

Further Education Course Energy English

Extract: Renewables 1 Wind and Solar Energy

CENTER FOR TECHNOLOGY-ENHANCED LEARNING (ZML)



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Legal notice

Extract from Unit 3: Renewables 1 – Wind and Solar Energy

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1 General Information

This is an extract of Unit 3 – Renewables 1 from the further education course "Energy English". It will give you a first impression of what the online course looks like inside. Unlike our other courses, there are no lecture notes as a paper text in this course. All course material is provided online and will be accessible via our learning platform, the virtual class room. Furthermore, many of the exercises are designed for online use and will be corrected automatically. There are also some exercises to be sent in, which will be corrected individually by the tutor, such as audio files or written texts.

Please note that this extract is the print version of an online course – we're showing you screenshots of some of the course material. We hope you like your first look inside and would be pleased to welcome you in our next course of 'Energy English'!

Yours sincerely,

Beschka Siehl
(course coordinator)

2 Renewables 1: Wind And Solar Energy

2.1 Introduction

Read the following text about renewables first.

Renewable energy originates from resources that are practically inexhaustible in relation to human needs. For instance, the sun, as the source of solar and most other forms of renewable energy, will continue to shine for some billions of years. Strictly speaking, however, the term “renewable” is not correct, as energy can neither be consumed nor renewed: according to the law of the conservation of energy, the total energy of a closed system remains constant. Using renewable energy therefore means partly redirecting natural energy flows to make them usable for human purposes.



Figure 1: Wind Energy Plant 1

Fossil fuel reserves like coal, petroleum and natural gas are limited in their future availability. Moreover, their use makes many European countries dependent on imports. They are also associated with significant CO₂ emissions and thus contributes to global warming. An increase in the use of renewable energy as a proportion of total energy use is therefore planned in Europe and worldwide.

Renewable energy, also referred to as sustainable energy, saves resources and protects the climate. However, some forms of it are not available for energy generation on a steady basis, but are instead subject to considerable fluctuations depending on the time of day, season and region: the sun does not always shine, nor does the wind always blow. Only renewable biomass and geothermal energy can be used to supply base load power, i.e. to ensure continuous supply.

In the future, renewable energy will contribute significantly to the energy mix. It will be important to combine those forms of renewable energy that fluctuate in availability, like solar and wind power, with resources capable of supplying base load power. So-called "hybrid power plants", which make use of various energy resources, might be a feasible solution. Such power plants may work with solar thermal energy during the day and with geothermal energy during the night. It may also be possible to combine this with biomass power.

2.2 Word Fields 1

One word does not fit with the other three. Decide and click on the word. Consult a dictionary if necessary:

1. inexhaustible , endless , boundless , limited
2. save , consume , use , deplete
3. constant , sustained , changing , persistent
4. gas , petroleum , biomass , oil
5. resource , reservoir , stockpile , outlay
6. distribute , contribute , supply , furnish
7. proportion , size , percentage , part
8. different , various , diverse , homogeneous
9. diminish , expand , increase , enlarge
10. sustain , perpetual , remit , prolong

Check solution

Figure 2: Screenshot exercise „Word Fields 1“

2.3 Vocabulary 1

Complete the following sentences using words or collocations from the list.

Complete the following sentence using words or collocations from the list.

words: energy mix, solar, renewable energy, subject, base load, Hybrid, closed, emissions, fossil fuels, biomass, wind

1. CO₂ contribute to global warming.
2. In the future, renewable energy will contribute to the country's .
3. A term sometimes used for sustainable energy is .
4. Some forms of energy such as the wind blowing or the sun shining are to high fluctuations.
5. The term refers to the constant load needed by a system to cover minimum needs.
6. The text states that only or geothermal energy can be used to supply the base load.
7. power plants make use of various energy forms.
8. According to the laws of energy, in a system energy is neither produced nor lost.
9. Neither nor energy is constant enough to provide for the baseload.
10. The main or sole use of makes many countries dependent upon the import of energy sources.

(70% of the possible score must be achieved)

Figure 3: Screenshot exercise „Vocabulary 1“

2.4 Renewables – Facts And Figures

Study the charts which illustrate the use of renewables in the European Union 27 in 1990, 2000 and 2010. The unit used is TWh (Tera Watt hours).

