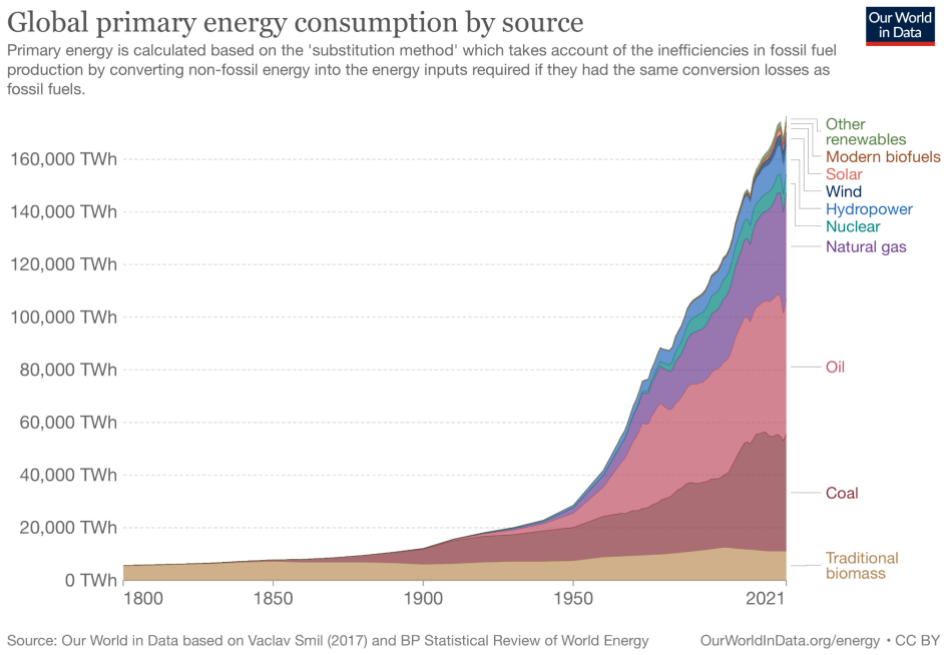
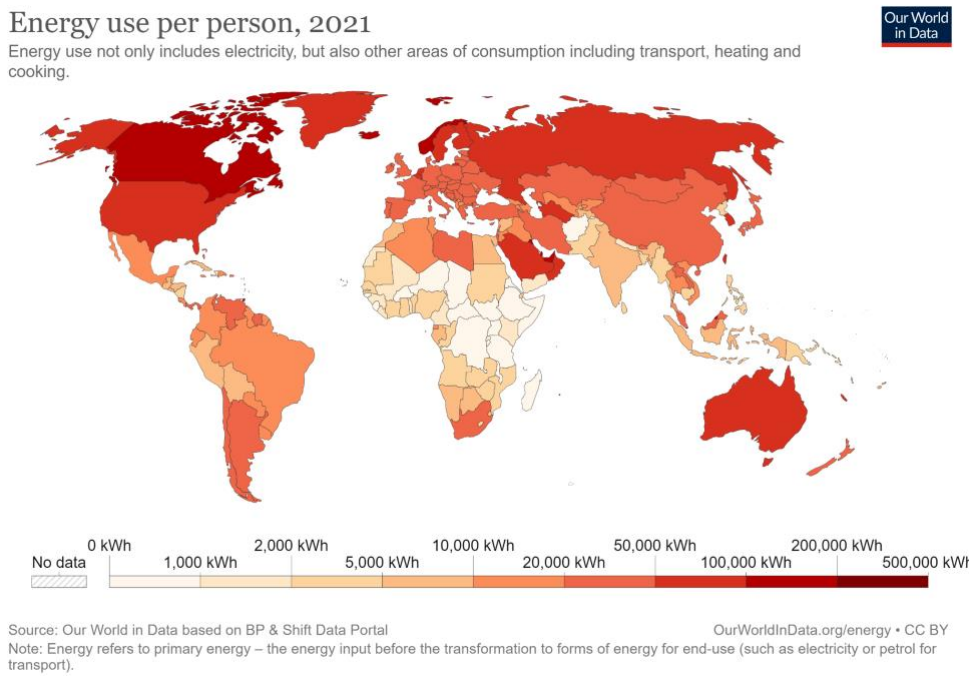
Lesson 5 Handout: Key graphs and questions for discussion of energy trends

Use these graphs as part of a handout or worksheet for students or create your own. You may wish to include other graphs found in the package for Lesson 2. Members can have access to an already-made PPT of the interactive graphs with

