BELL RINGER

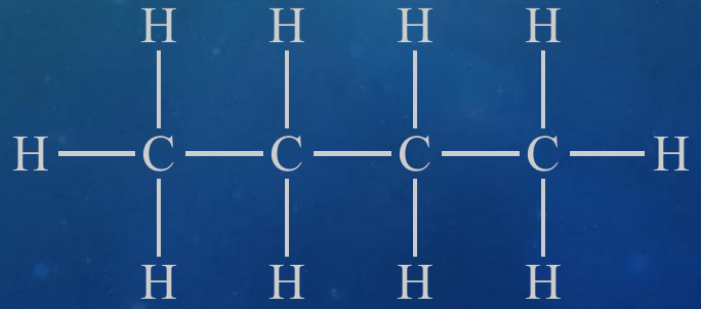
1. WHAT MAKES A RESOURCE NON-RENEWABLE?
2. WHAT FEATURES ARE FORMED WHEN AN OCEANIC PLATE COLLIDES WITH A CONTINENTAL PLATE?
3. AN OCTOPUS IS WHICH OF THE THREE TYPES OF OCEAN LIFE?

OIL, COAL, AND GAS

FOSSIL FUELS

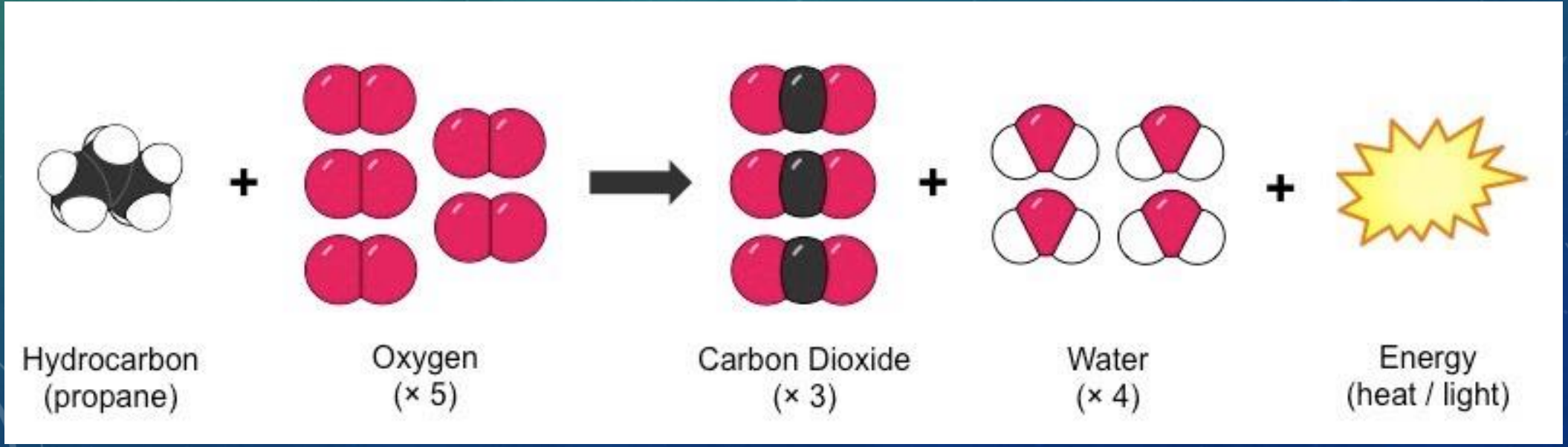
WHAT ARE FOSSIL FUELS?

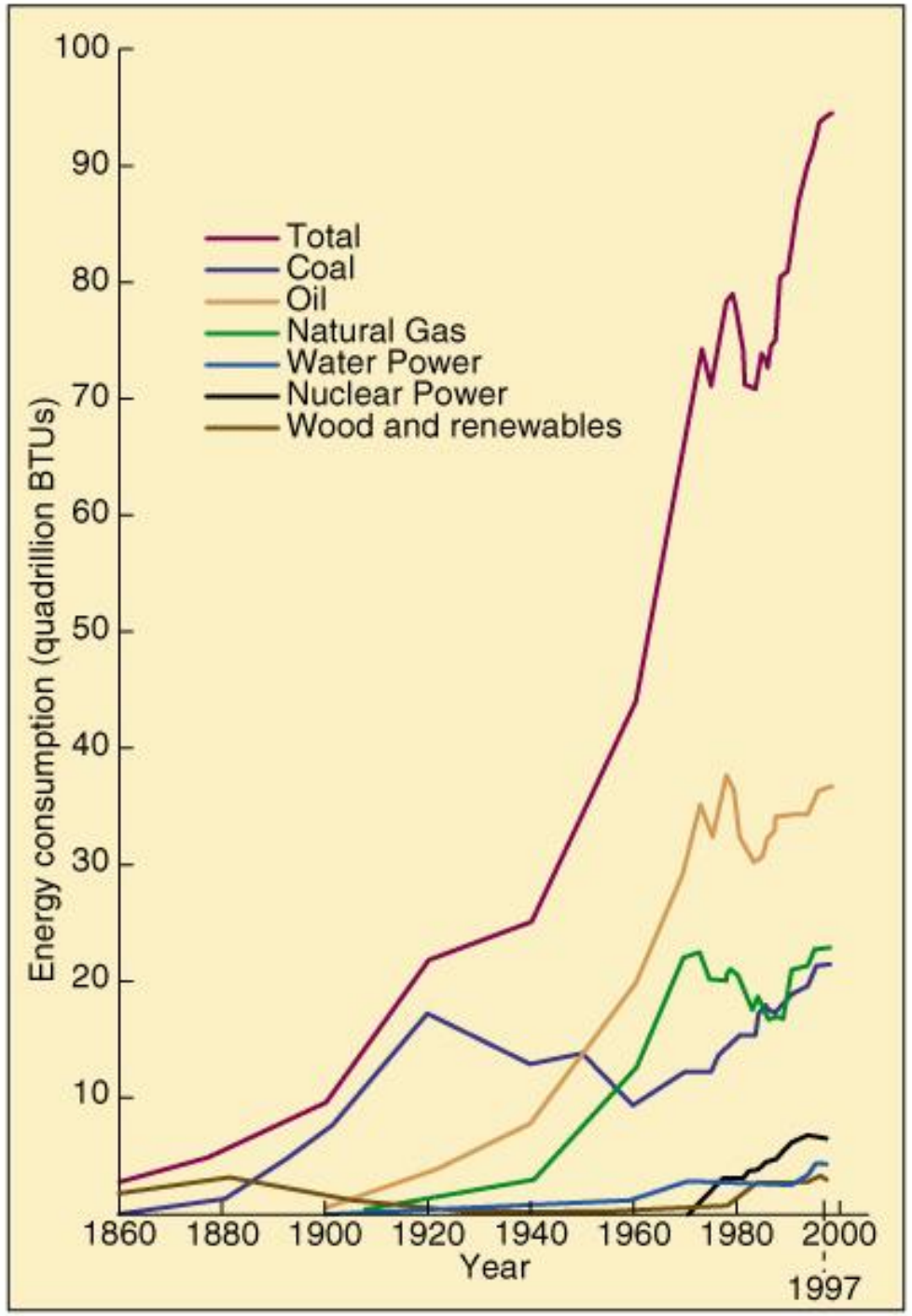
- Fossil Fuels are the energy rich substances formed from the remains of **once-living organisms.**
- The three major fossil fuels are **coal, oil** and **natural gas**.
- Fossil fuels are made of **hydrocarbons**, they contain carbon and hydrogen's.



