and it can also be a great peak load source. Every state in the US actually (5) ….. (have) some form of hydro. There are some states that (6) ….. (get) a majority of their power from it. Washington state (7) ….. (be) one of them. Let's hear from a Washington utility that (8) ….. (known) for their hydro generation. – I (9) ….. (be) Pat McCarty. I (10) ….. (be) the generation manager for Tacoma Power.

3. Change the sentences into the passive voice using the preposition *by*.

Many examples illustrate this fact. → This fact is illustrated by many examples.

1) Electrons surround the nucleus. 2) Heating affects chemical reactions. 3) High temperature maintains high pressure in the chamber. 4) Hating accounts for the high reaction rate. 5) Several examples demonstrate this idea. 6) Irradiation causes marked changes in the cell. 7) Centrifugation separates these particles. 8) Many laboratories study these phenomena. 9) Low temperature affects this process. 10) Heating of the mixture follows purification.

4. Combine the words from the column on the left with the suitable nouns from the column on the right.

1. transform	a. the various machines
2. run	b. pollution
3. cause	c. energy resources
4. reduce	d. energy
5. consume	e. more environmental damage

5. Use a compound from Ex. 4 to complete these sentences.

1. Cars, planes, trolleys, boats, and machinery also … into work.
2. There are many sources of energy that help to … invented by man.
3. In the past century, it became evident that the consumption of non-renewable sources of energy had … than any other human activity.
4. Their use significantly … chemical, radioactive, and thermal … .
5. The main problem isn't that we use energy, but how we produce and … .

Test 7

1. Complete the article with the correct forms of the verbs.

Tacoma is a municipal electric utility that(1) ….. (own) by the citizens of Tacoma. We (2) ….. (serve) about 170,000 people in Tacoma and the greater Tacoma area. And back in 1912, they (3) ….. (build) the first hydroelectric plant that (4) ….. (serve) the citizens of Tacoma on the Nisqually River. It (5) ….. (be) a 24 megawatt project. Shortly after that, they (6) ….. (decide) they (7) ….. (need) more power to fuel the industry that (8) ….. (grow) in Tacoma. And they (1) ….. (venture) out to the slopes of the Olympic mountains and (9) ….. (build) the Cushman Hydroelectric Project. In 1926, when it first (10) ….. (come) online, it (11) ….. (be) a big deal. It was so big that Calvin Coolidge, back in the White House, (12) ….. (press) the button, symbolically sending the electrons from the Cushman Dam to Tacoma.

2.Translate the sentences into Russian.

1) The research is completed. 2) The changes are observed well enough. 3) The sound is registered with this instrument. 4) These conditions are maintained throughout the experiment. 5) This deviation is associated with the energy loss, 6) This fact is explained by the conservation law. 7) This formula is readily deduced from the equation. 8) These changes are accounted for by ionization. 9) The defects are readily detected by X-ray analysis. 10) These requirements are justified in this case.

3. Read the first part of the Max factor story and complete it with the correct form of the verbs in brackets.

In many parts of the world, Max factor has become the famous brand of cosmetics. Yet few people know that Max factor, who was born in Poland in 1877, is also the name of the inventor of those cosmetics. Apparently, it was while Max (1) … (worked/was working) as an apprentice to a pharmacist, mixing all kinds of portions, that he (2)… (developed/ was developing) an interest in cosmetics.

He (3) … (lived/was living) in Moscow when he (4) … (opened/was opening) his own shop, selling a range of handmade cosmetics.

Now complete the second part of the story with either the past simple or the past continuous of the verbs given.

The story goes that one day, some members of the Russian nobility (5) … (notice) the beautiful make-up worn by some traveling theatre actors who (6) … (perform) for them. So they (7) … (appoint) Max Factor the cosmetic expert for the royal family. In 1904, Factor (8) … (immigrate) to the USA. He (9) … (create) a new kind of make-up for cinema actors in Los Angelos, where he (10) … (live). By the time he (11) … (introduce) his products to the public, all major actresses (12) … (visit) his salon.

4. Fill the gaps with the adjectives from the box.

affordable natural	greenhouse power	environmental general-purpose	alternative advanced

1. Green Engineering is the use of ..… measurement and control techniques to design, develop, and improve products and technologies resulting in ….. and economic benefits.
2. We now have … technologies that enable us monitor and manage our (bio-)systems, reduce the ….. gases we emit, lower the amount of energy we consume, and thereby reduce our costs while benefiting our planet.
3. We no longer have to rely on ..… computers to sense, monitor, analyze, and control our environment.
4. They are involved in developing and maintaining ..… stations and the machinery used in ..… energy sourcing and production.

5. Engineers are concerned with the production of energy through ..… resources such as the sourcing and use of wind, solar and wave power.

5. Match the synonyms.

1. to include	a. highly developed, complex
2. to increase	b. countryside, pastoral
3. to allow	c. establish, set up, fix
4. to install	d. contain, consist of
5. natural	e. enlarge, raise
6. rural	f. usual, normal, ordinary
7. advanced	g. let, permit

Test 8

1. Put the irregular verbs from the box in the past simple.

spend	catch	be	cost
buy	win	throw	choose

1. Jim … the ball to Sue who … it.
2. Ann … a lot of money yesterday. She … a suit which … $100.
3. The film … so boring that we both walked out.
4. Last year we … a TVset on the lottery.
5. Mary … to study medicine because she wanted to help people.

2. Complete the article with the correct forms of the verbs.

It might surprise you to know that hydro and coal fire plants (1) ….. (produce) electricity pretty similarly. Hydro power (2) ….. (produce) the same way. It (3) ….. (harness) the natural energy from falling and flowing water, that (4) ….. (be) what a hydroelectric project is. And it (5) ….. (do) that by capturing that water, sending it through a hydraulic turbine that (6) ….. (spin) that (7) ….. (turn) a generator to produce clean, green, renewable, and cost effective power for our citizens. There (8) ….. (be) actually three types of hydro plants. The most common (9) ….. (use) a dam and is called impoundment. Another (10 ….. (call) diversion, and as the name suggest, this is where a portion of the river(11) ….. (channel) through a canal. There might or might not be a dam. The third kind (12) ….. (call) pumped storage, and it (13) ….. (work) like a battery. It (14) ….. (store) the electricity that (15) ….. (create) by another power source, like solar, wind, or nuclear. Water (16) ….. (pump) uphill, and when energy demand is low, it (17) ….. (stay) there. When there's a high demand, it (18) ….. (release) back downhill, and that's what (19) ….. (turn) the turbine. Hydro (20) ….. (be) one of the most efficient energy sources, and there are no emissions in using it, and the cost

(21) ….. (be) pretty low. In fact, areas with a lot of hydro in the mix (22) ….. (tend) to have some of the lowest electric bills.

3. Put the verbs in brackets into the appropriate tense-form: the present perfect or the present continuous.

1. The research (show) that most internet surfers are women.
2. How long you (be) in Canada? – I (study) here for more than three years.
3. I (know) her all these years and I have never been bored with her company.
4. She (do) the cross-word since morning.
5. You are exhausted. What you (do)?
6. Julian is a journalist. He (write) for The Times for 4 years.