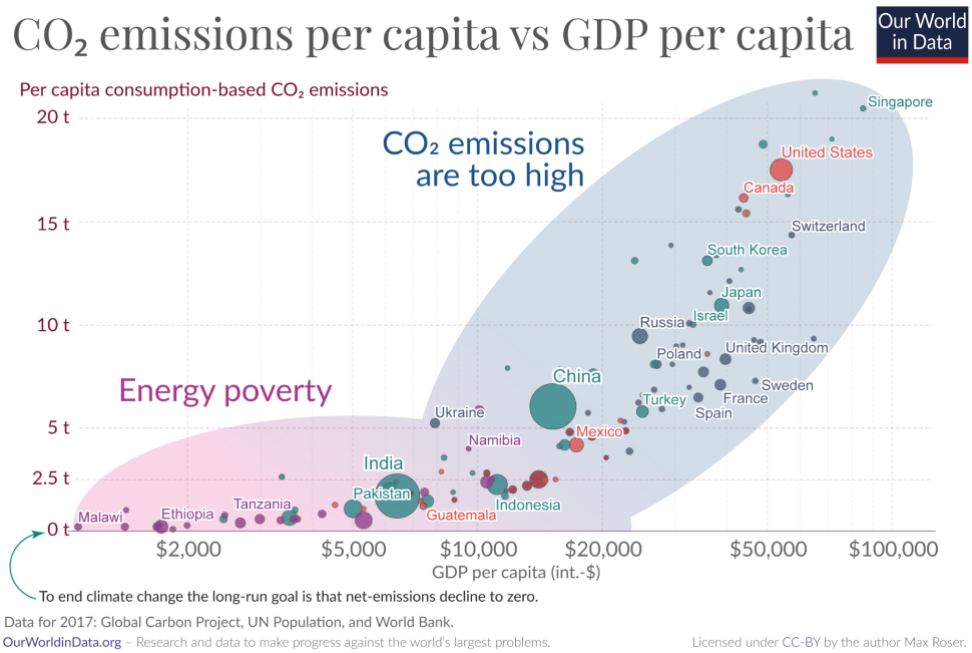
Graph/Image & Source	Questions to discuss
 **https://ourworldindata.org/global-energy-200-years**	Summary: This graph and the interactive from the website show how energy sources have changed since 1800 from traditional biomass (wood, peat, dung) to a variety of mostly non-renewable sources, and then more recently renewable energy sources. Questions: When did new energy forms start being used? How do you think this affected society? (See Lesson 3 for more background information.) Examine the renewable energy use on the graph. How would you like to see this graph change over the next 10 years?



https://ourworldindata.org/energy

Graph 6: This map clearly shows that Canada's per person (per capita) energy consumption is one of the highest in the world (along with Norway — though Norway leads the world in renewable energy with >50% use of renewables overall).

This graph could serve as a helpful discussion point regarding inequities and which factors are driving our energy use.