HOW DO WE USE FOSSIL FUELS?

- The process by which we turn fossil fuels into energy is called combustion.
- Combustion needs a hydrocarbon and oxygen, and turns it into CO2, H2O, and energy.
- We use this energy (usually in the form of heat) to run generators or motors.





ENERGY CONSUMPTION IN THE USA

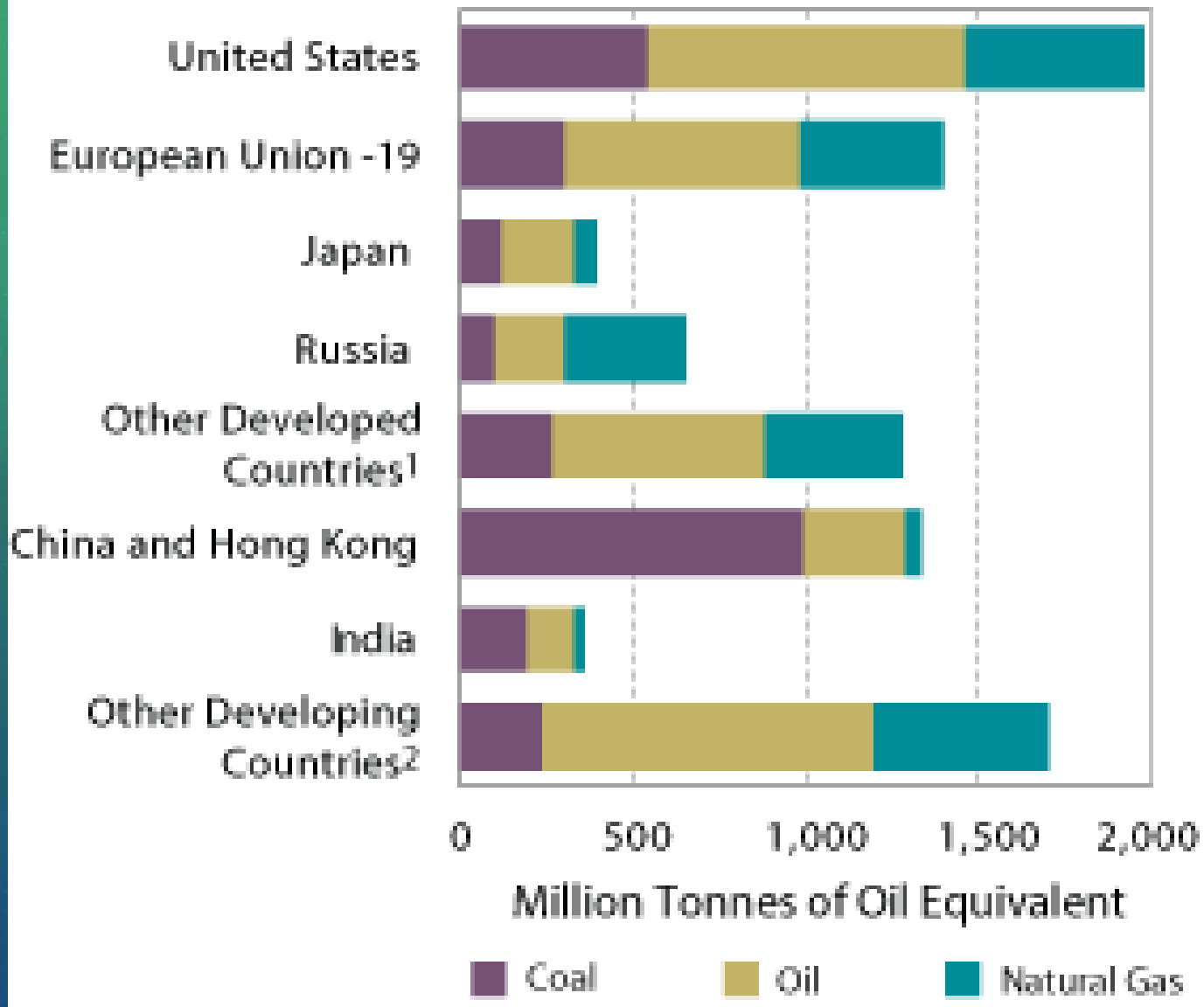
History of use:

- Wood
- Coal
- Oil
- Natural Gas
- Nuclear
- Renewables

MATCH ENERGY SOURCES TO HOW WE USE THEM

- Primary
  - **oil-based fuels**
  - **natural gas**
  - **coal**
  - **nuclear power**
  - **more than one of the above**
- Secondary
  - **transportation**
  - **industrial processes**
  - **heating and cooling spaces**
  - **generation of electrical power**