4. Use *for* or *since*.

Tom and Mary have been building a house (1) … two years. They have been dreaming of finishing it (2) … last summer but they have been having problems (3) … a few months because of the weather. In fact it has been raining and snowing (4) … October so they haven't been able to put the roof on yet. This weekend they are trying to put in the windows. They have only been working (5) … 8 o'clock but they feel like they've been doing it (6) … hours because it is very difficult. They have been saving up (7) … a long time but they haven't been able to hire any workmen yet.

5. Make true sentences by matching the halves.

1. Over millions of years, the remains of these animals and plants were	a. removed from the ground, it is sent to a refinery by pipeline, ship, or barge.
2. Above the hole a derrick is	b. used to produce energy, to move merchandise and people, help make plastics, and do many other things.
3. Crude oil is also	c. built to house the tools and pipes going into the well.
4. After crude oil is	d. classified by the weight of its molecules.
5. At a refinery, different parts of the crude oil are	e. covered by layers of sand and silt.
6. Most petroleum products are	f. separated into useable petroleum products.

6. Match the terms with their definitions.

barrel	sustainable	waste	mining

1. anything rejected as useless, worthless, or in excess of what is required
2. a unit of capacity used in the oil and other industries
3. the act, process, or industry of extracting coal, ores, etc., from the earth
4. capable of being maintained at a steady level without exhausting natural resources or causing severe ecological damage

Test 9

1. Make short sentences in passive from the following Intinitive phrases.

to meet tho requirements in tho experiment. (met). → *The requirements are met in the experiment.*

l) to keep up working contacts with other laboratories. (kept);
2) to set limitations on the bulk and cost of the machine. (set);
3) to cut off the electric current. (cut);
4) to feel the need to introduce changes in the program. (felt);
5) to set up an international centre for joint research. (set);
6) to make a comparison between the results. (made);
7) to lose some information in data processing. (lost);
8) to grind the substance into powder. (ground);
9) to pay much attention to the development of fundamental research. (paid);
10) to hold the meetings of the society regularly. (held);
11) to bind the atoms firmly in a molecule. (bound).

2. Choose the write form of adjectives or adverbs.

1. The fish was … the meat.
   1) such tasty as 2) as tasty as 3) as tasty so 4) more tasty as
2. I like walking … .
   1) slower 2) the slowest 3) slow 4) slowly
3. The news was much … than anyone had expected.
   1) bad 2) worse 3) worser 4) more worse
4. Jack has … finished writing his essay.
   1) nearly 2) near 3) nearest 4) more near
5. It was … successful of all his films.
   1) fewer 2) most 3) less 4) the least
6. He can jump really … .
   1) highly 2) more highest 3) high 4) not highly

3. Put the words in these sentences in the correct order.

1 movements/ to/ do/ We/ energy/ work /and / use / make/ all.
2. the / objects/ Motion Energy/ is / in / movement / energy /of/ stored.
3. be/ heating/ Wood fuel/ can/ and /for / cooking/ used.
4. of/ nonrenewable/ Coal/ millions/ because/ is/ energy/ it/ source/ create/ takes/ years/ a/ to.
5. varies/ The /of/ different/ gas/ in/ natural/ localities/ **composition**.

4. Choose the right answer: gerund or infinitive.

1. He used … football when he was younger.
   1) to playing 2) play 3) playing 4) to play
2. Mr. Smith prefers … everything in time.
   1) to do 2) doing 3) do 4) don't do
3. Mary, did you remember… some spare disks for my mp3 player?
   1) packing 2) packed 3) pack 4) to pack
4. I like … badminton.
   1) play 2) playing 3) – 4) –
5. The doctor asked him to … his left hand and show his fingers.
   1) raise 2) raising 3) – 4) –

5. Sequence of tenses. Choose the correct answer.

1. The staff wanted to know what … .
   1) had they got salary 2) they had got salary
   3) salary had they got 4) salary they had got
2. I asked Nora who … about the traffic jam.
   1) told her 2) had told her 3) has told her 4) have told her
3. We ask our teacher if … on an excursion.
   1) we were going 2) we are going
   3) going we are 4) were we going
4. Sam said he… any help.
   1)hadn't wanted 2) didn't want 3) doesn't want 4) wasn't wanted

6. Fill the gaps with the adjectives from the box.

boiling	industrial	combustible	bituminous
dead	natural	raw	extensive

1. Natural gas is a … **mixture** of gaseous hydrocarbons found issuing from the ground or obtained from specially driven wells.

2. Toward the latter part of the 19th cent., large … cities began to make use of natural gas, and … pipeline systems have been constructed to transport gas.
3. The … point of natural gas is extremely low.
4. Coal is a … black or brownish-black sedimentary rock composed mostly of carbon and hydrocarbons.
5. For millions of years, a layer of … plants at the bottom of the swamps was covered by layers of water and dirt, trapping the energy of the dead plants.
6. … coal is used to generate electricity and is an important fuel and … material for the steel and iron industries.

Test 10

1. Choose correct words from the box to complete the sentences.

commercial	desiccant	technological	compact
integrated			
absorption	multitude	formaldehyde	

1. These are **…..** systems that are able to use energy that is normally lost as heat.
2. The systems provide efficiency of natural gas cooking while being **…..** enough to serve small kiosk type establishments.
3. Natural gas **…..** systems, which are used for dehumidification, are increasingly popular in the plastics, pharmaceutical, candy, and even recycling industries.
4. A number of **…..** advancements have allowed natural gas to be used to increase energy efficiency in commercial settings.
5. Natural gas powered reciprocating engines, turbines, and fuel cells are all used in **…..** settings to generate electricity.
6. Natural gas has a **…..** of industrial uses, including providing the base ingredients for such varied products as plastic, fertilizer, anti-freeze, and fabrics.
7. Methanol is used to produce such substances as **…..** and acetic acid.
8. Natural gas **…..** systems are also being used extensively in industry to heat and cool water in an environmentally sound way.

2. Match the definition with the words in the box.

1. a device in which the photoelectric or photovoltaic effect or photoconductivity is used to produce a current or voltage when exposed to light or other electromagnetic radiation
2. something that affects or is of importance to a person; affair; business
3. to change or cause to change from a liquid or solid state to a vapor
4. incapable of being used up; endless
5. the act of elevating or the state of being elevated

evaporate	to capture	
inexhaustible	concern	viable
low-impact	photocell	to
absorb	elevation	to spin

6. designed to cause minimal damage to the environment
7. to rotate or cause to rotate rapidly, as on an axis
8. capable of becoming actual, useful, etc.; practicable
9. to soak or suck up (liquids)
10. gain control over or acquire something

3. Complete the sentences with *which, where, when* or *why*.

1. Is this the place ….. we're supposed to meet them?
2. She works in a building ….. used to be a hospital.
3. Is that the reason ….. she never answers your emails?
4. This is the house ….. my grandmother was born.
5. 1969 was the year ….. human beings first landed on the moon.
6. What a terrible thing to say! I don't know ….. she's always so rude to me.
7. It was a film ….. seemed to last forever.