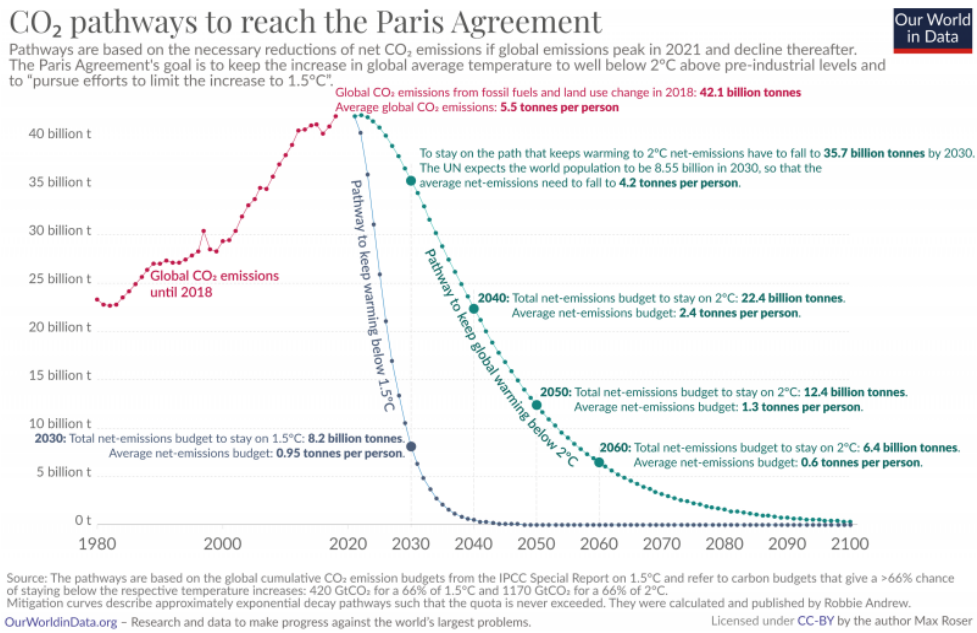


https://ourworldindata.org/worlds-energy-problem

Graph 7: This graph — with interpretation added — looks at the relationships between "consumption-based CO2 emissions" and GDP per capita.

The main message is that there are a number of countries whose citizens do not have access to enough energy to make their lives comfortable, but those who do currently emit a large number of emissions.

Looking through a social justice lens, what needs to be done?

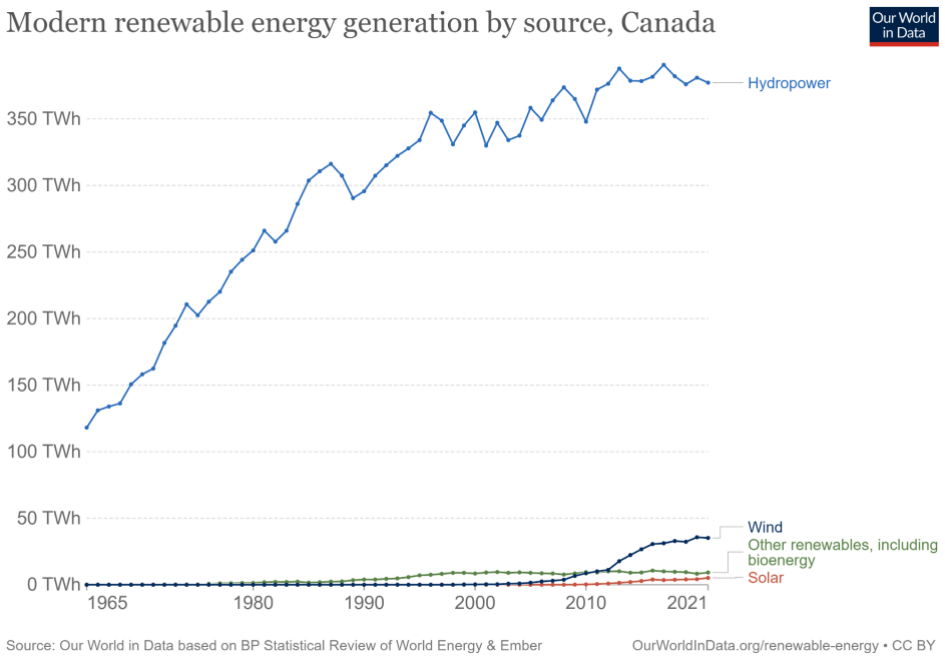


https://ourworldindata.org/worlds-energy-problem

This graph shows the current data for CO_2 emissions worldwide, some projected slopes if we cut emissions to maintain 1.5°C versus 2.0°C, and certain key benchmarks.

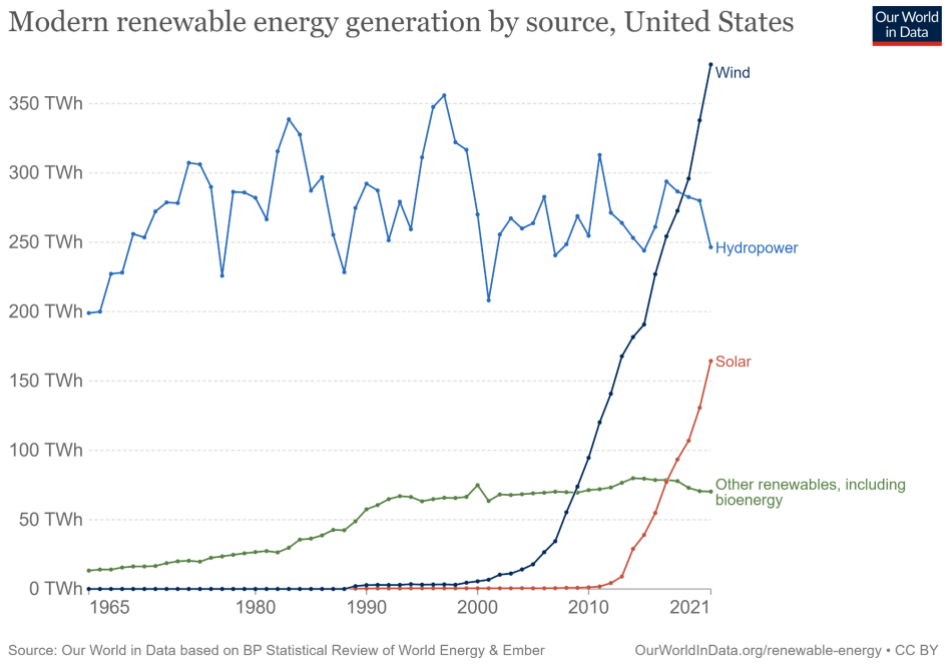
Questions: What do the differences in slopes in the two projections tell us?

