An ***energy crisis*** is any significant bottleneck in the supply of energy resources to an economy. In popular literature, it often refers to one of the energy sources used at a certain time and place, in particular those that supply national electricity grids or those used as fuel in vehicles.

Historical Crisis

- **1970s energy crisis** - caused by the peaking of oil production in major industrial nations (Germany, United States, Canada, etc.) and embargoes from other producers
- **1973 oil crisis** - caused by an OAPEC oil export embargo by many of the major Arab oil-producing states, in response to Western support of Israel during the Yom Kippur War
- **1979 oil crisis** - caused by the Iranian Revolution
- **1990 oil price shock** - caused by the Gulf War
- **The 2000–2001 California electricity crisis** - Caused by market manipulation by Enron and failed deregulation; resulted in multiple large-scale power outages
- **Fuel protests in the United Kingdom in 2000** were caused by a rise in the price of crude oil combined with already relatively high taxation on road fuel in the UK
- **North American natural gas crisis 2000-2008**
- **2004 Argentine energy crisis**
- **North Korea** has had energy shortages for many years
- **Zimbabwe** has experienced a shortage of energy supplies for many years due to financial mismanagement
- Political riots occurring during the **2007 Burmese anti-government protests** were sparked by rising energy prices
- **2000s energy crisis** - Since 2003, a rise in prices caused by continued global increases in petroleum demand coupled with production stagnation, the falling value of the U.S. dollar, and a myriad of other secondary causes
- **2008 Central Asia energy crisis**, caused by abnormally cold temperatures and low water levels in an area dependent on hydroelectric power

Cont.

Cont…

- **2008 prolonged electricity crisis in South Africa** (*"Mbeki in pledge on energy crisis"*)

- **In February 2008** the President of **Pakistan** announced plans to tackle energy shortages that were reaching crisis stage, despite having significant hydrocarbon reserves.

- **In April 2010,** the **Pakistani** government announced the Pakistan national energy policy, which extended the official weekend and banned neon lights in response to a growing electricity shortage

- **South African electrical crisis-** The South African crisis led to large price rises for platinum in February 2008 and reduced gold production.

- **China** experienced severe energy shortages towards the end of 2005 and again in early 2008. During the latter crisis they suffered severe damage to power networks along with diesel and coal shortages

- ***The Economist*** predicted that in the years after 2009 the United Kingdom will suffer an energy crisis due to its commitments to reduce coal-fired power stations

- **Nepal** experienced severe energy crisis in 2015 when India created an economic blockade to Nepal. Nepal faced the shortages of various kinds of petroleum products and food materials which affected severely on Nepal's economy

Causes of energy crisis

- Overconsumption
- Overpopulation
- Poor Infrastructure
- Unexplored Renewable Energy Options
- Delay in Commissioning of Power Plants
- Wastage of Energy
- Poor Distribution System
- Major Accidents and Natural Calamities
- Wars and Attacks
- Miscellaneous Factors

Possible Solutions of the Energy Crisis

- Move Towards Renewable Resources
- Buy Energy Efficient products
- Lighting Controls
- Easier Grid Access
- Energy Simulation
- Perform Energy Audit
- Common Stand on Climate Change
- Move Towards Public Transport
- Localized and Intensified Geological Exploration
- Enhance Scientific Research

Renewable Resources

- ***Renewable*** resources can be replenished over a fairly short period of time (months-decades)

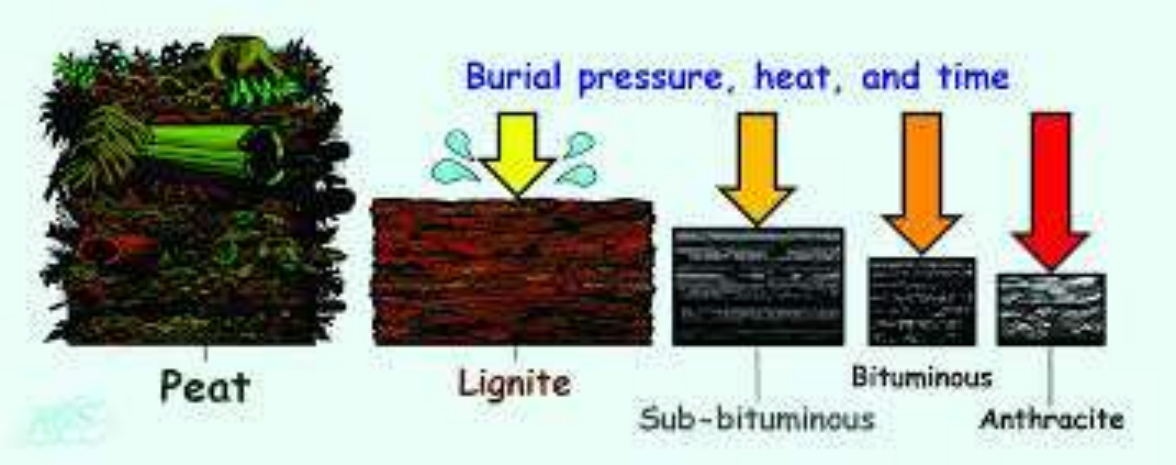
  Examples: Animals, Plants, Trees, Solar energy, etc.

