

Unit 4: Windparks and Energy

(Sek 1: Jahrgangsstufe 10, 6. Lernjahr, B1/B2)

Allgemeine Erziehungsziele:

Umwelterziehung;
Ursachen und Folgen des Klimawandels;
Problematisierung des Umgangs mit Fakten;
Medien kritisch analysieren;
Lesekompetenz schulen;
Inhalt von Informationen über komplexe Sachverhalte bearbeiten;
Eigene Stellungnahmen formulieren

Ziele fremdsprachlicher Bildung:

Karikaturen analysieren;
Interessen verstehen und zuordnen;
Gegenüberstellung von Positionen in *rubrics*;
Sprachliche Herausforderungen mit *scaffoldings* meistern;
Perspektivenwechsel vornehmen und an Diskursen teilnehmen

Inhalte und Themen:

Weather, climate and the carbon myth;
The truth about global warming;
COP 23 and "Talanoa";
The energy issue;
Wind parks and landscapes;
Lifestyle and regions;
The climate change quiz

Fertigkeiten, Fähigkeiten, Anbahnung von Kompetenzen:

GeR (Auszüge):

B1: Kann die Hauptpunkte verstehen, wenn klare Standardsprache verwendet wird und wenn es um vertraute Dinge aus Arbeit, Schule, Freizeit usw. geht; kann sich einfach und zusammenhängend über vertraute Themen und persönliche Interessengebiete äußern; kann über Erfahrungen und Ereignisse berichten, Träume, Hoffnungen und Ziele beschreiben und zu Plänen und Ansichten kurze Begründungen oder Erklärungen geben (Europarat 2001: 35).

B2: Kann einfache Sachinformationen herausfinden und weitergeben (84); verfügt über ein hinreichend breites Spektrum sprachlicher Mittel, um unvorhersehbare Situationen zu beschreiben, die wichtigsten Aspekte eines Gedankens oder eines Problems mit hinreichender Genauigkeit zu erklären und eigene Überlegungen zu kulturellen Themen ... auszudrücken (111).

Sachfach-Curriculum Po/Wi

Ökologie – Umweltschutz; Rohstoffe, Energie und Umweltstandards als Wirtschaftsfaktoren; Herausforderungen der Umweltpolitik, ökonomisch-ökologische Interessenskonflikte, Umweltpolitik in der politischen Auseinandersetzung, Umweltökonomie, Übernutzung, Dimensionen und Ziele nachhaltigen Wirtschaftens und der Energieversorgung, Analyse von Umweltproblemen

Sprachfokus:

content-based word fields and structures;
analysing texts;
CLIL discourse and useful phrases;
reading and viewing/listening comprehension;
mediation;
interpretation and individual research;

negotiation of meaning and perspectives

Lehr- und Lernstrategien:

caricature analysis; plenary discussions; crib sheets*; placemat activities*; think-pair-share*; double circle*; juxtapositions and presentations; group puzzle*; pie graph; gapped texts; guided and independent content-based research; input on a dialogue platform*

Evaluation:

formatives Feedback (im Rahmen der Lernaktivitäten mit *comparisons, negotiations, explanations of activities and procedures, peer scaffolding; plenary discussions, findings of research*); summatives Feedback: Ergebnisse von Präsentationen und Gruppenarbeit; *quiz results*

Übersicht Unit 4: Wind parks and energy

Unterrichtsstunde 1

Worksheet 1: Weather, climate and the carbon myth

Unterrichtsstunde 2

Worksheet 2: The truth about global warming

Unterrichtsstunde 3

Worksheet 3: COP 23 and "Talanoa"

Unterrichtsstunde 4

Worksheet 4: The energy issue

Unterrichtsstunde 5

Worksheet 5: Wind parks and landscapes

Unterrichtsstunde 6

Worksheet 6: Lifestyle and regions

Unterrichtsstunde 7

Worksheet 7: The climate change quiz

Worksheets 1 bis 7: Anregungen zum Vorgehen

Als Thema der politischen Bildung ist Ökologie als Erhaltung der natürlichen Lebensgrundlagen und Nachhaltigkeit nicht auf eine einzelne Jahrgangsstufe beschränkt, sondern inhaltliche Kompetenzen sind an unterschiedlichen Stellen des Spiralcurriculums anzubahnen. Aspekte des ökologischen Wirtschaftens, Klimawandels und der Energieversorgung stehen im Vordergrund.

Eine Karikatur zum Thema Klimawandel wird von den Schülern in der Zielsprache interpretiert, um im Anschluss die Problematik der Erderwärmung als Wetterphänomen oder globale Umweltgefährdung zu unterscheiden. Der prominenteste Protagonist der *climate-change deniers* äußert sich in *tweets* unmissverständlich zu seinem Umgang mit der Wirklichkeit: Präsident Donald Trump nimmt dabei den Kälteeinbruch an der amerikanischen Ostküste am Jahreswechsel 2017/18 zum Anlass, der Erderwärmung als „*good old global warming*“ eine wünschenswerte Funktion zuzuschreiben und wird von einer interessierten Lobby unterstützt, die den Klimawandel als „*carbon myth*“ entlarven will. In der Gegenüberstellung mit wissenschaftlichen Forschungsergebnissen beschreiben und diskutieren die Schüler in aufeinanderfolgenden Aufgaben diese Kontroverse (*worksheet 1*).

