



Reduction in CO2 from Transport Sector by 2050

For Prelims: [World Resources Institute \(WRI\)](#), [carbon dioxide emissions](#), [net-zero emissions goal by 2070](#), [Electric Vehicle](#), [internal combustion engine \(ICE\) vehicles](#), [National Action Plan on Climate Change \(NAPCC\)](#), [National Hydrogen Mission](#), [PM-KUSUM](#), [ethanol blending](#), [FAME initiative](#), [International Solar Alliance \(ISA\)](#), [National Smart Grid Mission \(NSGM\)](#), [Perform, Achieve, and Trade \(PAT\) Scheme](#).

For Mains: Major challenges and measures to achieve Transport Decarbonisation.

Source: [IE](#)

Why in News?

A recent study by the [World Resources Institute \(WRI\)](#) India suggests that India's transport sector could reduce [carbon dioxide emissions](#) by up to **71% by 2050** through the implementation of high-ambition strategies.

- This significant reduction hinges on **three key measures** including, advancing electrification, enhancing fuel economy standards, and transitioning to cleaner modes of transport and mobility.

World Resources Institute (WRI)

- It is a **global research organisation founded in 1982**, with its headquarters located in Washington, USA.
- It spans more than 60 countries and focuses on six critical issues at the intersection of environment and development: **climate, energy, food, forests, water, and cities and transport**.
- WRI **works with government, business, and civil society** to drive ambitious action based on high-quality data and objective analysis.

What are the Key Findings of the Report?

- **Current Emissions and Need for Targets:**
 - In **2020**, India's transport sector was responsible for **14% of the total energy-related CO2 emissions**. There is an urgent need to establish an emission reduction roadmap and specific targets for this sector.
- **Impact on Net-Zero Goals:**
 - Achieving high emission reduction targets in the transport sector is crucial for India to meet its [net-zero emissions goal by 2070](#).
- **Cost-Effectiveness of Decarbonisation:**
 - **Transitioning to low-carbon transport** is identified as the **most cost-effective long-**

term policy, with potential savings of Rs. 12,118 per tonne of CO2 equivalent abated.

- **Electric Vehicle Mandates:**
 - Expanding **Electric Vehicle** sales is particularly effective, with an annual CO2 emissions abatement potential of 121 million tonnes of CO2 equivalent. Complementing this with decarbonisation of electricity generation could enhance results.
- **Additional Policy Benefits:**
 - Implementing a **carbon-free electricity standard with 75% renewable energy** could further achieve a 75% reduction in emissions by 2050.
- **Future Fossil Fuel Dependency:**
 - Without significant intervention, fossil fuel consumption in the transport sector is expected to quadruple by 2050, driven by increased passenger and freight travel demands.
- **Current Emission Sources:**
 - **Road transport** accounts for **90% of the sector's emissions**. Railways, aviation, and waterways account for a smaller fraction of energy consumption.

Note:

- **Decarbonisation of Transport:** Decarbonising transport refers to the **process of minimising or eliminating carbon emissions from the transportation sector**, with the objective of making transportation more environmentally sustainable and reducing its **carbon footprint**.

What are the Major Challenges in Achieving Transport Decarbonisation?

- **High Dependence on Fossil Fuels:**
 - The **global transportation sector is heavily reliant on fossil fuels** such as gasoline and diesel, making the transition to cleaner alternatives challenging.
 - Fossil fuel infrastructure is deeply embedded, and a complete overhaul requires significant time and resources.
- **BAU (business as usual) Scenario:**
 - Under a BAU scenario, India's **fossil fuel consumption (LPG, diesel, and petrol)** is **expected to increase fourfold by 2050**, primarily due to rising demand in passenger and freight transport.
 - **Passenger travel is anticipated to witness a threefold growth by 2050**, while freight transport is projected to increase sevenfold, further driving the surge in fossil fuel consumption.
- **Lack of Clean Energy Infrastructure:**
 - **Inadequate infrastructure** for EV charging, hydrogen refuelling, and **biofuel** availability poses a major barrier to the widespread adoption of clean energy in transport.
- **Energy Grid Constraints:**
 - The decarbonisation of transport is closely linked to the availability of renewable energy for the power grid.
 - In many regions, **electricity generation is still dominated by fossil fuels**, limiting the benefits of electrification unless the energy mix is also cleaned up.
- **Slow Policy Implementation and Regulatory Gaps:**
 - The pace of **policy formulation and enforcement for transport decarbonisation is often slow**.
 - Regulatory frameworks for emissions standards, fuel efficiency, and alternative fuels are either lacking or insufficiently stringent in many countries, impeding progress.
- **Consumer Behavior and Market Acceptance:**
 - **Public reluctance to adopt alternative transportation modes or vehicles** due to unfamiliarity, cost concerns, and perceived inconvenience hinders progress.
 - Behavioural inertia and attachment to traditional vehicles present a significant challenge to scaling up clean transport solutions.
- **Technological and Supply Chain Barriers:**
 - Achieving transport decarbonisation **requires advances in battery technology, hydrogen production, and sustainable biofuel production**.

