

16/7/19

Conservation and management of energy

Loft insulation-

- using a construction material with good insulation properties will prevent loss of heat to the air.
- less heat loss will mean less energy is used in replacing it.
- adding an insulation layer to roofs and walls would reduce energy use as this is where most heat is lost.

Cavity insulation-

- some homes have a gap between the inside and outside walls.
- if this gap is filled with an insulating material, heat will pass through far more slowly.

Double glazing-

- two panes of glass have a gap which is filled with a clear material, like an inert gas.
- The gap should be sealed to improve insulation.

Triple glazing-

- this is same as double glazing, but three panes of glass are used.
- considered expensive.

Case study

A house that needs no energy

1) The energy savings from this building design are huge. Suggest reasons why so few houses have been built so far, even though so much energy can be saved.

- A)
- expensive cost of installation is high
 - installation is time-taking
 - lack of skilled people
 - lot of labour

2) Why might the aim of a house with no energy input not be possible?

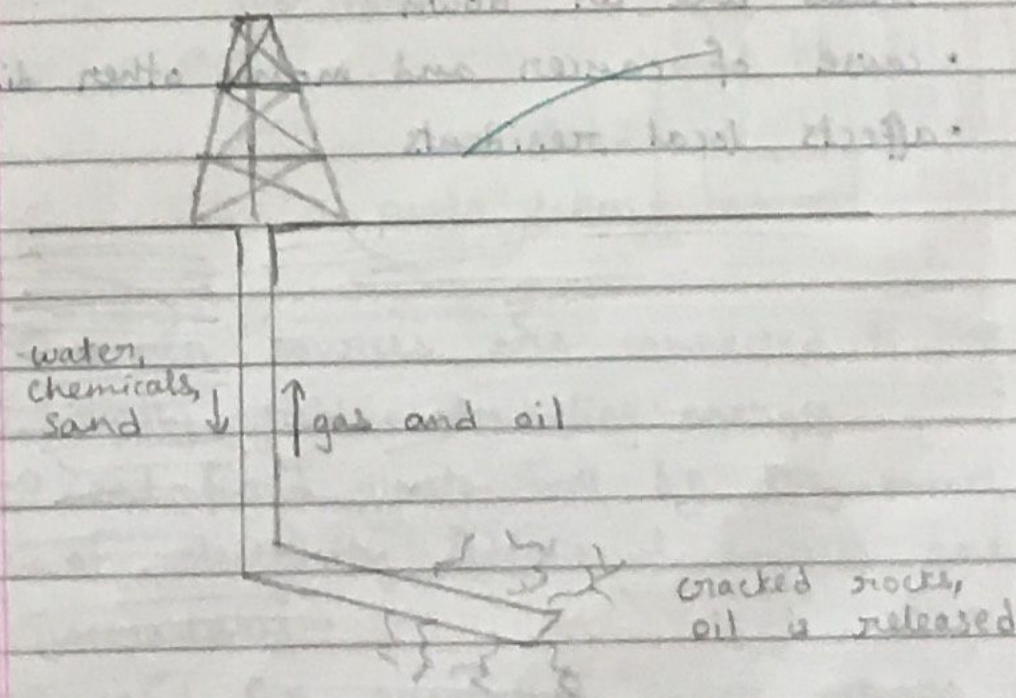
- A)
- weather might not co-operate
 - some amount of energy is lost

Fracking

The process-

(Hydraulic fracking)

- A deep, vertical hole is drilled to reach the shale rocks.
- Water, chemicals and sand are pumped in
 - Water is used to crack the rocks open
 - Chemicals are used to dissolve minerals and make way for the gas
 - Sand is used to keep the cracks open.
- oil and natural gas are released.