Die Problematik wird mit der Analyse eines *video clip* vertieft, in dem die Hintergründe in Interessen geleiteten Positionen dokumentiert sind und dessen sprachliche Herausforderungen mithilfe von kleinschrittigen *think-pair-share* Aufgaben auf der Grundlage eines *running sheet* besser bewältigt werden können. In einem Perspektivenwechsel auf die weltweite Diskussion werden die Initiativen der UNO in der Bonner Klimakonferenz von 2017 und die „*Talanoa Dialogue Platform*“ miteinbezogen, die auf die Tradition der Fidschi-Inseln zurück-

geht und deren Vertreter den Konferenz-Vorsitz innehatten. Sie legt den Schülern einen diskursiven Input nahe und ermöglicht einen aktiven Beitrag zur Diskussion (*worksheets* 2 und 3).

In einem weiteren Perspektivenwechsel wird die Situation in Deutschland in den Blick genommen, dessen Anspruch als Welt-Klimaführer in der alternativen Energieversorgung dokumentiert und kritisch hinterfragt wird. Insbesondere die Rolle der Windkraft steht bei der Weiterarbeit im Vordergrund, und auch der Landschaftsverbrauch wird thematisiert. Abschließend zeigt ein australischer Cartoon Auswirkungen des Klimawandels auf den Alltag, und als positiver Ausblick sind bürgernahe Ökostromkonzepte im Rahmen der deutschen Energie-wende zu bearbeiten (*worksheets* 4-6). Als *summatives feedback* überprüft ein *climate change quiz* die gewonnenen Erkenntnisse und Fähigkeiten der Schüler (*worksheet* 7). Alle *worksheets* sind so konzipiert, dass sie in rhythmisierten Stunden (90 Minuten-Einheiten) bearbeitet werden.

Worksheet compass

phase	activities of		scaffolding
	teachers	students	
planning; backward design	issues/ problems to be solved	analysis, assessment, negotiation, critical thinking, anticipa- ting and evaluating debates	worksheet compass
	guiding questions and outcomes	advance organizer; study objectives, peer-scaffolding, research	
complex task	guided research, evaluation of texts and quiz	double circle, think- pair-share, placemat activity, working in groups, pie chart, plenary discussion, evaluation, submit- ting input	crib sheets*, caricature analysis*, rubrics, word banks*, video running sheet, useful phrases, discourse files
worksheet 1	Weather, climate and the carbon myth	task 1: interpret, assess task 2: compare, discuss, evaluate task 3: contrast, outline	caricature analysis*, rubrics
worksheet 2	The truth about global warming	task 4: discuss task 5: comment	think-pair-share*, video running sheet, placemat activity*
worksheet 3	COP 23 and "Tala- noa"	task 6: read, analyse task 7: outline, re- search, summarise, create, submit	think-pair-share*, group work, submitting input
worksheet 4	The energy issue	task 8: transfer, out- line, discuss, com- ment, present task 9: read, mediate, identify, explain task 10: outline, discuss	group work, double circle*, think-pair-sha- re*, rubrics

worksheet 5	Wind parks and landscapes	task 11: read, answer, share, discuss task 12: fill in the gaps, explain	double circle*, gapped text
worksheet 6	Lifestyle and regions	task 13: interpret, discuss task 14: diskutieren, beschreiben, recherchieren task 15: mediate, report	political cartoon analysis*, crib sheet*
worksheet 7	The climate change quiz	task 16: do quiz, decide, comment	quiz, commentary

Worksheet 1: Weather, climate and the carbon myth

Task 1

Interpret the caricature (mediation* required) and assess its message about climate change and the protection of the environment.



https://commons.wikimedia.org/wiki/File:Karikatur_von_Gerhard_Mester_zum_Thema_Ignoranz_O12293.jpg (last accessed June 2018)

Scaffolding

Caricature Analysis

Content: *topics/issues* – climate change ...

Context: *description* – just carry on, rubbish ...

Technique: *message* – two skaters in full speed, ignoring the warning sign ...

Target: *effects* – mistake of the skaters, melting ice caps ...

Caricature Analysis

Content: The caricature refers to ...

Context: The image shows two persons ... The adult's coat shows the slogan ... The heading says: ...

Technique: The two skaters seem to carry on ... The adult wants to ignore ...

Target: The cracks in the ice surface The viewer realizes the mistake ... is alerted to ..., because global warming ...

Task 2: The US President's tweets

Compare the contents of the two following tweets and discuss the difference between "global warming" and "climate change" after entering your findings in the table below. Evaluate how Trump uses "global warming" as a "dumb joke".



Donald J. Trump 
@realDonaldTrump [Follow](#)

The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.

11:15 AM - 6 Nov 2012

101,716 Retweets 66,257 Likes

13K 102K 66K

Trump maintains that climate change is a “hoax”, using the term global warming instead. In both tweets he sees global warming as a weather phenomenon, whereas climate change, according to him and his administration, is part of the “carbon myth” and does not exist in reality (compare Unit 4 “Fake News”). In tweet one, global warming is allegedly a term created by the Chinese to gain advantages over the US industry. Chinese producers are more competitive because in China fewer environmental regulations are in place so that the US industry is less competitive and has to deal with more expensive restrictions. In tweet two, global warming is used as a “dumb joke”: In the light of extremely cold spells on the US east coast during the end of 2017, so the “joke” goes, people could profit from “that good old global warming”. Instead, the US – in contrast to other countries – would have to spend trillions of dollars against it. Trump’s advice is to “bundle up” in his usual gossip style on twitter. Global warming – as in weather conditions – is the overall average increase in atmospheric temperature and sea surface temperatures worldwide as a result of heat-trapping gases emitted by humans. Climate change includes global warming, which is again part of climate change. Climate change is not a weather phenomenon but a long-range (globally) threatening development. Climate-change deniers accuse scientists of changing the term – from global warming to climate change, because people realise that it sometimes still gets extremely cold. In a nutshell, you cannot do much against extreme weather situations but a lot against global warming. (BK)

Voc.: maintain: behaupten; hoax: Schwindel; carbon myth: climate-change deniers question the man-made nature of global warming and call it a “carbon myth”; allegedly: mutmaßlich; competitive: wettbewerbsfähig; environmental regulations: Umweltauflagen; bundle up: zusammenrücken; heat-trapping gas: Treibhausgas



Donald J. Trump 
@realDonaldTrump [Follow](#)

In the East, it could be the COLDEST New Year’s Eve on record. Perhaps we could use a little bit of that good old Global Warming that our Country, but not other countries, was going to pay TRILLIONS OF DOLLARS to protect against. Bundle up!

