Unit 5: Oil Sands and Fracking

(Sek 2: Jahrgangsstufe 11, 7. Lernjahr, B2/B2+)

Allgemeine Erziehungsziele:
Historische Entwicklungen einordnen;
Abwägung von kommerziellen und umweltorientierten Interessen;
Perspektivenwechsel;
Medien kritisch analysieren;
Standpunkte verstehen und vertreten

Ziele fremdsprachlicher Bildung:
Lesekompetenz schulen;
Informationen über komplexe Sachverhalte verarbeiten;
Landeskundliche und interkulturelle Kenntnisse;
Arbeiten mit Texten und Landkarten;
Interessen verstehen und zuordnen;
Standpunkte abwägen und beurteilen

Inhalte und Themen:
The pursuit of energy;
The story of energy dependency;
The energy turnaround;
Oil sands and fracking;
Issues;
Debating alternatives

Fertigkeiten, Fähigkeiten, Anbahnung von Kompetenzen:
GeR (Auszüge):
B2: Kann etwas systematisch erörtern und dabei entscheidende Punkte in angemessener Weise hervorheben und stützende Einzelheiten anführen (Europarat 2001: 65); kann eine klare und systematisch angelegte Präsentation vortragen und dabei wesentliche Punkte und relevante unterstützende Details hervorheben (66); kann längere Redebeiträge und Vorträge verstehen und auch komplexer Argumentation folgen; kann Artikel und Berichte über Probleme der Gegenwart lesen und verstehen; kann sich ... aktiv an einer Diskussion beteiligen und Ansichten begründen und verteidigen.
B2+: Kann ein breites Spektrum anspruchsvoller, längerer Texte verstehen und auch implizite Bedeutungen erfassen (65).

Sachfach-Curriculum Po/Wi:
Ökologische Herausforderungen der Gegenwart, Möglichkeiten und Schwierigkeiten von Umweltpolitik, Umweltpolitik in der politischen Auseinandersetzung, ökonomische Interessenkonflikte, Umweltökonomie, Übernutzung, Dimensionen und Ziele nachhaltigen Wirtschaftens, Analyse von Umweltproblemen (exemplarisch)

Sprachfokus:
thematisch orientierte Redemittel und Strukturen;
analysing texts and cartoons;
CLIL discourse and word fields;
reading and listening comprehension;
analysing video clips and commenting messages;
negotiation of meaning and perspectives

Lehr- und Lernstrategien:
double circle; comparisons and presentations; plenary discussions*; crib sheets*; placemat activities*; jigsaw puzzle*; think-pair-share*; preparing and role-playing discussion (fishbowl)*; guided and independent content-based research*

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, Durchführung und Auswertung einer Debatte

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Unterrichtsstunde 9–10
Worksheet 5: Fracking

Unterrichtsstunde 11–12
Worksheet 6: The issues

Unterrichtsstunde 13–14
Worksheet 7: Target activity – the debate on renewables

Worksheets 1 bis 7: Anregungen zum Vorgehen

Mit ökologischen Herausforderungen der Gegenwart wird in der politischen Bildung der Jahrgangsstufe 11 ein Schwerpunkt durch die Analyse von Umweltproblemen gesetzt, die am Beispiel von *Oil Sands* und *Fracking* aktuelle Fragen der Energieversorgung aufzeigen. Die Ausweitung der Nutzung fossiler Ressourcen ist keineswegs ein nordamerikanisches Phänomen, sondern sorgt auch in Europa für erheblichen Diskussionsbedarf. Mit einem Interview Spiel zu Beginn dieser Unterrichtseinheit wird ein förderliches Gruppenklima geschaffen und zugleich Vorwissen getestet. Es kann als Abschluss wiederholt werden, um den Lernzuwachs zu dokumentieren. Die Adaption eines *Asterix Cartoons* lenkt den Blick auf eine deutsche Perspektive, und eine Timeline zu *energy and climate* vertieft Kenntnisse zur historischen Entwicklung der Energie- und Klima-Problematik (*worksheet* 1). Ein weiterer historischer Aspekt wird mit den Veränderungen bedingt durch die Industrielle Revolution erarbeitet (*worksheet* 2), um danach einen genaueren Blick auf die deutsche Energiewende zu werfen, die international anerkannt aber auch kritisch gewertet wird. Hier tritt auch eine Besonderheit des bilingualen Unterrichts in den Vordergrund, wenn die notwendige deutsch-englische Terminologie von Schülern bearbeitet wird (*worksheet* 3). Der Kern der Unit liegt in der Analyse von *Oil Sands* und *Fracking*, die sich insbesondere auf die kanadische Situation bezieht und die dort entstehenden Umweltprobleme in den Blick nimmt (*worksheets* 4 und 5). Argumente von Befürwortern und Gegner dieser neuen Technologie werden im Einzelnen verhandelt (*worksheet* 6). Die gewonnenen Kenntnisse werden abschließend in einer *fishbowl debate* zur Sprache gebracht, vorbereitet durch *useful phrases* und in der Anwendungsphase gestützt durch eine Gegenüberstellung von pro und contra Argumenten (*worksheet* 7).
Im erweiterten sprachlichen Aktionsfeld ist formatives Feedback durchgängig in den *worksheets* angelegt. Alle *worksheets* sind so konzipiert, dass sie in rhythmisierten Stunden (90 Minuten-Einheiten) bearbeitet werden.

