

Sample Diploma Problems

1. During the past 100 years, global energy consumption could **best** be described as following a growth rate that is *i* . In comparison with other industrialized nations, Canada's per capita energy consumption is *ii* than average.

The statements above are completed by the information in row

Row	<i>i</i>	<i>ii</i>
A.	linear	lower
B.	linear	higher
C.	exponential	lower
D.	exponential	higher

Sample Diploma Problems

2. The highest energy use per capita tends to be in areas of the world that
- A. are highly populated
 - B. are heavily industrialized**
 - C. have a large geographical area
 - D. have warm average temperatures

Sample Diploma Problems

Numerical Response

4. A power plant provides an input power of 450 MW to transmission lines. If the long distance transmission of power is 92.0% efficient, then the power output after transmission is 414 MW.

(Record your **three-digit answer** in the response boxes at the bottom of the screen.)

Use the following information to answer numerical-response question 1.

Energy Consumption and Population for Some World Regions (2005)

Region	Proportion of Total World Energy Consumption (%)	Proportion of Total World Population (%)
1 North America	22.9	5.1
2 Europe	23.9	11.2
3 Asia (excluding Middle East)	34.0	56.0
4 Middle East and North Africa	6.4	6.8

—based on *International Energy Agency*, 2006

Numerical Response

1. Ranked in order from the region that used the least energy per capita in 2005 to the region that used the most, the regions of the world as numbered above are

Least per capita
energy used

3, 4, 2, 1

Most per capita
energy used

(Record all **four digits** of your answer in the response boxes at the bottom of the screen.)

$$22.9/5.1 = 4.49$$

$$23.9/11.2 = 2.13$$

$$34.0/56.0 = 0.67$$

$$6.4/6.8 = 0.94$$

Fossil Fuels

**ARE WE RUNNING OUT OF
FOSSIL FUELS**



**BECAUSE THERE ARE TOO
MANY NAUGHTY KIDS?**

Curriculum

- explain the need to develop technologies that use renewable and nonrenewable energy sources to meet the increasing global demand
- describe the environmental impact of developing and using various energy sources; i.e., conventional oil, oil sands, coal-burning power
- describe how the Aboriginal perspective of an interconnected environment demonstrates the need to balance resource extraction with environmental impact.

Energy on Earth

- Where does almost all the energy on the Earth come from?

Sun!

- In what form does this energy come to Earth?
- EMR and light
- When plants undergo photosynthesis what form is the energy stored as?
- glucose
- Where do fossil fuels come from?
- Areas of high coral reefs in the ocean (AKA Plants)

Developing Countries

- In developing countries, their main source of fuel is wood
- Collecting wood is time consuming and exhausting
- The wood is often burned in an open pit or a poor quality stove which releases CO(g), PAHs (**Polycyclic aromatic hydrocarbons**), particulate matter, and other pollutants