4:01 PM - 28 Dec 2017

61,888 Retweets 199,897 Likes

global warming	climate change	Trump's dumb joke
weather conditions, ...	includes global warming, ...	extremely cold spells ...

President Trump finds a lot of "friends" in his stance against climate change, such as "Friends of Science" (see task 3).

Task 3: The carbon myth

Contrast the two positions dealing with the carbon myth and **outline** their respective arguments.

Debunking the carbon myth

Friends of Science

Our Opinion: It is our opinion that the Sun is the main direct and indirect driver of climate change. Friends of Science is a non-profit organization ... we offer critical evidence that challenges the premises of Kyoto and present alternative causes of climate change. Our major environmental concern is the significant shift in recent years away from the important emphasis of previous decades on continual reductions in air and water pollution, to focus almost exclusively on global warming. The current obsession with global warming is misguided in that climate fluctuations are natural phenomena and we suggest that adaptation should be emphasized rather than misguided attempts at control. We do not represent any industry group ... (<https://www.friendsofscience.org/index.php?id=1> last accessed June 2018)

MYTH 3: Human produced carbon dioxide has increased over the last 100 years, adding to the Greenhouse effect, thus causing most of the earth's warming of the last 100 years.

FACT: Carbon dioxide levels have indeed changed for various reasons, human and otherwise, just as they have throughout geologic time. Since the beginning of the industrial revolution, the CO₂ content of the atmosphere has increased by about 120 part per million (ppm), most of which is likely due to human-caused CO₂ emissions. The RATE of growth during this century has been about 0.55%/year. However, there is no proof that CO₂ is the main driver of global warming. As measured in ice cores dated over many thousands of years, CO₂ levels move up and down AFTER the temperature has done so, and thus are the RESULT OF, NOT THE CAUSE of warming. Geological field work in recent sediments confirms this causal relationship. There is solid evidence that, as temperatures move up and down naturally and cyclically through solar radiation, orbital and galactic influences, the warming surface layers of the earth's oceans expel more CO₂ as a result. ...

MYTH 8: Global warming will cause more storms and other weather extremes.

FACT: There is no scientific or statistical evidence whatsoever that supports such claims on a global scale. Regional variations may occur. Growing insurance and infrastructure repair costs, particularly in coastal areas, are sometimes claimed to be the result of increasing frequency and severity of storms, whereas in reality they are a function of increasing population density, escalating development value, and ever more media reporting. ...

MYTH 9: Receding glaciers and the calving of ice shelves are proof of man-made global warming.

FACT: Glaciers have been receding and growing cyclically for hundreds of years. Recent glacier melting is a consequence of coming out of the very cool period of the Little Ice Age. Ice shelves have been breaking off for centuries. Scientists know of at least 33 periods of glaciers growing and then retreating. It's normal. Besides, changes to glacier's extent is dependent as much on precipitation as on temperature. **MYTH 10: The earth's poles are warming and the polar ice caps are breaking up and melting.**

FACT: The earth is variable. The Arctic Region had warmed from 1966 to 2005, due to cyclic events in the Pacific Ocean and soot from Asia darkening the ice, but there has been no warming since 2005. Current temperatures are the same as in 1943. The small Palmer Peninsula of Antarctica is getting warmer, while the main Antarctic continent is actually cooling. Ice cap thicknesses in both Greenland and Antarctica are increasing. ...

© Friends of Science Society, www.FriendsofScience.org, <https://www.friendsofscience.org/index.php?id=3> (last accessed June 2018)

Voc.: debunk: entlarven; Kyoto: UN convention on climate change in Kyoto 1994

Scientific evidence of climate change

Burning fossil fuels creates carbon dioxide, the main greenhouse gas emitter that contributes to global warming, which hit its peak in 2012. In the last 30 years, temperatures have risen to the warmest since records began. If we continue to pump greenhouse gases into our environment the average global temperature could increase by 1°C to 4°C by 2100. Even if we changed today to using more renewable resources instead of fossil fuels for example, increases could be between 1 to 2.5°C. Predictions estimate that global energy demand will grow by a third by 2035. Also critical to consider is the more than 1.2 billion people around the world who still do not have access – yet – to electricity. As the global population continues to grow – predicted to be nine billion people over the next 50 years – the world’s energy demands will increase proportionately.

...

However, the argument from governments, oil, coal and natural gas companies is that until renewable energy sources become more viable as major energy providers, the only alternative in meeting the increasing demands for energy from a growing global population that requires more and more energy, is to continue to extract fossil fuel reserves. DevelopmentEducation:

<http://developmenteducation.ie/feature/the-energy-debate-renewable-energy-cannot-replace-fossil-fuels/> (last accessed June 2018)

The fundamental point being missed is that the “fat-tail” risks of climate change — the irreversible, positive-feedback tipping points which have long concerned scientists — are being triggered at today’s warming of just 1°C. This can be seen in the Arctic and the Antarctic, in our oceans, and not least with the destruction of the Great Barrier Reef. These are genuine, existential risks unlike anything previously experienced by humanity, which will result in a substantial reduction in global population unless rapidly addressed. They cannot be handled by existing risk-management techniques.