4. Put the following sentences into the passive voice.

Other factors may affect the process. → The process may be affected by other factors.

1.This radiation dose may damage the cells. 2. This substance may catalyse the process. 3. The environmental factors may bring about such changes. 4. These conditions may affect the course of the reaction. 5. The structural changes may produce a marked effect. 6. This defect may account for the discrepancy in the results. 7. These organelles may accumulate energy. 8. This mechanism may involve an unknown factor. 9. Ultraviolet radiation may produce ionization.

5. Fill in the right preposition.

next to	during	on	in	at	at	above	under	off	along

1. Hydroelectric plants are more efficient at providing for peak power demands **…..** short periods than are nuclear power plants.
2. We can drive **…..** the Rhine to the south of Germany.
3. She was so angry, she threw the keys **…..** me.
4. Let's get **…..** the motorway and get something to eat.
5. Put the rubbish in the bin **…..** the sink.
6. There's a helicopter flying round **…..** the school.
7. I don't want to live **…..** the airport as the noise would be awful.
8. The managers have business meetings **…..** breakfast.
9. The world changed **…..** the last century.
10. I last saw him **…..** Thursday afternoon.

4. ВСПОМОГАТЕЛЬНЫЙ РАЗДЕЛ

Белорусский национальный технический университет

УТВЕРЖДАЮ
Проректор по учебной работе
Белорусского национального
технического университета
_____ Ю.А. Николайчик
30.06.2023
Регистрационный № УД-ДТУГ 09.21/ уч.

ИНОСТРАННЫЙ ЯЗЫК (АНГЛИЙСКИЙ)
Учебная программа учреждения высшего образования по учебной дисциплине для специальностей 7-07-0712-02 «Теплоэнергетика и теплотехника» Профилизация «Энергоэффективные технологии и энергетический менеджмент»

Минск 2023 г.

Учебная программа составлена на основе образовательного стандарта ОСВО 7-07-0712-02-2023 и учебных планов специальности 7-07-0712-02 «Теплоэнергетика и теплотехника», профилизация «Энергоэффективные технологии и энергетический менеджмент» (рег. № ФТУГ93д-4/уч. утв. 31.03.2023; рег. № ФТУГ93зи-1/уч. утв. 03.04.2023)

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ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Учебная программа по учебной дисциплине «Иностранный язык» разработана для специальности 7-07-0712-02 «Теплоэнергетика и теплотехника», профилизация «Энергоэффективные технологии и энергетический менеджмент».

Целью изучения учебной дисциплины является овладение английским языком как средством устной и письменной форм общения в различных сферах общественной и профессиональной деятельности в условиях межкультурной коммуникации и как средством социокультурного развития личности и формирования ценностных ориентаций через диалог культур родного и иностранного языков.

Основными задачами учебной дисциплины являются:

– подготовить студентов к естественной коммуникации в устной и письменной формах иноязычного общения;

– научить студента применять английский язык для расширения и углубления профессиональных знаний и видеть в нем средство самостоятельного повышения качества своей профессиональной подготовки;

– расширить с помощью английского языка языковую, лингвистическую и социокультурную компетенцию студентов;

– использовать широкие возможности иностранного языка для развития у студентов коммуникативных умений, опыта решения задач, формирования их гражданской позиции, принятия нравственных ценностей и культурно-исторических традиций белорусского народа, гражданско-патриотического и духовно-нравственного воспитания, уважения к культурному наследию.

В результате изучения дисциплины «Иностранный язык (английский)» студент должен **знать:**

– особенности системы изучаемого иностранного языка в его фонетическом, лексическом и грамматическом аспектах (в сопоставлении с родным языком);

– социокультурные нормы бытового и делового общения, а также правила речевого этикета, позволяющие специалисту эффективно использовать иностранный язык как средство общения в современном поликультурном мире;

– историю и культуру стран изучаемого языка.

уметь:

– вести общение социокультурного и профессионального характера в объеме, предусмотренном настоящей программой;

– читать и переводить литературу по специальности обучаемых;

– письменно выражать свои коммуникативные намерения в сферах, предусмотренных настоящей программой;

– составлять письменные документы, используя реквизиты делового письма;

– понимать аутентичную иноязычную речь на слух в объеме программной тематики;

– написать эссе или доклад,

– дать оценку разным идеям и вариантам решения проблем;

– синтезировать информацию и аргументы из нескольких источников.

иметь навык:

– владения базовой лексикой общего языка и языка специальных целей, фонетикой, нормативной грамматикой и синтаксическими структурами английского языка с целью правильного оформления высказывания и понимания речи собеседника;

– контроля грамматической правильности и избегания ошибок, которые могут привести к непониманию;

– критического мышления, необходимого для творческой профессиональной деятельности;

– самостоятельной работы.

Освоение данной учебной дисциплины должно обеспечить формирование следующих компетенций:

Для специальности 7-07-0712-02 «Теплоэнергетика и теплотехника» (срок обучения – 5 лет)

УК – 3. Осуществлять коммуникации на иностранном языке в академической, научной и профессиональной среде для реализации научно-исследовательской и инновационной деятельности.

УК – 4. Обеспечивать коммуникации, проявлять лидерские навыки, быть способным к командообразованию и разработке стратегических целей и задач, толерантно воспринимать социальные, этнические, конфессиональные, культурные и иные различия.

Согласно учебному плану для очной (дневной) формы получения высшего образования, интегрированного со средним специальным образованием на изучение учебной дисциплины отведено всего 400 ч., из них аудиторных – 136 часов; для заочной формы получения высшего образования, отведено всего 380 ч., из них аудиторных – 20 часов.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено в таблицах 1.

Таблица 1.

Очная (дневная) форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч	Практические занятия, ч.	Форма текущей аттестации
1	1	–	–	34	зачет
1	2	–	–	34	зачет
2	3	–	–	34	зачет
2	4	–	–	34	экзамен
Заочная форма получения высшего образования, интегрированного со средним специальным образованием					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч	Практические занятия, ч.	Форма текущей аттестации
1	1	–	–	4	зачет
1	2	–	–	4	зачет
2	3	–	–	6	зачет
2	4			6	экзамен

Содержание учебного материала

Раздел I. Энергетика

Тема 1.1 Энергия

Определение энергии. История использования и преобразования механической энергии. Электроэнергия. Возобновляемые и не возобновляемые источники энергии. Потребление энергии населением и предприятиями. Влияние энергопреобразующих предприятий на окружающую среду и здоровье людей.

Тема 1.2 Формы энергии

Кинетическая энергия и ее формы – энергия излучения, термальная энергия, энергия движения, энергия звука. Потенциальная энергия и ее формы – энергия атомов и молекул, механическая энергия, ядерная энергия, энергия гравитации, электрическая энергия.

Тема 1.3 Энергетика как сфера деятельности

Профессия инженера-энергетика. Задачи инженера по защите окружающей среды. Работа инженера в сфере энергосберегающих технологий. Круг обязанностей инженера ТЭЦ, атомных электростанций и электрических сетей. Работа в сфере использования альтернативных источников энергии.