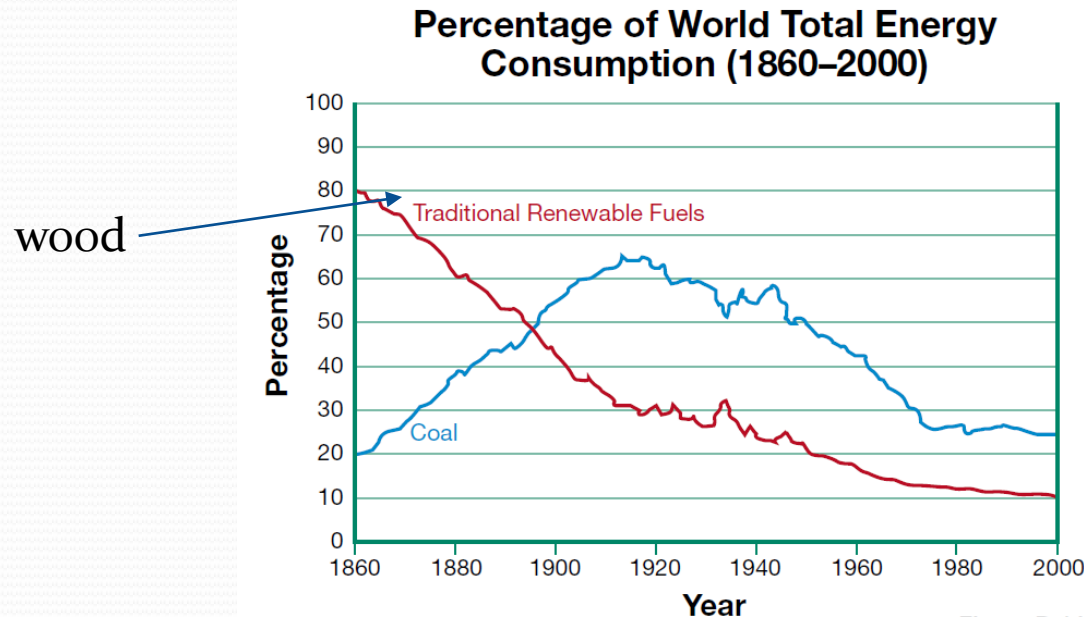
Non renewable resources

- Coal
- Petroleum
- Natural gas

- All three of these are fossil fuels.

Coal

- Coal is a more compact, cleaner burning fuel than wood, but still releases particle matter into the air (Sox) (leads to acid rain)
- Contributes to thermal pollution (hot water)



Coal has decreased because of the environmental effect

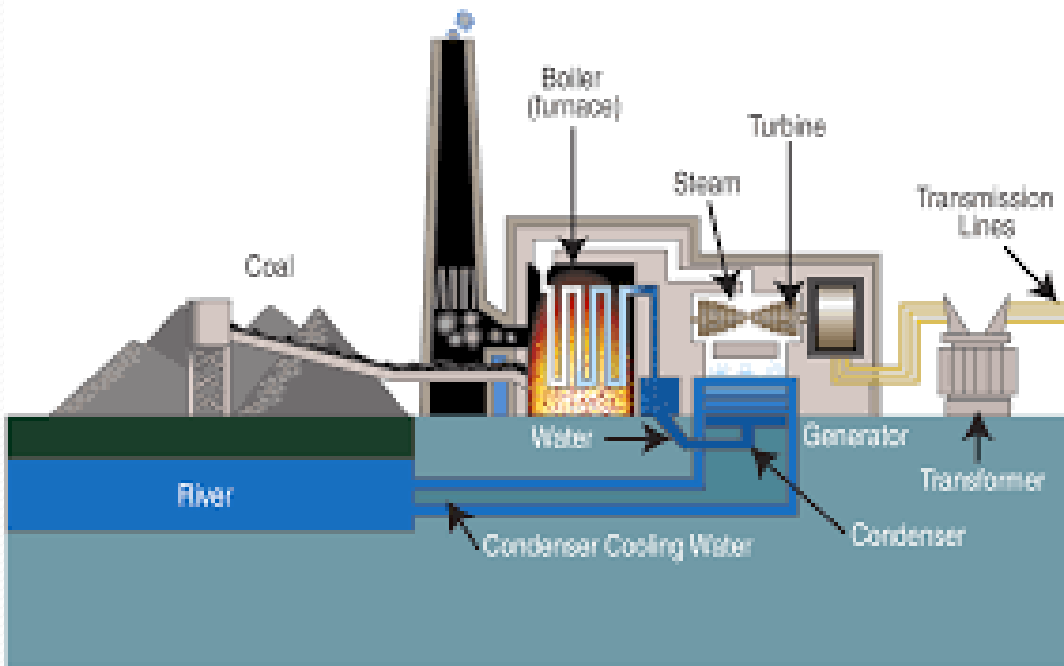
4) Coal-fired generators

- Coal is used to produce more than 70% of Alberta's electricity.
 - Converts chemical potential energy into electrical energy.
- Process:
 - Crush coal to fine dust, blow into combustion chamber, IGNITE.
 - Energy released is absorbed by water lining the chamber.
 - Water is converted to steam; causes turbine to spin---connected to generator.



Energy conversion:

1. Chemical potential
2. thermal energy (steam)
3. Kinetic energy (turbine)
4. Kinetic energy (generator)
5. electrical energy (electrical lines)



How are Fossil Fuels Formed?

