Green Hydrogen Fuel Cell Electric Vehicle

For Prelims: Green Hydrogen, renewable energy, fossil fuels, Paris Agreement, FAME II scheme, PLI scheme, EV30@30 campaign.

For Mains: challenges associated and ways to increase the electric vehicles penetration in the Indian market.

Why in News?

Recently, the Union Minister for Road Transport and Highways launched the **world's most advanced technology,** Green Hydrogen **Fuel Cell Electric Vehicle (FCEV) Toyota Mirai**.

What is the Significance of this Achievement?

- **Create Awareness about Green Hydrogen and FCEV Technology:**
  - This is a **first of its kind project in India** which aims to create a **Green Hydrogen based ecosystem in the country** by creating awareness about the unique utility of **Green Hydrogen** and **FCEV technology**.
    - An MoU was also signed by Toyota Kirloskar Motor Pvt Ltd and the **International Centre for Automotive Technology (ICAT)** for a pilot project to evaluate the vehicle's performance on Indian roads and climatic conditions.
      - ICAT is a **leading world class automotive testing, certification and R&D service provider** under the aegis of NATRiP (National Automotive Testing and R&d Infrastructure Project), Government of India.
- **Help India becoming Self-reliant' by 2047:**
  - It will **promote clean energy and environmental protection** by reducing dependence on **fossil fuels** and thereby make **India 'Energy Self-reliant' by 2047**.
- **Best Zero Emission Solutions:**
  - **Fuel Cell Electric Vehicle (FCEV),** powered by Hydrogen is one of the **best Zero Emission solutions**. It is completely **environment friendly with no tailpipe** emissions other than water.
    - **Tailpipe emissions:** Emission of something such as gas or radiation into the atmosphere.
    - **Green Hydrogen** can be generated from **renewable energy** and abundantly available **biomass**.
    - **Introduction and adoption of technology** to tap into the Green hydrogen's potential will play a key role in securing a **clean and affordable energy future for India**.

What is the State of Electric Vehicles in India?

- **About:**
  - The **push for Electric Vehicles (EVs)** is driven by the **global climate agenda** established under the **Paris Agreement** to reduce carbon emissions in order to limit

global warming.
        - The global electric mobility revolution is today defined by the **rapid growth in EVs uptake**.
        - Falling battery costs and rising performance efficiencies are also fueling the demand for EVs globally.
- **Need for Electric Vehicles:** India is in need of a transportation revolution.
    - The current trajectory of adding ever more cars running on expensive imported fuel and cluttering up already overcrowded cities suffering from infrastructure bottlenecks and **intense air pollution** is unfeasible.
    - The transition to electric mobility is a **promising global strategy for decarbonising the transport sector**.
    - EVs currently account for **less than 3% of all vehicles sold in India**. This is despite EV registrations crossing 50,000 units for the first time in December 2021, the highest ever monthly sale recorded.
    - Although **80% of the volume of EVs** sold is occupied by low-cost and low-speed three-wheelers, **overall EV sales have picked up pace** due to the rise of next-gen two-wheeler companies.
    - As per the **Accelerated e-Mobility Revolution for India's Transportation (e-AMRIT) portal in India,** only 7,96,000 EVs have been registered till December 2021, and just 1,800 public **EV charging stations** have been installed.
    - While there has been a **growth of 133% in the sales of EV from FY 2015 to FY 2020,** when compared to sales of conventional ICE vehicles, the numbers seem insignificant. In FY 2021-22, **only 1.32% of the total vehicles sold in the country were electric**.
- **Associated Challenges:**
    - **Consumer Related Issues:** Lack of appropriate charging stations is a cause of concern, which is quite less than the neighbouring counterparts who already had over 5 million charging stations.
        - Lack of charging stations makes it **unsuitable for the consumers in covering long range**.
    - **Policy Challenges:** EV production is a capital intensive sector requiring long term planning to break even and profit realisation, uncertainty in government policies related to EV production discourages investment in the industry.
    - **Lack of Technology and Skilled Labour:** India is **technologically deficient in the production of electronics** that form the backbone of the EV industry, such as batteries, **semiconductors**, controllers, etc.
    - **Unavailability of Materials for Domestic Production:** Battery is the single most important component of EVs.
        - India does **not have any known reserves of** lithium **and cobalt** which are required for battery production.
        - Dependence on other countries for the import of lithium-ion batteries **is an obstacle** in becoming completely self-reliant in the battery manufacturing sector.
- **Related Initiatives:**
    - The remodelled Faster Adoption and Manufacturing of Electric Vehicles (FAME II) **scheme**.
    - **Production-Linked Incentive (PLI) scheme for Advanced Chemistry Cell (ACC)** for the supplier side.
    - **PLI scheme for Auto and Automotive Components** for manufacturers of electric vehicles.
    - **"Charging Infrastructure for Electric Vehicles—Guidelines and Standards,"** describing the roles and responsibilities of various stakeholders at the Central and State level for expeditious deployment of public EV charging infrastructure across the country, has been issued recently.
    - India is among a handful of countries that support the global **EV30@30 campaign**, which aims for at least 30% new vehicle sales to be electric by 2030.
        - India's advocacy of five elements for climate change — "Panchamrit" — at the **COP26 in Glasgow** is a commitment to the same.
            - Various ideas were espoused by India at the Glasgow summit, such as, renewable energy catering to 50% of India's energy needs, reducing carbon emission by 1 billion tonnes by 2030 and achieving **net zero by 2070**.

Way Forward

- The Indian market **needs encouragement for indigenous technologies** that are suited for India from both strategic and economic standpoint.
- Breaking away the **old norms and establishing a new consumer behaviour is always a challenge**. Thus, a **lot of sensitisation and education is needed,** in order to bust several myths and promote EVs within the Indian market.
- **Subsidising manufacturing for an electric supplychain** will certainly improve EV development in India.

Source: PIB