Global Fossil Fuel Consumption in 2004

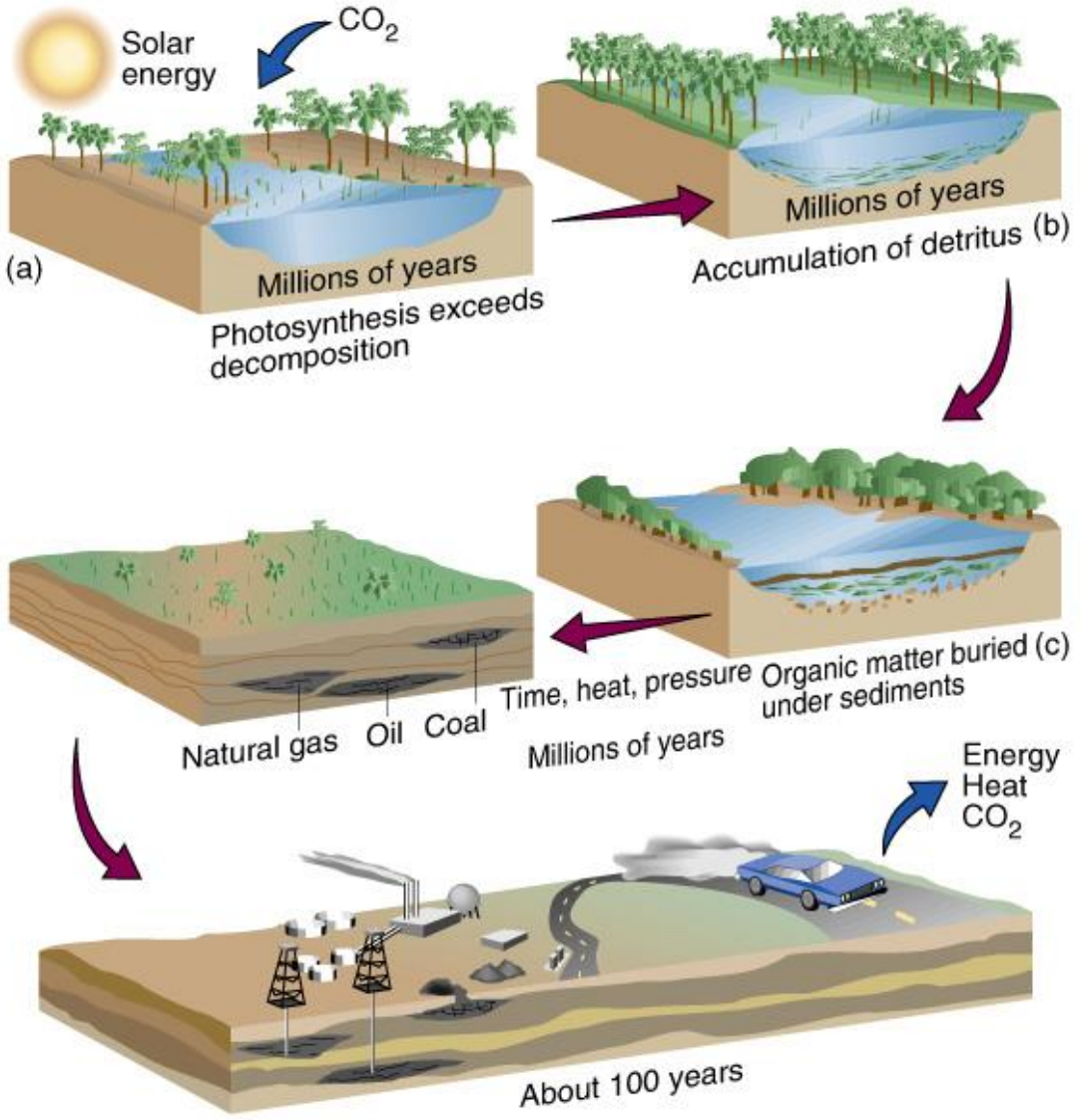


[1] Includes 25 countries. [2] Includes 135 Countries

Source: EarthTrends and the International Energy Agency, 2006.

HOW ARE FOSSIL FUELS FORMED?

- Millions of years of ….
- 1) photosynthesis exceeding respiration (decomposition).
- 2) detritus accumulation.
- 3) burial of detritus.
- 4) pressure & heat (metamorphosis).

