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CAFE-III Norms Tighten India's Passenger-Vehicle Fuel-Efficiency Standards While Promoting EVs, Hybrids and Cleaner Fuels

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Recent Developments:

- The **Ministry of Power** has notified the third phase of the **Corporate Average Fuel Economy (CAFE-III)** norms for passenger vehicles, replacing the existing CAFE-II framework for the next five-year compliance cycle. The norms will apply from **1 April 2027 to 31 March 2032**.
- The framework requires manufacturers to progressively improve the **fleet-average fuel efficiency** of eligible passenger vehicles and introduces multiple compliance pathways through cleaner powertrains, alternative fuels, fuel-saving technologies and tradable compliance credits.
- CAFE-III tightens the annual fleet-average fuel-consumption benchmark from **3.996 litres per 100 km in 2027–28 to 3.3273 litres per 100 km in 2031–32**, representing an improvement of about **16.7%** over the five-year period.
- The final framework **does not retain a separate 3 g CO₂/km concession for small petrol cars** that appeared in an earlier draft; instead, the revised weight-based target formula provides differentiated targets according to manufacturers' fleet composition.

CAFE Norms: Concept and Evolution:

Meaning and Objective:

- **Corporate Average Fuel Economy** norms regulate the average fuel consumption and associated **CO₂ performance of a manufacturer's eligible passenger-vehicle fleet**, rather than imposing an identical fuel-efficiency requirement on every individual model.
- The framework operates under the **Energy Conservation Act, 2001**, and is administered through the energy-efficiency regulatory framework involving the **Bureau of Energy Efficiency (BEE)**.
- CAFE regulation encourages manufacturers to improve the efficiency of their **entire fleet**, allowing efficient vehicles to compensate for relatively less-efficient models within the prescribed corporate average.
- **CAFE-II** preceded the new cycle, while CAFE-III establishes progressively tighter requirements for **M1-category passenger vehicles** manufactured or imported for sale in India.

Why Fleet-Average Regulation Matters:

- Vehicle-specific emission standards regulate the performance of an individual vehicle, whereas CAFE norms evaluate the **weighted average performance of a manufacturer's fleet**.
- This approach provides manufacturers with technological flexibility because compliance can be achieved through **smaller efficient cars, electric vehicles, hybrids, alternative fuels or efficiency-enhancing technologies** rather than through a single mandated technology.

CAFE-III Fuel-Efficiency Targets:

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Weight-Based Target Formula:

- The annual fuel-consumption standard is determined through a weight-sensitive formula:
- **Annual Average Fuel Consumption Standard = $a \times (W \div b) + c$**
- **W:** Weighted average unladen mass of the manufacturer's eligible vehicles.
- **b:** Reference weight, fixed at **1,229 kg**.
- **a:** Annual weight-adjustment factor.
- **c:** Annual baseline fuel-consumption target.
- The reference weight has increased from **1,082 kg under the existing framework to 1,229 kg under CAFE-III**, reflecting the changing weight profile of India's passenger-vehicle fleet.
- The annual baseline declines progressively from **3.9960 litres per 100 km in 2027–28 to 3.3273 litres per 100 km in 2031–32**.
- The weight-sensitive structure means that the applicable target varies with a manufacturer's **weighted fleet mass**, rather than applying a single identical numerical target to every manufacturer.

Transition in Testing Methodology:

- CAFE-III also strengthens reporting through the **Modified Indian Driving Cycle (MIDC)** and introduces reporting under the **Worldwide Harmonised Light Vehicles Test Procedure (WLTP)**.
- From **1 April 2027**, manufacturers are required to declare model-level CO₂ performance under both testing procedures where applicable, while the conversion factor for translating CAFE targets between the two cycles is to be separately notified by the Ministry of Power in consultation with BEE.
- The transition towards WLTP is significant because internationally harmonised testing can provide a more comparable assessment of vehicle efficiency than older domestic testing procedures.

Small Cars and the Weight-Based Approach:

Change from the Earlier Draft:

- The treatment of small cars became a major point of industry debate because an earlier proposal had considered an **additional 3 g CO₂/km benefit** for specified lightweight petrol vehicles.
- The final framework **removes this separate concession**, avoiding a distinct regulatory category based solely on the 909 kg threshold.
- Instead, CAFE-III uses a **revised and flatter weight-adjustment curve**, allowing the fleet's average weight to influence the applicable target.
- Therefore, a manufacturer's compliance position depends on its **overall fleet composition and weighted average mass**, rather than simply whether an individual model qualifies as a small car.