Do the projections in either, one, or neither of the slopes seem feasible?

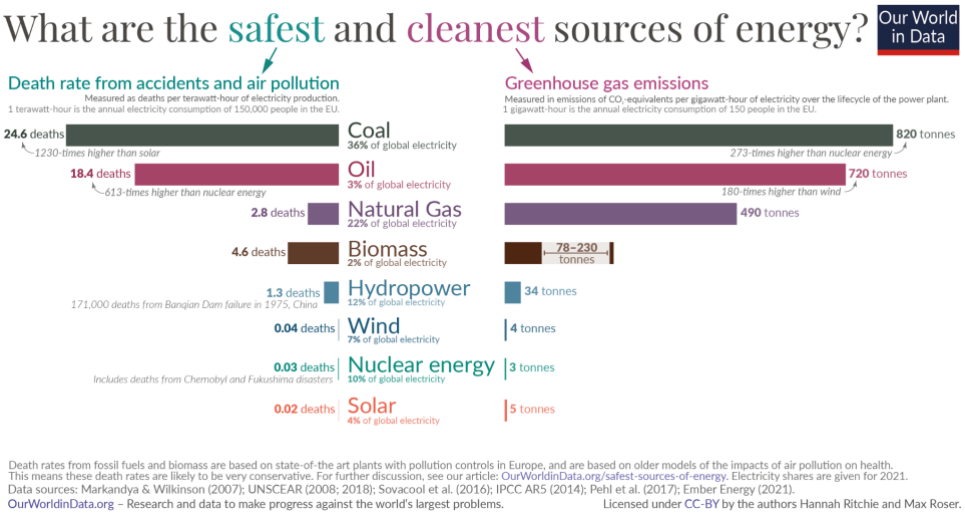


Graph 8 & 9: These two graphs come from a world graph where you can select a country to examine or look at world data. Compare these two North American countries or look at a few different ones.

Questions: What trends do you see in the different renewable energy use amounts per country? What may influence the differences (consider politics, economics, geography, etc.)?