Раздел II. Традиционные источники энергии

Тема 2.1 Древесина

Виды топлива. Древесина – как возобновляемый источник энергии. Виды древесного топлива.

Тема 2.2 Уголь

Уголь как не возобновляемый источник энергии. Виды угля. Способы добычи и обработки угля. Уголь как вид топлива и источник энергии.

Тема 2.3 Нефть

Происхождение нефти. Виды нефти. Добыча и очистка нефти. Переработка нефти. Нефтепродукты.

Тема 2.4 Природный газ

Происхождение газа. Добыча и транспортировка газа. Газ как вид топлива и не возобновляемый источник энергии.

Раздел III. Газоснабжение

Тема 3.1. Потребление газа населением

Газ как один из самых дешевых и доступных видов энергии. Использование газа для отопления жилых помещений, приготовления пищи и работы различных бытовых приборов.

Тема 3.2 Использование природного газа в промышленном и коммерческом секторе экономики

Использование газа для обогрева помещений различного назначения (производственных, складских, торговых, образовательных, медицинских, общепита, деловых офисов). Газ в системах охлаждения и кондиционирования. Газ для функционирования генераторов, вырабатывающих электроэнергию.

Раздел IV. Альтернативные источники энергии

Тема 4.1 Виды альтернативных источников энергии

Разница между возобновляемыми и не возобновляемыми источниками энергии. Преимущества и недостатки альтернативных источников энергии. Использование альтернативных источников энергии в Республике Беларусь.

Тема 4.2 Энергия солнца

Ресурсы солнечной энергии. Способы генерирования энергии солнца. Устройство солнечных панелей. Проекты будущего по использованию солнечного света как источника освещения и тепла при строительстве зданий.

Тема 4.3 Энергия ветра

История использования энергии ветра. Ветер как возобновляемый источник энергии. Ветряные турбины – генераторы энергии ветра. Типы турбин. Генерирование и использование энергии ветра в Республике Беларусь.

Тема 4.4 Энергия воды

Принцип работы гидроэлектростанций. Генерирование и использование энергии воды в Республике Беларусь.

Тема 4.4 Биотопливо

Что такое биодизель**.** Технологии производства биотоплива. Преимущества и недостатки биологического топлива.

Раздел V. Атомная энергетика

Тема 5.1 Ядерная энергия

Деление атома. Ядерная реакция. Принцип работы атомных электростанций. Виды ядерного топлива.

Тема 5.2 Производство ядерной энергии

Преимущества и недостатки производства ядерной энергии. Развитие ядерной энергетики в Республике Беларусь.

УЧЕБНО-МЕТОДИЧЕСКАЯ КАРТА УЧЕБНОЙ ДИСЦИПЛИНЫ «ИНОСТРАННЫЙ ЯЗЫК (английский)»

для специальности 7-07-0712-02 «Теплоэнергетика и теплотехника»
Очная (дневная) форма получения высшего образования

Номер раздела, темы	Название раздела, темы	Количество аудиторных часов					Количество часов УСР	Форма контроля знаний
		Лекции	Практические занятия	Семинарские занятия	Лабораторные занятия	Иное		
1	2	3	4	5	6	7	8	9
	1 семестр							
1	**Энергетика**							
1.1	Практическое занятие №1 «Энергия»		8				14	фронтальный опрос взаимоконтроль устная презентация взаимоконтроль
1.2	Практическое занятие №2 «Формы энергии»		8				14	фронтальный опрос взаимоконтроль устная презентация взаимоконтроль
1.3	Практическое занятие №3 «Энергетика как сфера деятельности»		8				14	фронтальный опрос

								взаимоконтроль устная презентация взаимоконтроль
2	**Традиционные источники энергии**							
2.1	Практическое занятие №1 «Древесина»		8				14	фронтальный опрос взаимоконтроль устная презентация взаимоконтроль

Продолжение таблицы

Номер раздела,темы	Название раздела, темы	Количество аудиторных часов					Количество часов УСР	Форма контроля знаний
		Лекции	Практические занятия	Семинарские занятия	Лабораторные занятия	Иное		
1	2	3	4	5	6	7	8	9
	Практическое занятие №2 «Итоговый контроль»		2				10	контрольная работа
	Итого за семестр		**34**				**66**	**зачет**
	2 семестр							
2	**Традиционные источники энергии**							
2.2	Практическое занятие №1 «Уголь»							фронтальный опрос взаимоконтроль устная презентация взаимоконтроль
2.3	Практическое занятие №2 «Нефть »		4				6	фронтальный опрос взаимоконтроль

								устная презентация взаимоконтроль
2.4	Практическое занятие №3 «Природный газ»		2				8	фронтальный опрос взаимоконтроль устная презентация взаимоконтроль
3	**Газоснабжение**							

Продолжение таблицы

Номер раздела,темы	Название раздела, темы	Количество аудиторных часов					Количество часов УСР	Форма контроля знаний
		Лекции	Практические занятия	Семинарские занятия	Лабораторные занятия	Иное		
1	2	3	4	5	6	7	8	9
3.1	Практическое занятие №1 «Потребление газа населением»		8				14	фронтальный опрос взаимоконтроль устная презентация взаимоконтроль
	Практическое занятие №2 «Итоговый контроль»		2				10	контрольная работа
	Итого за семестр		**34**				**66**	**зачет**
	3 семестр							
3.3	Практическое занятие №1 «Использование природного газа в промышленном и коммерческом секторе экономики»		8					фронтальный опрос взаимоконтроль устная презентация

								взаимоконтроль
4	**Альтернативные источники энергии**							
4.1	Практическое занятие №1 «Виды альтернативных источников энергии»		8					фронтальный опрос взаимоконтроль устная презентация взаимоконтроль
4.2	Практическое занятие №2 «Энергия солнца»		8					фронтальный опрос взаимоконтроль устная презентация взаимоконтроль

Продолжение таблицы

Номер раздела, темы	Название раздела, темы	Количество аудиторных часов					Количество часов УСР	Форма контроля знаний
		Лекции	Практические занятия	Семинарские занятия	Лабораторные занятия	Иное		
1	2	3	4	5	6	7	8	9
4.3	Практическое занятие №3 «Энергия ветра»		8				14	фронтальный опрос устная презентация взаимоконтроль
	Практическое занятие №4 «Итоговый контроль»		2				10	контрольная работа
	Итого за семестр		**34**				**66**	**зачет**
	IV Семестр							
4.4	Практическое занятие №1 «Энергия воды»		8				14	взаимоконтроль устная презентация взаимоконтроль
4.5	Практическое занятие №2 «Биодизель»		8				14	фронтальный опрос взаимоконтроль взаимоконтроль

5	**Производство ядерной энергии**							
5.1	Практическое занятие №1 «Ядерная энергия»		8				14	фронтальный опрос взаимоконтроль взаимоконтроль
5.2	Практическое занятие №2 «Производство ядерной энергии»		8				14	фронтальный опрос устная презентация взаимоконтроль
	Практическое занятие №3 «Итоговый контроль»		2				10	контрольная работа
	Итого за семестр		**34**				**66**	**экзамен**
	Всего		**136**				**264**	