Worksheet compass

phase	activities of teachers	students	scaffolding
planning; backward design	issues/problems to be solved	analysis, assessment, negotiation, critical thinking, fishbowl debate	worksheet compass
	guiding questions and outcomes	advance organizer, study objectives, peer-scaffolding	reciprocal teaching
complex task	introducing and guiding fishbowl debate on renewable energies	double circle, working in groups, plenary and fishbowl discussion, presentations, evaluation	crib sheets*, useful phrases, discourse files
worksheet 1	The pursuit of energy	**task 1:** discuss **task 2:** analyse, examine **task 3:** delineate, research, compare, present	interview game*, milling around, double circle*, cartoon analysis*, timeline
worksheet 2	The story of energy dependency	**task 4:** outline, discuss, present	jigsaw group*
worksheet 3	The energy turnaround (including useful phrases)	**task 5:** read, mediate, explain **task 6:** examine, discuss, complete, outline	placemat activity*, rubrics, think-pair-share*, discourse file
worksheet 4	Oil sands	**task 7:** question, summarise, clarify, predict **task 8:** research, profile, compare	reciprocal teaching*, think-pair-share*
worksheet 5	Fracking	**task 9:** watch video, make notes, comment, discuss **task 10:** create, outline, explain	jigsaw puzzle*, think-pair-share*
worksheet 6	The issues	**task 11:** watch, answer questions **task 12:** analyse, present	video clip, questions/ answers,gallery walk*, posters
worksheet 7	Target activity – the debate on renewables	**task 13:** rehearse **task 14:** discuss, decide	peer scaffolding*, double circle*, fishbowl debate*

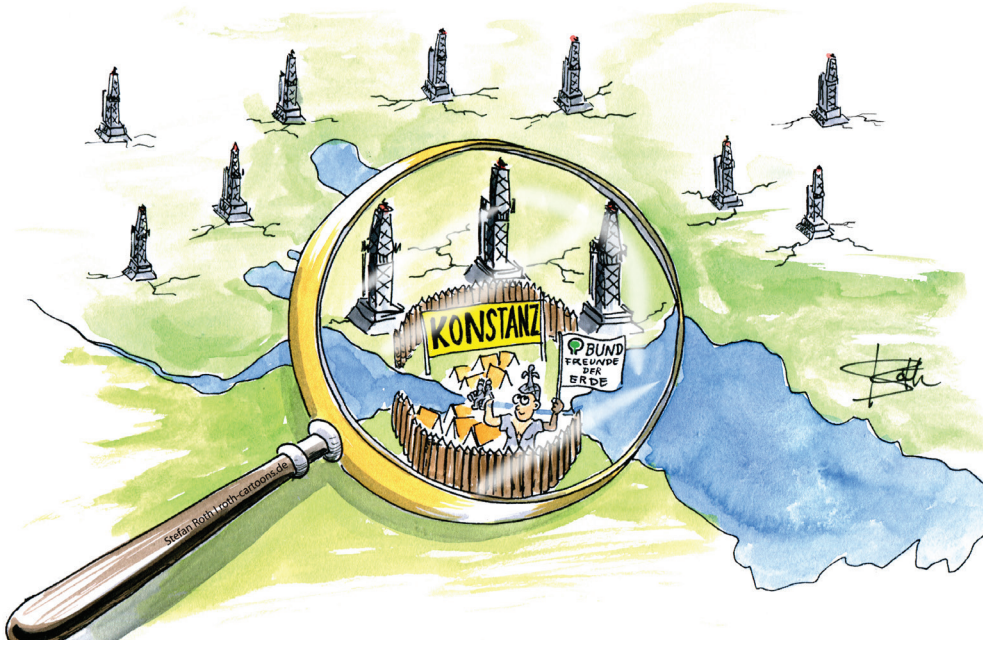
Worksheet 1: The pursuit of energy

Task 1: Interview game

Enjoy the interview game* in your class. Please remember to write student names only (not the answers!) in the boxes of the questionnaire (see glossary*) and **discuss** – after milling around – the answers later in plenary. Open questions would be collected in a word bank* for further investigation.