(3 min)



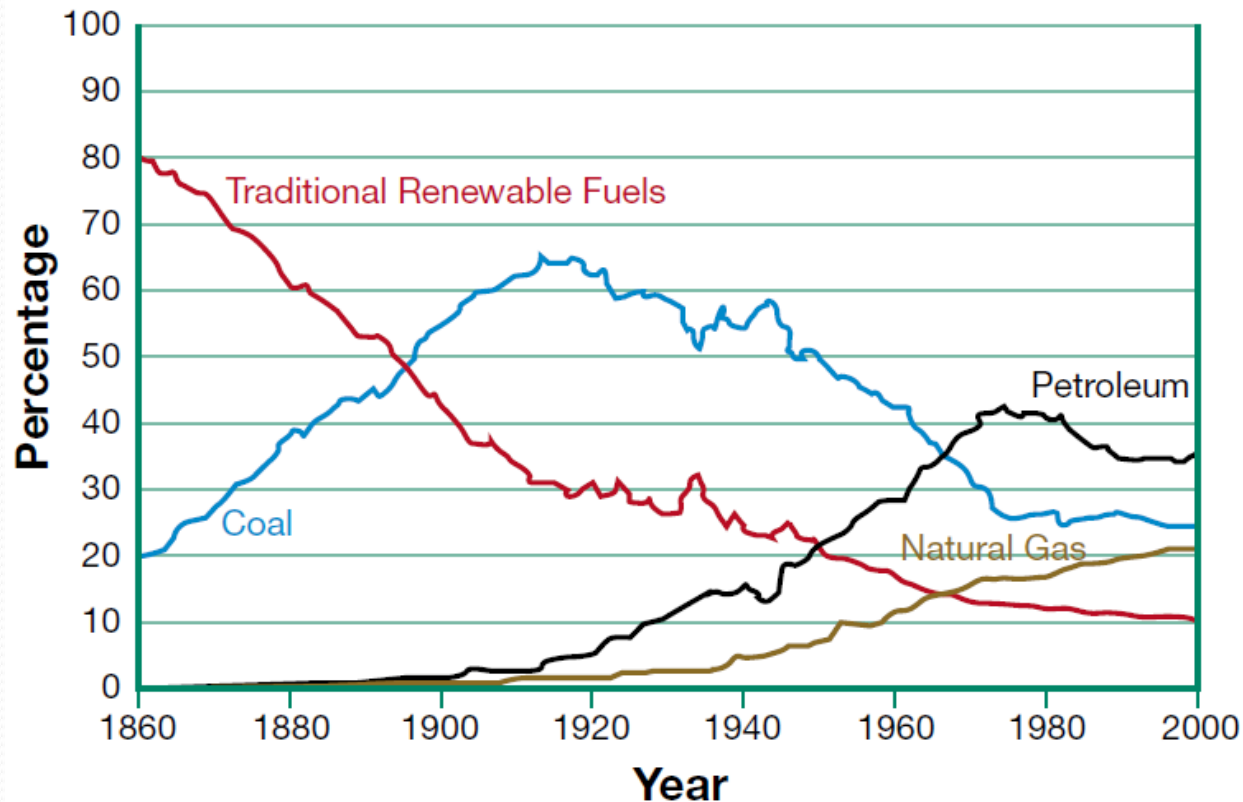
Reclaiming Land

- Coal lies beneath the surface of the earth and large mechanical shovels and trucks are used to remove it
- It is relatively inexpensive to mine which makes it so popular
- After land has been mined it must undergo a process called **reclamation**
- The requires companies to restore the land to what is looked like prior to mining

Petroleum

- Petroleum is liquid hydrocarbons

Percentage of World Total Energy Consumption (1860–2000)

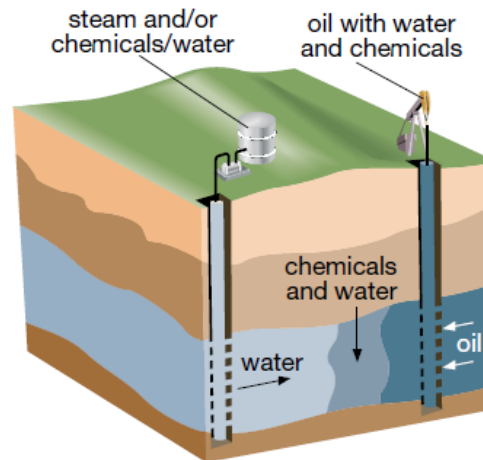


Petroleum
& natural
gas go up
when coal
decreases

Extraction of Petroleum

- Enhanced Oil recovery process is where water, chemicals, or gases are pumped into the rock layers and force the oil into well for extraction

Pros
Less land
use
Less man
labor



Cons
Chemicals in
ground
expensive

Oil Sands

- Alberta's Athabasca region contains oil but it is trapped in sand which makes it difficult and expensive to extract
- They have to dig out the oil/sand mixture and wash it in solvents to extract the oil.
- This creates a product called bitumen (black tar) and tailings (wet sandy mixture)