(Source: European Energy Commission, Energy Statistics)

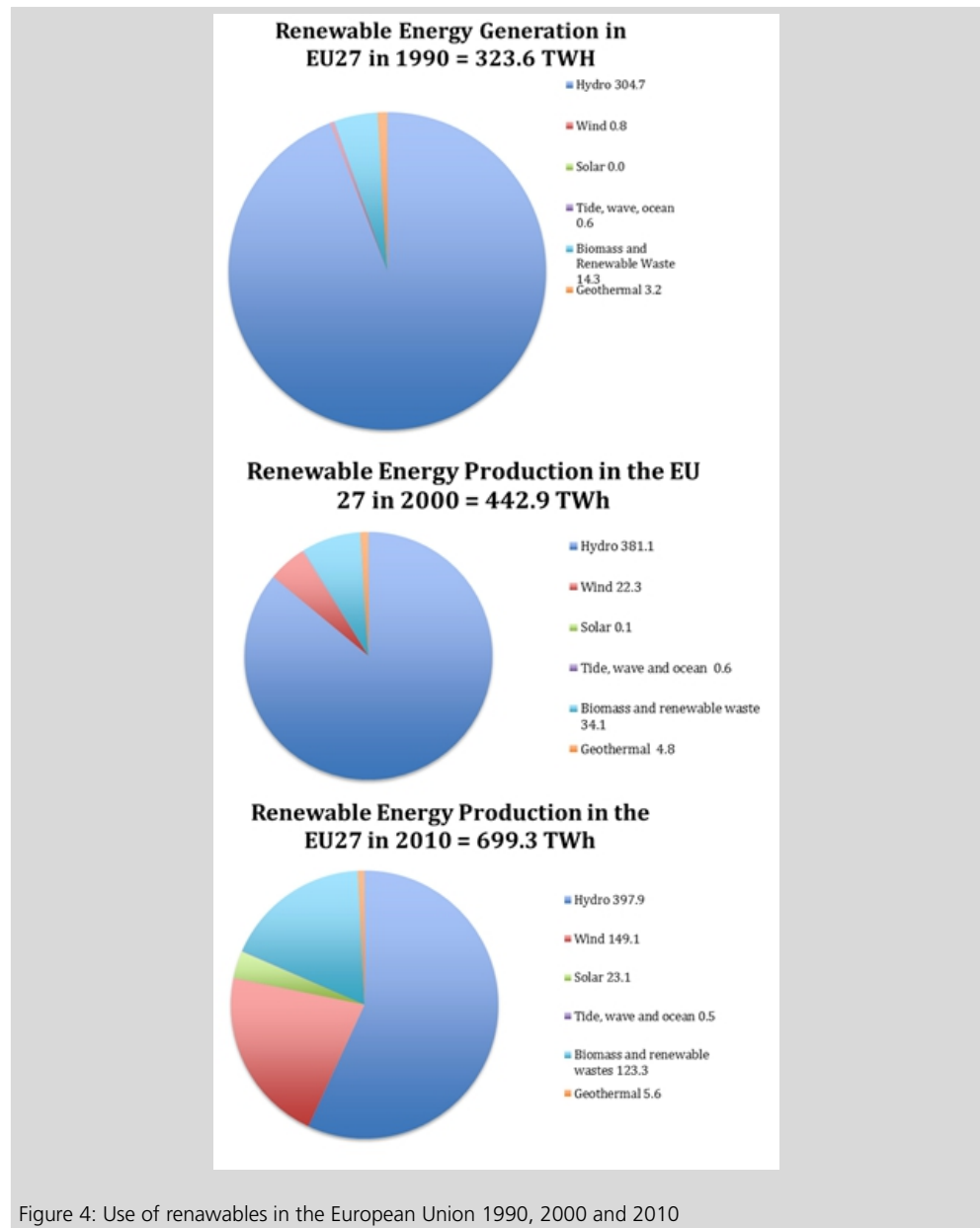


Figure 4: Use of renewables in the European Union 1990, 2000 and 2010

2.5 Vocabulary 2: Languages Of Change And Dates

Based on the information provided in the charts, complete the below sentences by selecting the correct word from the two words in brackets.

1. The total production of renewable energy has more than (**doubled/tripled**) between 1990 and 2010.

2. Geothermal energy generation (**increased/rocketed**) between 1990 and 2010.

3. The proportion of energy by hydroelectric production generation (**has remained constant/has dropped**) in the given time span.