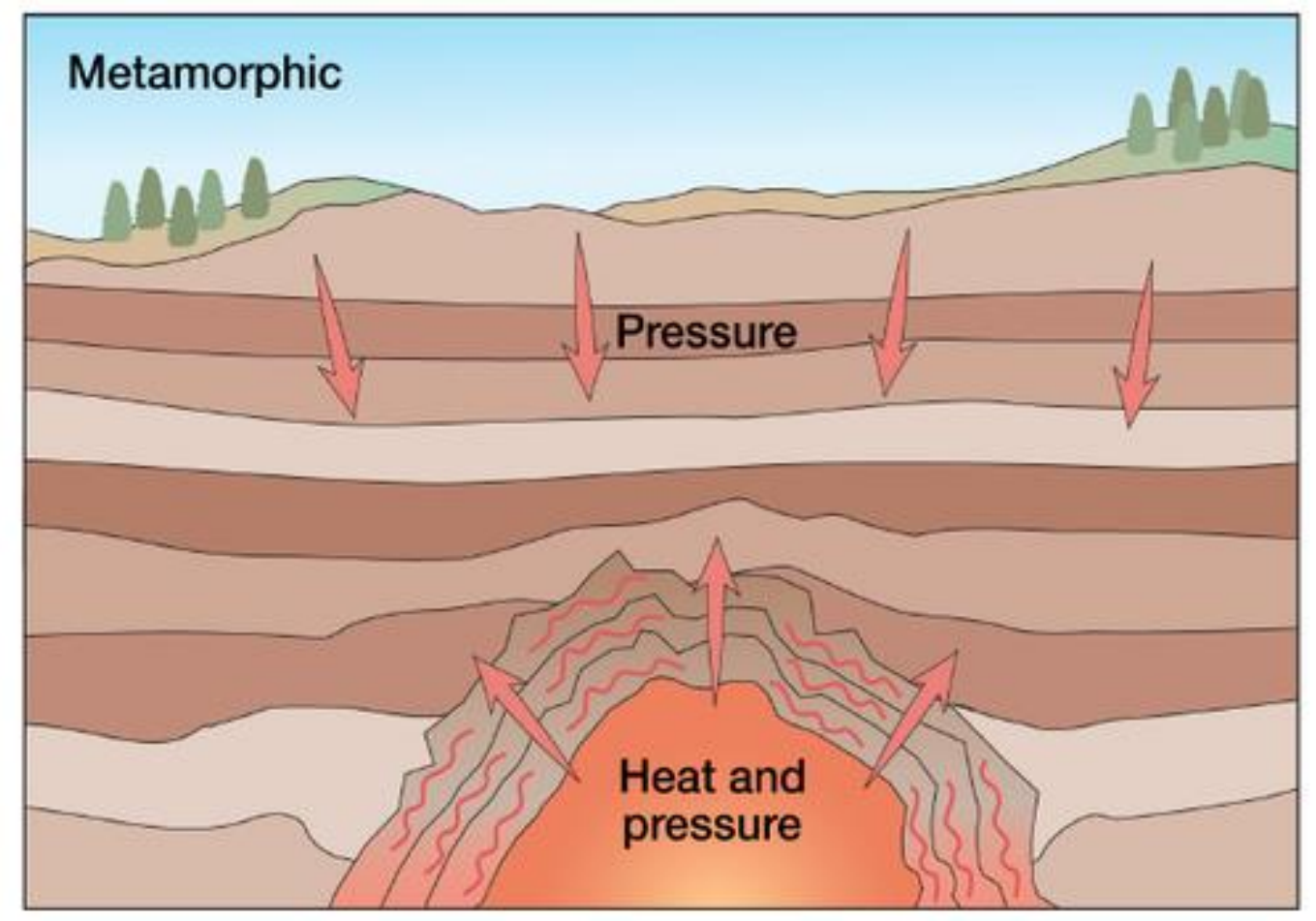


OIL AND NATURAL GAS
STAGE 1: 200-400 MILLION YEARS AGO

- Plankton die and fall to ocean floor
- Layers of sediment bury their remains

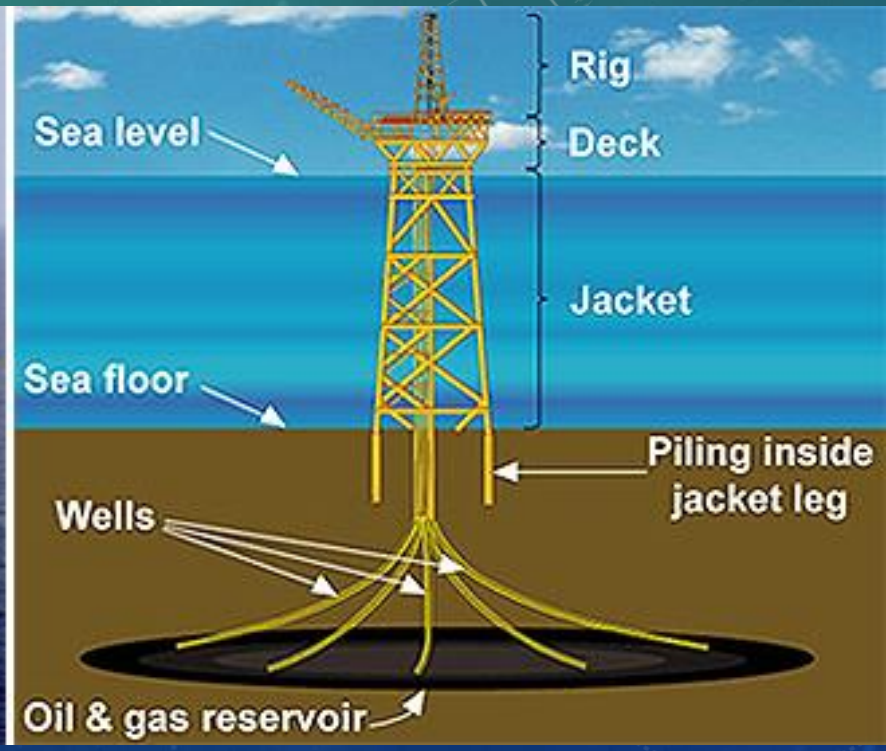
OIL AND NATURAL GAS
STAGE 2: 50-100 MILLION YEARS AGO

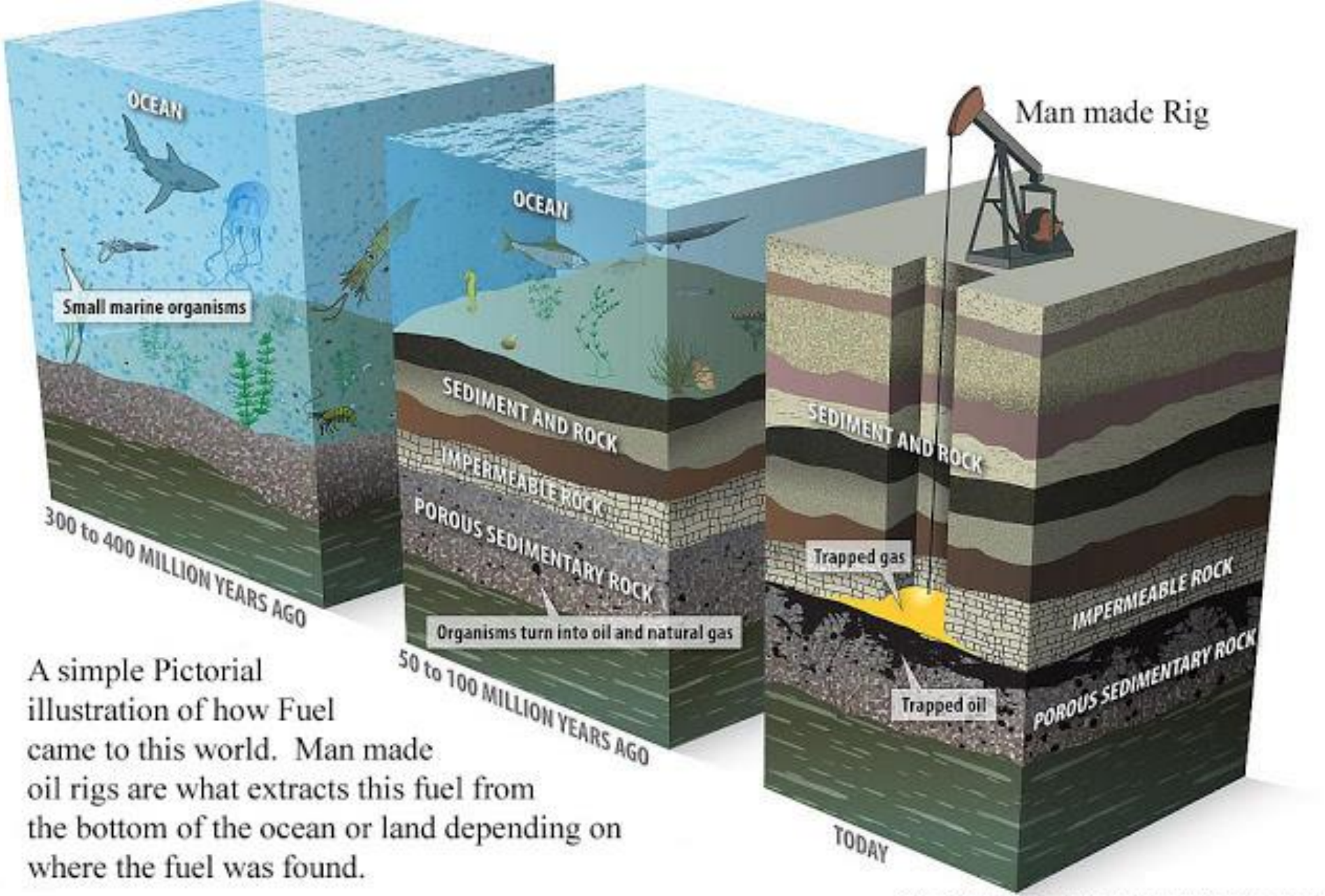
- Remains buried deeper under sediment
- Bacteria decompose organic matter
- Pressure and temperature increase



OIL AND NATURAL GAS STAGE 3: TODAY

- Greater pressure and increased temperature form thick, liquid oil
- More pressure and temperatures form natural gas
- Oil and natural gas begin to rise through pores until they get trapped by impermeable rock
- Oil/Natural gas collected