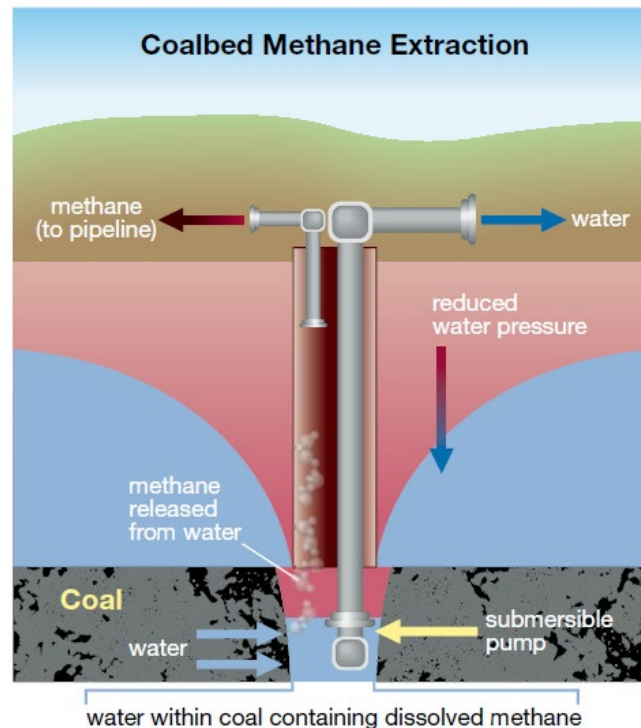


Tailings Pond



Natural Gas (CH_4 methane)

- Natural gas is a mixture of small hydrocarbons. Mostly methane with a little ethane, propane, and butane
- Natural gas is extracted by drilling deep underground

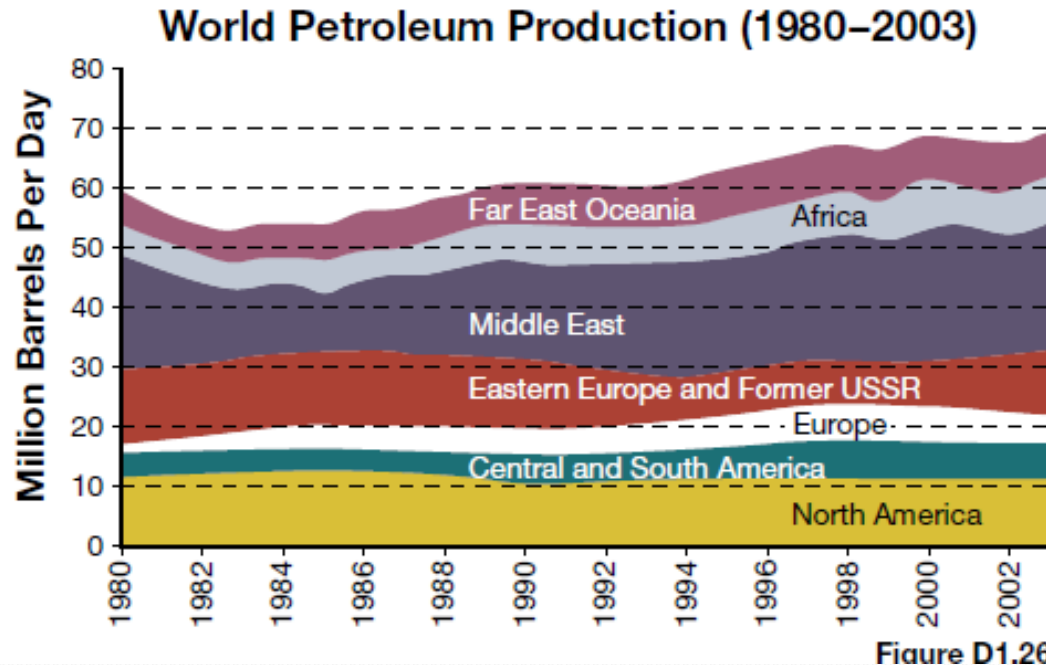


Fracking (6 minutes)



Non Renewable

- Fossil Fuels are non renewable resources
- This means that once oil, coal, and natural gas are consumed, they can not be replaced



Non Renewable

- Many scientist believe that over half the world's petroleum supplies have been used up
- It is very difficult to tell how much oil and gas are left because studies usually have a lot of bias in them
- Lots of studies are done by oil and gas companies

Interconnectedness (4 min video)

- Interconnectedness is a central core to First Nations, Inuit, and Metis worldviews
- Everything from in connected including people, animals, land, lakes, and rivers