Task 2: One small village

Analyse this cartoon and consider references to a well-known French comic (*"the year is 50 BC … One small village of indomitable gauls still holds out against the invaders …");* **examine** in a double circle* why the author might have chosen this approach and report in plenary.



Die Zentren des Widerstandes gegen Fracking werden kleiner. Daher der subtile Hinweis auf ein „kleines Dorf, das erbitterten Widerstand leistet." Hoffentlich gelingt der Widerstand. Denn so blöd, kann man gar nicht sein, dass man auf eine Technologie aufspringt, die eh in 10–15 Jahren erschöpft ist …

Scaffolding:

Working with a cartoon
Content: map of Lake Constance, magnifying glass showing Constance as a small, fenced in village, …
Context/meaning: reference to "Asterix" and the fight against overwhelming powers (the Romans); here ….

Voc.: Lake Constance: Bodensee; menace: bedrohen

Task 3: Timeline energy and climate (including useful phrases)

Delineate a chronological order of historic events that show human influence on energy consumption and climate change, and – individually and in tandems – **research** some details that capture your interest. **Compare** results in groups (of 4) and **present** in plenary.

Events

UN-Convention on Climate Change in Paris – Al Gore receives Nobel Prize for his throwing light on climate change – International treaty to reduce greenhouse gas emissions (Kyoto Protocol) – Iraqi forces driven out of Kuwait, destroying oil plants and wells, biggest oil catastrophe in history (1.25 million tons of oil leaked) – Chernobyl catastrophic nuclear accident – First photo-voltaic power station in USA – First mobile telephone by Motorola with 1kg weight – OPEC (Organisation of Petrol Exporting Countries) reduces oil exports to Europe – Club of Rome publishes document "The Limits to Growth" – International protests after nuclear weapon test at Bikini Atoll – First commercial nuclear power station in Calder Hall, GB – global oil consumption rises rapidly – Start of radio broadcasts – Mass production of cars – First electricity power plant in NY – Thomas Edison invents light bulb – First high-yield oilfields in Pennsylvania, after invention of the oil drill by Edwin Blake (1859) – In England telegraph is introduced – Steamships cross the Atlantic Ocean – Steam engine invented by James Watt – Windmills in Iran – Invention of the wheel in Uruk, Iraq.

3200 BC … 600 BC … 1769 … 1830s … 1837 … 1859 … 1879 … 1882 …

1900s … 1915 … 1950s … 1956 … 1968 … 1972 … 1973 … 1983 … 1985

… 1986 … 1991 … 1997 … 2007 … 2015.

Worksheet 2: The story of energy dependency

Task 4:

Outline the dynamics of changes during the Industrial Revolution and **discuss** different factors and outcomes in energy consumption and growth. **Present** your findings in jigsaw groups*.

Voc.: usher in: einleiten; catalyst: Katalysator; abundant: reichlich vorhanden; scarce: selten; commodity: Gut, Ware; spark: entfachen; shift: Verschiebung; diminishing: verschwindend

A brief history

The Industrial Revolution (1760–1850) changed British socio-economic and political life fundamentally. Starting from agricultural infrastructure, an era of new technology transformed Britain's agriculture, transportation, communications and social sectors and began the country's heavy reliance on natural resources. The invention of the steam engine (James Watt: 1769) ushered in the era of unchecked energy consumption. Its application was virtually limitless and a catalyst for an increased rate of industrialisation. (BK)

James Watt's workshop

The improvement of transportation and communications stimulated the Industrial Revolution. For raw materials, manufactured goods, food and people a faster and cheaper system of transportation was needed. Railways (growing from 1,000 miles in 1836 to more than 7,000 miles by 1852) connected various industries, both rural and urban communities, and the number of cities grew rapidly.

