

# What is energy?

The ability to do work



# Types of Energy

Potential energy



Kinetic energy



# Can we create energy?

Energy cannot be created or destroyed, only transformed from one form to another

Where do we get most of our energy?

The Sun!



# Energy transformations

Q: What is happening in each picture?

A: Energy is transforming from \_\_\_\_\_ to \_\_\_\_\_ energy



What kind of energy  
does this spring loaded  
car have?

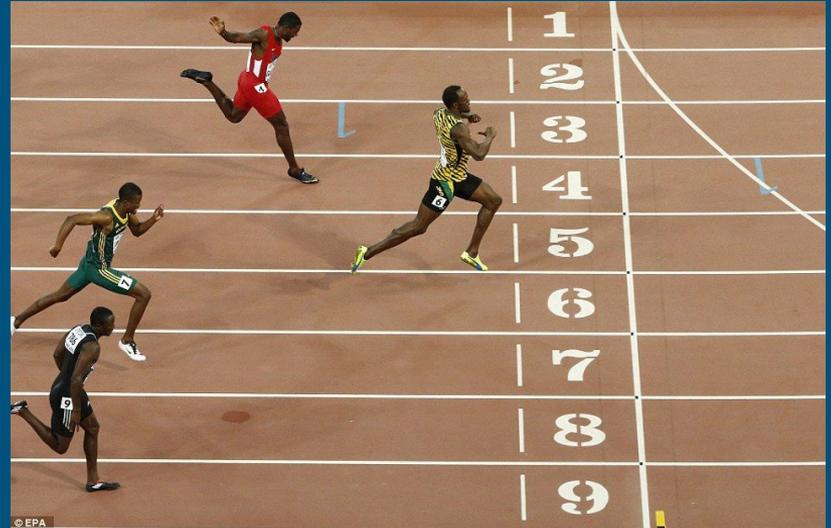


# Energy competition!

Who can transform the most energy in their spring loaded car?

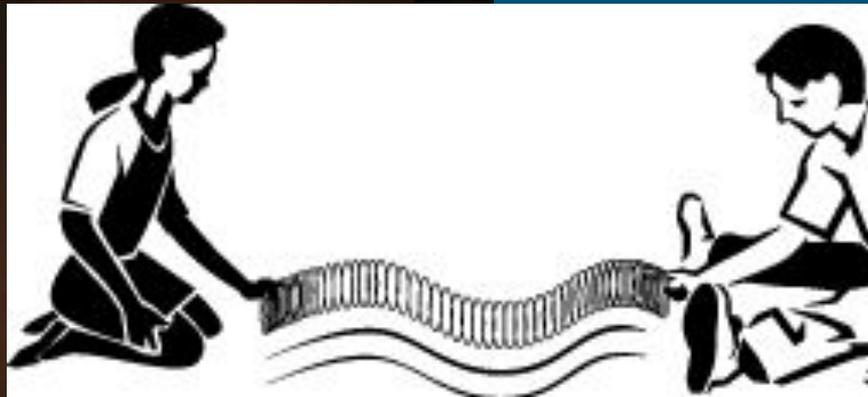


How do we know?



# Other forms of Energy

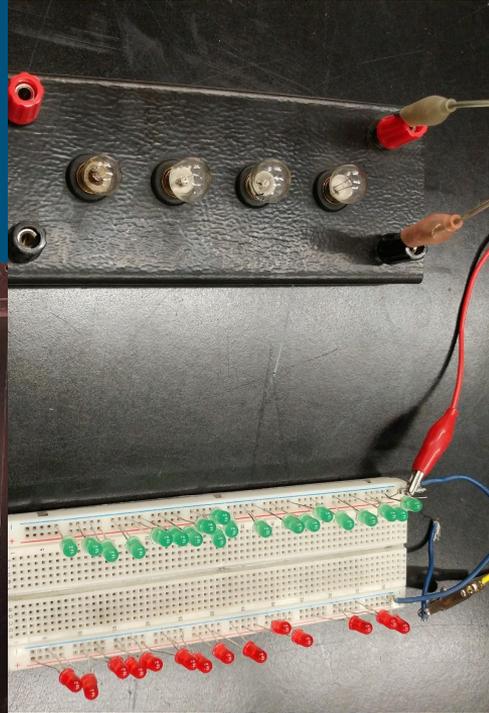
What kind of transformation is happening?



# Which light bulbs are more efficient?

How can we tell?

Efficient devices convert most of their energy into useful forms



# Energy competition #2!

How can we use energy transformations to get your golf balls to bounce higher? —

Highest bounce of either ball (when both dropped from 20cm) wins!



