



global system choices

unit four

ask

How will life on earth be different when oil runs out?

acquire

- Chart paper and markers OR laptops for students to collaborate using Google docs
- Student & teacher handouts
- PowerPoint presentation
- Newspaper articles

explore

- Interactive PowerPoint presentation

analyze

- Cartoon analysis
- Oil stakeholders organizer
- Post-oil readiness country comparison
- Energy sustainability activity

act

- Cartoon design
- Ranking justification
- Funds allocation recommendation

U4L2 | Life after oil

This lesson builds on concepts learned in the introductory lesson, ‘Oil addiction’ (Unit 1: Sustainability). Students will begin to visualize how different the world will be once oil reserves are exhausted. They will assess the positions of key stakeholders in the oil scarcity issue and critique the sustainability of seven major energy sources. Students will also consider the actions of governments in regards to transitioning to world without oil.

subjects: Economics, Politics, Geography, Science, Civics English

timing: **Activity 1**

Cartoon analysis | **10–15 minutes per cartoon x four cartoons**

Note: follow-up with Activity 5

Activity 2

Oil stakeholders organizer | **75 minutes**

Note: follow-up with Activity 5

Activity 3

Post-oil readiness country | **75 minutes**

Note: follow-up with Activity 6

Activity 4

Energy sustainability activity | **150 minutes**

Note: follow-up with Activity 7

Activity 5

Cartoon design | **75 minutes**

Activity 6

Ranking justification | **75 minutes**

Activity 7

Recommendation to Prime Minister | **70 minutes**

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learning goals

- To recognize and understand the techniques used to create effective social/political/economic cartoons.
- To understand the complicated and conflicting positions of major stakeholders on the issue of oil scarcity.
- To understand the necessity of post-oil planning and preparation.
- To gain insight as to how different countries are preparing to transition to a world without oil.
- To understand that all energy sources have pros and cons which determine their degree of sustainability.
- To effectively communicate a message in the visual format of a cartoon.
- To understand that different countries are at different stages of readiness to transition to a post-oil world.
- To effectively support an opinion on an issue with evidence.
- To develop and defend an informed position on the issue of energy sustainability.


success criteria

- Detailed and accurate cartoon analysis.
- Completion of Oil stakeholders organizer.
- Comprehensive analysis and sound reasoning used to support post-oil readiness country rankings.
- Detailed analysis and deep thinking demonstrated in assessment of advantages and disadvantages of seven major energy sources.
- Use of the five elements of a cartoon to create an original cartoon that clearly illustrates the topic of oil scarcity.
- Completion of post-oil readiness ranking justification.
- Completion of funds allocation recommendation to Prime Minister.

ask

Inquiry questions

- How do cartoons make effective social/political/economic commentaries?
- What are the potential impacts of oil depletion on major stakeholders?
- What steps are different countries taking to prepare for the transition to a post-oil world?
- Which energy sources are the most sustainable?
- How can I design a visually impactful cartoon which sends a clear message about oil scarcity?
- How can I use research to effectively support and justify my position on an issue?
- How can I use research to persuade my audience to side with my position?

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acquire

Life after oil PowerPoint presentation

Activity 1

Cartoon analysis worksheet

Activity 2

Oil stakeholders organizer student worksheet

Oil stakeholders organizer teacher answer key (appended to lesson plan)

Activity 3

Package #1: Norway

- “Norway’s sovereign wealth holds lessons for Canada”
- “Norway’s oil fund heads for \$1 trillion; so where is Alberta’s pot of gold?”
- “What Norway did with its oil and we didn’t”

Package #2: Venezuela

- “Oil cash waning, Venezuelan shelves lie bare”
- “Venezuela’s government is sinking in a sea of oil”
- “Hugo Chavez leaves Venezuela in economic muddle”

Package #3: Canada

- “Alberta should learn from Norway on managing oil”
- “Peak oil? More like peak Canada”
- “Why every Norwegian is a (kroner) millionaire”

Activity 4

Energy sustainability activity teacher answer key (appended to lesson plan)

- Laptops and Internet access

Activity 5

Cartoon design worksheet

Activity 6

Ranking justification worksheet

Activity 7

Recommendation to Prime Minister worksheet

explore

Teacher presents interactive life after oil PowerPoint

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analyze

Activity 1 | Cartoon analysis

In this activity students will analyze a cartoon via five techniques: symbolism, exaggeration, labelling, analogy and irony. They will become experts in identifying and analyzing the tools cartoonists use to effectively deliver their message.

Students will analyse four cartoons embedded in the the Life after oil PowerPoint.

