

# HOW WELL DO YOU KNOW YOUR ENERGY?

## FUTURE ENERGY SYSTEMS

### Question 1

My laptop gets really hot sometimes. So does my phone. The heat build-up is:

- a) A sign of energy being lost.
- b) An indication that your battery needs to be replaced.
- c) A really bad way to heat your home.

### Question 2

Alberta has more hydrocarbon (oil, gas, coal) energy under the ground than geothermal energy, ... right?

- a) Yes.
- b) No.
- c) It depends.

### Question 3

Methane is a harmful greenhouse gas. Research at the U of A is looking to reduce its effects through:

- a) Chicken feathers.
- b) Bacteria.
- c) A specialized scanning probe microscope with the world's sharpest tip.

### Question 4

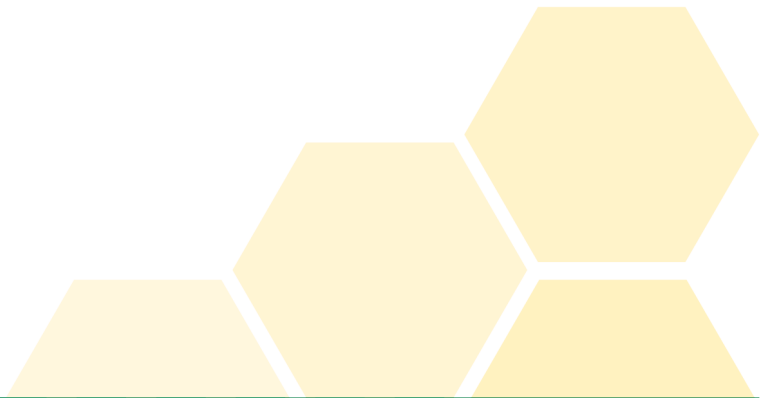
List these energy sources in order that humans first harnessed them: coal, fire, water, wind.

- a) Fire, water, coal, wind.
- b) Water, fire, coal, wind.
- c) Fire, water, wind, coal.

### Question 5

The world's first oil well was drilled in:

- a) Pennsylvania.
- b) Saudi Arabia.
- c) Ontario.



### Question 6

Land reclamation is:

- a) Cleaning up pollution.
- b) Building land from a waterbody.
- c) Changing damaged land to its previous or another use.

### Question 7

Energy for human use can be stored in many ways, including batteries and heat. But can energy be stored in movement?

- a) Yes.
- b) No.
- c) Maybe.

### Question 8

Rising levels of carbon dioxide are a concern for climate change. What can you do in your own home to reduce carbon dioxide?

- a) Catch some with a net.
- b) Turn on the lights.
- c) Grow a garden.

### Question 9

Rank the sources of electricity in Alberta from most to least energy generated:

- a) Coal, natural gas, wind, hydro.
- b) Wind, coal, hydro, natural gas.
- c) Natural gas, wind, hydro, coal.

### Question 10

Energy research must be interdisciplinary. What does interdisciplinary mean?

- a) Using one area of knowledge.
- b) Combining many areas of knowledge together.
- c) Inside out.

**...TURN THE PAGE TO EXPLORE THE ANSWERS...**



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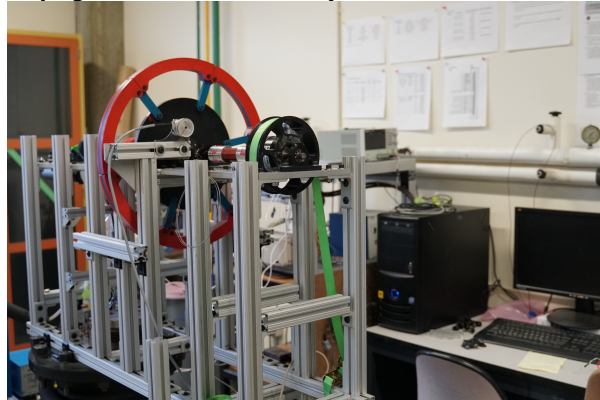
## ANSWER KEY

### Question 1. Answer: A) A sign of energy being lost.

The heat you feel is energy going to waste. This happens with batteries and many other types of energy system. Our electrical grid moves between places, but it leaks power like a sieve leaks water. Improvements to the grid to reduce loss would save lots of energy and are being studied at the U of A.

### Question 2. Answer: B) No.

There is more potential geothermal energy - that's heat found under the Earth's surface! However, the geothermal energy in Alberta is below 100°C, so it's hard to harness to create power. Research at the U of A into Stirling engines (a centuries old engine design) could help generate electricity from those low temperatures.



### Question 3. Answer: B) Bacteria.

Methane-eating bacteria exist in nature and research is determining how we can use them on an industrial scale to change methane into biodegradable plastics and biofuels.



**Question 4. Answer: A) Fire, water, coal, wind.**

The first evidence of humans using fire was around 400,000 BC. Watermills were used by 300 BC around the world. The first known coal extraction occurred in China around 200 BC. The first windmills, as we think of them today, were used around 100 AD.

**Question 5. Answer: C) Ontario.**

In 1858, Canadian, James Miller Williams built an oil well and struck oil in southwest Ontario, near a town later called Oil Springs. Titusville, Pennsylvania, tried to claim the title, but their oil well came a year later.

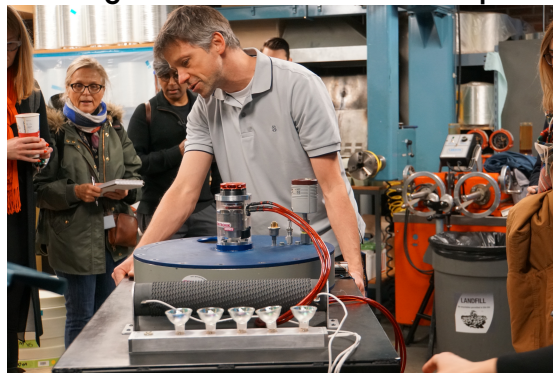
**Question 6. Answer: A,B,C.**

All can be true: A) cleaning up pollution can be part of reclamation, called remediation; B) building land is another type of reclamation; C) changing damaged land is what we consider land reclamation in Canada and it plays an essential role in cleaning up current and future energy disturbances.



**Question 7. Answer: A) Yes.**

Energy can be stored in motion. For example, pumped hydro stores water at different heights and release the water when energy is needed. As the water moves downhill it can make electricity. Flywheels work by spinning at high speeds. When power is needed, they are plugged into generators that turn their spinning motion into electricity.



**Question 8. Answer: C) Grow a garden.**

Through photosynthesis, plants suck carbon dioxide out of the air, turn it into sugars, and release oxygen.



**Question 9. Answer: A) Coal, natural gas, wind, hydro.**

According to the National Energy Board (2017), coal generates 47.4%, natural gas 40.3%, wind 6.9% and hydro 2.8%. Since 2005, coal has decreased and natural gas increased with the goal to phase out coal by 2030. Wind has increased more than other renewables since 2005, from 1.1% to 6.9%.

**Question 10. Answer: B) Combining many areas of knowledge together.**

Interdisciplinary means that many areas of knowledge are combined together to do an activity or answer a question. At the U of A, researchers looking at energy come from many backgrounds – science, engineering, business, arts, and more – and they all work together to find solutions.