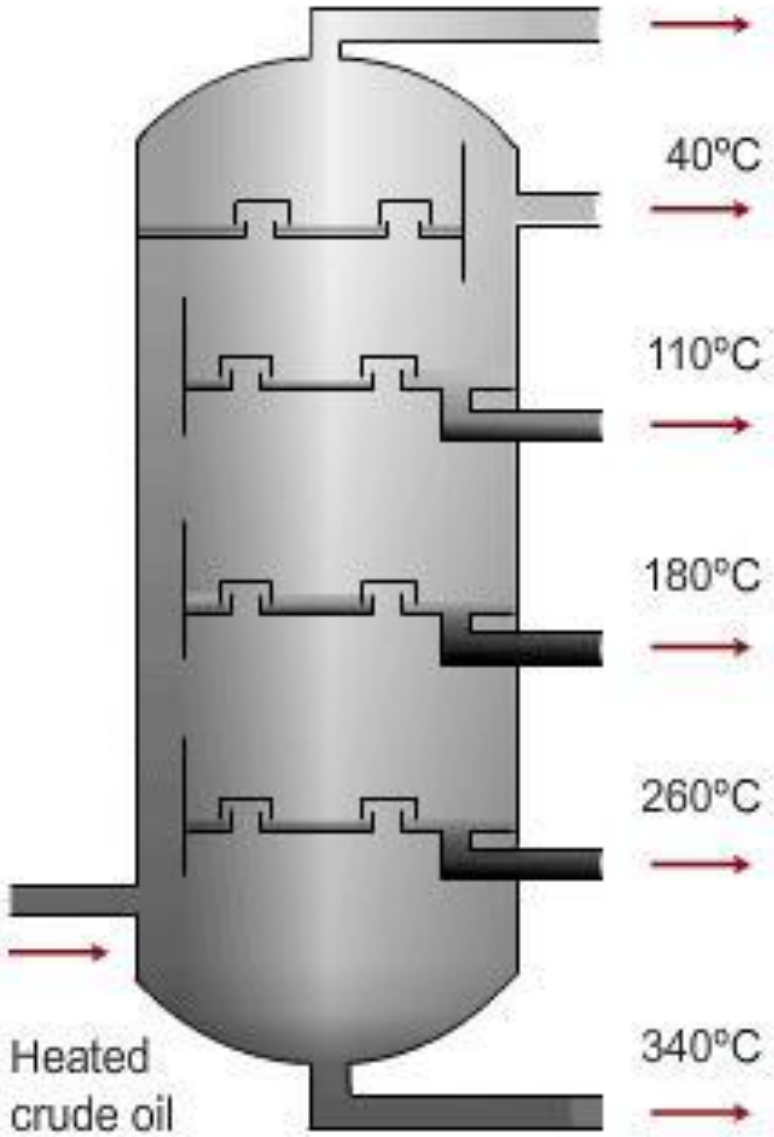
A simple Pictorial illustration of how Fuel came to this world. Man made oil rigs are what extracts this fuel from the bottom of the ocean or land depending on where the fuel was found.

This picture is taken from timmeko's photostream

REFINING OIL

- When oil is first pumped out of the ground, it is called **crude oil**.

- A factory where crude oil is separated into fuels and other products by heating is called a **refinery.**