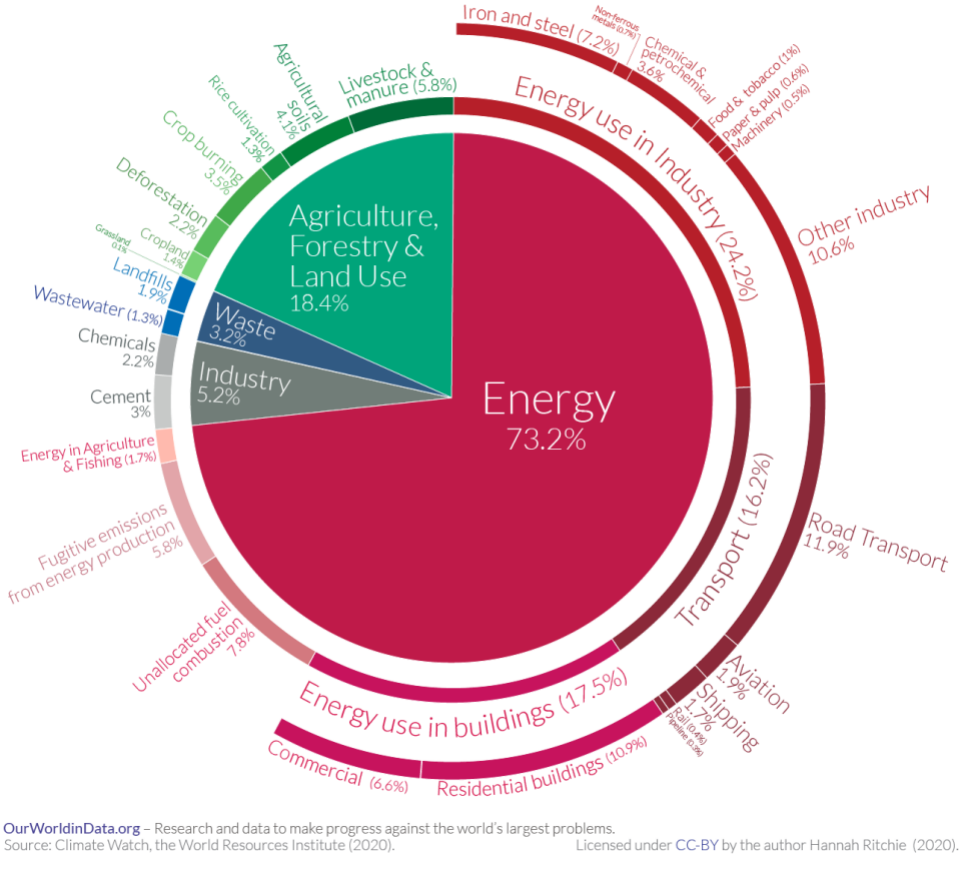


https://ourworldindata.org/renewable-energy



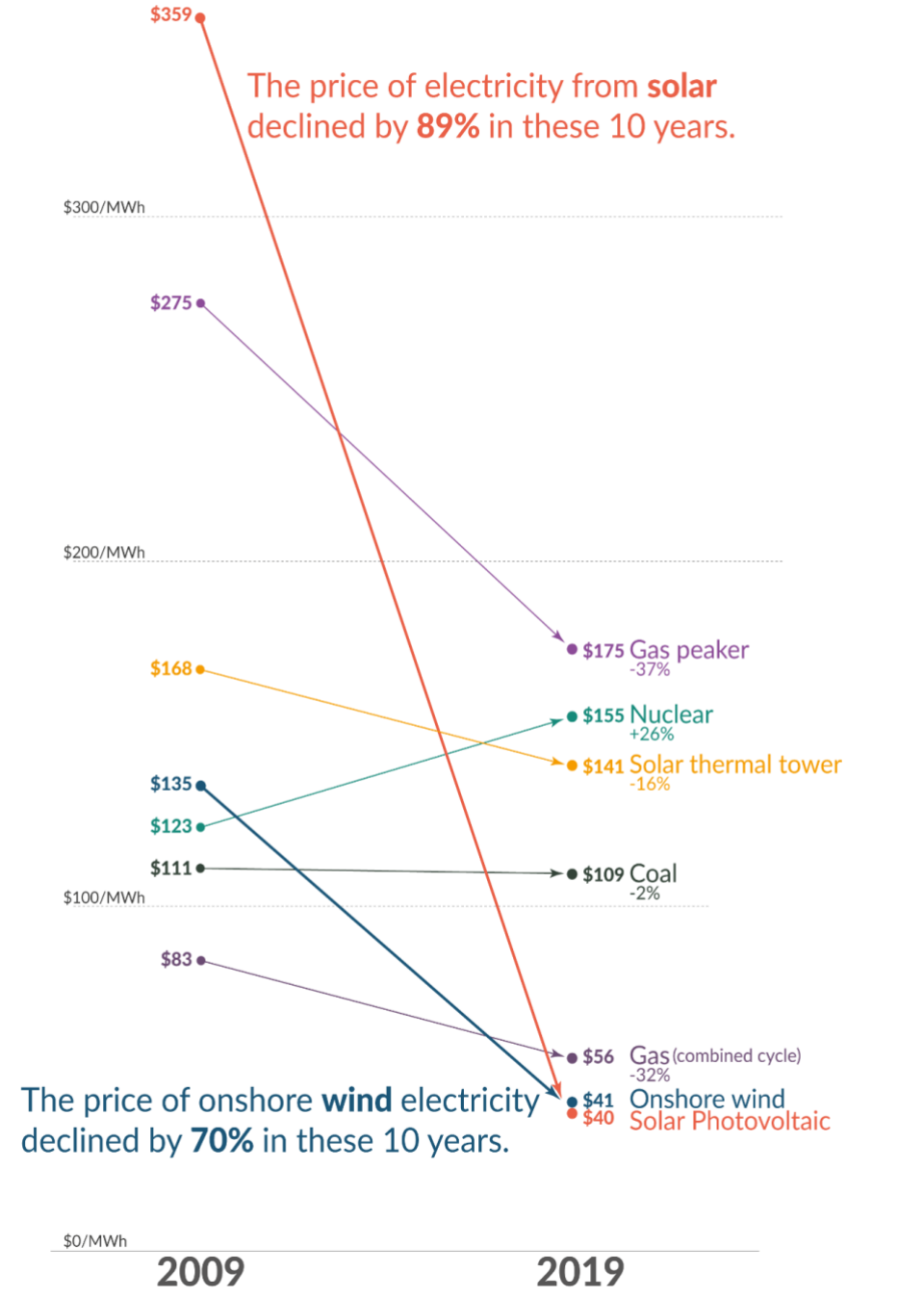
https://ourworldindata.org/safest-sources-of-energy