© David Spratt, <http://www.climatecodered.org/2016/09/unravelling-myth-of-carbon-budget-for.html> (last accessed June 2018)

Voc.: renewable: erneuerbar; viable: umsetzbar; tipping point: Wende-, Umkehrpunkt; handle: bewältigen

debunking the carbon myth	scientific evidence of climate change
The Sun ..., alternative causes of climate change, ..., trees will ...	burning fossil fuels creates ..., contributes to ..., the global population ..., “fat-tail” risks ...
current obsession with global warming ...a concern is to focus ...no proof ..., temperatures ..., ice cap thicknesses ...,	temperatures have risen ..., global energy demand ..., only alternative ..., cannot be handled ...

Worksheet 2: The truth about global warming

Task 4:

Watch the video clip and focus on the six episodes marked in the running sheet (visible in the clip by screen captions). **Discuss** the related questions in a think-pair-share* format.

“Why didn’t we succeed? Competing explanations and special interests”

Stephen Henry Schneider (1945-2010) was Professor of Environmental Biology and Global Change at Stanford University. His research included analysing the atmosphere, climate change, and „the relationship of biological systems to global climate change“. Prof. Schneider was one of the leading scientists to advocate radical reductions of greenhouse gas emissions to fight global warming. (BK)

Video: https://www.youtube.com/watch?v=4_eJdX6y4hM (last accessed June 2018)

Episode Index (running sheet)

Episode 1 (00:00')

What was already known in the 1970s?
What was accelerating the process?

Episode 2 (01:40')

What are similarities between climate and medical science?
Why are explanations often competing with each other?

Episode 3 (02:20')

How do different ideologies influence research findings?

Episode 4 (03:35')

How does the public handle potential outcomes?

Episode 5 (05:00')

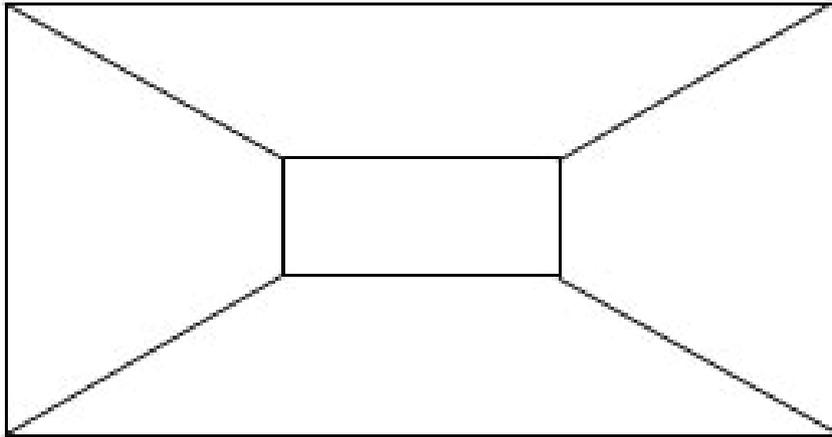
What does the example of lung cancer demonstrate?

Episode 6 (06:04')

Why does risk management often fail?

Task 5:

Comment on the bottom line of Professor Schneider’s narrative. Work in groups using a placemat* and share your results in plenary.



The bottom line

(10:30'/10:41')

The conclusion (bottom line) points at the fact that we live at the cost of future generations. ...

Worksheet 3: COP 23 and “Talanoa”

Task 6:

Read the reports about the United Nations climate talks in Bonn (COP 23) and **analyse** the events and outcomes of the conference, using the think-pair-share* format.

Meeting of 195 state delegates at the UN Climate Change Conference presided by Fiji (Bonn November 2017)

The UN Climate Change Conference in Bonn is the next step for governments to implement the Paris Climate Change Agreement and accelerate the transformation to sustainable, resilient and climate-safe development. The Paris Agreement entered into force last November and the era of implementation has begun. This conference will further clarify the enabling frameworks that will make the agreement fully operational and the support needed for all nations to achieve their climate change goals. COP 23 – which will be presided over by the Government of Fiji with support by Germany – is also an excellent example of the cooperation and collaboration between nations that will truly meet the global climate change challenge.

© United Nations Framework Convention on Climate Change (UNFCCC),
http://unfccc.int/meetings/bonn_nov_2017/meeting/10084.php (last accessed June 2018)

Voc.: accelerate: beschleunigen; sustainable: nachhaltig; resilient: belastbar

Coal phase-out

A second major event at the COP was the launch of the “Powering Past Coal Alliance”, led by the UK and Canada. More than 20 countries and other sub-national actors joined the alliance, including Denmark, Finland, Italy, New Zealand, Ethiopia, Mexico and the Marshall Islands; as well as the US states of Washington and Oregon. It aims to top 50 members by this time next year. While the alliance notes in its declaration that “analysis shows that coal phase-out is needed no later than by 2030 in the OECD and EU28, and no later than by 2050 in the rest of the world” to meet the Paris Agreement, it does not commit signatories to any particular phase-out date. It also does not commit the signatories to ending the financing of unabated coal power stations, rather just “restricting” it. Claire Perry, the UK’s climate minister, travelled to Bonn to launch the initiative alongside Canada’s environment minister Catherine McKenna. The UK has previously pledged to phase out unabated coal by 2025, while Canada has a 2030 deadline. The US did not sign onto the pledge and several other big coal countries were notable by their absence, including Germany, Poland, Australia, China and India. Meanwhile, German chancellor Angela Merkel maneuvered a delicate balancing act at the talks ... trying to maintain her climate leadership on the world stage ... Coal-phase out has become a significant focal point for campaigners at UNFCCC summits ...