An abundant and prominent resource, coal was another driving force behind the Industrial Revolution. By the end of the 17th century, wood had become a scarce commodity. Forests that once covered England had been destroyed to provide the population with fuel, build ships and houses. Therefore, the British had to turn to coal as a new source of energy. It was, for example, used to produce iron from iron ore, for heat and energy. Then metal makers discovered new ways of using coal and coke (high-carbon, converted from coal) to speed the

production of raw iron and later steel – vital in making both railways and machinery. Coal thus sparked a global trend of fossil fuel dependence, but an important shift occurred with the discovery of oil.
This expedient fuel source rose to prominence after the invention of the oil drill, by Edwin Drake in Pennsylvania in 1859, which facilitated the increase in oil production and led to a rising demand for fuel oil. As up to now, many countries rely heavily on oil to meet their growing energy demands and there is a dominance of oil over coal. Though coal is still an important resource, oil dominates today's energy markets. The rapid consumption of oil is predicted to increase despite warnings of diminishing reserves and its negative impact on the environment. (BK)

Picture: https://commons.wikimedia.org/wiki/James_Watt#/media/File:James_Watt%27s_Workshop.jpg (last accessed June 2018)

Worksheet 3: The energy turnaround

Task 5:

Read the following texts about the "Energiewende" – and **mediate** the second using the target language. **Explain** differences and similarities. A placemat activity* will help organize your results.

Two perspectives

Germany's Energy Turnaround

The "Energiewende" – literally meaning "energy turnaround" or "energy revolution" – is Germany's effort to reduce climate-damaging CO_2 emissions, without relying on nuclear energy. ... Germany is a pioneer in this regard: With broad public backing and cross-party support, Europe's most populous country aims to become almost climate-neutral by mid-century. …The "Energiewende", which grew from a grassroots anti-nuclear and environmental movement into a vast national project, has profound effects throughout society and business. Many environmentalists cite Germany as proof that an industrialised nation can ultimately ditch fossil fuels without sacrificing growth. Critics argue the German experience confirms that switching to renewables comes at a high cost to consumers and industry – and doesn't automatically reduce carbon emissions.

So far, the transformation has focused on the electricity sector. The boom of wind and solar power, triggered by generous financial support, means a third of the electricity Germany uses now comes from renewable sources. Citizens and cooperatives own many of these installations, while the fortunes of major energy companies have declined. Integrating this distributed, small-scale generation that depends on the weather into the power system still poses significant challenges. At the same time, Germany is now serious about extending the scope of its energy transition. It aims to power heating and transport with renewable electricity, to replace fossil fuels entirely – a move with massive implications for its car giants BMW, Mercedes and VW. And much must still be done to reduce the energy appetite of the world's fourth largest economy, by increasing efficiency both in households and industry. Despite its green ambitions, Germany struggles to meet its short-term climate targets, because it continues to burn lignite, or brown coal, to generate its electricity.

https://www.cleanenergywire.org/dossiers/germanys-energiewende-easy-guide#Description (last accessed June 2018)

Die deutsche Energiepolitik ist mittlerweile im internationalen Sprachgebrauch angekommen: Nahezu überall in der Welt kennt man nach den Worten „Kindergarten" und „German Angst" auch das Wort „Energiewende". Die Industrie-Musternation Deutschland hat sich zum Ziel gesetzt, Atomstrom abzuschalten und die Energieversorgung mittelfristig auf erneuerbare Energien umzustellen. ... Der eingeleitete Wandel bringt enorme wirtschaftliche Chancen, schafft Innovationen und stärkt die Wettbewerbsfähigkeit.

Zunächst international belächelt, wird inzwischen immer weniger über Deutschlands Energiepläne gescherzt. Spätestens seit die Kosten für Solar- und Windstrom immer weiter zurückgehen und die von Atomstrom immer weiter ansteigen und zum Beispiel in Texas mehr in Solar als in Öl investiert wird, verstummen viele Kritiker. ...

Als international bedeutende Stimme spielt Deutschland im Prozess der globalen Energiewende eine entscheidende Rolle: Die „Energiewende made in Germany" stellt einen wichtigen Beitrag für den Klimaschutz dar; ... [aber Deutschland hat] zu wenig im Bereich nachhaltige Mobilität vorzuweisen; der VW-Abgasskandal ist ein schlechtes Beispiel für „Umweltschutz made in Germany". Wenn Deutschland sich als Klimaschutz-Musterschüler feiern lassen will, dann muss das Kohleproblem gelöst werden; auch muss mehr für das Energiesparen getan und vor allem im Bereich nachhaltige Mobilität wieder Glaubwürdigkeit zurückgewonnen werden. Daher ist die Politik nun gefordert, Maßnahmen für mehr Klimaschutz auch gegen Widerstände aus der Wirtschaft umzusetzen.

http://www.bpb.de/apuz/222980/globale-energiewende-made-in-germany?p=all (last accessed June 2018)

similarities	differences
Germany's effort to reduce climate-damaging CO_2 emissions, without relying on nuclear energy; …	the term "Energiewende" accepted in international parlance; Germany as a model for industrial nations aims at …

Task 6:

Examine the list of "loan words" of German origin used in English and – in think-pair-share* – **discuss** reasons why these words might have crept into the language. Also **complete** the list below and **outline** further examples that refer to the topic "energy and climate".