4. Wind energy has experienced a (**dramatic upturn/dramatic leveling off**) in the twenty years examined.

5. Tide wave and ocean energy are of (**little significance/high relevance**) for renewable energy in the EU27.

6. Solar energy experienced the highest rise during the time period (**1990-2000/2000-2010**).

7. The amount of biomass and renewable waste contribution to energy production has nearly (**tripled/quadrupled**) from 2000 to 2010.

8. Wind energy generation has increased by 560% in the period between (**1990-2000/2000-2010**).

9. Although hydroelectric production has constantly increased between 1990 and 2010, its proportion of the total renewable production has decreased the most between (**1990 to 2000/2000 to 2010**).

10. The increase of (**solar/wind** energy) production was the highest between 2000 and 2010.

(70% of the possible score must be achieved)

Figure 5: Screenshot exercise „Vocabulary 2“

2.6 Speaking Exercise

Prepare a five minute discussion of the three charts in which you compare them using the language of change (see Grammar Section).

Preparation and execution time 30-40 minutes.

[At this point, the online version of the course provides a voice recorder]

2.7 TED Talk: The Missing Link To Renewable Energy

The production of renewable energy is always bound to the possibility of storage. This was discussed in Unit 1 Chapter 4.

Listen to the TED talk given by Donald Sadoway in which he discusses the missing link to renewable energy. Try to first listen with subtitles and, if needed print out the transcript and read along.



Source: http://www.ted.com/talks/lang/en/donald_sadoway_the_missing_link_to_renewable_energy.html

If required, download the transcript from: TED Talk_Donald_Sadoway.pdf

Listening Comprehension

Now listen to the text again and decide if the following statements are true or false:

1. Electricity demand must not be in constant balance with electricity supply.

True. False.

2. According to Sadway, a giant battery could help solve the problem of intermittency.

True. False.

3. The battery was invented about 200 years ago in Padua by Alessandro Volta.

True. False.

4. A side effect of the invention was that it showed that professors could be useful for something - an unknown thought at that time.

True. False.

5. Presently there is no battery available which meets the performance requirements of the grids: uncommonly high power, long service lifetime and super-high cost.

True. False.

6. To make a battery cheap it needs to be made of raw earth materials.

True. False.

7. A second criterion is that the manufacturing techniques should be as simple as possible to reduce costs.

True. False.

8. The battery first invented by Sadway is all liquid.

True. False.

9. The first battery produced by this Sadway's research has the capacity of a one watt hour cell.

True. False.

10. The latest battery mentioned in the talk is 14 inches in diameter and has a capacity of one kilowatt-hour.

True. False.

11. A two million watt hours battery is envisioned which would supply the needs of approx. 200 American households.

True. False.

12. Sadway ignored some of the conventional wisdom used in inventing.

True. False.

13. He also believes that mentoring is a possibility to minimize human potential.

True. False.

Figure 7: Screenshot exercise „Listening Comprehension“

Vocabulary 3

Match the following words with their respective explanations or synonyms.

The screenshot shows a digital interface for a vocabulary exercise. At the top, there are four yellow boxes containing the words: 'straightforward', 'to elevate', 'device', and 'intermittency'. Below these is a large area with several dashed-line boxes containing definitions and synonyms. An orange arrow points from the 'device' box to the definition 'an object or a machine which does a p...'. The definitions include: 'the state of not being constantly ava ...', 'a state of being in opposition to con ...', 'a special method of doing something', 'an object or a machine which does a p...', 'not to waste', 'honest or clear', 'to put on top of each other, building ...', and 'to make something last longer'. The interface also features a question mark icon, a search icon, and a scroll bar.

Figure 8: Screenshot exercise „Vocabulary 3“

Vocabulary 4

Match the following words with their respective explanations or synonyms.

The screenshot shows a digital interface for a vocabulary exercise. At the top, there are four yellow boxes containing the words: 'pace', 'hearken', 'evolution', and 'abundance'. Below these is a large area with several dashed-line boxes containing definitions and synonyms. An orange arrow points from the 'evolution' box to the definition 'the gradual process of change'. The definitions include: 'a furnace used to extract metal from ...', 'the first or at the beginning', 'to make better', 'liquid state of metal', 'the gradual process of change', 'rate, speed', 'to produce words', 'to make something larger in size', and 'in great supply'. The interface also features a question mark icon, a search icon, and a scroll bar.

Figure 9: Screenshot exercise „Vocabulary 4“

Vocabulary 5

Use the words from the list to fill the gaps. The grammatical form of the word must fit the blank.