- ***Non-Renewable*** resources require millions of years to form and accumulate

  Examples: Coal, Oil, Metals

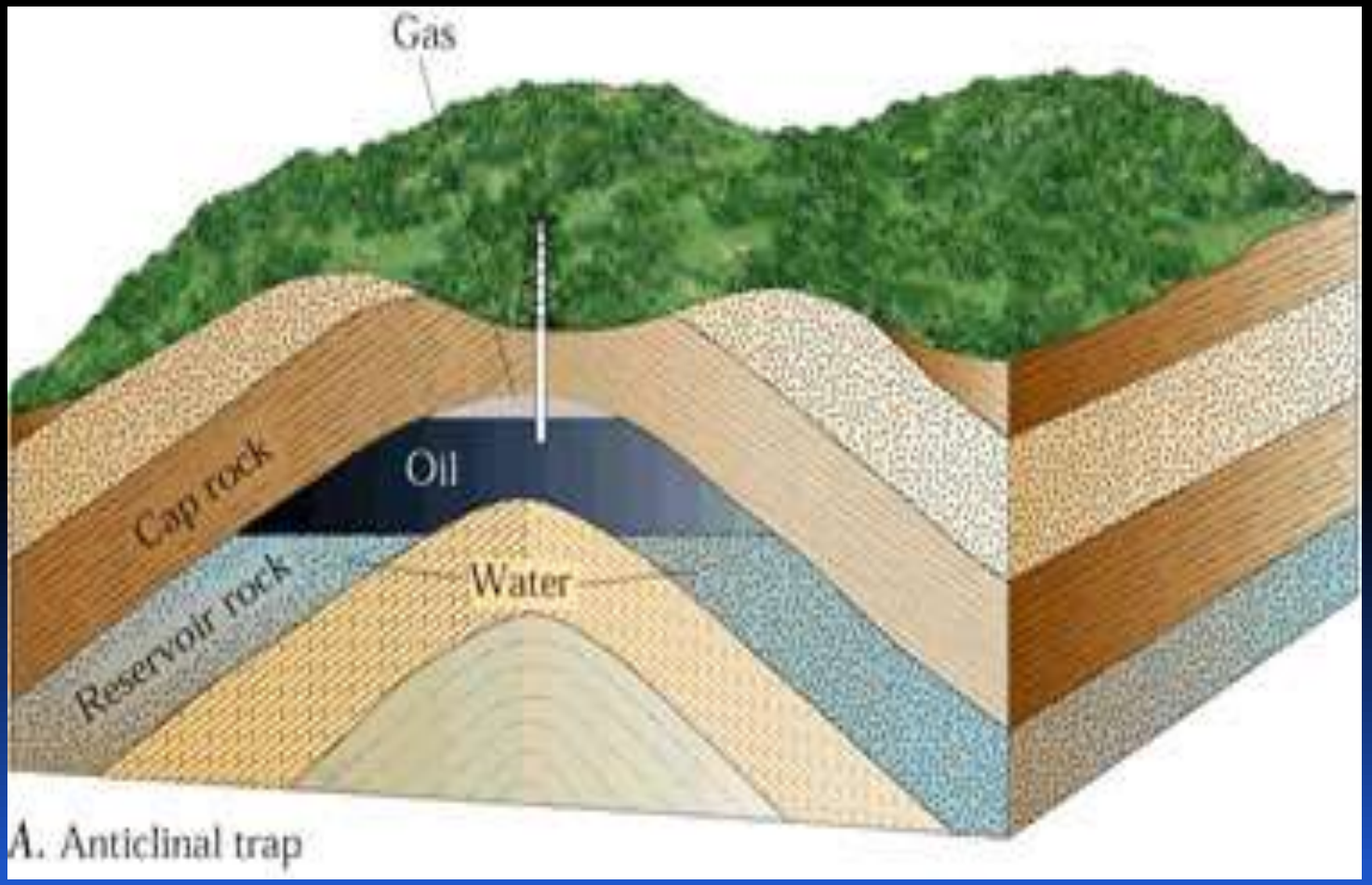
Fossil Fuels

- ***Fossil fuels*** **are** ***hydrocarbons*** **that can be used as a source of energy**
- ***Coal*** **is formed by heat and pressure acting on plant remains**
  - **Stages of formation:** ***Peat, Lignite, bituminous, anthracite***
  - ***Anthracite*** **releases the most energy and Peat provides the least**
  - **Used by power plants to produce electricity**