- Supply chain disruptions for critical components, such as lithium and rare earth metals, can further complicate the transition.
- **Financing and Investment Constraints:**
 - Decarbonising transport at scale demands massive capital investment in infrastructure, technology, and research and development.
 - In developing nations, limited financial resources and competing development priorities restrict the capacity to invest in sustainable transport solutions.
- **International Coordination:**
 - International coordination is crucial for effectively decarbonising the transport sector, but differing regulations, standards, and levels of commitment across countries create barriers to collaboration.

What are the Initiatives India has Undertaken for Energy Transition?

- **National Solar Mission:**
 - Launched under the [National Action Plan on Climate Change \(NAPCC\)](#), the mission aims to achieve 100 GW of solar capacity by 2022, **later revised to 280 GW by 2030**.
 - It promotes the development of [solar energy](#) infrastructure, focusing on **large-scale solar power plants and rooftop solar installations**.
- **National Hydrogen Mission (NHM):**
 - [NHM](#) was launched in 2021, this initiative aims to **make India a global hub for the production and export of green hydrogen**.
 - The mission focuses on research, production, and deployment of hydrogen as a clean energy source, with plans to meet 19% of India's industrial hydrogen demand from green hydrogen by 2070.
- **National Biofuel Policy:**
 - The policy encourages the **blending of biofuels with conventional fuels** to reduce dependency on fossil fuels.
 - **India aims for a 20% ethanol blending target by 2025**, advancing the initial 2030 target to accelerate emission reduction in the transportation sector.
- **Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME):**
 - Under the [FAME initiative](#), the government incentivizes the adoption of EVs and hybrid vehicles.
 - **FAME-II**, launched in 2019, provides subsidies for electric two-wheelers, buses, and charging infrastructure, with the objective of boosting clean mobility.

Way Forward

- **Enhancing Renewable Energy Deployment:**
 - India can accelerate the deployment of solar and [wind energy projects](#) to meet and surpass the 2030 targets.
 - **Exploring offshore wind potential** can diversify the renewable energy mix and contribute significantly to the energy transition.
- **Strengthening Energy Storage Infrastructure:**
 - Developing **large-scale battery storage solutions** is essential for renewable energy integration and ensuring grid stability.
 - Identifying and utilising suitable sites for pumped hydro storage can provide additional energy storage capacity.
- **Advancing Grid Integration and Modernization:**
 - Deploying smart meters and grid automation technologies can enhance energy efficiency and facilitate the integration of renewable energy sources.
- **Fostering Innovation in Clean Technologies:**
 - Increasing investment in Research and Development (R&D) for emerging clean technologies, including [green hydrogen](#) and advanced energy storage, can position India as a global leader in the energy transition.
- **Strengthening Policy and Regulatory Frameworks:**
 - Ensuring **stability and clarity in energy policies** can attract investments and facilitate smooth implementation of energy projects.
 - Streamlining regulations to **remove bottlenecks and introducing incentives** for

renewable energy can accelerate the energy transition.

Drishti Mains Question:

What are the major challenges associated with the decarbonisation of transport, and suggest methods to achieve sustainable energy goals by 2070?

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Regarding “carbon credits”, which one of the following statements is not correct? (2011)

- (a) The carbon credit system was ratified in conjunction with the Kyoto Protocol.
- (b) Carbon credits are awarded to countries or groups that have reduced greenhouse gases below their emission quota.
- (c) The goal of the carbon credit system is to limit the increase of carbon dioxide emission.
- (d) Carbon credits are traded at a price fixed from time to time by the United Nations Environment Programme.

Ans: (d)

Mains

Q. Should the pursuit of carbon credits and clean development mechanisms set up under UNFCCC be maintained even though there has been a massive slide in the value of a carbon credit? Discuss with respect to India’s energy needs for economic growth. (2014)

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