# See/Think/Wonder

Use your whiteboards to write:



What do you see?

What do you think?

What do you wonder?



What questions do you  
have about Energy?



# Fossil Fuels

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300 years of fossil fuels in 300 seconds:

<https://www.youtube.com/watch?v=cJ-J91SwP8w>

# Driving Question

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Which renewable energy source will allow you to demonstrate that it provides the best performance in reducing our carbon footprint, based on scalability, cost, and effectiveness?

# What do you want?

Start a new google doc or slides (individual), name it (e.g. Meadow's Energy PBL) and share it with [gsjokvist@gedu.sd73.bc.ca](mailto:gsjokvist@gedu.sd73.bc.ca)

Write a paragraph on what you care about: narwhals? Electric cars without pollution? Clean water? A world without oil wars? Vancouver not sinking?



# Sample introduction

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For years, I have been a bicycle commuter. I had many days where I breathed in so much car exhaust that it made me feel ill. I would love to live in a city where electric cars dominate the traffic. Pedestrians and cyclists would be able to walk the streets and sidewalks without choking on carbon monoxide pollution. I want my daughters to grow up in a world where they can count on breathing clean air. I know electric cars are currently too expensive, but if we start mass producing them by the millions, their cost will fall to the equivalent of gas powered cars. A Tesla for everyone!!

# How to use the Driving Question

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Everything that we do in this unit, I want you to have the Driving Question in the back of your mind...

# What am I going to have to do?

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See the list of things that you can choose to do...

<https://docs.google.com/a/gedu.sd73.bc.ca/document/d/1yXkd-FM6w9JwglC-BbJSvGuhHsi601TAwJYyW8H59zg/edit?usp=sharing>

CONTEXT	Essential LEARNING OUTCOMES
Our choices require an analysis of the energy transformations involved in choosing a renewable source of energy on which to focus <u>our efforts</u> .	Law of conservation of energy
Energy cannot be created or destroyed: we must find sources of energy that can be efficiently converted into useful forms.	Transformation of potential and kinetic energy
Climate change is the biggest scientific problem of the 21st century.	How energy production results in local and global impacts
Development of land for new energy resources can be optimised with consultation with first people on traditional territory.	First Peoples perspectives on energy and land use
Non-renewable sources need to be analyzed for pros and cons compared to renewable energy.	Nuclear energy and radiation: <ul style="list-style-type: none"> <li>— fission versus fusion</li> <li>— technologies, applications, &amp; implications</li> <li>— balancing nuclear reaction equations</li> </ul>

# Exit Ticket - 1

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1. What is energy?
2. What are the different types of energy?
3. What is an energy transformation and give 3 examples?
4. What is a renewable energy source?
5. List at least 4 examples of renewable energy resources and a brief description how each one works.
6. What event is coming up in B.C. soon and how does this relate to this unit?

# Driving Question

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Which renewable energy source will allow you to demonstrate that it provides the best performance in reducing our carbon footprint, based on scalability, cost, and effectiveness?

# Exit Ticket - 2

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1. What is the Law of Conservation of Energy?
2. How does this apply to the concept of energy resources?
3. What is “climate change”?
4. Find and list 4 **articles** (the title and where they came from) that *agree* with climate change and 4 **articles** that *disagree* with climate change.
5. **Summarize** 1 article agreeing with climate change and 1 that challenges climate change. (give a brief statement of the main points of the article.)

# Driving Question

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Which renewable energy source will allow you to demonstrate that it provides the best performance in reducing our carbon footprint, based on scalability, cost, and effectiveness?

# Exit Ticket 3

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1. Why is the electric power company in B.C. called BC Hydro rather than BC Electric?
2. How does a hydroelectric dam work? Draw a labelled diagram with the steps involved.
3. Draw a t-chart with the benefits and drawbacks of hydroelectric power.
4. With a partner, combine your findings on the pro's and cons of hydroelectric power and put them on one of the whiteboards (with your names).
5. Kahoot...