  - **Coal releases sulfur compounds (*acid rain*), mercury, carbon dioxide and other harmful chemicals**



Types of Coal

- ***Petroleum*** **and** ***Natural Gas*** **is formed by the accumulation of plant and animal remains in the ocean**
  - **Pumped out of "oil traps"**
  - **Used to make gasoline, fuel oil, plastic, etc.**



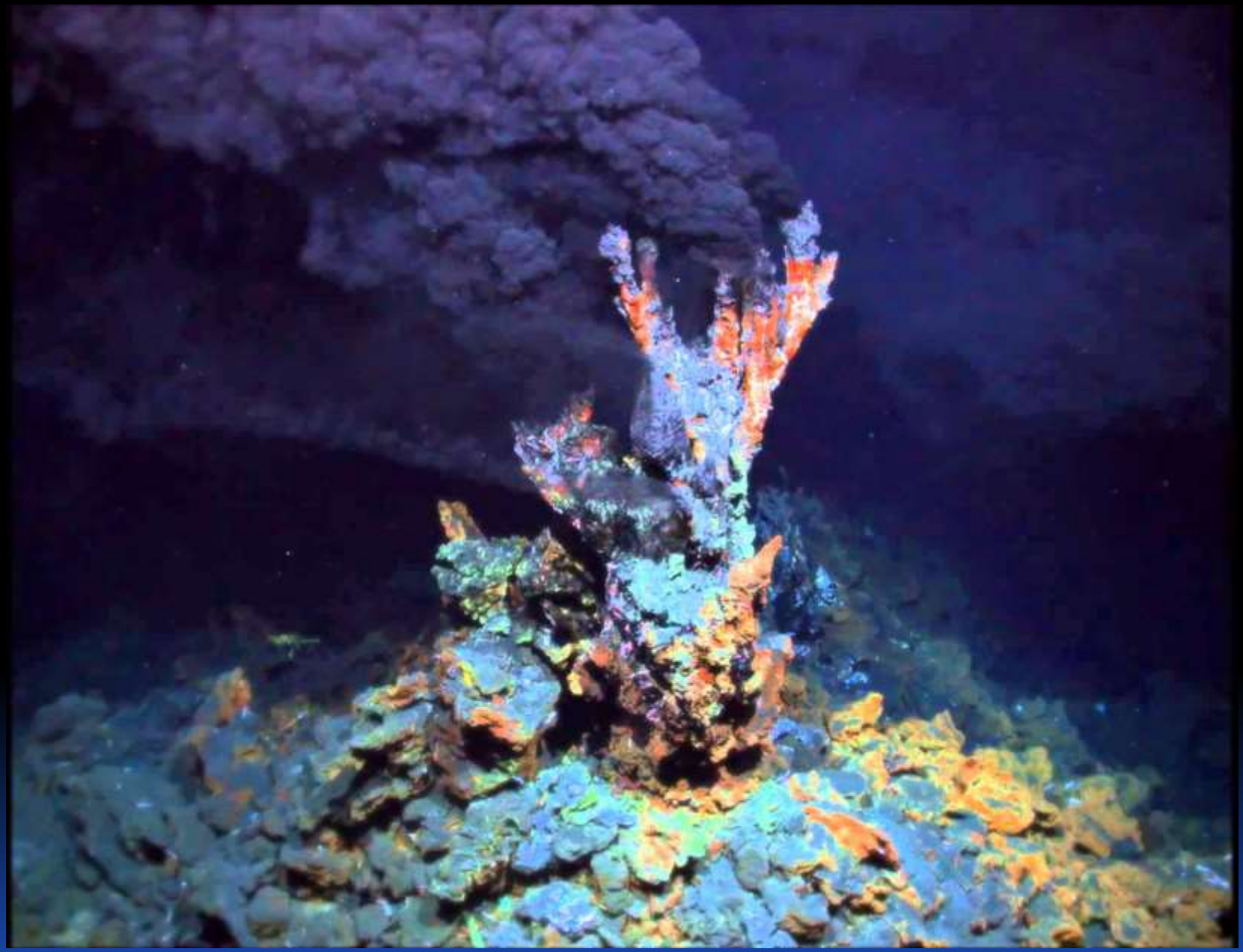
- ***Tar sands*** **are deposits of sand and clay that contain thick tar like hydrocarbons called "bitumen"**
  - **Must be "steamed off sands"**
  - **Requires a lot of energy to retrieve bitumen and process it (half as much energy to mine as it supplies)**