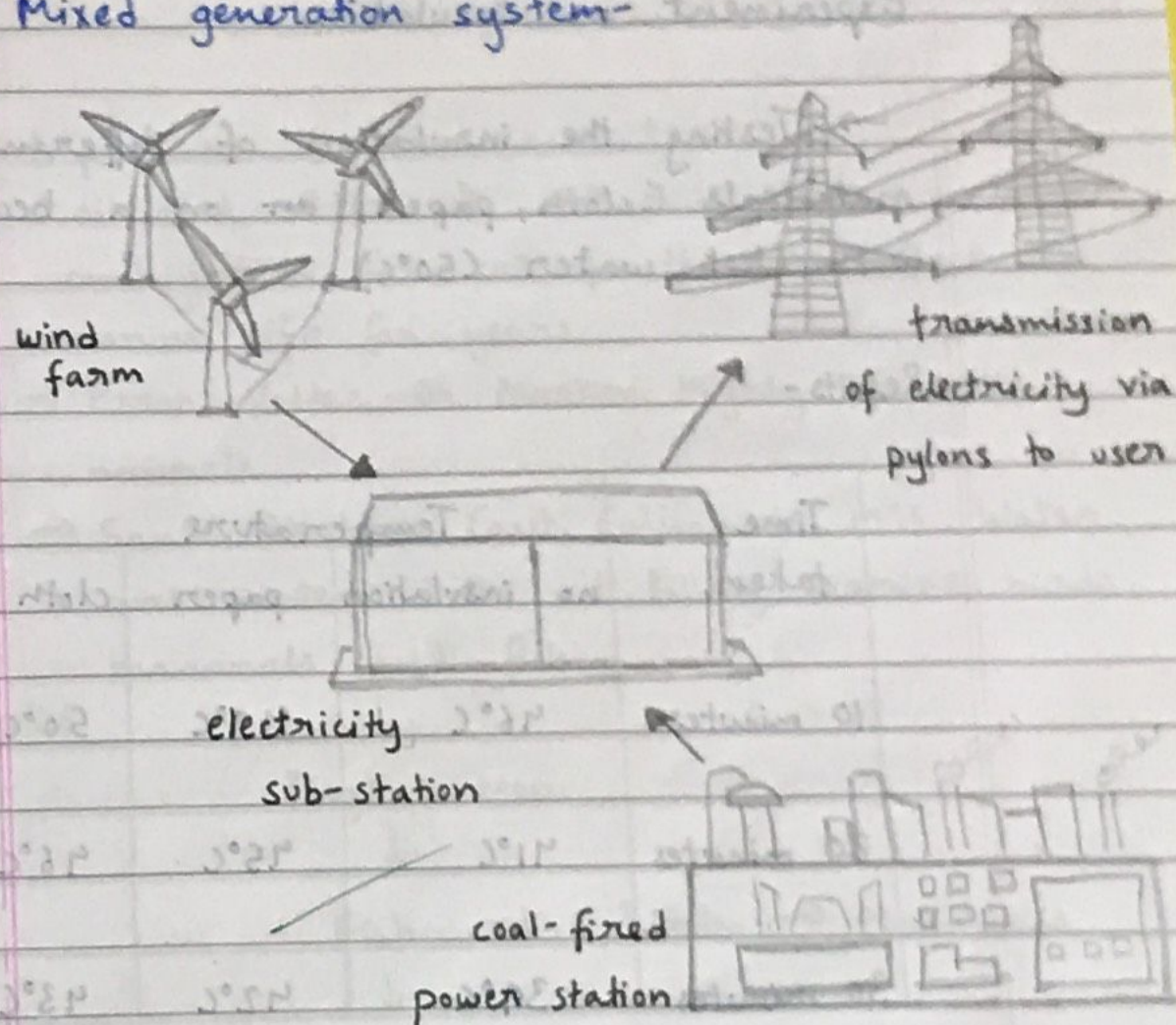
Advantages-

- gives gas and oil
- creates jobs
- contributes to the economy
- reduces the need to depend on other countries for oil or gas

Disadvantages-

- a lot of water is wasted
- water gets contaminated with toxins
- causes pollution and earthquakes
- releases greenhouse gases
- trees are cut down
- cause of cancer and many other diseases
- affects local residents

Mixed generation system-



- power sources are connected to the main supply grid, contributing energy
- coal-fired plants will be the main sources of electricity. Additional sources are secondary
- useful for preventing power outages as the grid can use other sources of power while one source runs out. This gives the first source to come back into operation.

Experiment on insulation

→ Testing the insulation of different materials (cloth, paper) on a beaker with hot water (50°C)

Results -

Time taken	Temperature		
	no insulation	paper	cloth
10 minutes	46°C	49°C	50°C
20 minutes	41°C	45°C	46°C
30 minutes	39°C	42°C	43°C

26/07/19

1/8/19

Oil spills

Impact on the environment

→ oil and water do not mix. It is a lethal combination for wildlife. It can affect marine life for years

→ Exxon Valdez in Alaska. Highly impacted animals.

→ Santa Barbara Coast, California, 1966. Water was coated with oil, killing marine birds, mammals and fish

→

Phytoplankton

↓

Fish → Birds → Mammals

↓

Large fish

↓

Shark

Oil spills destroy phytoplankton and ruin the ecosystem.

→ Fishing industry is negatively impacted

→ It is an ecological disaster

Management of oil pollution

• MARPOL

→ signed in 1973

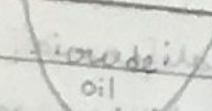
→ updated in 1978

→ came into force in 1983

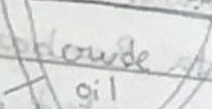
• Tanker design

→ double hulled: two layers (two hulls)

SINGLE HULL



DOUBLE HULL



• Floating booms

→ prevents the oil from spreading

• Adsorbent mat

→ adsorbs oil

→ very light

• Skimmers

→ eat coated with fur to absorb oil

→ nanofibrillated cellulose

• Scraper

→ scrapes oil collected by skimmer

(14)

07/08/19

Extended Case Study - Exxon Valdez

1) Outline the causes for the accident

A) Exxon Valdez oil spill was caused due to an oil tanker collision due to an inexperienced officer trying to avoid ice. Also, the tanker was single hulled. The weather wasn't favorable either.

2) Explain why so many large mammals have been affected.

A) Mammals were affected either due to direct contact or ingestion of oil while hunting for food. They were also affected by the failure of attempts to clean-up.

3) Other than the environmental damage, how are the locals impacted by oil spills?

A) • bioaccumulation
• health problems
• unemployment

4) Changes have been made as a result of the Exxon Valdez incident. Suggest three recommendations you would make to prevent a similar accident from occurring.

- A) • using double hulled containers
• experienced officers and proper rest
• use of appropriate systems and
certification.

5) Environmentalists argue that extraction of oil so close to the Arctic Circle should be banned because the area is environmentally sensitive. Give an opposite argument.

- A) It is efficient and profitable. It can be controlled by well designed containers, proper planning and efficient workers/officers.