УЧЕБНО-МЕТОДИЧЕСКАЯ КАРТА УЧЕБНОЙ ДИСЦИПЛИНЫ

Заочная форма получения высшего образования[1], интегрированная со средним специальным образованием

Номер раздела,темы	Название раздела, темы	Количество аудиторных часов					Количество часов УСР	Форма контроля знаний
		Лекции	Практические занятия	Семинарские занятия	Лабораторные занятия	Иное		
1	2	3	4	5	6	7	8	9
1	**1 семестр Энергетика**							
1.1	Практическое занятие №1 «Энергия»		2				45	фронтальный опрос
1.3	Практическое занятие №2 «Формы энергии»		2				46	устная презентация, взаимоконтроль
	Итого за семестр		**34**				91	**зачет**
3	**2 семестр Газоснабжение**							
3.1	Практическое занятие №1 «Потребление газа населением»		2				45	фронтальный опрос, взаимоконтроль
3.2	Практическое занятие №2 «Использование природного газа в промышленном и коммерческом секторе экономики»		2				46	устная презентация
	Итого за семестр		**34**				**91**	**зачет**
4	**3 семестр Альтернативные источники энергии**							
4.1	Практическое занятие №1 «Виды альтернативных источников энергии»		6				89	фронтальный опрос, устная презентация,

	Итого за семестр		**34**				89	**зачет**
5	**4 семестр Атомная энергетика**							
5.1	Практическое занятие №1 «Ядерная энергия»		2				34	фронтальный опрос взаимоконтроль
5.1	Практическое занятие №2 «Производство ядерной энергии»		4				55	устная презентация, взаимоконтроль
	Итого за семестр		**34**				89	**экзамен**
	Всего		**136**				**360**	

[1] темы учебного материала, не указанные в Учебно-методической карте, отводятся на самостоятельное изучение

ИНФОРМАЦИОННО-МЕТОДИЧЕСКАЯ ЧАСТЬ

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Средства диагностики результатов учебной деятельности в соответствии с критериями, утвержденными Министерством образования Республики Беларусь

Оценка уровня знаний студента производится по десятибалльной шкале.

Для оценки достижений студента рекомендуется использовать следующий диагностический инструментарий:

- устный и письменный опрос во время практических занятий;
- собеседование при проведении индивидуальных и групповых консультаций;
- выступление студента на конференции по подготовленному реферату;
- сдача зачета по дисциплине;
- сдача экзамена по дисциплине.

Тематика рефератов

1. Использование водорода для получения энергии.
2. Формы энергии.
3. Безопасность энергетических объектов.
4. Использование энергии в мире.
5. Использование ископаемого топлива в Республике Беларусь.
6. Угольная энергетика: переход к новым технологиям и проблемы сокращения выбросов.
7. Использование газа в промышленности и повседневной жизни людей.
8. Использование нефти в промышленности и ЖКХ.
9. Влияние отходов производства и жизни людей на окружающую среду.
10. Перспективы развития альтернативных источников энергии.
11. Перспективы развития гидроэнергетики энергии.
12. Способы экономии электроэнергии.
13. Перспективы развития ветряной энергии в Беларуси.
14. Перспективы развития ядерной энергетики.
15. Перспективы развития биотоплива, что это такое.
16. Энергосбережение и энергоэффективность: инновации и практическое применение.
17. Перспективы развития солнечной энергии в Беларуси.
18. Способы использования отходов производства и жизни людей в энергетике.
19. Способы вторичного использования энергии в промышленности.
20. Глобальный энергетический рынок: особенности и проблемы.

Промежуточный и итоговый контроль

Для промежуточного контроля после прохождения каждой темы даются лексико-грамматические тесты. На последнем занятии проводится итоговое

тестирование по всему пройденному грамматическому и лексическому материалу.

Требования к зачету

1. Чтение со словарем текста на одну из изученных в течение семестра ситуаций общения объемом 2000 п.зн.

2. Постановка в письменной форме 5 вопросов по содержанию текста. Ответы на вопросы преподавателя.

3. Передача краткого содержания текста на английском языке.

Время на подготовку – 30 мин.

4. Беседа или диалоги по пройденным устным темам и речевым ситуациям.

Требования к экзамену

1. Чтение со словарем оригинального текста по специальности объемом 1500 п.зн. Передача краткого содержания текста на английском языке.

2. Перевод с листа фрагмента текста по специальности объемом 400 п.зн.

3. Беседа или диалоги по пройденным устным темам и речевым ситуациям.

Перечень контрольных вопросов и заданий

для самостоятельной работы

1. Не возобновляемые источники энергии.
2. Экологически чистые виды энергии.
3. Кинетическая и потенциальная энергия.
4. Принципы, лежащие в основе техники и технологий.
5. Для чего можно использовать древесное топливо?
6. Четыре основных типа угля.
7. В чем разница между возобновляемыми и не возобновляемыми источниками энергии?
8. Почему важно развивать альтернативные источники энергии?
9. Экологический аудит.
10. Плюсы и минусы альтернативной энергетики.
11. Солнечная батарея.
12. Разница между атомной и ядерной энергией.
13. Потребительские тенденции определяют решения в отношении упаковки.
14. Новая привлекательная графика упаковки пищевых продуктов.
15. Тенденции упаковки.

16. Секрет успешного дизайна продукта.
17. Важны ли цветовые тенденции в дизайне продукта?
18. Разница между первичной и вторичной упаковкой.
19. Инновации в первичной упаковке.
20. Новые тенденции вторичной упаковки.
21. Последние технологические достижения в области холодильной техники.
22. Экологически чистые инновации в области охлаждения.
23. Дизайн для производства в цифровую эпоху.
24. Компьютерный промышленный дизайн.
25. Охрана промышленных образцов.
26. Последние разработки в системах сжатия пара.

Методические рекомендации по организации и выполнению самостоятельной работы студентов

При изучении дисциплины рекомендуется использовать следующие формы самостоятельной работы:

– выполнение индивидуальных разноуровневых заданий;

– подготовка сообщений, тематических докладов, презентаций по заданным темам;

– составление тематической подборки литературных источников, интернет-источников;

– проработка тем (вопросов), вынесенных на самостоятельное изучение.

Номер раздела, темы	Название раздела, темы, занятия	Количество аудиторных часов			Количество часов УСР	Форма контроля знаний
		Лекции	Практические занятия	Лабораторные занятия		
	промышленном и коммерческом секторе»					тест
	3 семестр					
4.1	Практическое занятие № 1 «Виды альтернативных источников энергии»		6		89	лексико-грамматический тест
	4 семестр					
5.1	Практическое занятие № 2 «Производство ядерной энергии»		4		55	лексико-грамматический тест

Средства диагностики результатов учебной деятельности в соответствии с критериями, утвержденными Министерством образования Республики Беларусь

Оценка уровня знаний студента производится по десятибалльной шкале.

