

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 utilizes 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.

Hydrogen colour palette

| Colour code | Brown | Grey | Blue | Turquoise | Green |
|--|-----------------|---------------------------|--|-----------|-----------------------------|
| Energy source | Coal or lignite | Natural gas | Any non-renewable energy source | Methane | Any renewable energy source |
| Process of getting hydrogen | Gasification | Steam methane reformation | Steam methane reformation and carbon capture & storage | Pyrolysis | Electrolysis of water |
| Highest to lowest greenhouse gas emissions | ←————→ | | | | |
| Lowest to highest acceptance level | ←————→ | | | | |



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 electrolyzers
 - 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](#)

