HYDROGEN POWERED TRAIN PROJECT: NATIONAL

NEWS: India's first hydrogen-powered train coach successfully tested at ICF Chennai: Union Minister Ashwini Vaishnaw

WHAT'S IN THE NEWS?

Indian Railways has launched its first hydrogen-powered train coach as part of a green initiative to decarbonise rail transport, with operations planned in Haryana. The project includes fuel cell technology, built-in safety systems, and aligns with India's National Green Hydrogen Mission.

Hydrogen-Powered Train Project – Indian Railways

Overview

- Indian Railways has successfully tested its first hydrogen-powered coach.
- The coach was developed at the Integral Coach Factory (ICF), Chennai.
- This is part of India's effort to decarbonise transport and adopt green hydrogen technology.

Key Components of the Project

Conversion Work:

- Two conventional 1600 HorsePower (HP) diesel power cars have been converted into hydrogen fuel cell-powered traction systems.

Hydrogen Fueling Station:

- A 3,000-kg hydrogen fuelling facility is being set up at Jind, Haryana.
- This facility will supply hydrogen for the operational needs of the train.

Organisations Involved

Design & Development:

- Handled by Research Designs and Standards Organisation (RDSO).

Manufacturing:

- Executed by the Integral Coach Factory (ICF), Chennai.

Financial Outlay

- The total budgetary allocation for the project is approximately ₹136 crore.

Operational Plan

- The train will have 10 coaches with a passenger capacity exceeding 2,600.

- Planned operation includes two round trips daily (total distance 356 km) between Jind and Sonepat stations in Haryana.

Built-in Safety Systems

Considering hydrogen's flammability, multiple safety features have been embedded:

- Pressure relief valves
- Leak detection sensors
- Flame detection systems
- Temperature monitoring units
- Structured ventilation systems

Significance of the Project

- This is a key milestone in Indian Railways' green transition.
- It aligns with India's goals to:
    - Reduce greenhouse gas emissions
    - Enhance the share of renewable energy
    - Decarbonise rail transport infrastructure

Hydrogen Fuel Cell-Based Traction Systems

Working Principle

- Hydrogen fuel cells convert hydrogen (H_2) and oxygen (O_2) into electricity, with water and heat as by-products.
- The electricity is used to power electric traction motors for movement.

Battery Integration

Battery packs are used to:

- Store excess power
- Store energy from regenerative braking
- Supply electricity during peak power demands

Advantages

- Zero emissions (water is the only by-product).
- Silent operation and lower mechanical wear.
- Supports India's National Green Hydrogen Mission.

Petroleum and Explosives Safety Organisation (PESO)

About PESO

- PESO is the national regulatory body ensuring safety in handling hazardous substances.
- Formerly known as the Department of Explosives.
- Established in 1898, under the colonial regime.

Nodal Ministry

- Functions under the Ministry of Commerce and Industry.
- Specifically operates under the Department for Promotion of Industry and Internal Trade (DPIIT).

Key Responsibilities

Licensing and Regulatory Role:

- Issues licenses for manufacture, storage, transport, and sale of:
    - Explosives
    - Petroleum products
    - Compressed gases
    - Flammable substances

Safety Enforcement:

- Enforces multiple safety legislations including:
    - Explosives Act, 1884
    - Petroleum Act, 1934
    - Gas Cylinders Rules, 2016
    - Static and Mobile Pressure Vessels (Unfired) Rules, 2016

Inspection and Audit:

- Conducts inspections of industrial and transport facilities handling hazardous materials.
- Ensures compliance with safety standards.

Technical and Advisory Role:

- Offers expert guidance on hazardous material management.
- Assists in formulation of national safety codes and standards.

Source: https://www.thehindu.com/news/national/indias-first-hydrogen-powered-train-coach-successfully-tested-at-icf-chennai-union-minister-ashwini-vaishnaw/article69854506.ece