Для оценки достижений студента рекомендуется использовать следующий диагностический инструментарий:

- устный и письменный опрос во время практических занятий;
- собеседование при проведении индивидуальных и групповых консультаций;
- выступление студента на конференции по подготовленному реферату;
- сдача зачета по дисциплине;
- сдача экзамена по дисциплине.
- выполнение лексико-грамматических тестов.

Учебная программа (рег. номер УД-ФТУГ09-21/уч. от 30.06.2023) пересмотрена и одобрена на заседании кафедры «Иностранные языки» (протокол № 9 от 12.04. 2024 г.)

Заведующий кафедрой
канд.пед. наук, доцент
(ученая степень, ученое звание) _____ (подпись) О.В. Веремейчик (И.О. Фамилия)

УТВЕРЖДАЮ
Декан факультета
канд.пед. наук, доцент
(ученая степень, ученое звание) _____ (подпись) Г.М. Бровка (И.О. Фамилия)

KEYS
Test 1

1.

1-i, 2-g, 3-b, 4-h, 5-f, 6-c, 7-j, 8-e, 9-d, 10-a

2.

1. electricity 2. power 3. purpose 4. advanced 5. strength 6.use
7. collect 8. distribute 9. essential 10. potential

3.

Scale (a)

plant (b)

store (b)

4.

1. True - Solar power is considered a renewable energy source.

2. False - The power grid is essential for the distribution of electricity.

3. False - Capacity refers to the amount of electricity used, not the speed at which it travels.

4. True - Nuclear energy produces zero greenhouse gas emissions during electricity generation.

5. True - Energy storage technologies, such as batteries, play a crucial role in balancing the supply and demand of electricity.

6. False - Wind power is an example of renewable energy.

7. True - The power grid is essential for the distribution of electricity.

8. False - Capacity refers to the amount of electricity used, not the speed at which it travels through wires.

5.

1.	A	10.	the
2.	the	11.	the
3.	the	12.	the
4.	the	13.	a
5.	the	14.	the
6.	the	15.	the
7.	the	16.	the
8.	the	17.	an
9.	the	18.	the

6.

1-c 2-d 3-a 4-b 5-e

1 What are you doing to reduce your energy consumption at home?

2 Why are they installing solar panels on the roof of that building?

3 What is causing the wind turbines to spin so fast?

4 How much electricity is this wind farm generating?

5 Are you considering switching to an electric car?

6 What renewable energy sources are being used in your community?

7 Is your city investing in renewable energy projects?

8 How are you contributing to the transition towards a more sustainable energy system?

9.

1. Do you know much about the power business?
2. The power plant produces enough electricity to power a small town.

3. The power business sector deals with the generation and distribution of electricity.

10.

1. b) aren't they

2. b) will

3. b) by

4. b) were

5. b) of

6. b) be needing

7. c) were to provide

8. b) at, on

9. a) doesn't

10. b) our

Test 2

1.
Renewable, or regenerative, "green" energy is energy from energy resources that are renewable or inexhaustible **on** a human scale. The basic principle **of** using renewable energy is to extract it **from** processes constantly occurring in the environment or renewable organic resources and provide **it** for technical use. Renewable energy **is** obtained from natural resources **such as** sunlight, streams of water, wind, tides and geothermal heat, which **are** renewable (replenished naturally), as well as from biofuels: wood, vegetable oil, ethanol.

3.
F,F,T,F,F

4.
смягчение последствий , домохозяйства, возрастающий, загрязнение, общемировой, поставка, позволяющий, потребление , крупномасштабное , сельское

5.
solar energy, water energy, wind energy, wood biomass energy, draft energy of cattle

6.
1.Solar energy is produced using solar panels.
2. Gas, coal and oil are not renewable energy.
3. Renewable energy sources will never disappear.
4. Humanity is developing renewable energy sources.
5.Hydro power plants produce a lot of electricity.

8.

1. Solar energy is an inexhaustible source of energy.
2. The reserves of gas, oil, coal and modern forms of nuclear energy are not unlimited.
3. Solar energy can be divided into three main groups.
4. Solar heat has been used for heating for many centuries.
5. A device with multiple moving parts that uses the sun's rays is called a passive solar generator.
6. Since the 1970s, passive solar heating has become widely known to house designers.
7. Active solar water heating includes tubes mounted on panels and installed on roofs of houses.
8. The water that passes through the tubes heats the houses and is used as a hot water supply.
9. Since the 1970s, the number of active solar installations has steadily increased.
10. The main technical problem of active solar installations is water leakage from pipes.
11. To date, the number of solar power plants is quite small.

9.

1.No
2.Yes
3.Solar energy is a renewable energy source.
4. Yes
5. Yes
6. in the 1970s
7. Active solar heating and solar hot-water heating are variations on one theme, differing principally in cost and scale
8. They depend on the weather,also water leak and air blockage.
9. Yes
10. Yes

10.
1-a 2-c 3-a 4-b 5-b 6-a 7-b 8-b,c

Test 3

1

1. B___2. A___3. B

2.

1. D___2. E___3. G___4. C___5. F___6. B___7. A

3.

1. E___2. C___3. D___4. A___5. F___6. B

4.

1. C___2. A___3. E___4. B___5. D

5.

1. Depletable 2. Produces 3. Provides 4. Drilling

6.

1. Lived 2. Decays 3. Have been 4. Was 5. Was

6. Has become 7. Burns 8. Produces

7.

1. Ancient plants 2. Air pollution 3. Non-renewable resources

8.

1. Nature 2. Efficiency 3. Independence 4. Reliability 5. Classification 6. Transformation 7. Pollution 8. Conversion 9. Difference 10. Production

9.

1. Transform 2. Run machinery 3. Caused more environmental damage

4. Reduces, pollution 5. Consume it

Test 4

1.

s	y	p	p	l	y	o	c	w	i	c	b
i	g	s	a	i	d	v	o	a	n	k	e
a	r	p	f	a	i	z	n	k	s	h	g
s	h	e	x	b	z	f	s	r	u	e	y
u	q	t	c	i	s	s	u	e	r	l	b
x	r	e	n	l	p	u	m	w	a	p	m
h	q	e	f	i	z	b	e	a	n	l	s
s	k	m	e	t	e	r	r	t	c	i	f
e	d	c	k	y	a	u	h	t	e	n	w
c	o	n	s	e	q	u	e	n	c	e	s

2.

1)of 2)with 3)for 4)to 5)in 6)to 7)of 8)on
9)to 10)in 11)in 12)with 13)on 14)by 15)of
16)in 17)with 18)of 19)for

3.

1.
benefit
2. circumstance
3. issue
4. decline
5. supplier
6. supply
7. meter
8. helpline
9. consequences
10. liability
11. insurance
12. outage

6.

1e
2b
3c

4d
5a
6g
7f

7.

1.He went into great technical detail
about power surges and outages in the surrounding areas.
2.Can you switch your gas or electricity
supplier in your country?
3.I had to call the tech support helpline to troubleshoot the issue with my meter.

8.

