DATE - 6 July 2021

Fly Ash: Composition, properties, uses

Context:

• National Thermal Power Corporation (NTPC) Limited has invited Expression of Interest (EOI) for sale of fly ash, in its endeavour to achieve 100% utilization of fly ash, from the designated plants of the Middle East and other regions.

• Fly Ash is a byproduct from burning of coal in the thermal power generation.

About:

Fly Ash:

• It is called fly ash because it is transported from the combustion chamber by exhaust gases.

• It is collected from the exhaust gases by electrostatic precipitators or bag filters.

• An electrostatic precipitator (ESP) is defined as a filtration device that is used to remove fine particles like smoke and fine dust from the flowing gas.

• It is the commonly used device for air pollution control.

Composition:

Fly ash includes substantial amounts of silicon dioxide (SiO_2), aluminium oxide (Al_2O_3), ferric oxide (Fe_2O_3) and calcium oxide (CaO).

Properties:

• Resemble Portland cement but is chemically different.

• Portland cement is a binding material in the form of a finely ground powder that is manufactured by burning and grinding a mixture of limestone and clay.

• Its chemical composition includes calcium silicates, calcium aluminate and calcium aluminoferrite.

• Exhibit cementitious properties.

• A cementitious material is one that hardens when mixed with water.

Uses:

• It is used in concrete and cement products, road base, metal recovery, and mineral filler among others.

Harmful Effects:

• Fly ash particles are toxic air pollutants. They can trigger heart disease, cancer, respiratory diseases and stroke.

• When combined with water they cause leaching of heavy metals in ground water.

• It also pollutes the soil, and affects the root development system of trees.

Fly Ash Utilisation:

• NTPC has collaborated with Cement manufacturers around the country to supply Fly Ash.
• To promote the use of Fly Ash bricks in building construction, NTPC has set up Fly Ash brick manufacturing Plants at its Coal based Thermal Power Plants.

• These bricks are being utilized in Plants as well as township construction activities exclusively.
• On average, 60 million Fly Ash bricks are being manufactured annually by NTPCs own Fly Ash brick Plants.
• As per the MoEF&CC directives, NTPC stations must keep at least 20% of total Fly Ash produced in reserve for the issue to Fly Ash brick/blocks/tiles manufacturers and issuing Fly Ash free of cost to them.
• About 9% of the total Fly Ash produced in NTPCs stations, is being utilized by Fly Ash bricks/blocks and tiles manufacturing units annually.
• During the year 2020-21, almost 15 NTPC stations supplied Fly Ash to various Road projects and Ash utilization crossed by nearly 20 million tonnes.
• Over the last five years the fly ash utilisation has grown up by 80% in the country.
• Pradhan Mantri Awas Yojana (Urban) has focused on new construction technologies such as using fly ash bricks that are innovative, and environmentally friendly.
• Even state governments have come out with their Fly ash utilization policies, e.g. Maharashtra was the first state to adopt the policy.
• A web portal for monitoring of fly ash generation and utilization and a mobile based application titled "ASHTRACK" has been launched by the Government.
• GST rates on fly ash and its products have been reduced to 5%.

Last Ice Area

Context:

The 'Last Ice Area' (LIA), located in the Arctic's Ice north of Greenland, has started melting earlier than what the scientists had expected.

About:

Last Ice Area:

- This region is located north of Greenland and Ellesmere Islandin the Canadian territory of Nunavut.
- This area was believed to bestrong enough to withstand global warming.
- Thetotal disappearance of summer ice in the Arctic was estimated by the year 2040, however the 'Last Ice Area' was the exception.

- World wildlife fund (WWF)-Canada was believed to be the first to call this area the 'Last Ice Area'.

Importance:

- It was thought to be able to help ice-dependent speciesas ice in the surrounding areas melted away.
- It is used by polar bears to hunt for sealswho use ice to build dens for their offspring. Walruses too, use the surface of the ice for foraging (to search for food).
- Sea ice is a highway for inuit,who use it to travel and hunt.
- Theterm Inuit refers broadly to the Arctic indigenous population of Alaska, Canada, and Greenland.

Reasons for Melting:

- About80% of thinning can be attributed to weather-related factors such as winds that break up and move the ice around.
- The remaining 20%can be attributed to longer-term thinning of the ice due to global warming.

About Arctic:

- The Arctic is a polar regionlocated at the northernmost part of Earth.
- The Arctic consists ofthe Arctic Ocean, adjacent seas, and parts of Alaska (United States), Canada, Finland, Greenland (Denmark), Iceland, Norway, Russia, and Sweden.
- Land within the Arctic region has seasonally varying snow and ice cover.
- Since 2013,India has had observer status in the Arctic Council, which is the predominant inter-governmental forum for cooperation on the environmental and development aspects of the Arctic.

Impact of Melting Arctic Ice:

- **Global Climate:**The Arctic and Antarctic act like the world's refrigerator. Since they are covered in white snow and ice that reflect heat back into space (Albedo effect), they balance out other parts of the world that absorb heat.
- **Coastal Communities:**Global average sea level has risen by about 7-8 inches since 1900, and it's getting worse. Rising seas endanger coastal cities and small island nations by exacerbating coastal flooding and storm surge.

- **Food Security: Polar Vortexes**, increased heat waves , and unpredictability of weather caused by ice loss are already causing significant damage to crops on which global food systems depend.
- **Permafrost & Global Warming: Permafrost** in the Arctic region (ground that is permanently frozen) stores large amounts of methane, which is a greenhouse gas that contributes to climate change.
- **Biodiversity Threat:**Melting of the Arctic ice puts the Arctic region's vibrant biodiversity under serious threat.

India's interests in Arctic:

- Recently, India participated in the 3rd Arctic Science Ministerial and shared plans for research and ling-term cooperation in the Arctic Region.
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