# Kahoot on Hydroelectric power

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1. <https://create.kahoot.it/#user/ba2f3999-890c-4fc8-852b-449189163c1b/kahoots/created>

# Non-Renewable Energy Sources

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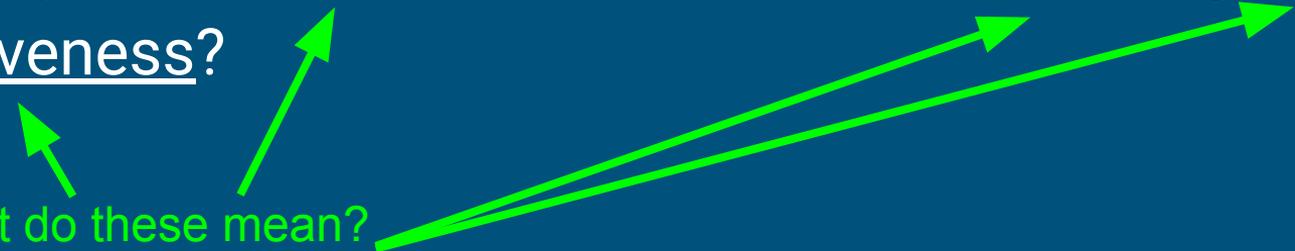
<https://www.youtube.com/watch?v=SCg81A6kww0>

# Driving Question

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Which renewable energy source will allow you to demonstrate that it provides the best performance in reducing our carbon footprint, based on scalability, cost, and effectiveness?

What do these mean?

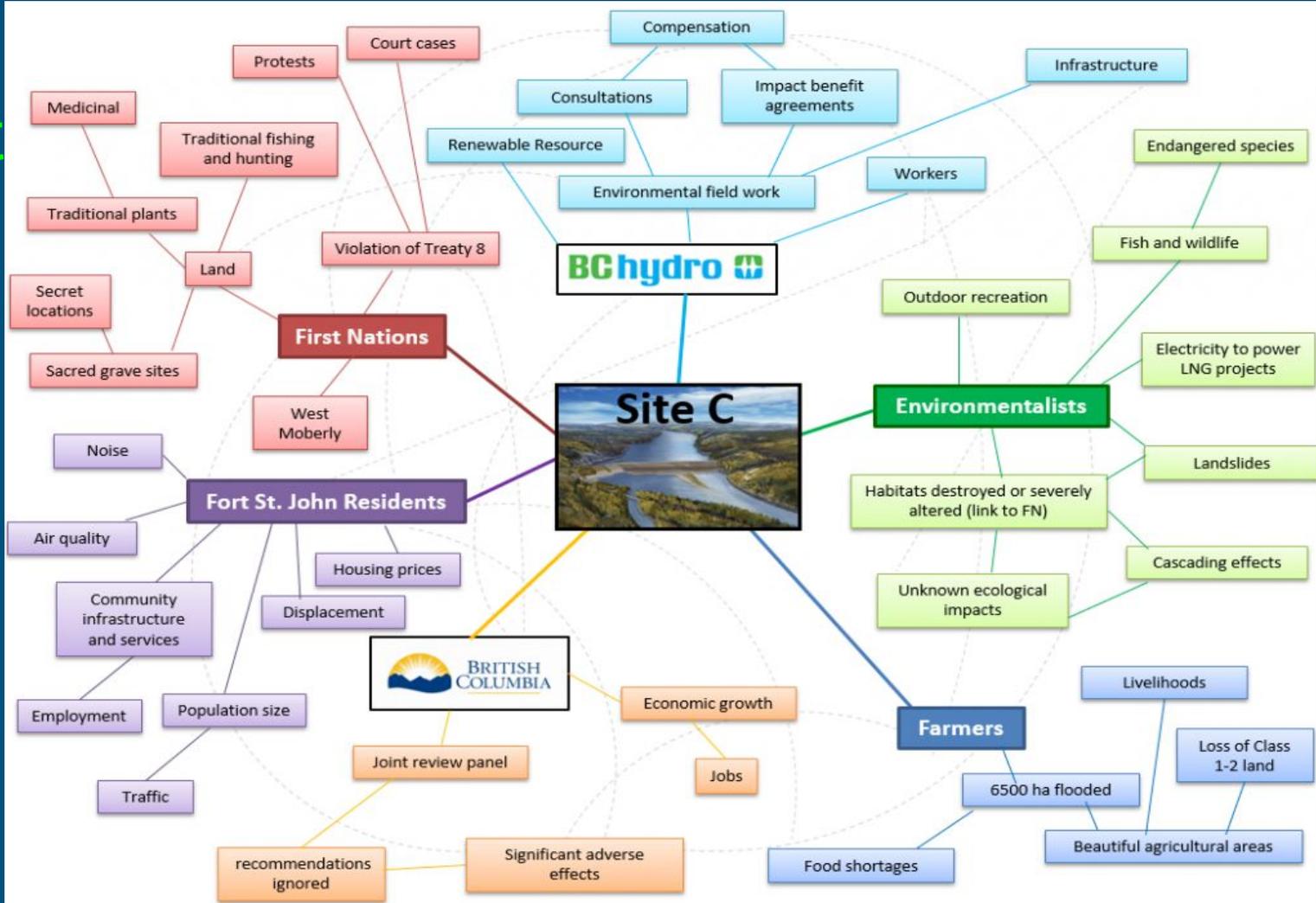


# Exit Ticket - 4

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1. Define the terms (as they relate to non-renewable energy resources):
  - a. Carbon footprint
  - b. Scalability
  - c. Cost
  - d. Effectiveness
2. Where is the Site C project? Draw a rough map of BC to show where it is.
3. What are the environmental & ethical issues associated with the Site C project?
4. Is the Site C project necessary? Give reasons why you think it is or isn't. Please **find** some **articles** online to **SUPPORT** your justification.

