Significance of Hydrogen Powered Ferry

Why in news?

India recently launched its first indigenously developed hydrogen fuel cell ferry.

What are the special features of hydrogen fuel cell ferry?

- **'Harit Nauka' initiative**- The ferry is a part of this initiative which was launched in 2024 to reduce greenhouse gas emissions as per the ***Maritime Amrit Kaal Vision 2047.***
- **Manufactured-** By Cochin Shipyard Limited.
- **Deployed in service**- At Varanasi in Uttar Pradesh.
- **Features**- The ferry can carry 50 people, in its air-conditioned passenger area, the boat has five hydrogen cylinders that can carry 40kg of hydrogen and support 8 hours of operations. The vessel is also fitted with a 3-kW solar panel.
- **Fuel cell**- It utilises utilizes a 50-kW Proton-Exchange Membrane (PEM) fuel cell which is a type of hydrogen fuel cell with Lithium-Ion Phosphate batteries.
- **Hydrogen fuel cell system**- It was developed by KPIT Technologies, Pune in collaboration with CSIR labs.

What is the significance of hydrogen fuel cell ferry?

- **Environment friendly-**The hydrogen fuel cell-powered vessel has zero emission, zero noise and is energy-efficient.
- **Zero emission-** Fuel cell technology allows for efficient conversion of chemical energy in hydrogen into electricity, with water being the only byproduct.
- **Quick refuelling-** The hydrogen fuel cells do not require recharging, for the continuous operation it must be provided with uninterrupted supply of fuel and oxygen.
- **Zero noise-** The hydrogen fuel cell-powered vessel produces zero emissions and operates silently, making it environmentally friendly and suitable for urban areas.
- **Durability-** The passenger area is constructed with high-quality fiberglass reinforced plastic, similar to metro train coaches it enhances durability while keeping the vessel lightweight.
- **Sustainability-** The ferry features a 3-kW solar panel, contributing to the vessel's energy needs and enhancing its sustainability.
- **Flexibility-** The advantage of using a PEM fuel cell with a Lithium-Ion Phosphate battery is that the system can adjust the power output according to the power demand.
    - When the vessel needs to accelerate, the battery can provide extra power.
    - When the vessel needs to slow down, the battery can store the excess power generated by the fuel cell.
- **Benefits of PEM cell**- PEM fuel cells are popular in automotive applications because

they operate at a lower temperature, and are lighter and more compact.

- **Cost effective**- There are no moving parts, hence the ferry requires less maintenance than combustion vessels.
- The ferry is a milestone for the field of nuclear fusion and green energy, as it represents the necessary heat and stability required for viable fusion reactors.
- **Emerging green fuel**- The ferry has given India an early mover advantage to tap the potential of hydrogen as an emerging green fuel in the marine sector.
- **Boost National Green Hydrogen Mission**- It aims to make India the global hub for production, usage, and export of green hydrogen and its derivatives, such as green ammonia and green methanol.

Quick facts

National Green Hydrogen Mission
• **Launch year**- 2021 • **Objective-** To make India the Global Hub for production, usage and export of Green Hydrogen and its derivative. • **Strategic Interventions for Green Hydrogen Transition (SIGHT)-** - Incentive for manufacturing of electrolysers - Incentive for production of green hydrogen. • **Green hydrogen hubs**- It will identify and develop regions capable of supporting large scale production and/or utilization of Hydrogen as Green Hydrogen Hubs.
Harit Nauka Initiative
• It is the 'Guidelines for Green Transition of Inland Vessels'. • **Launch-** By ***Ministry of Ports, Shipping, and Waterways.*** • **Aim**- To embark on a journey towards a sustainable and eco-friendly future for our inland waterway • All states have to make efforts to use green fuels for 50 per cent of inland waterways-based passenger fleets in the next one decade, and 100% by 2045. • This is to reduce greenhouse gas emissions as per the Maritime Amrit Kaal Vision 2047.

Reference

1. Indian Express- Significance of hydrogen powered ferry service
2. MNRE- National Green Hydrogen Mission

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