© Carbonbrief, <https://www.carbonbrief.org/cop23-key-outcomes-agreed-un-climate-talks-bonn> (last accessed June 2018)

Voc.: launch: Einführung; phase-out: Ausstieg; OECD: Organisation for Economic Co-operation and Development; signatories: Unterzeichnerstaaten; unabated: unvermindert; pledge: Verpflichtung; UNFCCC: United Nations Framework Convention on Climate Change

events	outcomes
delegations ...	attempt: reduce ...
China and the USA ...	aim: to curb ...
conference to clarify ...	introduction of ...
support needed ...	
launch of ...	coal phase-out ...
with more ...	does not ...
US ...	coal-phase out ...

Task 7:

Outline the meaning of “talanoa” and its purpose. Do some **research** first, using the UNFCCC Website and **summarise** your findings on a crib sheet*. Work in groups to **create** an input (write a short text) for the dialogue platform and select a best result in plenary to **submit** to the platform.

The 2018 Talanoa Dialogue Platform

“Talanoa is a traditional word used in Fiji and across the Pacific to reflect a process of inclusive, participatory and transparent dialogue. The purpose of Talanoa is to share stories, build empathy and to make wise decisions for the collective good.

The process of Talanoa involves the sharing of ideas, skills and experience through storytelling. During the process, participants build trust and advance knowledge through empathy and understanding. Blaming others and making critical observations are inconsistent with building mutual trust and respect, and therefore inconsistent with the Talanoa concept. Talanoa fosters stability and inclusiveness in dialogue, by creating a safe space that embraces mutual respect for a platform for decision making for a greater good.”

© United Nations Framework Convention on Climate Change (UNFCCC),
http://unfccc.int/focus/talanoa_dialogue/items/10265.php (last accessed June 2018)

Voc.: participatory: teilnehmend; advance: voranbringen; inconsistent: unvereinbar; mutual: gegenseitig; foster: fördern

Talanoa: word used in Fiji, describing a dialogue between people to share empathy and understanding, decision making is supported by advancing knowledge, the aim is to build mutual trust and respect for a greater good.

How to submit inputs

It is important that the inputs are consistent with the concept of Talanoa. Therefore, the tone and content of the inputs should not be confrontational, threatening, abusive, defamatory, obscene, offensive, or otherwise unlawful. The inputs should serve the purpose of the Talanoa Dialogue.

Link: <https://talanoadialogue.com/submit-inputs> (last accessed June 2018)

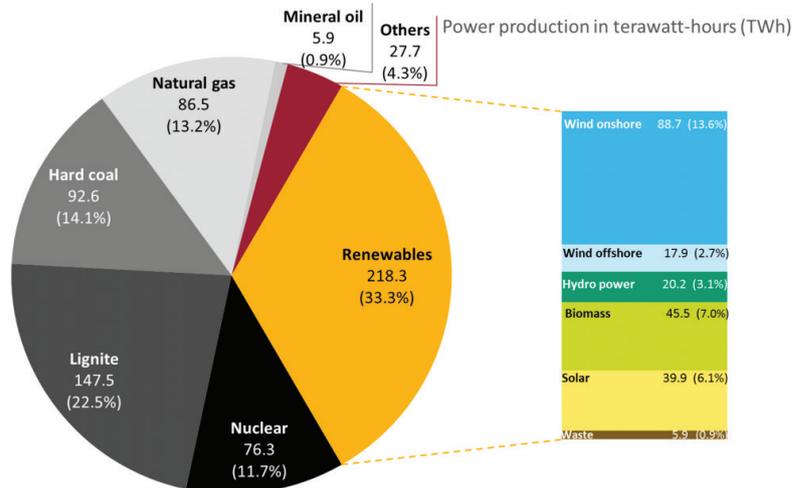
Worksheet 4: The energy issue

Task 8:

Transfer the data of the pie chart into a flow text **outlining** the proportionate share of energy sources. **Discuss** your results in groups and **comment** on possible developments of German power production. **Present** the outcomes in plenary.

Share of energy sources in gross German power production in 2017.

Data: AG Energiebilanzen 2018, preliminary.



© BY SA 4.0

<https://www.cleanenergywire.org/factsheets/germanys-energy-consumption-and-power-mix-charts> (last accessed June 2018)

Scaffolding

Discourse phrases for a pie chart

the pie chart shows ...
 numbers amount to ...
 slightly higher than ...
 it compares ...
 plays a dominant role
 there is evidence that ...
 according to ...
 as you can see from the pie chart ...
 the most significant feature ...
 this implies that ...
 the pie chart makes clear that ...

Flow text

...

Task 9:

Read the texts and **identify** the correct statements on the list below (mediation* required). In a double circle*, **explain** why some of the statements sound wrong.

ESYS**Energy systems of the future:**

Electricity will play a crucial role for reaching the EU climate goals. To match the increasing electricity demand, the share of intermittent renewables will rise. This will create new challenges for the electricity supply system. Market regulations will need to offer incentives for reserve capacities, energy storage as well as demand response management. At the same time, the European electricity market is expanding, offering new possibilities to enhance delivery reliability and balancing the electricity load across borders.

