Electric Vehicles (EVs)

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For Prelims: Faster Adoption and Manufacturing of Electric vehicles (FAME), FAME II, National Mission on Transformative Mobility and Battery Storage, National Electric Mobility Mission Plan (NEMMP).

For Mains: Electric Vehicles (EVs): Origin in India, Need, Challenges, Significance, Steps that can be taken.

Why in News?

- Recently, the **NITI Aayog** released the **draft battery swapping policy for** Electric Vehicles (EVs) in the country.
  - The policy aims to **improve the efficiency of the battery swapping ecosystem** for electric scooters and three-wheeler electric rickshaws, thereby driving EV adoption.
  - As per the draft policy, **all metropolitan cities with a population above 40 lakhs will be prioritized** for the development of a battery swapping network under the first phase.

What are Electric Vehicles (EVs)?

- An electric vehicle, uses one or more electric motors or traction motors for propulsion.
- An electric vehicle may be **powered through self-contained battery, solar panels or an electric generator to convert fuel to electricity.**

What is the Origin and Increasing Scope in India?

- 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 electric vehicle (EV) uptake.
  - About two in every hundred cars sold today are powered by electricity with EV **sales for the year 2020 reaching 2.1 million.**
    - The global EV fleet totaled 8.0 million in 2020 with **EVs accounting for 1% of the global vehicle stock** and 2.6% of global car sales.
  - Falling battery costs and rising performance efficiencies are also fueling the demand for EVs globally.

Why is there a Need for EVs in India?

- **Climate Change:**
  - The Problem of rapid **global temperature increase** has created the need for a reduction in the use of fossil fuels and the associated emissions.
  - India has committed to cutting its **GHG emissions** intensity by 33% to 35% below 2005 levels by 2030.

- **Rapid Urbanization:**
  - Economic development leads to rapid urbanization in emerging nations as rural populations move **non-agricultural sectors** in cities creating environmental problems.
  - According to a recent study by **World Health Organisation (WHO)**, **India is home to 14 out of 20 most polluted cities in the world.** EVs will help in tackling this problem by reducing local concentrations of pollutants in cities.
- **Energy Security:**
  - India imports oil to cover over 80% of its transport fuel.
  - EVs can **reduce dependence on imported** crude oil promoting **India's energy security.**
- **Innovation:**
  - It will encourage cutting edge technology in India through adoption, adaptation, and research and development.
  - EVs manufacturing capacity will **promote global scale and competitiveness.**
- **Employment:**
  - Promotion of EVs will facilitate employment growth in a sunrise sector.
- **Clean and Low Carbon Energy:**
  - The shift towards **renewable energy** sources has led to cost reduction from better electricity generating technologies. This has introduced the possibility of clean, low-carbon and inexpensive grids.
- **Cutting Edge Battery Technology:**
  - Advances in battery technology have led to higher energy densities, faster charging and reduced battery degradation from charging. Combined with the development of motors with higher ratings and reliability, these improvements in battery chemistry have reduced costs and improved the performance and efficiency of electric vehicles.

What are the Challenges Regarding the EV Industry in India?

- **Lack of a Stable Policy for EV Production:** EV production is capital intensive sector requiring long term planning to break even and profit realization, uncertainty in government policies related to EV production discourages investment in the industry.
- **Technological Challenges:** India is technologically deficient in the production of electronics that form the backbone of EV industry, such as batteries, semiconductors, controllers, etc.
- **Lack of Associated Infrastructural Support:** The lack of clarity over AC versus DC charging stations, grid stability and range anxiety (fear that battery will soon run out of power) are other factors that hinder the growth of EV industry.
- **Lack of Skilled Workers:** EVs have higher servicing costs and higher levels of skills is needed for servicing. India lacks dedicated training courses for such skill development.
- **Battery Manufacturing:** It is estimated that by 2020-30 India's cumulative demand for batteries would be approximately 900-1100 GWh.
  - However, there is concern over the **absence of a manufacturing base for batteries in India,** leading to sole reliance on imports to meet rising demand.
  - As per government data, **India imported more than $1 billion worth of lithium-ion cells in 2021,** even though there is negligible penetration of electric vehicles and battery storage in the power sector.
- **Consumer Related Issues:** In 2018, India was reported to have only 650 charging stations, which is quite less than the neighboring counterparts who already had over 5 million charging stations.
  - **Lack of charging stations** makes it unsuitable for the consumers in covering long range.
  - Moreover, it **takes up to 12 hours for a full charge of a vehicle at the owner's home** using a private light-duty slow charger.
  - Also, the **cost of a basic electric car is much higher** than the average price of a car running on conventional fuel.
- **Policy Challenges:** EV production is a **capital-intensive sector** requiring long term planning to break even and profit realization, **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.
  - EVs have higher servicing costs which require higher levels of skills. **India lacks**

dedicated training courses for such skill development.