T- 1. The symbol for current is I.
F - 2. The electric current can flow only through liquids.
T - 3. The current can be of two types: direct current and alternating current.
F- 4. The alternating current flows in one direction.
T - 5. A battery is the simplest source of power for the direct current.
T - 6. Direct current finds wider application than alternating current.
F - 7. Electrolytes don't change greatly when current passes through them.
T - 8. One of the great advantages of alternating current is the ease with which voltage can be changed.

9.

1B	2C	3C	4B	5C	6B	7C	8A	9A	10C

10.

By the time you recieve this letter I will have finished my final exams. He was writing 3 reports on an accident when his mother called.I don’t think I will have done these exercises by 3 o’clock. He was looking forward to a good meal at home, but Jill had gone out. Your house looks nice. Did you paint it? After we had discussed all details on the phone I wrote a letter about it. Before my 18th birthday I haven't been out of England. It is the easiest job I have ever had. I feel better after I have taken the medicine. I haven't been there for ages. She will have tidied up the flat before he comes. I was late. The teacher had already given a quiz when I came into the classroom. The workers will have shipped the goods before the telegram arrives. I am here for an hour. Where have you been? When I got to the station, the 9 o’clock train had already left.

Test 5

1.

1. energy efficiency
2. portfolio

3. comparative
4. airtightness mold
5. comparative
6. fossil fuels

2.

1. I will be the chief energy and safety engineer.
2. The transition to a new technological basis for energy development has already begun.
3. When did Rob start working as an energy manager?
4. I must say that our company has very high energy.
5. William works in the energy industry and travels all over the world.
6. A functioning energy management system helps reduce costs.

3.

1. whose
2. where
3. when
4. who
5. who
6. whose
7. where

4.

1. go
2. is wearing
3. haven’t slept
4. tastes
5. have been playing
6. am going

5.

1. a,the
2. -,-
3. the
4. an

6.

1. holes

2. fresh
3. cold
4. efficiency
5. projects
6. improvements
7. fuels

7.

1. false
2. true
3. false
4. true
5. false
6. false

8.

1. Last year I traveled to China.
2. Did you have dinner last night?
3. I forgot to make my bed this morning.
4. They saw a movie yesterday.
5. We wanted to go to out, but it started raining.
6. We stayed at Grand Hotel when we were in Venice.
7. Who gave you this book about energy?

9.

1. energy efficiency
2. pollution
3. converting
4. reliability
5. product
6. compactness

10.

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.

Test 6

1.

1. A student of physics **a physicist.**
2. A student of biochemistry **a biochemist.**
3. A student of biophysics **a byophysicist.**
4. A student of radiology **a radiologist.**
5. A student of microbiology **a microbiologist.**
6. A student of physiology **a physiologist.**
7. A student of theoretical science **a theoretical scientist.**
8. A student of psychology **a psychologist.**
9. A student of mathematics **a mathematician.**
10. A student of languages **a linguist.**
11. A man doing experimental work **an experimental worker.**
12. A student of medicine **a medic.**

2.

Hydroelectric power (1) ….. **is** actually the most widely used renewable energy resource in the world. The first hydro project (2) ….. **powered** just one single lamp in the late 1800s. More (3) ….. **came** on board soon after. By the turn of the 20th century, use because much more preferred all around the world. Right now, China, the US, and Brazil (4) ….. **lead** the way in hydro capacity. Hydro (4) ….. **is considered** a great base load source, and it can also be a great peak load source. Every state in the US actually (5) ….. **has** some form of hydro. There are some states that (6) ….. **get** a majority of their power from it. Washington state (7) ….. **is** one of them. Let's hear from a Washington utility that (8) ….. **is known** for their hydro generation. – I (9) ….. '**m** Pat McCarty. I (10) ….. '**m** the generation manager for Tacoma Power.

3.

1.The nucleus are surrounded by electrons. 2. Chemical reactions are affected by heating. 3. High pressure in the chamber is maintained by high temperature. 4. High reaction is rated by hating accounts. 5. This idea is demonstrated by several examples. 6. Marked changes in the cell are caused by irradiation. 7. These particles are separated by centrifugation. 8. These phenomena

is studied by many laboratories. 9. This process is affected by low temperature. 10. Purification is followed by heating of the mixture.

4.

1. transform energy resources
2. run the various machines
3. cause more environmental damage
4. reduce pollution
5. consume energy

5.

1. Cars, planes, trolleys, boats, and machinery also **transform energy** into work.
2. There are many sources of energy that help **to reduce pollution** invented by man.
3. In the past century, it became evident that the consumption of non-renewable sources of energy had **caused more environmental damage** than any other human activity.
4. Their use significantly **reduced** chemical, radioactive, and thermal pollution.
5. The main problem isn't that we use energy, but how we produce and **consume energy**.

Test 7

1.

Tacoma is a municipal electric utility that(1) ….. **is owned** by the citizens of Tacoma. We (2) ….. **serve** about 170,000 people in Tacoma and the greater Tacoma area. And back in 1912, they (3) ….. **built** the first hydroelectric plant that (4) ….. **served** the citizens of Tacoma on the Nisqually River. It (5) ….. **was** a 24 megawatt project. Shortly after that, they (6) ….. **decided** they (7) ….. **needed** more power to fuel the industry that (8) ….. **was growing** in Tacoma. And they (1) ….. **ventured** out to the slopes of the Olympic mountains and (9) ….. **built** the Cushman Hydroelectric Project. In 1926, when it first (10) ….. **came** online, it (11) ….. **was** a big deal. It was so big that Calvin Coolidge, back in the White House, (12) ….. **pressed** the button, symbolically sending the electrons from the Cushman Dam to Tacoma.

2.

1) Исследование завершено. 2) Изменения наблюдаются достаточно хорошо. 3) Звук регистрируется с помощью этого прибора. 4) Эти условия поддерживаются на протяжении всего эксперимента. 5) Это отклонение

связано с потерей энергии. 6) Этот факт объясняется законом сохранения. 7) Эта формула легко выводится из уравнения. 8) Эти изменения объясняются ионизацией. 9) Дефекты легко обнаруживаются с помощью рентгеноструктурного анализа. 10) В данном случае эти требования оправданы.

3.

In many parts of the world, Max factor **has become** the famous brand of cosmetics. Yet few people know that Max factor, who was born in Poland in 1877, is also the name of the inventor of those cosmetics. Apparently, it was while Max **was working** as an apprentice to a pharmacist, mixing all kinds of portions, that he **developed** an interest in cosmetics.

He **was living** in Moscow when he **opened** his own shop, selling a range of handmade cosmetics.

The story goes that one day, some members of the Russian nobility **noticed** the beautiful make-up worn by some traveling theatre actors who **were performing** for them. So they **appointed** Max Factor the cosmetic expert for the royal family. In 1904, Factor **immigrated** to the USA. He **created** a new kind of make-up for cinema actors in Los Angelos, where he lived. By the time he **introduced** his products to the public, all major actresses **were visiting** his salon.

4.

