**Problem Statement-5**

**Title of the Problem Statement**:Dry Coal Beneficiation: Addressing Efficiency, Scalability, and Adaptability Challenges for Indian Coal**.**

**Issues:**

Coal beneficiation is a crucial process in the energy sector, aimed at improving the quality of coal. Wet beneficiation methods often face challenges such as high water consumption and environmental concerns. Dry beneficiation techniques eliminate the need for water, has the advantages of less investment in infrastructure, low operating cost, energy conservation, low carbon emissions etc. However, following limitations are associated with dry coal beneficiation:

1. Heterogeneous nature of coal complicates the separation process which may not be effective for handling complex coal blends leading to low efficiency of separation and misplacement of product in reject. Moreover, dry separation depends on precise control of air flow and particle density. Variation in these parameters affect separation efficiency.
2. High moisture content in raw coal (RoM) feed reduces the efficiency of dry beneficiation processes and it becomes difficult to operate plant in rainy season.
3. Dry beneficiation methods struggle with fine coal particles, which may not separate effectively without water-based processes. It has been observed that there is lack of effective equipment for dry beneficiation of (-) 6 mm coal.
4. In India, scalability for industrial application is a concern as there is limited proven track records for dry beneficiation. Technological immaturity hinders confidence in their reliability and effectiveness in industrial settings.
5. Adaptability to Indian coal needs to be established as Indian coal often has a high ash content, which complicates the separation of coal from impurities. Dry beneficiation methods need to be specifically designed or optimized for removal of ash and other impurities from Indian coal.
6. Variations in raw coal quality lead to inconsistent performance and lower reliability compared to more established wet processes.
7. Dust generation poses health risks to workers and leads to environmental pollution if not properly controlled. Particulates or other emissions require management to minimize environmental impact.

**Expected Outcomes:**

Enhance existing dry beneficiation methods to boost separation efficiency, achieve cost savings, handle high-moisture raw coal, and ensure environmental sustainability, practicality, and scalability. The proposed solution should be tailored to meet Indian coal processing needs and include a comprehensive plan for transitioning the technology from concept to industrial implementation.

**Mentor:**

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