ESC 205A : Assignment-2 (by Animesh Pareek {2021131} {IIITD})

Understanding E-Waste?

E-waste, or electronic waste, is a common waste produced in the new technological world and is becoming a significant environmental problem. Improper disposition of electronic devices can affect the environment and our health. Toxic elements in these appliances can pollute soil and water, which may cause serious environmental issues. The reasons for the generation of e-waste are Rapid Technological advancements and frequent updates of E-devices in the market, the throwing up of properly functioning models by customers for buying the latest models and Dumping or exporting e-waste to developing countries. Only 17%(of 53.6 MT as of 2020) of global e-waste is recycled yearly. E-waste generation will reach 74.7Mt by 2030. The E-waste generation rate varies globally from 5% to 10% yearly. There are norms and laws for recycling e-waste in various developing countries, but they lack enforcement. They also need more awareness, sensitization, and safety norms than the EU and Japan. Electronic waste generally contains dangerous compounds and metals such as titanium, iron, zinc, silver, gold, copper, tungsten, polysilicate, cadmium, lead, and mercury. Also, they contain Certain metals which, after removal, can be reused.

E-Waste Management Approaches

1) Reducing and Reusing the E-waste

We should use Electronic devices for their complete lifespan. A more sustainable production will also lead to lesser generation of E-waste. Their Designers should also ensure their durability and should avoid any unnecessary upgrades. We can reuse them further via repair and refurbishment. Our Acts will also help in reducing demand for new devices

2) Recycling E-waste

E-waste recycling involves these stages :

(i) Dismantling and Sorting :

In this stage, Electronic Devices are dismantled into different components and sorted into categories for further recycling. This stage is generally carried out manually by skilled workers. This stage helps in the precise separation of materials, helping in further recovery or recycling.

(ii) Separation based on physical properties:

E-waste is then further broken down into smaller pieces using the mechanical process of shredding. These pieces are separated based on magnetic and electrical properties using magnetic and eddy current separation techniques. This method facilitates their recycling or further processing.

(iii) Chemical Extraction (Recovery Stage):

The recovery stage processes the separated chunks of e-waste, where Chemical processes are applied to extract valuable resources. These techniques often involve chemical leaching, precipitation, and specific chemical reactions for separating and recovering valuable metals and materials.

3) Innovations and Technologies in E-Waste Recycling:

Continuous research in technology has led to innovative approaches for recycling e-waste. For example, hydrometallurgical processes have helped in recovering metals more efficiently. New research on pyrolysis and gasification has generated a new possibility of converting e-waste into energy, which helps minimize the environmental impact. These innovations are necessary for improving the efficiency of e-waste recycling more sustainably.

3) Legislative steps to help E-Waste Management

(i) Policy Frameworks:

Governments Have Defined Policy Frameworks to address challenges associated with e-waste management. These policies focus on developing guidelines for e-waste management, setting recycling targets, promoting new units for recycling, and enforcing them via laws.

They also discourage illegal dumping and improper disposal of e-waste.

(ii) Extended Producer Responsibility:

It refers to a policy in which manufacturers are responsible for the product's entire lifecycle and proper disposal. It ensures the manufacturing of more recyclable products and helps finance e-waste management.

Its implementation will foster the sustainable designing of products and lead to responsible waste management by producers.

(iii) Collaboration and Stakeholder Engagement:

Governments are trying to involve industries, businesses, organizations, and individuals to work together to create effective E-waste management systems.

(iv) Promoting Awareness and Responsibility:

Governments and organizations are taking initiatives to set up points where recycling teams can collect e-waste from people for proper recycling. Apart from these initiatives, they also create awareness about e-waste and its environmental effects.

Challenges in E-Waste Management

(i) Illegal E-Waste Dumping and Improper Recycling

Various countries face issues related to practices of illegal export and import of e-waste.They also face issues of improper disposal of e-waste.

(ii) Lack of Awareness and Infrastructure:

Inadequate infrastructure, such as recycling units and collection points, is quite a challenge for the government. Also, the lack of awareness among the general public about e-waste and its environmental effects is an issue in developing a proper e-waste management system for a country's government.

Waste management for Solar Panels in future

Waste management of solar Panels also involves the same recycling and Legislative pipeline as discussed above. Along with this It also Involves a close collaborative working of government, researchers, and Solar panel manufacturers on developing a solar PV cell waste management model.

References->

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