1. Green Engineering is the use of natural **measurement** and control techniques to design, develop, and improve products and technologies resulting in **advanced** and economic benefits.
2. We now have **alternative** technologies that enable us monitor and manage our (bio-)systems, reduce the **greenhouse** gases we emit, lower the amount of energy we consume, and thereby reduce our costs while benefiting our planet.
3. We no longer have to rely on **general-purpose** computers to sense, monitor, analyze, and control our environment.
4. They are involved in developing and maintaining **alternative** stations and the machinery used in **power** energy sourcing and production.
5. Engineers are concerned with the production of energy through **affordable** resources such as the sourcing and use of wind, solar and wave power.

5.

1. to include d. contain, consist of
2. to increase e. enlarge, raise
3. to allow g. let, permit
4. to install c. establish, set up, fix
5. natural f. usual, normal, ordinary
6. rural b. countryside, pastoral
7. advanced a. highly developed, complex

Test 8

1.

1. Jim **threw** the ball to Sue who **caught** it.
2. Ann **spent** a lot of money yesterday. She **bought** a suit which **cost** $100.
3. The film **was** so boring that we both walked out.
4. Last year we **won** a TVset on the lottery.
5. Mary **chouse** to study medicine because she wanted to help people.

2.

It might surprise you to know that hydro and coal fire plants (1) ….. **produce** electricity pretty similarly. Hydro power (2) ….. **is produced** the same way. It (3) ….. **harnesses** the natural energy from falling and flowing water, that (4) ….. **is** what a hydroelectric project is. And it (5) ….. **does** that by capturing that water, sending it through a hydraulic turbine that (6) ….. **spins** that (7) ….. **turns** a generator to produce clean, green, renewable, and cost effective power for our citizens. There (8) ….. **are** actually three types of hydro plants. The most common (9) ….. **uses** a dam and is called impoundment. Another (10 ….. **is called** diversion, and as the name suggest, this is where a portion of the river(11) ….. **is channeled** through a canal. There might or might not be a dam. The third kind (12) ….. **is called** pumped storage, and it (13) ….. **works** like a battery. It (14) ….. **stores** the electricity that (15) ….. **is created** by another power source, like solar, wind, or nuclear. Water (16) ….. **is pumped** uphill, and when energy demand is low, it (17) ….. **stays** there. When there's a high demand, it (1) ….. **is released** back downhill, and that's what (18) ….. **turns** the turbine. Hydro(19) ….. **is** one of the most efficient energy sources, and there **are** no emissions in using it, and the cost (20) ….. **is** pretty low. In fact, areas with a lot of hydro in the mix (21) ….. **tend** to have some of the lowest electric bills.

3

1. The research **has shown** that most internet surfers are women.
2. How long you (be) in Canada? – I **have been studing** here for more than three years.
3. I **have known** her all these years and I have never been bored with her company.
4. She **has been doing** the cross-word since morning.
5. You are exhausted. What have you **been doing**?
6. Julian is a journalist. He **has been writing** for The Times for 4 years.

4.

Tom and Mary have been building a house (1) ***for*** two years. They have been dreaming of finishing it (2) ***since*** last summer but they have been having problems (3) ***for*** a few months because of the weather. In fact it has been raining and snowing (4) ***since*** October so they haven't been able to put the roof on yet.

This weekend they are trying to put in the windows. They have only been working (5) ***since*** 8 o'clock but they feel like they've been doing it (6) ***for*** hours because it is very difficult. They have been saving up (7) ***for*** a long time but they haven't been able to hire any workmen yet.

5.

1 e.
2.c.
3.a
4.d
5.f
6. b

6.

1.**Waste** anything rejected as useless, worthless, or in excess of what is required
2. **Barrel** a unit of capacity used in the oil and other industries
3.**Mining** the act, process, or industry of extracting coal, ores, etc., from the earth
4.**Sustainable** capable of being maintained at a steady level without exhausting natural resources or causing severe ecological damage

Test 9

1.

l) Working contacts **are kept** with other laboratories.
2) Limitations **are set** on the bulk and cost of the machine.
3) The electric current **is cut off**.
4) The need **is felt** to introduce changes in the program.
5) An international centre **is set up** for joint research.
6) A comparison **is made** between the results.
7) Some information **is lost** in data processing.
8) The substance **is ground** into powder.
9) Attention **is paid much** to the development of fundamental research.
10) The meetings **are held** of the society regularly.
11) The atoms **are bound** firmly in a molecule.

2.

1. (**2) as tasty as.**
2. (**4) slowly.**
3. (**2) worse.**
4. (**2) near.**
5. (**4) the least.**
6. (**1) highly**.

3.

1 We make work and use all energy to do movements.
2. Motion Energy is stored of the energy movement in objects.
3. Wood fuel can be used for cooking and heating.
4. Coal is take a nonrenewable energy source because it create to millions of years.
5. The **composition of** different natural gas localities varies.

4.

1. He used …**1) to play** football when he was younger.
2. Mr. Smith prefers … **1) to do** everything in time.
3. Mary, did you remember…**2) to pack** some spare disks for my mp3 player?
4. I like …**1) playing** badminton.
5. The doctor asked him to …**2) raise** his left hand and show his fingers.

5.

1. (2) they had got salary.
2. (2) had told her.
3. (1) we were going.
4. (1)hadn't wanted any help.

6.

1. Natural gas is a … **natural mixture** of gaseous hydrocarbons found issuing from the ground or obtained from specially driven wells.
2. Toward the latter part of the 19th cent., large … **industrial** cities began to make use of natural gas, and … **extensive** pipeline systems have been constructed to transport gas.
3. The … point of natural gas is extremely low.
4. Coal is a … **combustible** black or brownish-black sedimentary rock composed mostly of carbon and hydrocarbons.
5. For millions of years, a layer of … **dead** plants at the bottom of the swamps was covered by layers of water and dirt, trapping the energy of the dead plants.
6. … **bituminous** coal is used to generate electricity and is an important fuel and … **raw** material for the steel and iron industries.

Test 10

1.

9. technological
10. absorption
11. desiccant

12. commercial
13. compact
14. integrated
15. formaldehyde
16. multitude

2.

1. photocell
2. concern
3. evaporate
4. inexhaustible
5. elevation
6. low-impact
7. to spin
8. viable
9. absorb
10. to capture

3.

1. where
2. which
3. why
4. where
5. when
6. why
7. which

4.

1. The cells may be damaged by this radiation dose. 2. .The process may be catalysed by this substance. 3. Such changes may be brought about by environmental factors. 4. The course of the reaction may be affected by the conditions. 5. A marked effect may be produced by the structural changes. 6. The discrepancy in the results may be accounted for by this defect. 7. Energy may be accumulated by these organelles. 8. An unknown factor may be involved by this mechanism. 9. Ionization may be produced by ultraviolet radiation.

5.

1. Hydroelectric plants are more efficient at providing for peak power demands **during** short periods than are nuclear power plants.
2. We can drive **off** the Rhine to the south of Germany.
3. She was so angry, she threw the keys **at** me.
4. Let's get **in** the motorway and get something to eat.

5. Put the rubbish in the bin **under** the sink.
6. There's a helicopter flying round **above** the school.
7. I don't want to live **next to** the airport as the noise would be awful.
8. The managers have business meetings **at** breakfast.
9. The world changed **along** the last century.
10. I last saw him **on** Thursday afternoon.

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