- Analysis can be done in pairs or small groups
- Students can use the cartoon analysis worksheet to complete their analysis (can also be done on chart paper or Google doc)
- Each group informally shares findings with the class

Note: follow up with Activity 5

Activity 2 | Oil stakeholders organizer

In this activity students will work collaboratively in a small group to complete the oil stakeholders organizer. Each group will identify the potential impacts of oil depletion on the major stakeholders, and identify each stakeholder as a winner or loser. Students will begin to contemplate the realities of life after oil.

- Students will work in small groups (three–four students) to complete oil stakeholders organizer, identifying the potential impacts of oil depletion on major stakeholders
- Students will identify stakeholders as winners or losers
- Each group will informally share findings with the class

Note: follow up with Activity 5

Activity 3 | Post-oil readiness country comparison

In this activity students will work in a group of three to investigate the post-oil readiness of three petroleum producing countries. Each group member will investigate a different country (Norway, Venezuela, or Canada) and share their findings with the group. Once all findings have been shared, group members will work collaboratively to rank the countries from most to least prepared.

- Students will work in groups of three to investigate how three petroleum rich countries (Canada, Venezuela, Norway) are preparing to transition to a world without oil
- Each student receives one set of articles to read:

Package #1: Norway

- “Norway’s sovereign wealth holds lessons for Canada”
- “Norway’s oil fund heads for \$1 trillion; so where is Alberta’s pot of gold?”
- “What Norway did with its oil and we didn’t”

Package #2: Venezuela

- “Oil cash waning, Venezuelan shelves lie bare”
- “Venezuela’s government is sinking in a sea of oil”
- “Hugo Chavez leaves Venezuela in economic muddle”

Package #3: Canada

- “Alberta should learn from Norway on managing oil”
- “Peak oil? More like peak Canada”
- “Why every Norwegian is a (kroner) millionaire”

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- Students will record findings in a three-way Venn diagram (can be done on the handout, chart paper or Google doc)
- Each group will rank the countries from most to least prepared
- Each group will informally share decision with the class

Note: follow up with Activity 6

Activity 4 | Energy sustainability activity

In this activity students will work in a small group (three–four people) to assess the advantages and disadvantages of seven major energy sources (oil, natural gas, coal, nuclear, solar, wind and hydroelectric). They will use the internet to conduct research.

- Students work in small groups (three–four students) to research the advantages and disadvantages of seven major energy sources (oil, natural gas, coal, nuclear, solar, wind and hydroelectric)
- Students will record findings using table provided on handout, chart paper or Google docs
- Each group will informally share findings with the class

Note: follow up with Activity 7

act

Activity 5 | Cartoon design

In this activity students will design an original cartoon (by hand) on the topic of oil scarcity using the five elements of a social/political/economic cartoon: symbolism, exaggeration, labelling, analogy and irony. Their message must be clear and easy to understand. They will also submit a brief written explanation of how their cartoon illustrates the five elements of a cartoon.

- Students design an original cartoon (by hand) on the topic of oil scarcity using the five elements of a political cartoon (symbolism, exaggeration, labelling, analogy and irony).
- Students also submit a brief written analysis explaining how all five elements of a cartoon are illustrated in their drawing.

Activity 6 | Ranking justification

In this activity students will individually justify how they ranked the post-oil readiness of Canada, Norway and Venezuela in Activity 3 (i.e. “X” country is most prepared because...).

- Students individually justify how they ranked the post-oil readiness of Canada, Norway and Venezuela in Activity #3 (i.e. “X” country is most prepared because...).
- Justification should be approx. one page typed, double-spaced.
- In-text citations and a full reference list required, submit to turnitin.com

Activity 7 | Recommendation to Prime Minister

In this activity students will individually make a recommendation to the Prime Minister as to how funds should be allocated to ensure a sustainable energy future for Canada. They should refer to the advantages and disadvantages of major energy sources recorded in their energy sustainability organizer from activity 4.

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- In the role of Minister of Natural Resources, students will individually make a recommendation to the Prime Minister as to how funds should be allocated to promote a sustainable energy future for Canada. (students should refer to the advantages and disadvantages of major energy sources recorded in their Energy Sustainability organizer from Activity 4)
- Mandatory APA bibliography with minimum three sources, submitted to turnitin.com.
- Approx. 500 words

references

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U4L2 | Life after oil

U4L2A2 | Oil stakeholders organizer | **TEACHER ANSWER KEY**

overview

In this activity you will work collaboratively in a small group to complete the oil stakeholders organizer. Your group will identify the potential impacts of oil depletion on the major stakeholders, and identify each stakeholder as a winner or loser. You will begin to contemplate the realities of life after oil.

learning goal

- To understand the complicated and conflicting positions of major stakeholders on the issue of oil scarcity.

success criteria


- Thoroughly and thoughtfully complete organizer and informally share findings with the class—each group must justify their winner/loser designation.