© Energiesysteme der Zukunft (ESYS),

<https://energiesysteme-zukunft.de/veranstaltungen/aktuelle-termine/symposium-in-bruessel/> (last accessed June 2018)

Wollen wir die Offshore-Windkraft weiter ausbauen oder klimafreundlichen Strom bevorzugt in kleinen, dezentralen Anlagen produzieren? Brauchen wir eine flächendeckende Ladeinfrastruktur für die Elektromobilität oder tanken die Autos der Zukunft synthetische Kraftstoffe aus Windstrom? Für die Umsetzung der Energiewende gibt es keinen Masterplan, sondern verschiedene Szenarien und Lösungsansätze. In dem im April 2013 initiierten Akademienprojekt „Energiesysteme der Zukunft“ (ESYS) kommen Expertinnen und Experten zusammen, um Handlungsoptionen für eine umweltverträgliche, sichere und bezahlbare Energieversorgung zu erarbeiten.

© Energiesysteme der Zukunft (ESYS),

<http://energiesysteme-zukunft.de/presse/meldungsarchiv/2016/esys-startet-die-zweite-projektphase/> (last accessed June 2018)

Voc.: crucial: entscheidend; intermittent: zeitweilig; challenges: Herausforderungen; incentives: Anreize; demand response management: Management der Nachfrage(reaktion); delivery reliability: Liefertreue; electricity load: Spitzenlast; dezentrale Anlagen: decentralised systems; flächendeckend: comprehensive; Ladeinfrastruktur: recharging infrastructure; Handlungsoptionen: options for action

Power mix

The power mix refers to how electricity production and consumption in a country breaks down by primary energy source. It can refer to either power generation, or power consumption, i.e. how much electricity a country uses, taking into account imports and exports. In 2015, renewables covered 30 percent of Germany's gross power generation (or production), and 31.6 percent of its gross power demand (or consumption). Gross electricity generation usually refers to the total amount of electricity generated in all power plants. Net electricity generation is equal to gross electricity generation minus the amount of power the generating facilities (auxiliary services) use themselves to operate. Gross national electricity consumption includes gross electricity generation minus exports, plus imports. Net national electricity consumption is equal to gross national electricity consumption minus power lost during transmission via the electricity grid.

https://www.cleanenergywire.org/glossary/letter_p#power_mix (last accessed June 2018)

Voc.: generated: erzeugt; gross: brutto; auxiliary services: Hilfsdienste; electricity consumption: Energieverbrauch; electricity grid: Stromnetz

- Reserve capacities, energy storage and demand response management are state responsibilities
- The total amount of electricity generated in all power plants is called gross energy generation
- Power lost during transmission via the electricity grid is part of national electricity consumption
- Renewables covered 30 percent of Germany's gross power generation
- Electricity will play a crucial role for reaching the EU climate goals
- The European electricity market is expanding, offering new possibilities
- The share of intermittent renewables will go down
- ESYs develops new options for environmentally safe and affordable energy supply
- Power mix refers to electricity production only

These statements are wrong, because

.....

.....

.....

.....

.....

Task 10:

Outline how emissions trading works and **discuss** why global warming might be reduced by implementing this concept, using a think-pair-share* format.

Greenhouse gas

Gases that trap heat in the Earth's atmosphere are called greenhouse gases (GHGs). Carbon dioxide (CO₂) is the dominant anthropogenic (man-made) GHG, but other gases, such as methane (CH₄), nitrous oxide, and fluorinated gases, have an even greater global warming potential (GWP). GHG emissions are often quantified as CO₂ equivalent emissions, but no single metric can accurately compare all consequences of different emissions, and all choices of metric entail limitations and uncertainties. According to the 5th IPCC report, methane has 28-34 times the GWP of carbon dioxide over 100 years, and the release of one ton of methane is equivalent to the release of 28-34 tons of CO₂ over 100 years.

https://www.cleanenergywire.org/glossary/letter_g#greenhouse_gas (last accessed June 2018)

Emissions trading is a tool to keep carbon emissions in check by putting environmental costs on company balance sheets. First, a tolerable total amount of greenhouse gas emissions is specified and a certificate is issued. Then, if a company emits more than the allocated amount, it must buy an allowance for each additional ton of CO₂ equivalents. These allowances can be traded between companies. The EU Emissions Trading Scheme (ETS) is currently the world's biggest (China plans to introduce a nationwide scheme in 2017 that will be roughly twice the size), covering energy providers, energy-intensive industry, and civil aviation in the 28 EU member states. An oversupply of allowances means that prices have fallen well short of what most experts say is needed to make electricity generation from fossil sources like coal more expensive compared to energy from clean power sources, such as renewables.

https://www.cleanenergywire.org/glossary/letter_e#emissions_trading (last accessed June 2018)

Voc.: trap: einfangen, verschließen; equivalent: gleichwertig; metric: Messung; entail: nach sich ziehen; emissions trading: Emissionshandel; allocated: zugewiesen; allowance: Bewilligung; energy providers: Energieversorger; civil aviation: zivile Luftfahrt

Worksheet 5: Wind parks and landscapes

Task 11:

Read the text and **answer** the questions about the differences between “*onshore and offshore wind parks*”. In a double circle*, **share** experiences with wind parks in your region and **discuss** changes in your landscape in plenary.

Offshore wind

In 2016, offshore wind parks accounted for about 2 percent of Germany’s power production. By mid-2016, 3.6 GW of offshore wind capacity was connected to the German grid, with a further 324 megawatts of capacity installed off the German coast, but yet to be connected to the grid. A further 3.8 GW of capacity was either under construction or in the planning stages. Unlike other renewable energy sources in Germany, most of which are owned by citizens, cooperatives, and smaller operators, offshore wind, which requires high investment, is largely owned by major energy companies.