Scaffolding – word bank

loan word in English	meaning/context
Energiewende	energy turnaround / transition
Ersatz	…
Angst	fear, anxiety
road angst	threatening situation while driving
Waldsterben	…
Blitz	also Blitzkrieg: method of warfare
Hinterland	…
Völkerwanderung	Barbarian invasions
Umlaut	…
Vergangenheitsbewältigung	coping with the past
Leitmotiv	guiding idea
Abseil	…
Rucksack	…
Lebensraum	living space

Schadenfreude	…
Zeitgeist	spirit of the time
Doppelgänger	duplicate living person
Gemütlichkeit	…
„Gesundheit“	bless you
Kindergarten	day-care centre
Kitsch	…
Wanderlust	yearning to travel

Energie und Klima	**energy and climate**
Abgasskandal	Dieselgate (exhaust emissions scandal involving VW and other German car firms);
Abgasmanipulation	emissions rigging
erneuerbare Energien	…
fossiler Brennstoff (Reserven)	fossil fuel (reserves)
Energieabhängigkeit	…
Unstetigkeit	intermittency
Verschmutzer Subventionen, Fördermittel	… subsidies
Energiespeicherung	…
CO_2 Bilanz	carbon footprint
Wasserkraft	…
Reserven anzapfen	tapping reserves
Waldzerstörung, Entwaldung	…
Vernichtung von Artenvielfalt	extinction of species
herkömmliche Energieträger ersetzen	…
Schadstoffausstoß	emission
herkömmliche Kraftwerke	conventional power plants
Windpark	…

Worksheet 4: Oil Sands

Task 7:

Working on the following text, you can improve your reading comprehension based on Reciprocal Teaching* (RT). In groups of four, after silent reading you would use the strategies of **questioning**, **summarising**, **clarifying** and **predicting**. Individually, you will take the role of

- Questioner – three of you ask questions on the text for the fourth group member to answer, who is taking the role of a teacher;
- Summariser – one student summarises the text to be evaluated by the other members;
- Clarifyer – one group member deals with difficult text parts;
- Predictor – the task for this student is to delineate which further developments might be imagined or guessed at.
- In this scaffolding, you can see a worked example. Record and **compare** your results in plenary.

Scaffolding

Questioning:
Why are oil sands called 'unconventional' oil? Which approaches of extraction are used?
Summarising:
Oil sands have become profitable at a time of rising oil prices.
Clarifying:
Current technologies involve surface mining as well as in situ drilling.
Predicting:
Increased environmental concerns versus business opportunities.

Your turn
Questioning:
…

Summarising:
…

Clarifying:
…

Predicting:
…

Facts and Stats of Oil Sands

[**Oil sands** (also tar sands) are a mixture of water, sand, clay and a form of petroleum called bitumen which can be used as fuel. Making oil sands into liquid fuel generates between two to four times more greenhouse gases than conventional oils.]

The Canadian oil sands (or tar sands) are a large area of petroleum extraction from bitumen, located primarily along the Athabasca River with its centre of activity close to Fort McMurray in Alberta, approximately 400 km northeast of the provincial capital, Edmonton. Increased global energy demand, high petroleum dependency and geopolitical conflict in key oil producing regions has driven the exploration of unconventional oil sources since the 1970s which, paired with advances in the field of petroleum engineering, has continued to make bitumen extraction economically profitable at a time of rising oil prices. Oil sands are called "unconventional" oil because the extraction process is more difficult than extracting from liquid ("conventional") oil reserves, causing higher costs of production and increased environmental concerns.

Extraction Methods: Oil sands extraction occurs through two major approaches: surface mining and deep drilling called *in situ.* Surface mining first strips the area of the so-called overburden (i.e., vegetation, soil and earth layers above the bitumen), and creates large open-pit mines from which the bitumen is removed with shovels and trucks to be physically and chemically processed. Based on current technologies and their economic costs, oil sands operators use surface mining for areas where the bitumen is up to 70–100 m below the surface. For areas where the bitumen layer is deeper, *in situ* drilling is used. As the Latin term for "on site" suggests, this type of drilling leaves the vegetation and soil layers above the bitumen largely intact and instead pressure-pumps the bitumen to the surface after heating it underground. The technologies that made this method possible — steam-assisted gravity drainage (SAGD) and cyclic steam stimulation (CSS) — marked the beginning of large-scale commercial in situ drilling, which significantly changed the dimensions of Canadian oil sands extraction from the early 2000s on.