1. The investors of the wind park project want a [] approach to be used, including state-of-the-art [] so that the project can develop at a quick pace from the [] stage.

2. Wind parks and solar plants produce electricity with [].

3. The [] helps produce the [] metal needed [] the production.

4. There is an [] of renewable sources that can be used [] the Earth.

5. The various components of the [] must be [] in order to function.

6. The owners of the plant were [] to follow the regulations of the government.

7. The utility company has to [] the cooling towers in order to comply with the regulators' requirements.

8. Simultaneously, the roof of the plant must be [].

9. The licensing process has been long and [].

10. The head engineer always thought differently than the others - his [] has often gotten him into trouble.

(70% of the possible score must be achieved)

Figure 10: Screenshot exercise „Vocabulary 5“

2.8 Renewable Energy

The following text discusses renewable energy.

Read it and look up any new or unfamiliar words in a dictionary.

Renewable energy flows involve natural phenomena such as sunlight, wind, tides, plant growth, and geothermal heat, as the International Energy Agency explains:

Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun, or from heat generated deep within the earth. Included in the definition is electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels as well as hydrogen derived from renewable resources.



Figure 11: Wind Energy Plant 2

Renewable energy resources and significant opportunities for energy efficiency exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries. Rapid deployment of renewable energy and energy efficiency and technological diversification of energy sources would result in significant energy security and economic benefits.

Renewable energy replaces conventional fuels in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services:

- Power generation. Renewable energy provides 19% of electricity generation worldwide. Renewable power generators are spread across many countries, and wind power alone already provides a significant share of electricity in some areas: for example, 14% in the U.S. state of Iowa, 40% in the northern German state of Schleswig-Holstein, and 20% in Denmark. Some countries get most of their power from renewables, including Iceland and Paraguay (100%), Norway (98%), Brazil (86%), Austria (62%), New Zealand (65%), and Sweden (54%).
- Heating. Solar hot water makes an important contribution to renewable heat in many countries, most notably in China, which now has 70% of the global total (180 GWh). Most of these systems are installed on multi-family apartment buildings and meet a portion of the hot water needs of an estimated 50–60 million households in China. Worldwide, total installed solar water heating systems meet a portion of the water heating needs of over 70 million households. The use of biomass for heating continues to grow as well. In Sweden, national use of biomass energy has surpassed that of oil. Direct geothermal for heating is also growing rapidly.
- Transport fuels. Renewable biofuels have contributed to a significant decline in oil consumption in the United States since 2006. The 93 billion liters of biofuels produced worldwide in 2009 displaced the equivalent of an estimated 68 billion liters of gasoline, equal to about 5% of world gasoline production.

In international public opinion surveys there is strong support for promoting renewable sources such as solar power and wind power, requiring utilities to use more renewable energy (even if this increases the cost), and providing tax incentives to encourage the development and use of such technologies. There is substantial optimism that renewable energy investments will pay off economically in the long term.

Adapted from: Wikipedia

Reading Comprehension 1

1. Renewable energy _____ 19% of electricity generation worldwide.

- provides
- produces
- gives

2. In Iowa, a state in the USA, 14% and in Schleswig-Holstein, in Northern Germany, 40% of the electricity _____ from wind.

- comes
- come
- comes

3. The amount of energy supplied by renewable sources is ___ in Norway than in Sweden.

- high
- higher
- higher

4. A considerable drop in oil consumption in the United States has occurred ____ 2006.

- by
- from
- since

5. Renewable energy _____ conventional fuels in many areas.

- replaces
- revives
- rejuvenates

Figure 12: Screenshot exercise „Reading Comprehension 1“

Grammar 1: Word Forms

The text contains many common terms used in energy in different forms.

Please complete the following table.

Noun (state)	Noun (person)	Verb	Past	Participle	Adjective	Adverb
concentration	/./	to concentrate	concentrated	concentrated		
	consumer	to consume	consumed	consumed		
contribution contributiveness	contributor	to contribute		contributed	contributed contributive contributable	
decline		to decline	declined	declined	declinable	
	/./	to deploy	deployed	deployed		
derivation		to derive	derived	derived		
diversification		to diversify	diversified	diversified	diversified	
estimation		to estimate	estimated	estimated		
existence		to exist	existed	existed		
flow flowability	/./	to flow			flowing	
generation		to generate	generated	generated	generating	
	grower	to grow		grown	growing	
	/./	to include	included	included	inclusive included includable	
investment		to invest	invested	invested	invested	
		to provide	provided	provided	provided providable	
replacement	/./	to replace	replaced	replaced	replaced	
	replenisher	to replenish	replenished	replenished	replenished	
requirement		to require	required	required		
	user	to use	used	used	used	

Figure 13: Screenshot exercise „Grammar 1: Word Forms“

Grammar 2

Place the correct form of the word in the blank. The infinitive stem is provided in brackets.