Graph 10: This chart displays the death rate due to air pollution and accidents as well as the greenhouse gas emissions from different sources of energy.



Graph 11: This pie chart shows greenhouse gas emissions by sector.

A sound explanation is provided on the website: https://ourworldindata.org/ghg-emissions-by-sector



Graph 12: This graph shows the changes in energy prices as new technologies are adopted. The costs of solar and onshore wind decrease significantly.

No data is provided on the cost of gas cost (i.e., natural gas).

Gas peaker refers to gas-peaking power plants, which are power plants that run only when there is a high demand for electricity. Historically, they were used with coal when peak demand required them (gas being more expensive than coal).

Today, they are used during times of peak demand when other sources (renewable and non-renewable) cannot keep up.

Peaker plants in some places are now being replaced by battery storage: https://en.wikipedia.org/wiki/Peaking_power_plant

It is interesting to note how coal is not changing and nuclear is increasing (notes from Our World in Data indicate that this is because nuclear is being regulated for safety, very few new plants are being built, & the market is small).

Energy Expo Research Notes

Energy Type you are representing: _____

Area of Research	Notes, Images, & Source info
Current trends for development (growth/decline, etc.)	
Financial contribution to sector and trends	
Greenhouse gas emissions (total and relative to other industries)	
Other environmental risks and/or benefits	
Other relevant information (political, social, geographical, etc.)	

Credible Sources Checklist

As you do your research on your energy source, use this credible sources checklist to verify that any information you find is from a credible, unbiased, and reliable source.

WHO? (Author, organization, company)	Yes	No
Can you find a biography of the author or description of the company or organization on the website?		
Is the author or organization an expert in this topic or have a strong educational background on this topic?		
Is the website likely to be peer-reviewed (fact-checked by a number of other experts)?		
Are the authors likely to be unbiased? (or do they have a reason to try to convince readers of their opinion — i.e., for financial or political gain?)		
WHAT is the purpose of this site?		
Does the information seem like a fact (or an opinion)? i.e., Can you find factual references to other reliable scientific or peer-reviewed sources?		
Does the site contain links to more information and other credible sources?		
Is the domain a *usually reliable* one? If not, does it seem credible? **Usually Reliable:** **.edu (school, college, university)** **.gc.ca (government of Canada)** **.gov (government agency USA)** **Check Carefully:** **.com (business – likely biased)** **.ca (could be government or company in Canada)** **.org (organization – likely biased)** **wikis & blogs – opinion**		
When was the article or site last updated? _____ (If not obvious, check for copyright at the bottom of page)		
Does the article/website date seem recent? (put 'no' if no date found)		
Do all the links still work and does the site use newer graphics?		
Total your YES's and NO's ----->		
Is this source reliable? (It is not just about the total; use your brain!)		

Comparison Table for Energy Expo Participants

Use this table to guide you in your questioning so that you have a thorough understanding of each type of energy that is part of the expo and to help you decide which energy types should be the basis in your country or region's future.

Energy type (List below)	Type of energy, how it is created, & trends you learned about at booth	Opportunities (benefits of this energy)	Drawbacks (environment/emissions)

Which energy sources would you like to see as part of your future and why?

Extension Activity: The Reasons Behind Indigenous Energy Transitions

Quick facts:

Community chosen and location	
Type of project and size of project	
Benefits of project discovered	
Energy challenges or successes discovered	

Reasons for the energy transition project: While there are many reasons why a community may switch to a renewable energy source, Indigenous communities are often driven by three main factors: **Energy autonomy or sovereignty, culture and worldviews, and sustainability**. Place into the various sections of the following Venn Diagram facts, quotes, and reasons that you've found in this community's example.