Fort McMurray is the local economic hub of the oil sands operations. The region is associated with high regional employment and revenue, as well as with socio-economic disparities and social impacts. These impacts include high costs of living; transient community; "gold rush" effects; unbalanced demographic structure (i.e., the population is primarily male, and young); high dependencies of the local economy on volatile energy markets; and uncertainty of future budgets regarding social programs, infrastructure and environmental clean-ups. Located along the Athabasca River, Fort McMurray is upstream from the oil sands operations, while Fort McKay and Fort Chipewyan, two Aboriginal communities, are facing higher environmental impacts further downstream.

Task 8:

Research the locations in Canada (Alberta's oil sands – facts and stats) shown on the map below and **profile** the areas most affected and the dimensions involved (reserves, investment, projects assessed). **Compare** results in a think-pair-share* activity.

https://open.alberta.ca/dataset/b6f2d99e-30f8-4194-b7eb-76039e9be4d2/resource/063e27cc-b6d1-4dae-8356-44e27304ef78/download/FSOilSands.pdf (last accessed June 2018)

https://commons.wikimedia.org/wiki/File:Athabasca_oil_sand_mining_map_2011.jpg
(last accessed June 2018)

Worksheet 5: Fracking

Task 9:

In plenary, **watch** the video clip (6':36") on YouTube twice and **make notes** using the scaffolding below. **Comment** on the intentions of this film and **discuss** the results in a jigsaw puzzle group*.

Scaffolding

This video shows techniques to implement hydraulic fracturing (aka fracking) as a means to extract oil and gas resources from shale formations. It involves horizontal drilling to produce oil and natural gas that previously were not accessible in an industrial fashion. The claim is that safe and environmentally secure procedures are used by the employment of innovative techniques.

Video: https://www.youtube.com/watch?v=VY34PQUiwOQ (last accessed June 2018)

episode	"information"	critical assessment
context	… drinking water	safe and efficient
technical detail	surface casing, …	water plus "a few chemicals", …
environmental considerations	…	under controlled conditions, …

Task 10:

Create a crib sheet* **outlining** the information of the text. **Explain** elements of fracking in your own words, using think-pair-share*.

Fracking

Hydraulic fracturing is a technique used in oil and natural gas production. It releases otherwise irrecoverable resources from certain geological formations by injecting water and additives at high pressure into the ground to create microfractures in the rock. Hydraulic fracturing is a technique used in oil and natural gas production. It releases otherwise irrecoverable resources from certain geological formations by injecting water and additives at high pressure into the ground to create microfractures in the rock. Hydrocarbons can then flow through these fractures into a well. It has become controversial because of concerns that the technique, and well-drilling activity associated with its use, threatens groundwater, surface water, air quality, and other environmental values. Common in Alberta's oil patch since the 1970s, the practice expanded greatly in this century, triggering gas rushes in British Columbia and Saskatchewan and resistance in several other provinces. Hydraulic- or hydro-fracturing uses water (hydro), mixed with additives, and pumped at extremely high pressure into oil- or gas-bearing rock formations, to create minute fractures through which hydrocarbons can flow more easily than they would through solid rock. The effect has been described as similar to striking a windshield with a hammer: the layer of rock stays put, but it is webbed with small fissures. Oil wells "stimulated" this way produce 75 per cent more crude than untreated wells. The process is also routinely applied to release the gas held in shale (i.e., sedimentary rocks formed at the bottom of ancient water bodies and now widely distributed), and may need to happen multiple times before the well begins production. In the Horn River area of northeastern British Columbia, for example, wells have been fractured 20 or more times before natural gas is collected. In the latest hydrocarbon rush — beginning around 2005 — fracturing has made it feasible to release natural gas hidden in microscopic pores in rocks 50 times less permeable than solid concrete. More than 2.5 million wells have been fractured worldwide, and as many as 200,000 in Canada, more than three-quarters of which are in Alberta. The industry and its regulators have begun to respond to critics' concerns. Service companies are turning to

non-potable and recycled water instead of fresh, and phasing out toxic additives for others that are also used in hospitals, homes, and even as food additives. State and provincial regulators (in neither Canada nor the US do federal governments regulate hydro-fracturing) have required more disclosure of frac-fluid contents. Similarly, the Canadian Association of Petroleum Producers has released guidelines for fracturing companies, which include public disclosure of chemical ingredients. Such improvements may do little to soften critics. Industry and regulatory sources concede that chemicals or gas can leak out when wells are improperly "cemented"— or sealed — at the top, allowing contaminants to reach the surface in the space between the steel well casing and the walls of a drilled hole. Pressure to keep costs down in an era of low gas prices — in part the ironic result of the glut of gas from other fracked wells — can encourage shortcuts.