1. Renewable energy from natural processes. (derive)

2. Renewable sources constantly . (replenish)

3. Geothermal energy comes from heat deep within the Earth. (generate)

4. Rapid of renewable energy could result in higher energy security. (deploy)

5. Renewable energy is a for convention fuels in several areas. (replace)

6. The use of renewable biofuels to a significant reduction of oil in the United States. (contribute /consume)

7. Surveys show that there is strong public support for utilities to use more renewable energy. (require)

8. The government sometimes tax incentives to encourage the use of renewable energy. (provide)

9. Many have spent money on buying share of renewable energy companies. (invest)

10. Businesses that deal with renewables quickly. (grow)

(70% of the possible score must be achieved)

Figure 14: Screenshot exercise „Grammar 2“

Grammar 3: Prepositions

If necessary, review the rules for prepositions in the grammar sheets before completing this exercise.

[At this point, the online version of the course provides two grammar sheets]

1. Renewable energy is derived natural sources.

2. Geothermal energy relies on deep the earth.

3. Many people question if renewable energy will pay off the long run.

4. Sweden, the biomass has surpassed that oil.

5. Heating water heating systems meets the needs of over 70 million households worldwide.

6. 2006 there has been a oil consumption the United States.

7. Wind is now making an important contribution the production renewable energy.

8. The use biomass heating is constantly growing.

9. Some countries Iceland, Paraguay, Norway, Brazil, Austria and Sweden get more than 50% their power renewables.

10. 2009 68 billion liters gasoline were replaced by biofuels.

(70% of the possible score must be achieved)

Figure 15: Screenshot exercise „Grammar 2“

Grammar 4: Regular And Irregular Verbs

Decide if the following verbs are regular or irregular and give the past and past participle in the blank provided:

Bare Infinitive	Regular/Irregular	Past	Past Participle
to arise	<input type="text"/>	<input type="text"/>	<input type="text"/>
to be	<input type="text"/>	<input type="text"/>	<input type="text"/>
to bear	<input type="text"/>	<input type="text"/>	<input type="text"/>
to choose	<input type="text"/>	<input type="text"/>	<input type="text"/>
to contribute	<input type="text"/>	<input type="text"/>	<input type="text"/>
to cost	<input type="text"/>	<input type="text"/>	<input type="text"/>
to deploy	<input type="text"/>	<input type="text"/>	<input type="text"/>
to derive	<input type="text"/>	<input type="text"/>	<input type="text"/>
to do	<input type="text"/>	<input type="text"/>	<input type="text"/>
to flow	<input type="text"/>	<input type="text"/>	<input type="text"/>
to forecast	<input type="text"/>	<input type="text"/>	<input type="text"/>
to freeze	<input type="text"/>	<input type="text"/>	<input type="text"/>
to generate	<input type="text"/>	<input type="text"/>	<input type="text"/>
to include	<input type="text"/>	<input type="text"/>	<input type="text"/>
to keep	<input type="text"/>	<input type="text"/>	<input type="text"/>
to know	<input type="text"/>	<input type="text"/>	<input type="text"/>
to replenish	<input type="text"/>	<input type="text"/>	<input type="text"/>
to shake	<input type="text"/>	<input type="text"/>	<input type="text"/>
to shrink	<input type="text"/>	<input type="text"/>	<input type="text"/>
to spend	<input type="text"/>	<input type="text"/>	<input type="text"/>
to spoil	<input type="text"/>	<input type="text"/>	<input type="text"/>
to stand	<input type="text"/>	<input type="text"/>	<input type="text"/>
to steal	<input type="text"/>	<input type="text"/>	<input type="text"/>
to think	<input type="text"/>	<input type="text"/>	<input type="text"/>
to throw	<input type="text"/>	<input type="text"/>	<input type="text"/>

(70% of the possible score must be achieved)

Figure 16: Screenshot exercise „Grammar 4: Regular And Irregular Verbs“