Refinery Gas
Used as a fuel

Petrol
Used in cars

Naphtha
Used in chemical production

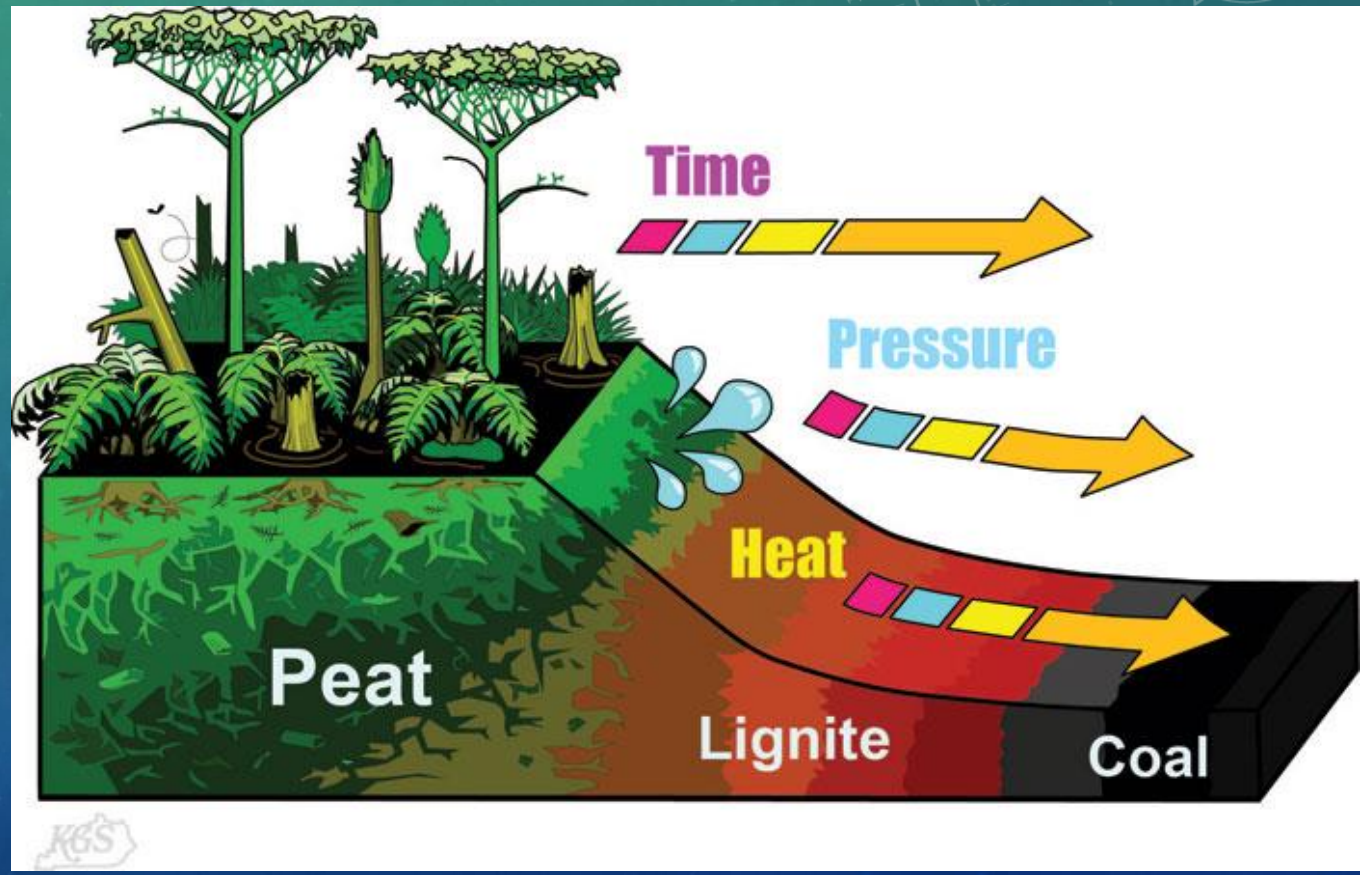
Kerosene
Used as jet fuel

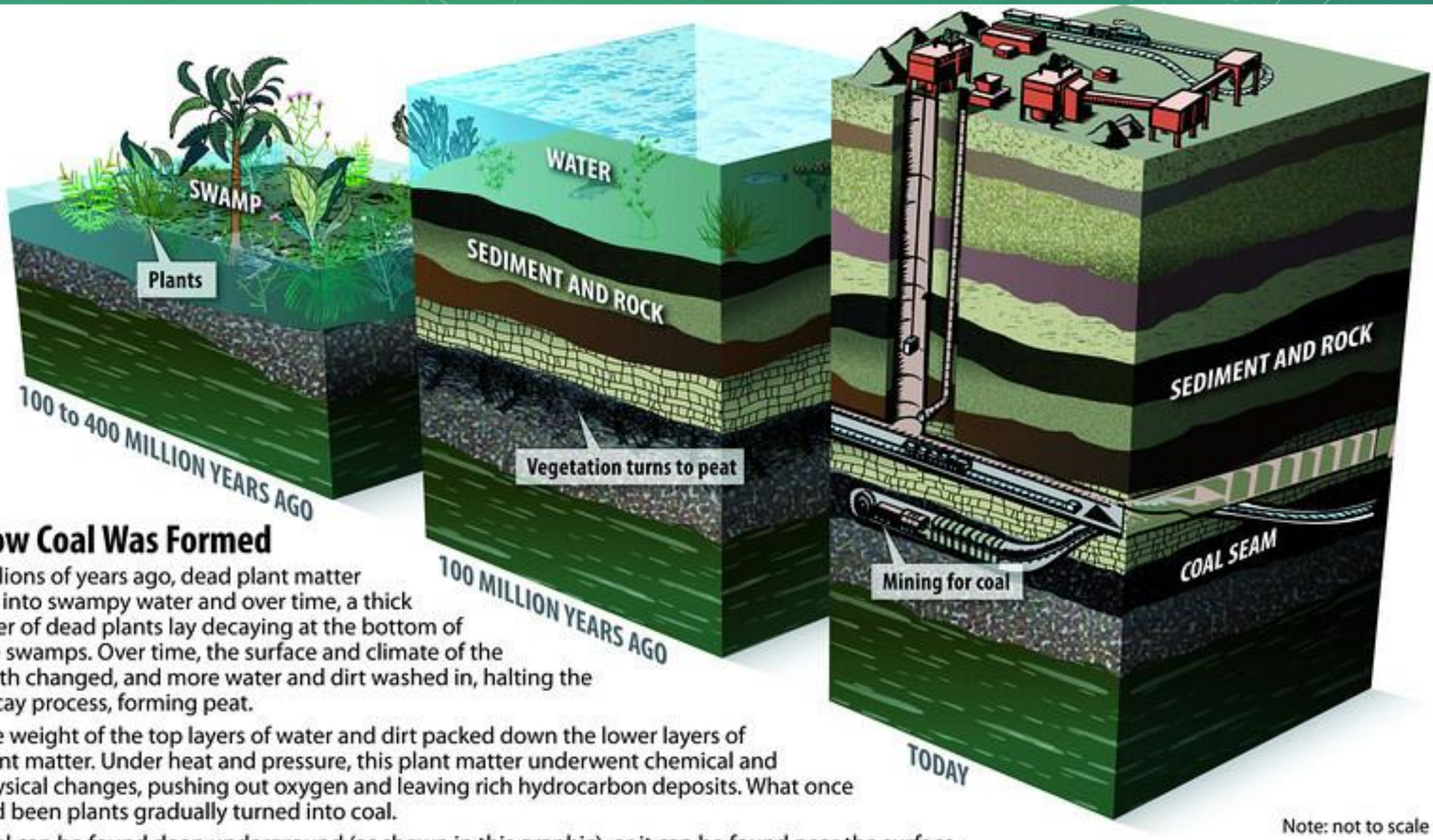
Diesel Oil
Fuel for diesel engines

Residue
Fuel for ships, lubricating oil, road surface

COAL FORMATION

- Very similar to oil and gas, except coal is formed by large plants millions of years ago in swampy areas.
- Dead plants pile on top of each other and undergo chemical changes to turn first into peat (push out oxygen and leave only rich hydrocarbons)
- Peat -> Lignite (richer in hydrocarbons) -> Coal (richest)
- Must be mined through underground shafts.





How Coal Was Formed

Millions of years ago, dead plant matter fell into swampy water and over time, a thick layer of dead plants lay decaying at the bottom of the swamps. Over time, the surface and climate of the Earth changed, and more water and dirt washed in, halting the decay process, forming peat.

The weight of the top layers of water and dirt packed down the lower layers of plant matter. Under heat and pressure, this plant matter underwent chemical and physical changes, pushing out oxygen and leaving rich hydrocarbon deposits. What once had been plants gradually turned into coal.

Coal can be found deep underground (as shown in this graphic), or it can be found near the surface.

Note: not to scale

WHO HAS THE OIL? PROVEN RESERVES IN BILLIONS OF BARRELS

Region	Reserves
North America	75.7
South and Central America	79.1
Europe	20.2
Former Soviet Countries	57.0
Middle East	676.4
Africa	67.6
Far East and Oceania	42.3
Total	1018.3