Worksheet 6: The issues

Task 11:

Watch the video at hand (twice) and, in tandems*, **answer** the following questions.

Western Canadian's tar sands are one of the biggest industrial projects in human history. The story about the war for water shows the consequences when crude oil is being extracted from the tarry sands. Each barrel of oil uses up to four barrels of glacier-fed spring water which is then dumped into huge tailing ponds, even visible from space.

Video: https://www.youtube.com/watch?v=eo302D9SqRo (last accessed June 2018)

Questions/answers:

1. **What is the size of Alberta's recoverable oil patches?**
   …

2. **Describe how the bitumen is processed.**
   …

3. **How much water is used by the oil sands mining operations and where does it come from?**
   …

4. **How does the oil cycle of consumption accelerate climate change?**
   …

5. **Explain how NAFTA (North American Trade Agreement) works.**
   …

6. **How will the oil sands become the largest industrial project in human history?**
   …

7. **Comment on the consequences for Canadian energy supply.**
   …

Task 12:

In groups of four, **analyse** the following text and **present** the arguments of supporters and critics of oil sands and fracking technology on posters, using a gallery walk*.

Environmental and social impacts

… of the Canadian oil sands have led to widespread debate and critiques over the scope of their future development. There are ongoing discussions about environmental regulations and ecological monitoring practices, decision-making and approval processes, distribution of economic benefits between Canadian taxpayers and foreign investors, as well as socio-economic benefits for the region. Canada and Alberta's carbon and energy strategies have also been called into question, as have the energy input and emission levels for the oil sands. For many, the subject underlying all of these debates is the global rise of energy consumption and demand, which has opened debates on ecological modernization and an energy transition to shift society away from petroleum dependency.

© Courtesy of *The Canadian Encyclopedia*, Historica Canada, www.thecanadianencyclopedia.ca (last accessed June 2018)

Companies that provide hydraulic fracturing services insist that the practice poses no threat to freshwater typically found less than 300 metres below the surface. Thousands of metres and layers of impermeable rock separate that groundwater from petroleum pay zones, leaving little chance that hydro-fracturing a deep shale formation will, by itself, contaminate a water well on the earth's surface, most assessments suggest. Nonetheless, critics found it troubling that companies were allowed to keep secret the identity of chemicals they mix with water in fracturing fluid. What had been merely a customary protection was formalized in the United States in 2005, when Vice President Richard (Dick) Cheney, who before his election was the chief executive officer of Halliburton Co., the world's leading provider of hydro-fracturing services, exempted the practice from disclosure requirements in that country's Safe Drinking Water Act. Researchers trying to penetrate industry secrecy, however, have identified hundreds of compounds in frac fluid samples that could potentially pose risks to human health. Fracturing rock, moreover, is only a small part of the months-long, round-the-clock activity of drilling an oil or gas well, let alone the intense, years-long development of a major resource field. People living near active gas developments have complained of dizziness, headaches, rashes, nosebleeds, trouble concentrating and sleeping, as well as the noise and dust kicked up by heavy truck traffic. Ranchers have blamed livestock deaths on nearby fracturing operations. Seismologists suspect a link to earthquakes in places where waste frac liquids (more than half the mixture pumped into a well during a frac comes back up again afterwards) has been disposed of underground. Gasland, a 2010 documentary about the impact of gas developments on neighbours and communities, whose accuracy the industry challenges, was nominated for an Academy Award.

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Worksheet 7: Target activity – the debate

Task 13:

In a peer scaffolding* activity, you can support each other – **rehearsing** "useful phrases" in a double circle*.