- ***Oil Shale*** **is shale that contains hydrocarbons called** ***kerogen***
  - **Shale is heated to release** ***Kerogen***
  - **Very expensive to process (not economical to mine)**

Formation of Minerals Deposits

- **Sources**
  - Mineral resources: Deposits of extractable minerals
  - Mineral reserve: Profitable mineral deposit
  - Ore: Metallic minerals that are profitable to mine
- **Igneous Processes**
  - Heavy minerals crystallize and accumulate in magma chambers
  - Yields: Gold, Silver, Copper, Mercury, Lead, Platinum, Nickel, etc.
- **Hydrothermal Solutions**
  - Hot metal rich fluids are injected into rock by magma intrusions
  - As fluid cools metallic ions crystallize in veins
  - Yields Gold, Silver, Mercury, etc.
- **Placer Deposits**
  - Heavy minerals are deposited in streambeds as weathering of country rock occurs
  - Yields: Gold, Silver, Platinum
- **Non-Metallic Resources**
  - Building materials-Gravel, Sand, Limestone (cement), Rock Salt
  - Industrial minerals-Abrasives (corundum), Limestone (steel)

Igneous vents



Hydrothermal Vents

Placer Deposits

Non-Metallic Resources

Alternate Energy Sources

- *New energy sources must be developed to replace fossil fuels!*
- **Solar Energy**
  - Harnesses the suns energy
  - Solar energy is “free” energy
  - Passive Solar energy-Requires no special equipment (ex. Windows)
  - Active solar energy-Utilizes special equipment (ex. Photovoltaic cells, water heaters)
  - Cons: High start up cost, not continuous

- **Nuclear Energy**
  - **Relies on nuclear fission of heavy elements to heat water**
  - **Cons: Dangerous, Produces hazardous waste**

- **Wind Energy**
  - Uses wind turbines to generate electricity
  - Can be used on a large or small scale
  - Cons: unsightly, expensive start up, only good in certain areas

- **Hydroelectric power**
  - Uses flowing water to turn turbines and generate electricity
  - Cons: Sediment behind dams builds up, Wildlife disruption, Need suitable spot

- **Geothermal energy**
  - Uses hot water and steam from earth to turn turbines and generate electricity
  - Can be utilized by home owners
  - Cons: Exhaustible, rare to find suitable spot

- **Tidal Power**
  - Traps incoming tidal waters and releases the water during low tide to generate electricity
  - Cons: Requires 8 meter tidal range (rare), Requires suitable coastline

Pollution

- Point source Pollution
- Non-Point source Pollution
- Freshwater Pollution
- Land Pollution
- Air Pollution

Point source Pollution

- Point source pollution comes from a known spot
- Examples: Factories, Sewage discharge

- **Non-Point source Pollution**
  - Non point source pollution has no specific point of origin
  - Examples: Oil on roadways, fertilizer/pesticide runoff

Freshwater Pollution

- We rely on freshwater for drinking water, farming, tourism/sporting etc.
- Groundwater, once contaminated is difficult/impossible to remediate

Land Pollution

- Farming depletes and poisons soil
- Mining destroys land surfaces
- Landfills leak dangerous chemicals

Air Pollution

- Fossil fuel combustion is the major source of air pollution
- Fossil fuels cause/add: Soot, Carbon dioxide (global warming, acidification), Smog, Acid Rain, Mercury contamination
- Ozone layer is destroyed by CFC's causing skin cancer increases
- The world health organization attributes 3 million deaths per year to air pollution

What Can We Do..

- Use of renewable energy
- Recycling of resources
- Reutilization of resources
- Resource conservation
- Sustainable use of resources
- Proper disposal

Thank You

Subhanil Guha