Fuel Cell Technology for Disaster Management

Why in News

The **International Advanced Research for Powder Metallurgy & New Materials (ARCI), Hyderabad** has developed **Polymer Electrolyte Membrane Fuel Cells (PEMFC).**

- ARCI is an **autonomous Research and Development (R&D) Centre** of the Department of Science and Technology (DST).

Polymer Electrolyte Membrane Fuel Cells

- PEMFC convert the **chemical energy stored in hydrogen fuel directly and efficiently to electrical** energy with **water as the only byproduct** without the need for grid power as required by conventional battery backup systems.
- **Potential:** To reduce energy use, pollutant emissions and dependence on fossil fuels and providing sustainable electricity.
- **Advantage:** Operational capability at low-temperatures with applications in decentralised power generation systems.

Key Points

- The ARCI has developed in-house PEMFC systems in the **power range of 1 to 20 kiloWatt (kW)** at its **Centre for Fuel Cell Technology, Chennai.**
- ARCI is planning to set up a PEMFC system at **Tamil Nadu State Emergency Operation Centre (TN SEOC)** as a disaster management measure.
    - Tamil Nadu is generally affected by five to six cyclones every year, of which two to three are severe.
- In general, **Emergency Operation Centres (EOC)** backed with a **10 kW system** along with **fuel cell stack,** air moving subsystems, power control devices and control and monitoring system is being planned as a natural disaster management measure.
    - EOCs have been set up in the states as per the **National disaster Management Guidelines.**
    - An EOC is the hub to coordinate various activities during emergencies. The basic functions of the EOC includes collection and dissemination of early warnings on disaster, ensuring administrative and community preparedness and coordinating with all emergency support functions.
    - Fuel cell systems in EOCs offer a potential benefit in terms of providing sustainable electricity.
- **India is** vulnerable to a large number of disasters.
    - Disaster risks in India are further compounded by increasing vulnerabilities related to changing demographics and socio-economic conditions, unplanned urbanization,

development within high-risk zones, environmental degradation, climate change, geological hazards, epidemics and pandemics.
    - There has been a **paradigm shift in the focus of Disaster Management**, from response-centric (rescue, relief, rehabilitation, and reconstruction) to laying greater emphasis on the other elements of disaster management cycle (prevention, mitigation, and preparedness) as a means to avert the impact of future emergencies.

Source: PIB