Vehicular Emissions in India

For Prelims: Vehicular Emissions and associated issues

For Mains: Vehicular Emissions and its impact, Steps taken in this direction

Why in News

The **annual car sales in India** are projected to increase from the **current 3.5 million to about 10.5 million** — a three times **increase — by 2030, which will increase exposure to vehicular exhaust emissions.**

- India is the **fifth-largest global car manufacturer** with one of the highest compound annual growth rates (10%) of vehicle registration as of 2019.

Key Points

- **Vehicular Emissions in India:**
  - Vehicular emission is a **major cause of [air pollution](#)** in urban areas.
  - Typically, vehicular emission **contributes 20-30% of Particulate Matter (PM) 2.5** at the breathing level of air quality.
    - PM2.5 refers to particles that have a diameter less than 2.5 micrometres (more than 100 times thinner than a human hair) and remain suspended for longer.
  - According to studies, vehicles annually contribute about 290 gigagrams (Gg) of PM2.5.
  - At the same time, around **8% of total Greenhouse Gas (GHG) Emissions** in India are from the transport sector, and in Delhi, it exceeds 30%.
- **Vehicular Emissions (World):**
  - The transport sector accounts for a quarter of total emissions, out of which road transport accounts for three-quarters of transport emissions (and 15% of total global CO2 emissions).
  - Passenger vehicles are the largest chunk of this, releasing about 45% of CO2.
  - If the conditions prevail, annual GHG emissions in 2050 will be 90% higher than those of 2020.
- **Issues in India's Steps towards Reducing Emissions:**
  - In India, **vehicle technology is changing rapidly** with changes in fuel quality, exhaust treatment systems of the Internal Combustion Engines (ICE), electrification of vehicle segments and steps towards hydrogen-powered vehicles.
  - But the current and future batches of ICE vehicles are likely to have a substantial share in on-road fleet till 2040, if not beyond.
  - This not only **requires substantial tightening of the emissions standards** but also **modification of technical parameters** for testing of vehicles to reduce the emissions in the real world.
- **Emissions Testing Methods:**
  - Most countries have formulated regulations for testing vehicles at the manufacturing end and when in use.
  - The vehicle certification procedures consist of testing engine performance and emission

compliance on the engine chassis dynamometer in the laboratory.

- A **drive cycle** (a series of continuous data points of speed and time that approximates driving pattern in terms of acceleration, deceleration and idling) is followed to achieve acceptable test results.
  - This is expected to simulate realistic driving intended for the vehicle type that has a bearing on emissions.

- **Testing Methods Formulated by India:**
  - The **Indian Drive Cycle (IDC)** was the first driving cycle formulated for vehicle testing and certification in India based on extensive road tests.
    - The IDC was a short cycle comprising six driving cycle modes of 108 seconds (reflecting a pattern of acceleration, deceleration and idling).
  - But the **IDC did not cover all the complex driving conditions** that are normally observed on Indian roads.
  - Subsequently, as an improvement over IDC, the **Modified Indian Drive Cycle (MIDC)** was adopted, which is equivalent to the **New European Driving Cycle (NEDC).**
    - MIDC accounts for wider speed profiles and is a better-suited cycle than the IDC.
    - MIDC is also **significantly close to the idling conditions** observed in real-world driving.
  - Despite the improvements, MIDC may **still represent vehicular emissions** during on-road conditions adequately because of variations in traffic density, land-use patterns, road infrastructure and poor traffic management.
  - It has therefore become necessary to adopt the **Worldwide Harmonized Light Vehicle Test Procedures (WLTP)**, which is a global harmonised standard for determining the levels of pollutants from ICE and hybrid cars.

- **Measure Emissions in Real World:**
  - For the **Real Driving Emissions (RDE) tests,** the European Commission, the United States and China suggest that the **driving cycles and laboratory tests do not reflect the likely emissions** during real driving conditions, which are more complex than laboratory driving cycles.
    - RDE is an independent test to overcome the limitations of WLTP and equivalent laboratory tests. A car is driven on public roads over a wide range of conditions.
  - **The International Centre for Automotive Technology** in India is currently developing RDE procedures that are likely to come into force in 2023.
    - The RDE cycle **must account for conditions prevailing in the country,** such as low and high altitudes, year-round temperatures, additional vehicle payload, up and downhill driving, urban and rural roads and highways.

Initiatives to Reduce Emissions in India

- **Shift from Bharat Stage-IV (BS-IV) to Bharat Stage-VI (BS-VI) emission norms:**
  - Bharat stage (BS) emission standards are laid down by the government to regulate the output of air pollutants from internal combustion engine and spark-ignition engine equipment, including motor vehicles.
  - The central government has mandated that vehicle makers must manufacture, sell and register only BS-VI (BS6) vehicles from 1st April 2020.
- **Roadmap for Ethanol Blending in India by 2025:**
  - The roadmap proposes a **gradual rollout of ethanol-blended fuel** to achieve E10 fuel supply by April 2022 and phased rollout of E20 from April 2023 to April 2025.
- **Faster Adoption and Manufacturing of Hybrid and Electric vehicle (FAME) Scheme:**
  - The FAME India Scheme is aimed at incentivising all vehicle segments.
  - Two phases of the scheme:
    - Phase I: started in 2015 and was completed on 31st March, 2019
    - Phase II: started from April, 2019, will be completed by 31st March, 2024.
- **National Hydrogen Energy Mission:**
  - It aims to cut down carbon emissions and increase the use of renewable sources of energy while aligning India's efforts with global best practices in technology, policy and regulation.

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