Cleaner Technologies and Super-Credits:

Volume Derogation Factors:

- CAFE-III introduces **volume derogation factors**, commonly described as **super-credits**, to provide additional compliance recognition to selected cleaner vehicle technologies.
- Under the final framework, the key factors include:
- **Battery Electric Vehicles (BEVs) and Range-Extended Electric Vehicles (REEVs): 3.0**
- **Plug-in Hybrid Electric Vehicles (PHEVs) and flex-fuel strong hybrids: 2.5**
- **Strong Hybrid Electric Vehicles: 1.6**
- **Flex-fuel ethanol vehicles: 1.1.**
- A super-credit does **not** constitute a direct consumer subsidy; it is a regulatory accounting mechanism that increases the effective weight of qualifying vehicles in the fleet-compliance calculation.
- For example, a qualifying **BEV with a factor of 3.0 is effectively counted as three vehicles** for the relevant fleet calculation.

Carbon Neutrality Factors:

- CAFE-III also recognises the role of **alternative and biofuel-based pathways** through Carbon Neutrality Factors.
- **E20 or higher petrol blends** receive an **8% factor**, while flex-fuel ethanol vehicles and flex-fuel strong hybrids receive a **22.3% factor**; CNG vehicles receive a **5% factor or the notified CBG blending percentage, whichever is higher**.
- These provisions demonstrate that CAFE-III is not limited to battery-electric mobility and instead supports a **multi-technology decarbonisation pathway**.

Fuel-Saving Technology Incentives:

Recognised Efficiency Technologies:

- Manufacturers can claim specified efficiency improvements from technologies such as **start-stop systems, tyre-pressure monitoring, regenerative braking, efficient transmissions, efficient alternators, motor-generators, electric water pumps, electronically controlled radiator fans, LED lighting, advanced glazing, efficient air-conditioning and solar-reflective technologies**.
- Each eligible technology can provide a claimed reduction of **1 g CO₂/km**, subject to an overall maximum benefit of **9 g CO₂/km**.
- The first compliance block permits specified claims through **self-declaration**, while the subsequent block requires stronger validation through testing.
- This mechanism encourages manufacturers to improve the efficiency of **internal-combustion and hybrid vehicles**, rather than making electrification the only route to compliance.

Flexible Compliance Mechanism:

Credits, Debits and Trading:

- Manufacturers performing **better than their prescribed target earn credits**, while those exceeding the permitted fuel-consumption level accumulate debits.
- Credits and debits are recorded through a **compliance passbook**, allowing manufacturers to manage compliance across the prescribed blocks.
- Credits can be **carried forward within a compliance block and traded between manufacturers**, creating a market-oriented compliance mechanism.
- A manufacturer with a deficit can also purchase credits from **BEE** at a notified buyout price.

Escalating Buyout Price:

- The BEE buyout price increases progressively:
- **2027–28:** ₹2,500 per g CO₂/km
- **2028–29:** ₹3,000 per g CO₂/km
- **2029–30:** ₹3,500 per g CO₂/km
- **2030–31:** ₹4,000 per g CO₂/km
- **2031–32:** ₹4,500 per g CO₂/km.
- The rising price increases the economic incentive for manufacturers to improve actual fleet efficiency rather than relying permanently on compliance purchases.

3+2 Compliance Structure:

- CAFE-III divides the five-year period into **two compliance blocks**.
- The first block covers **2027–28 to 2029–30**, lasting three years.
- The second block covers **2030–31 to 2031–32**, lasting two years.

- Credits and debits can be carried within the relevant block, while unsettled credits lapse at the end of the block.
- This structure gives manufacturers flexibility to manage temporary shortfalls while maintaining a cumulative compliance requirement.

Institutional and Regulatory Architecture:

Role of Key Institutions:

- The **Ministry of Power** is responsible for the CAFE framework and compliance enforcement in consultation with BEE.
- **BEE** performs the central energy-efficiency role and administers relevant compliance mechanisms.
- The **Ministry of Road Transport and Highways** is responsible for testing, calculation methodologies, reporting, conformity of production and relevant vehicle-related provisions under the Central Motor Vehicles Rules.
- The framework therefore requires coordination between **energy policy, automobile regulation, testing agencies and environmental objectives**.

Small-Volume Manufacturers:

- Manufacturers producing or importing **fewer than 1,000 eligible vehicles during a reporting period** are exempt from meeting the specific CAFE target.
- Such manufacturers must nevertheless report their **actual fleet-average fuel consumption**, maintaining regulatory visibility despite the exemption.