Inquiry Question

- What are the potential impacts of oil depletion on major stakeholders?

When change occurs there are winners and losers. How will each of these stakeholders be affected by the end of oil?

Form a small group of three–four students and work collaboratively identify potential impacts of oil depletion on each stakeholder. Record your answers in the table that follows. Be prepared to share and justify your opinion.

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U4L2 | Life after oil

U4L2A1 | Considering the hidden costs of production | **TEACHER ANSWER KEY**

Stakeholder	Potential impacts	Winner/Loser
Oil industry	<ul style="list-style-type: none"> • Huge job loss • Huge profit loss for shareholders 	Loser
Oil rich (exporting) countries	<ul style="list-style-type: none"> • Huge loss of government revenue • Cuts in government spending due to loss of government revenue • Tax increases to make up for lost export income • Decreased standard of living (higher unemployment rate) • Increased reliance on government welfare programs (i.e. job retraining, EI etc...) • Potential loss of international relationships 	Loser
Oil dependent countries	<ul style="list-style-type: none"> • Major lifestyle changes required (which could be seen as good or bad depending on perspective) • Positive—potential wake-up call for some citizens, resulting in greater respect for the planet and a healthier lifestyle • Negative—potential increased cost of living and anger regarding lost conveniences • Really depends how respective government prepares for and manages the transition to a post-oil world 	Loser
Alternative energy sector	<ul style="list-style-type: none"> • Huge job gain • Increased profits 	Winner
Environmentalists	<ul style="list-style-type: none"> • No more oil will require most countries to adopt renewable energy sources like solar and wind—positively affecting the natural environment 	Winner
Alternative energy sector	<ul style="list-style-type: none"> • Many Indigenous groups have a strong connection to Mother Earth—shift to renewable energy sources would be seen as positive 	Winner

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U4L2A4 | Energy sustainability activity | **TEACHER ANSWER KEY**

overview

In this activity you will work in a small group (three–four people) to assess the advantages and disadvantages of seven major energy sources (oil, natural gas, coal, nuclear, solar, wind and hydroelectric). You will use the internet to conduct research—be sure to cite all sources for credibility. Remember, information is only as reliable as its source!

learning goal

- To understand that all energy sources have pros and cons which determine their degree of sustainability.

success criteria

- Detailed analysis and deep thinking demonstrated in assessment of advantages and disadvantages.

Inquiry question

- Which energy sources are the most sustainable?

Conventional sources

Non-renewable energy sources	Advantages	Disadvantages
Oil	<ul style="list-style-type: none"> • Oil is arguably the planet’s most versatile fossil fuel, yielding a vast quantity of other products following further processing • Oil is relatively easy to store and to transport between source and end-user—its liquid form means that it can be pumped through pipelines where possible or stored in containers • Oil is cleaner and easier to burn than coal • Electricity produced from oil is reliable 	<ul style="list-style-type: none"> • Non-renewable • Burning oil generates greenhouse gases contributing to global warming • Processing oil produces hazardous waste • Oil is expensive compared to other fossil fuels • Oil spills cause significant environmental damage—the catastrophic effect on marine life, birds and coastlines is evident for many years • Gas flares during drilling emit CO2 • Oil is the cause of several foreign wars • Oil contains sulphur which when burnt leads to acid • Oil is neither as clean nor efficient in use as natural gas • Locating additional oil reserves is an extremely costly ongoing process with no guarantee of success • While many of the products obtained from oil are hugely beneficial to mankind, many are also highly toxic

U4L2 | Life after oil

U4L2A4 | Energy sustainability activity | **TEACHER ANSWER KEY**

Conventional Sources

Non-renewable energy sources	Advantages	Disadvantages
Natural gas	<ul style="list-style-type: none"> • Costs less than oil • Less damaging to environment than coal and oil • Abundant supply worldwide • Easy storage • Easy transport (ships, tankers, pipes) • Technology to produce natural gas already exists • Can be piped into houses (cooking, heating) • Used to make plastics, chemicals, fertilizers and hydrogen 	<ul style="list-style-type: none"> • Non-renewable • Costs more than coal • Emits greenhouse gases contributing to global warming • Highly flammable—gas leaks are very dangerous (fires, explosions) • Processing produces hazardous waste • Refining process creates harmful by-products (sulfur, CO2 etc...) • Infrastructure needed to use natural gas is very expensive (long pipes, specialized tanks, and separate plumbing systems) • Long distance transmission and transportation requires extra cost • Maintenance & fixing of leaking pipes add to the cost
Coal	<ul style="list-style-type: none"> • Historically cheap, but becoming more expensive with increasing environmental requirements (i.e. scrubbers on smokestacks) • Abundant supply worldwide • Not dependent on weather—electricity produced from coal is reliable • Coal can be safely stored and drawn upon to create energy in time of emergency • Coal is versatile enough to be used for recreational activities such as BBQ's or simply for home fires • Transporting coal does not require the upkeep of high-pressure pipelines and there is no requirement for extra security when transporting coal • Using coal reduces the dependence on using oil, which is often found in nations where there is unstable political regimes 	<ul style="list-style-type: none"> • Non-renewable (requires non-renewable uranium) • Mining and refining uranium is a dirty, expensive process (creates nuclear waste) • Nuclear accidents are catastrophic (i.e. Chernobyl, Fukushima) • Storing radioactive waste is dangerous and expensive • Plants are expensive to build and usually opposed by people living in the region • Nuclear energy can be used to make extremely dangerous weapons • Nuclear power plants are targets for terrorism