FOSSIL FUELS – ADVANTAGES/DISADVANTAGES

Natural Gas

Advantages

Provides lots of energy

Lower levels of air pollutants

Easy to transport

Disadvantages

Highly flammable

Oil

Advantages

Easy to make usable for vehicles

High energy density

Useful for lots of industries

Disadvantages

US has large dependence on foreign states

Source of many spills

Cause of many wars

Toxic materials created during refining

Coal

Advantages

Easy to transport

Most plentiful fossil fuel

Cheap to gather

Disadvantages

Destroys natural landscapes

Causes most pollution out of all fossil fuels

Only useful for specific industries

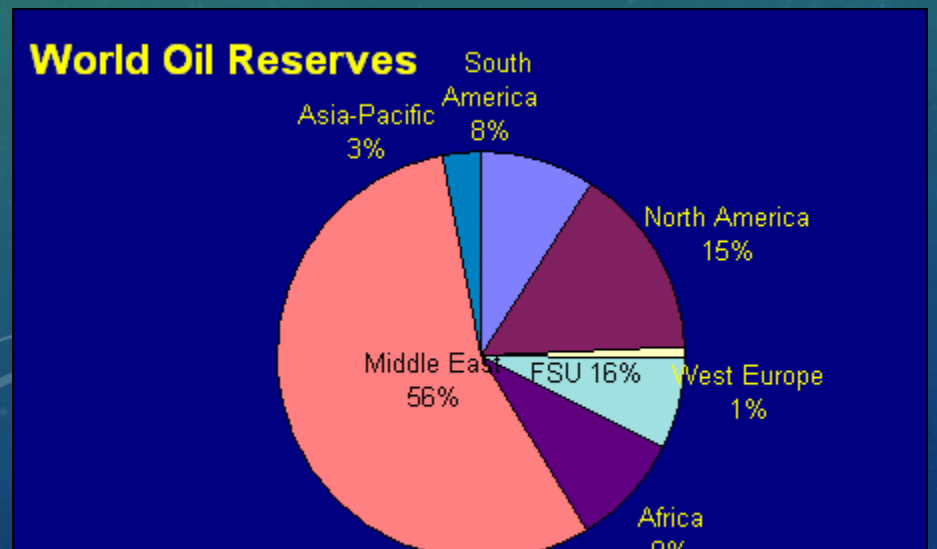
FOREIGN OIL DEPENDENCE

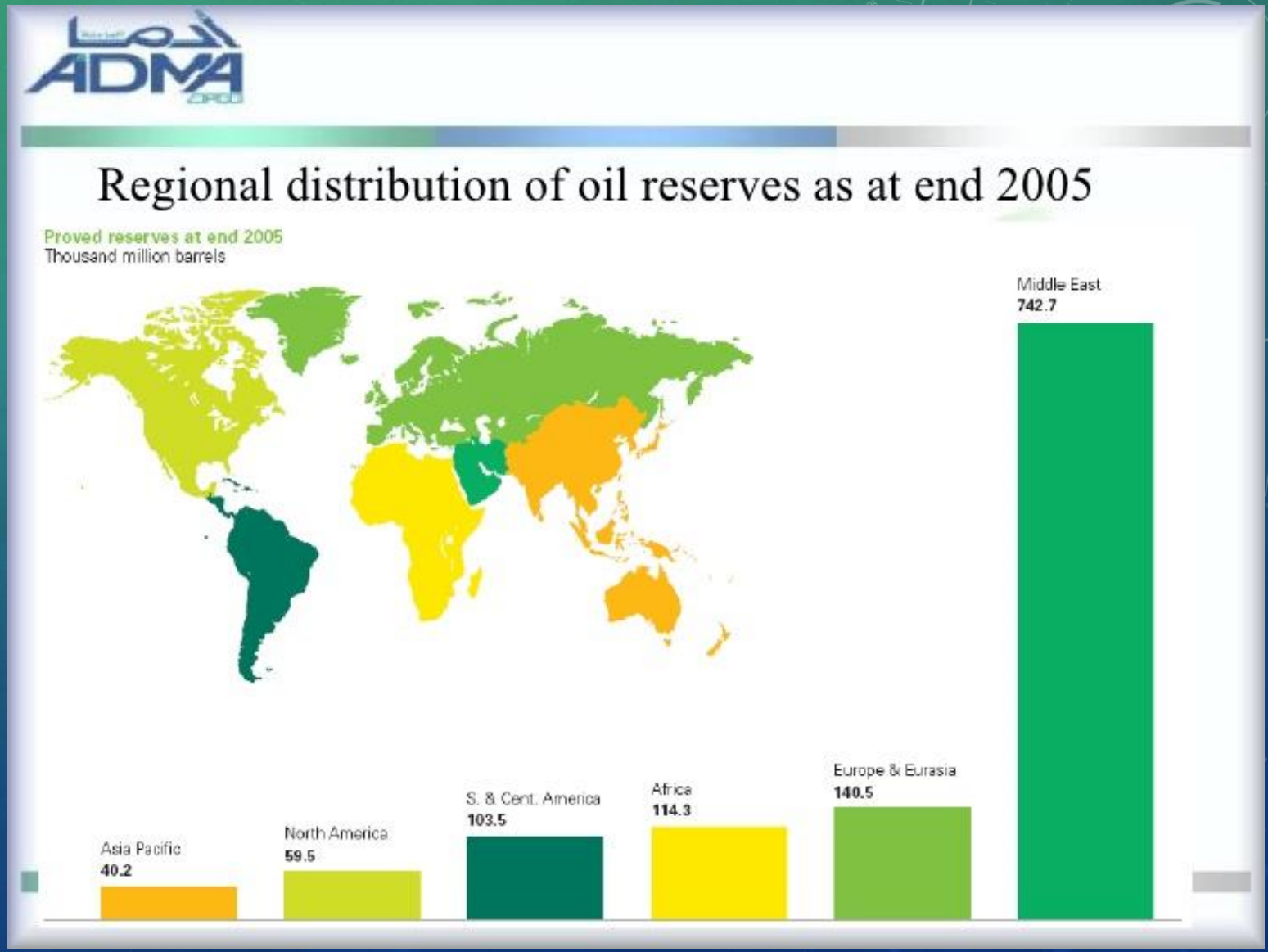
Problems:

- Variations in cost of purchases
- Threat of supply disruptions
- Limitations of nonrenewable resource