Site



# Your Project...

1. You need to pick an energy resource.

a. Hydroelectric, Geothermal, Tidal, Solar PV or Thermal, Nuclear, Wind?

2. You need to choose what kind of way that you are going to present your learning:

<https://docs.google.com/a/gedu.sd73.bc.ca/document/d/1yXkd-FM6w9JwglC-BbJSvGuhHsi601TAwJYyW8H59zg/edit?usp=sharing>

3. Next steps:

a. What? (What energy resource?)

b. Where? (Where is the energy resource located?)

c. When? (How long will it take to develop this technology? Build infrastructure?)

d. Why? (Why this resource? Why is it good? Are there drawbacks? If so, what? Statistics?)

e. How? (What materials, land etc. are needed to bring this to completion?)

f. What materials do you need for your (working) scale model?

# Exit Ticket 5

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1. What renewable energy resource are you picking?
2. How are you going to present your learning?

# Debate Protocol

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- The first speaker on the affirmative team presents arguments in support of the resolution. (5 – 10 minutes)
- The first speaker on the opposing team presents arguments opposing the resolution. (5 – 10 minutes)
- The second speaker on the affirmative team presents further arguments in support of the resolution, identifies areas of conflict, and answers questions that may have been raised by the opposition speaker. (5 – 10 minutes)

# Debate Protocol - part 2

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- The second speaker on the opposing team presents further arguments against the resolution, identifies further areas of conflict, and answers questions that may have been raised by the previous affirmative speaker. (5 – 10 minutes)
- The rules may include a short recess for teams to prepare their rebuttals. (5 minutes)
- The opposing team begins with the rebuttal, attempting to defend the opposing arguments and to defeat the supporting arguments without adding any new information. (3 – 5 minutes)

# Debate Protocol - part 3

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- First rebuttal of the affirmative team (3 – 5 minutes)
- Each team gets a second rebuttal for closing statements with the affirmative team having the last opportunity to speak. (3 – 5 minutes each)
- There cannot be any interruptions. Speakers must wait their turns. The teacher may need to enforce the rules.

# Exit Ticket - 6

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1. Continue working on your project...your Exit Tickets from yesterday were handed out.
2. At the end of class, you're going to show me what you've done so far. I expect that you have a good start on your background information for your project.

# Exit Ticket - 7

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1. Continue working on your project -  $\frac{3}{4}$  of the way through the class...move on to #2
2. Use the **Tuning Protocol** on the next page with another person/group to provide feedback on another group's project and then switch roles. (I have handed out sheets for you regarding the **Tuning Protocol** which have examples of questions that you can ask).

# Critical Friends Tuning Protocol

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**2 - 4 Minutes** - **Group A** present their work, **Group B** listens

**2 Minutes** - **Group B** asks clarifying questions, **Group A** answers

**3 Minutes** - **Group B** asks deep, probing questions to get **Group A** to think more deeply

**3 Minutes** - **Group B** discusses **Group A's** project and thinks about suggestions. **Group A** listens but doesn't talk, **Group A** should record notes about what they hear below.

**Group A** responds to what they hear.

# How are we assessed?

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- Today, we are going to develop a rubric TOGETHER!
- This is your way of telling me how you want to be assessed on your **Project**.
- Use this link: <https://goo.gl/O6mve4>
- Choose a ROW and write out an OUTCOME that you would like to be assessed on.

# How are we assessed part 2...

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- I will choose an OUTCOME for you
- You will write the EXCELLENT level for that outcome
  - Eg. what should be included in that level that is reader friendly?
  - What would a student have to SAY, DO, or WRITE to attain an EXCELLENT level?

## How are we assessed part 3...

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- We need some **VERBS** for our outcomes...
- Let's investigate our rubric a little more...I know that you're super pumped about this!

# Debate - And the winner is...

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Fill out this form:

<https://goo.gl/forms/5dlCM4PzroYHvulm2>

# Feedback on the Unit

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Please fill out the form using the URL below:

<https://goo.gl/forms/Tc11hBxDpXkSzWUB3>