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U4L2A4 | Energy sustainability activity | **TEACHER ANSWER KEY**

Alternative sources

Renewable energy sources	Advantages	Disadvantages
Solar	<ul style="list-style-type: none"> • Renewable and sustainable • ‘Clean source,’ doesn’t generate greenhouse gases • Tax incentives and credits available • Provides energy security & independence • Helps national economy by creating new employment opportunities in this developing engineering field • Doesn’t require water for generation • Can be installed on a small distributed scale • Many low power devices can be powered effectively (i.e. calculator, lamp etc...) • Solar panels are used in large numbers by home owners to reduce monthly electricity bills • Capability to provide power to people living in remote areas not connected to national electrical matrix • Can be installed on any number of roofs, free supply of power once installed (pays for itself in the long-run) • Sunlight is available throughout the world and can easily be harnessed by every nation • Low maintenance costs (panels can last 20–25 years) • No noise pollution (silent) 	<ul style="list-style-type: none"> • Starting costs are very high • Solar power cannot be easily or cheaply stored—Solar power can be used to charge batteries so that during the evening hours you will still have access to power. These batteries are heavy and large. Need to find somewhere to store them, and have to replace them occasionally, which can add to the cost • Unreliable—energy can only be harvested when sunny, energy not produced at night • Large farms require a lot of land • Construction of panels requires use of harmful substances that must be disposed of carefully • Difficult to maintain roofs under solar panels

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U4L2A4 | Energy sustainability activity | **TEACHER ANSWER KEY**

Alternative Sources

Renewable energy sources	Advantages	Disadvantages
Wind	<ul style="list-style-type: none"> • Renewable and sustainable • ‘Clean source,’ doesn’t generate greenhouse gases • Tax incentives and credits available • Provides energy security & independence • Wind energy has seen enormous growth in last decade—cost continues to drop as it becomes more popular • Doesn’t require water for generation • Can be installed on a small distributed scale • Lessens reliance on imported fossil fuels • Helps national economy by creating new employment opportunities in this developing field • Can be installed on existing farms (source of earning for the farmers) • Organizations will pay you if they can install wind turbines on your land • If you produce more power than you require from wind power, it may go into the general electric matrix, which in turn will make you some extra cash 	<ul style="list-style-type: none"> • Reliability—wind doesn’t generally blow reliably, and turbines usually function at about 30% capacity or so. You may wind up without power • Serious storms or high winds may cause harm to your wind turbine, particularly when they are struck by lightning. • Wind energy can only be harvested where speed of wind is high • Since they are mostly setup in remote areas, transmission lines have to be built to bring the power to the residential homes in the city (requires extra investment to set up the infrastructure) • Turbines are expensive to set up • Large farms require a lot of land • Fuel cannot be stored • Turbines can be unsafe for birds • Some people find turbines unattractive • City codes and mandates can create installation obstacles

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U4L2A4 | Energy sustainability activity | **TEACHER ANSWER KEY**

Alternative Sources

Renewable energy sources	Advantages	Disadvantages
Hydroelectric	<ul style="list-style-type: none"> • Renewable and sustainable • ‘Clean source,’ doesn’t generate greenhouse gases • Provides energy security & independence • Energy can be stored • Reliable source of energy • Low operating cost • Lakes that form behind dams can be used for recreational opportunities (fishing, boating, swimming). The lake’s water can also be used for irrigation purposes • Large dams become hot spot for tourist attractions 	<ul style="list-style-type: none"> • Initial investment is high, very expensive to build • Difficult/complicated to get construction approval • Affects wildlife and natural water system (fish can be negatively affected by changes in their environment) • Can temporarily or permanently displace people • People living along low lying areas are often in the danger of floods as they areas might get swept away when water is released in full force from the dam. • Drought or dry spell could significantly reduce amount of power harnessed • Large dams built across one river can alter the flow of another river