Useful phrases for a fishbowl debate

participating	**backing up (sb/sth)**
excuse me, I would like to add may I interrupt? that illustrates perfectly what I'd like to say I see what you mean but have you ever considered	I'd like to stress the fact that here's a good example of what I mean looking at the facts, it is quite clear that what … has just said is that statement is true/right because this proves what … was saying
expressing your opinion	**agreeing**
as far as I'm concerned the way I see it in my opinion I'm convinced that it seems to me according to I expect I can't see any reason after all/above all	I couldn't agree more yes, that's definitely the case that's how I feel about it, too exactly that's great good point I agree with … because … did you really mean to say that … I think … is absolutely right when …
disagreeing with respect	**asking for clarification**
hear what you are saying, but I can't agree with you on that point I beg to differ I take your point but I'm sorry but I have to disagree here did you really mean to say that …? I see what you mean but … II can't see why have you ever considered is it right that	I'm sorry but I don't know what you mean by … could you give an example … could you prove what you are saying? If I understood you correctly … I wonder if you could are you implying that excuse me, how… are you saying may I request
it is generally accepted I assure you I think we'd better it would be a good idea	would you like to comment on are you seriously suggesting that would you mind telling us

Task 14: Fishbowl debate

Discuss and then **decide** which position you want to adopt after carefully studying the controversial texts (agree/disagree) below. The rules of a fishbowl debate* apply, three active participants on either side are designated and single students may join in later. The "audience" will take notes and evaluate the results of the debate by finally casting their vote on the motion. After selecting a chairman, the participants take their seats in the middle of the circle, with one chair remaining empty. The chairman then reads the following statement as an introduction to the debate:

"Currently, we are (over)dependent on fossil fuels to heat our homes, run our cars, power our offices, industry and manufacturing. 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. Or is it?"***

The motion:

"Renewable energy cannot replace fossil fuels"

point	agree	disagree
1	**Switching to renewable energy is not as simple as it is being made out to be. Quite the opposite.** Limits to renewable energy; critical light on the difficulties and limits of renewables missing; capturing these resources is expensive, and many are intermittent, not for use on a large scale; it will **not** be possible to substitute renewable energy sources for fossil fuels.	**Leaving fossil fuels in the ground is good for everyone.** To simply rape the earth of all its fossil-fuels would be gross folly; fossil fuels are not renewable, they can't be made again, once they are gone, they're gone; need to avert dangerous levels of global warming (2-5°C).
2	**Renewables cannot provide the required amount of energy to supply demand (intermittency).** Sun and wind can only supply intermittent energy; fossil fuel backups required; anticipated energy demand expected to double by 2050; radical change in social, economic and political systems needed as regards energy consumption.	**Renewable energy can meet energy needs in a safe and reliable way.** Mix of sources spread over a wide area; smart grids = flexible group producers to form virtual power plants; sunlight in one day contains more than twice the energy we consume in one entire year.
3	**Renewable energy is not cost effective.** Heavy government subsidies needed; conventional plants to be kept on standby; one coal-fire plant produces as much energy as 7 solar plants and 4 wind farms together; EU governments interfere with electricity markets; oil companies interested in renewables as well.	**Fossil fuel does not factor in all the 'hidden costs'.** Renewables are good for economic growth and people; greater energy independence; reducing the carbon footprint; greater control over national energy prices; attract foreign investment.
4	**Renewable energy utilises too much land, meaning problems in scalability and storage.** Big scale of land required; electricity cannot be stored; hydroelectric energy is cost effective but impacts on environment (settlements, livelihoods); long-distance transmissions involved; intermittency factored in smart grids.	**Renewable technologies are scalable, land problems can be overcome.** New complex energy system required; new technologies and tools (electric vehicles etc.); problems of land use, noise (mainly aesthetic aspects in wind parks); birds and bats can be overcome.

5	**Demand is increasing globally.** Oil provides 41 % of the world's total energy supplies, coal 24 %, natural gas 22 %; renewables would not be able to meet increasing demands (by 50 % up to 2050).	**Demand is decreasing in significant parts of the world, e.g. the EU.** Total demand fell in EU by 2.5 % from 2007 to 2012, due to energy saving in various areas.
in a nut-shell	More CO_2 creates more plant food and is, in effect, greening the planet; responsibility to advance alternative power – **but**: low-cost electricity is crucial to the economy, increases income, employment and purchasing power of consumers, makes exports more competitive; renewable energy certainly can supplement conventional power, and its use will be likely to continue to steadily grow – **nevertheless, it can't entirely replace non-renewable fuels anytime soon.**	Depending on fossil fuels will have to lessen as the planet's known supplies diminish; difficulty and cost of tapping remaining reserves will increase (→ oil sands and fracking); burning dirty coal must be stopped at once to cut emissions, overconsumption of our natural environment has severe consequences for soil and fresh water quality, deforestation, extinction of species, pollution – **renewable energy is a solid alternative to meet energy demands.**

Voc.: intermittent: unregelmäßig, in Abständen auftretend; scalable: anpassbar; storage: Speicherung; crucial: entscheidend wichtig

Based on: http://developmenteducation.ie/feature/the-energy-debaterenewable-energy-cannot-replace-fossil-fuels/ (last accessed June 2018)