Onshore wind

Land-based wind turbines contributed more (10 percent) to Germany’s overall power production in 2016 than any other renewable energy source. Germany has 44.6 GW of onshore wind capacity (end-2016). Schleswig-Holstein, in the northeast of the country, has more than double the onshore wind power capacity of any other state. Close to 150,000 people are employed in the German wind power sector.

https://www.cleanenergywire.org/glossary/letter_o#offshore_wind (last accessed June 2018)



Kellerwald (Hessen) Photo: Bernd Klewitz

Questions:

1. What is the basic difference between the two types of wind parks?
2. How extensive is their contribution to energy supply in Germany?
3. Why are some offshore wind turbines not yet in operation?
4. Why are offshore wind parks mostly owned by major energy companies?
5. Where are most wind parks situated?
6. What is the effect on the employment sector?

Wind parks in your region?

Task 12:

Rapid expansion

Fill in the gaps in the texts and **explain** the reason for the rapid growth of wind parks and the role they play in the German energy turnaround.

World Leader

Text 1 Germany is supposed to be the world leader in terms of wind parks and The German landscape is with more than 19,000 windmills, not counting the one And the numbers are growing fast. The (BMUB) has supported this development and is now encouraging new wind farms to be built along the North Sea and coasts. There has been some criticism despite overall public support because generous subsidies have a billion-euro industry, almost market rules of competition and best practice. Beyond that, energy have to buy wind power at set prices according to the Renewable Energy Act (*Erneuerbare Energien Gesetz –EEG*), introduced in 2000. (BK)

Voc.: wind turbines: Windräder; Federal Environment Ministry: Bundesumweltministerium; Baltic Sea: Ostsee; fostered: gefördert; exempt from: ausgenommen von

Text 2 Onshore wind power capacity in Germany has more than 1,000 times since 1990. A combination of idealistic and enthusiasm among citizens has brought the number of wind turbines up to almost 30,000. Onshore wind power today is the largest sector in the country, a vibrant industry, and a central pillar of the Energiewende. A record expansion period, however, has not the industry from a sweeping change of political conditions, intensifying, and rejection by parts of the population. But wind power companies have long sought to become more independent of their home market, drawing international investors' attention and pushing energy around the globe.

<https://www.cleanenergywire.org/dossiers/onshore-wind-power-germany> (last accessed June 2018)

Voc.: impetus: Anstoß; entrepreneurial: unternehmerisch; shielded: abgeschirmt; adamant: hartnäckig

Text 3 Germany's onshore wind power industry started out in 1990 with a handful of rather installations producing about 71 gigawatt hours (gWh) – roughly the demand of a small town. It has grown to a euro business that in 2016 poured out nearly 80,000 gWh of electricity, capable of powering over ten percent of the world's fourth largest economy, or the of almost 23 million households. Germany's onshore wind power industry may await a watershed in terms of, but it has benefitted from a supportive industrial policy to overcome its status. The rapid expansion in Germany has been the result of targeted policy design, effective engineering, and also widespread public Germany is a vocal supporter of the Paris Climate Agreement and concerted action to limit the effects on climate change. The nation will continue to depend heavily on the wind power sector to cut emissions by at least 80 percent until 2050 and derive 60 percent of gross final energy consumption in all sectors from renewables, as outlined by the Federal Environment Ministry (BMUB). Onshore wind power currently ten percent to Germany's power mix, by far the largest chunk among Windmills have for many become an Energiewende because of their visibility and straightforward mode of operation. The industry's ascent, however, did not happen by accident.

https://www.cleanenergywire.org/glossary/letter_o#onshore_wind (last accessed June 2018)

Voc.: equivalent: gleichwertig; average: durchschnittlich; funding: Förderung; infant: jung; figurehead: Aushängeschild

Word box:

(text 1): providers – exempt from – fostered – Baltic Sea – Federal Environment Ministry – offshore – dotted – wind turbines

(text 2): transition – adamant – competition – shielded – energy – renewable – entrepreneurial – impetus – increased

(text 3): figurehead – renewables – contributes – greenhouse gas – man-made – international – enthusiasm – infant – funding – average – equivalent – multibillion – experimental

rapid growth	figurehead
more than 19,000 windmills...	central pillar of the Energiewende ...
generous subsidies...	Germany supports ...
supportive industrial policy...	depends heavily on ...
	visibility and ...

Worksheet 6: Lifestyle and regions

Task 13:

Interpret the cartoon and discuss implications for personal lifestyles and environmentally safe energy supply.

Scaffolding

Working on a political cartoon

Consider the following questions and take notes: **Context:** Which issue is the cartoon referring to? **Content:** What do the people in the cartoon look like – normal – distorted – funny? What is the couple in the cartoon talking about? Comment on the difference between the male (barbecue) and the female (newspaper headline, explaining it). Have a closer look at the carpet and the dog. What could the message be? How do the three sentences relate to each other?

Target: What, then, is the message of the cartoon? What key people or groups are part of the cartoon's message?

Technique: Is the cartoon funny or rather not? Please explain how the method chosen by the cartoonist conveys the political message more effectively. How does the cartoonist (Michael Leunig), persuade the reader to accept his message? How is the reader's attention captured? What did you first notice about this cartoon?



© Michael Leunig, www.leunig.com.au, <http://www.leunig.com.au/works/cartoons> (last accessed June 2018)

Task 14:

Diskutiert, in Kleingruppen, wie eine bürgernahe Ökostromförderung aussehen könnte. **Beschreibt** dabei, welche Vorteile Bürgergesellschaften haben. **Recherchiert**, ob es in Eurer Gegend auch solche Initiativen gibt und wie dort insgesamt die Stromversorgung erfolgt – auch im eigenen Haushalt. Haltet die Ergebnisse auf einem Crib Sheet* zur Vorbereitung von *task 15* fest.