Significance for India:

Environmental and Climate Benefits:

- CAFE-III can reduce **petroleum consumption and road-transport CO₂ emissions** by requiring continuous improvements in fleet-average efficiency.
- It complements India's broader climate strategy by promoting **electrification, hybridisation, ethanol blending and vehicle-efficiency improvements**.
- Unlike a single-technology mandate, the framework allows manufacturers to select combinations of technologies according to **technical feasibility, market demand and investment capacity**.

Energy Security:

- Transport remains heavily dependent on petroleum, making vehicle efficiency an important component of **energy security**.
- Lower fuel consumption can reduce the economy's exposure to **international crude-oil price volatility and import dependence**.
- Greater adoption of EVs, hybrids, ethanol and other cleaner pathways can diversify the transport-energy mix.

Industrial and Technological Transformation:

- The norms can influence manufacturers' **product portfolios, research and development priorities, powertrain strategies and investment decisions**.
- Super-credits and technology derogations create economic incentives for manufacturers to deploy **low-carbon powertrains and efficiency technologies**.
- The transition towards **WLTP-based reporting** can also strengthen standardisation and comparability in vehicle testing.

Key Challenges:

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Affordability and Industry Costs:

- Compliance requires investment in **new powertrains, batteries, hybrid systems, fuel-saving technologies, testing and certification.**
- These costs may ultimately influence vehicle prices, particularly in the **price-sensitive mass-market segment.**
- Manufacturers therefore need to balance regulatory compliance with **consumer affordability and market competitiveness.**

Accounting and Enforcement:

- Super-credits, technology derogations and Carbon Neutrality Factors increase regulatory flexibility but also make compliance calculations more complex.
- Effective implementation requires **accurate testing, transparent reporting, verification and enforcement.**
- The transition between MIDC and WLTP also requires a clear and scientifically robust **conversion methodology.**

Technology-Neutrality versus Policy Priorities:

- A multi-technology framework can reduce the risk of prematurely locking the industry into a single technology.
- However, different credits and derogations influence the relative attractiveness of **BEVs, hybrids, ethanol and other pathways**, making the design of incentives important for achieving actual emissions reductions.

Way Forward:

Strengthen Regulatory Implementation:

- Ensure **transparent testing, independent verification and consistent enforcement** of fleet-average performance.
- Finalise and periodically review the **MIDC–WLTP conversion methodology** using robust empirical data.
- Monitor whether credits and derogations produce genuine additional efficiency improvements rather than merely changing compliance accounting.

Integrate CAFE with Broader Mobility Policy:

- CAFE-III should operate alongside **electric-mobility policies, charging infrastructure, public transport expansion, ethanol blending, battery recycling and urban transport planning.**
- Policy coherence is necessary because vehicle efficiency alone cannot address congestion, vehicle kilometres travelled and urban air pollution.
- Greater emphasis should be placed on **public and shared mobility**, alongside cleaner private vehicles.

Value Addition for UPSC:

Prelims Facts:

- **CAFE:** Corporate Average Fuel Economy.
- **CAFE-III period:** 2027–28 to 2031–32.
- **Effective from:** 1 April 2027.
- **Reference weight:** 1,229 kg.
- **Fuel-consumption benchmark:** 3.996 litres/100 km in 2027–28, declining to 3.3273 litres/100 km in 2031–32.
- **BEV/REEV super-credit:** 3.0.
- **PHEV/flex-fuel strong hybrid:** 2.5.

- **Strong hybrid: 1.6.**
- **Flex-fuel ethanol vehicle: 1.1.**
- **Maximum technology-based benefit: 9 g CO₂/km.**
- **Small-volume threshold: Fewer than 1,000 eligible vehicles** in a reporting period.

Mains Linkages:

- **GS-III:** Energy security, climate change, sustainable mobility, automobile-sector transition, energy efficiency and pollution control.
- **Environment:** Transport-sector decarbonisation, alternative fuels, electrification and emissions reduction.
- **Economy:** Industrial competitiveness, technology investment, compliance costs and consumer affordability.
- **Science and Technology:** EVs, hybrid powertrains, regenerative braking, vehicle-efficiency technologies and WLTP.
- **Essay: Energy efficiency as a bridge between economic growth, energy security and climate action.**

Core Takeaway:

- **CAFE-III shifts India's passenger-vehicle regulation from model-level efficiency towards progressively stricter manufacturer-level fleet performance**, while using **super-credits, alternative-fuel recognition, technology incentives and tradable credits** to provide flexibility in achieving the transition. Its effectiveness will ultimately depend on the integrity of compliance accounting, technological innovation, enforcement and the affordability of cleaner mobility.