- **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.

What are the Related Government Initiatives?

- The government has set a target for electric vehicles making up 30 % of new sales of cars and two-wheelers by 2030 from less than 1% today.
- **To build a sustainable EV ecosystem initiatives like** – National Electric Mobility Mission Plan (NEMMP) **and** Faster Adoption and Manufacturing of Electric vehicles in India (FAME India) have been launched by India.
- **FAME II:** Phase II of FAME seeks to give a push to EVs in public transport and seeks to encourage adoption of EVs by way of **market creation** and **demand aggregation**.
    - It envisages the **holistic growth of EV industry,** including providing for charging infrastructure, research and development of EV technologies and push towards greater indigenization.
    - **Establishment of Charging stations** are also proposed on major highways connecting major city clusters on both sides of the road at an interval of about 25 km each.
    - The scheme with a total outlay of Rs 10,000 Crores over the period of three years will be implemented with effect from 1st April 2019.
    - FAME 2 will offer incentives to manufacturers who invest in developing electric vehicles and their components, **including lithium-ion batteries** and electric motors.
    - The centre has asked states to frame their EV policy and provide additional fiscal and non-fiscal incentives to manufacturers and buyers.

- **Organization: Bureau of Indian Standards (BIS),** Department of Heavy Industry, Automotive Research Association of India are devising design and manufacturing standards of EVs, Electric Vehicle Supply Equipment (EVSEs) & charging infrastructure to smoothen the advent of in-house production of EVs.
- **National Mission on Transformative Mobility and Battery Storage:** To promote clean, connected, shared, sustainable and holistic mobility initiatives.
    - The Mission will drive mobility solutions that will bring in significant benefits to the industry, economy and country.
- **Phased Manufacturing Programme:** Valid for 5 years till 2024 to support the setting up of a few large-scale, export-competitive integrated batteries and cell-manufacturing Giga plants in India.
    - Creation of a PMP valid for 5 years till 2024 to **localise production** across the entire Electric Vehicles value chain.
- **Other Initiatives**: 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.**

- **NEMMP:** It was launched in 2013 with an aim to achieve national fuel security by promoting hybrid and electric vehicles in the country.
    - There is an ambitious **target to achieve 6-7 million sales of hybrid and electric vehicles** year on year from 2020 onwards.
- **FAME:** FAME India Scheme **(Faster Adoption and Manufacturing of Electric Vehicles in India)** was launched in 2015 with the objective to support hybrid/electric vehicles market development and manufacturing ecosystem. The scheme has 4 focus areas i.e., **Technology Development, Demand Creation, Pilot Projects and Charging Infrastructure.**

What can be the Way Forward?

- **Electric Vehicle as Way Forward:** EVs will **contribute to improving the overall energy security situation** as the country imports over 80% of its overall crude oil requirements, amounting to approximately $100 billion.
    - The push for EVs is also expected to play an **important role in the local EV manufacturing industry** for job creation.
    - Additionally, through several grid support services, EVs are expected to strengthen the grid and help **accommodate higher renewable energy penetration** while maintaining secure and stable grid operation.
- **Opportunities for Battery Manufacturing and Storage:** With recent technology disruptions, battery storage has **great opportunity in promoting sustainable development** in the country, considering government initiatives to promote e-mobility and **renewable power (450 GW energy capacity target by 2030).**
    - With rising levels of per capita income, there has been a **tremendous demand for consumer electronics** in the areas of mobile phones, UPS, laptops, power banks etc. that require advanced chemistry batteries.
    - This makes **manufacturing of advanced batteries one of the largest economic opportunities** of the 21st century.
- **EV Charging Infrastructure:** An EV charging infrastructure that draws power from local electricity supply can be **set up at private residences, public utilities** such as petrol and CNG pumps, and **in the parking facilities of commercial establishments** like malls, railway stations, and bus depots.
    - The Ministry of Power has prescribed **at least one charging station to be present in a grid of 3 km** and at every 25 kms on both sides of the highways.
    - The Ministry of Housing and Urban Affairs under the **Model Building Bye-laws, 2016 (MBBL)** has mandated **setting aside 20% of the parking space for EV charging facilities** in residential and commercial buildings.
        - Giving effect to the MBBL will also require the **state governments to introduce necessary amendments** to their respective building bye-laws.
- **Increasing R&D in EVs:** The Indian market needs **encouragement for indigenous technologies** that are suited for India from both strategic and economic standpoint.
    - Since investment in **local research and development is necessary to bring prices down**, it makes sense to leverage local universities and existing industrial hubs.
    - India should **work with countries like the UK** and synergise EV development.

UPSC Civil Services Examination, Previous Year's Question (PYQs)

Mains

Q. How is efficient and affordable urban mass transport key to the rapid economic development in India? **(2019)**