Task 15:

Mediate the following text about the German energy turnover. Your exchange partner is alarmed about President Trump's climate-change denial and would like to learn about the situation in Germany. **Report** to him/her about the state-of-the-affair in your country.

Zum Stand der Energiewende

Solange Wind und Sonne als fluktuierende Energiequellen nur einen marginalen Anteil an der Energiegewinnung hatten, war [es] unproblematisch. Jetzt, da ihr Anteil bei der Stromerzeugung bei einem Drittel liegt, werden die Folgen der Schwankungen allerdings virulent. EE-Anlagen werden zunehmend öfter abgeschaltet, das sogenannte dispatching – Eingriffe der Netzbetreiber in den Betrieb der Kraftwerke – gewinnt an Bedeutung. Die Volatilität des Energiesystems nimmt zu. Sie nagt am Prinzip der Versorgungssicherheit, nach dem der Strom unabhängig vom Wetter und von der Jahreszeit immer und überall gesichert zur Verfügung stehen muss. In Deutschland seien mehr als 15 Minuten Stromausfall pro Jahr (durchschnittliche Versorgungsunterbrechung pro Kunde) nicht zu tolerieren, heißt es in der Energiewirtschaft kategorisch. Gemäß dieses tradierten Prinzips gilt: Je höher der Anteil der fluktuierend einspeisenden Erneuerbaren ist, desto mehr Ausgleichs- und Back-up-Kapazitäten bedarf es. Entsprechend bedeuten mehr Wind- und Solarstromanlagen mehr aufwändige Redundanzen, also Reservekapazitäten. Für den Strombereich heißt das, dass mehr Übertragungsleitungen und steuerbare Reservekraftwerke gebraucht werden.

...

Die Hypothese lautet: Die dezentrale, über regionale Marktplätze organisierte Energieversorgung und eine wichtigere Rolle der "Prosumenten" (Verbraucher, die aber auch lokal Strom erzeugen und einspeisen) birgt nicht nur wirtschaftliche, sondern auch ökologische und soziale Vorteile. Sie erhöht die Wertschöpfung vor Ort, vermeidet einen übermäßigen und von den Bürgern nicht gewollten Ausbau von Übertragungsnetzen, stärkt die regionale Identität und sichert auf Dauer die Akzeptanz des notwendigen weiteren Ausbaus von EE-Erzeugungsanlagen.

<http://www.bpb.de/apuz/246429/mit-angezogener-handbremse-zum-stand-der-energiewende?p=all#footnode1-1> (last accessed June 2018)

Scaffolding

Wind and sun power ...

With the increasing use of these resources ...

To guarantee power supply ...

The energy sector maintains ...

This means that the more ...

The hypothesis is ...

In need are "pro/consumers", ...

This has economic but also ...

It enhances ...

State-of-affairs in Germany

Your text: ...

Worksheet 7: The climate change quiz

Task 16:

Do the quiz, making use of the scaffolded crib sheet* below. **Decide** whether each statement below is true or false. **Comment** on your results, whether known or surprising. You will have to change the sequence of answers.

Questionnaire

1. Biodegradable plastic is ok to use and better for the environment than conventional plastic.
2. We consume our Earth's natural resources at a faster pace than our planet can replenish them.
3. People can continue living their current lifestyle without emitting any CO₂ at all.
4. The average American has a smaller carbon footprint than the average European.
5. Airplane transport industry as a whole produces the most total CO₂ emissions out of all transportation industries.
6. Electric cars are much better than fuel-powered ones because they have a smaller carbon footprint.
7. Organic food is not always sustainable.
8. On average, 0.5 lbs. of beef create more carbon dioxide than driving for 5 miles.
9. Solar power is expensive and unreliable.

Voc.: biodegradable: biologisch abbaubar; conventional: herkömmlich; replenish: wiederherstellen; emit: ausstoßen, abgeben; carbon footprint: total amount of CO₂ you create; fuel-powered: Benzin Antrieb; sustainable: nachhaltig; organic food: Bio-Lebensmittel; unreliable: unzuverlässlich

Scaffolding

Answer sheet

answers	comment (surprised? I knew that!)
... : cost of solar panels has dropped 80% since 2008 (USA), keeping household costs down, most panels can be used for more than 20 years	
... : everything used has a carbon footprint, impossible to reduce carbon emissions to zero, purchasing carbon offsets might be a way out	
... : similar to spending more money than you earn, we emit more CO ₂ than nature can remove, equivalent to 1.5 Earths, if nothing changes we require the resources of two planets before mid-century	
... : air transport (relatively small size of the aviation industry) claims only 12% of CO ₂ emissions, road transport: 74%, but greater climate impact per passenger per mile than driving	

... : half a pound of beef steaks has the same harmful effects as driving almost 10 miles	
... : plastic worse for environment, decomposes and releases methane (more potent than CO ₂), composting companies send all plastic to landfills most of the time	
... : carbon footprint of electric cars depends on the power source used, if electricity comes from a coal-fired plant charging your car is no better than using gasoline	
... : US carbon footprint far ahead (16.5 tons per person, per year), Europe: 6.8 tons per year, per capita average worldwide: lower than 5 tons	
... : organic farming uses compost which generates a significant amount of greenhouse gases and groundwater pollution, sustainable products not concerned with whether or not the environment is harmed	