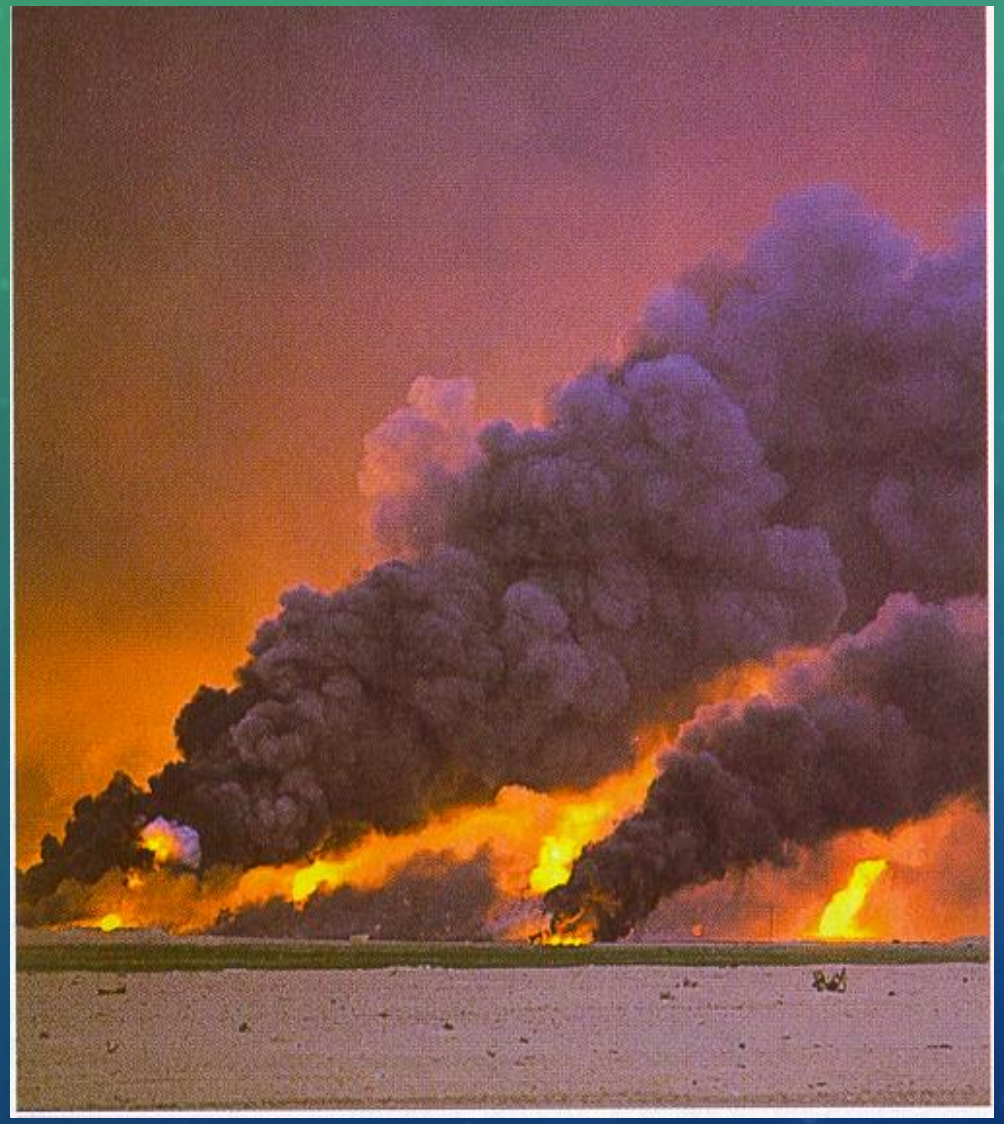
Impacts:

- Pollution of oceans
- Coastal oil spills
- Trade imbalances





WHY WAS PERSIAN GULF WAR (1ST GULF WAR – 1991) FOUGHT?



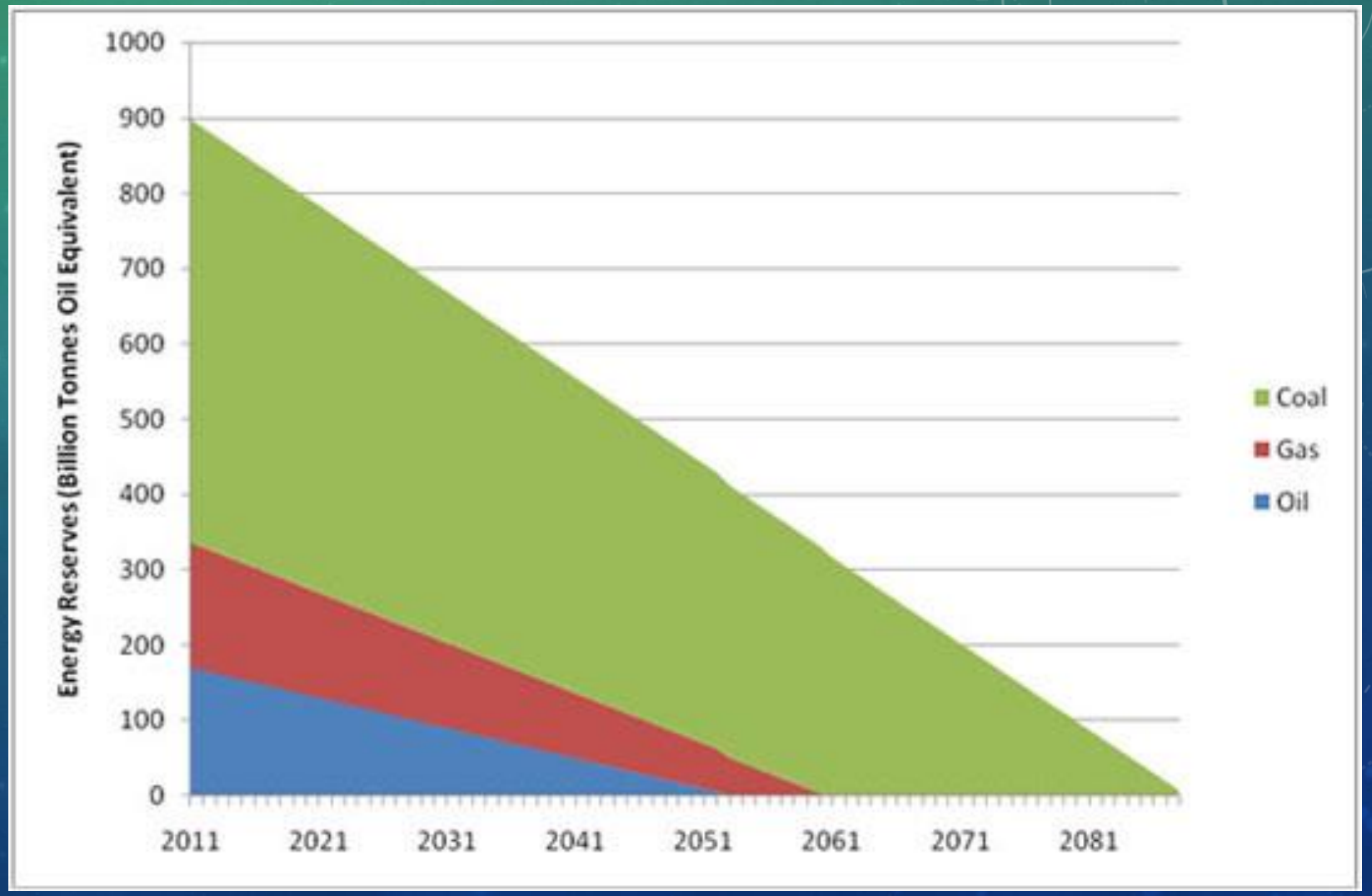
- To free the people of Kuwait?
- To protect Kuwait oil fields from Iraq?
- To drive up domestic oil prices?
- To force OPEC (Organization of the Petroleum Exporting Countries) to come to terms on oil prices?

WHAT A BARREL OF OIL REALLY COSTS U.S. CONSUMERS

- **$14 is initial price per barrel**
- **+ $80 for military support services**
- **= $94 is actual price per barrel**

FUTURE FOSSIL FUEL SUPPLIES

- Oil & Natural gas - 50 year supply
- Coal - 100 year supply
- No oil = no cars, no jets, no transport trucks, no cargo ships
- No coal = no power



SO NOW WHAT?