

CAFE (Corporate Average Fuel Efficiency/ Economy) Norms in India

By Anjali Gandhi¹

Introduction

CAFE standards represent a crucial regulatory tool employed by governments globally.² They compel automotive manufacturers not just to produce some efficient vehicles but to ensure that the average fuel efficiency across their entire fleet of newly manufactured and sold vehicles meets a progressively stringent minimum threshold each year.³⁴ This average is not a simple mean; it is a sales-weighted average, meaning high-volume models have a greater impact on a manufacturer's overall CAFE score than niche vehicles.⁵ The core principle is straightforward: regulate the fuel economy or fuel consumption.⁶⁷

The genesis of this regulatory approach lies in the United States, where CAFE standards were enacted in 1975 via the Energy Policy and Conservation Act.⁸ This was a direct strategic response to the severe economic and logistical challenges posed by the 1973 OPEC oil embargo⁹, which starkly highlighted the vulnerability of nations heavily reliant on imported fossil fuels and highlighted the need for mandated energy conservation in the transport sector. Since

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² The Alliance for Citizen Engagement (2023):

<https://ace-usa.org/blog/research/research-environmental-policy/introduction-to-corporate-average-fuel-cafe-standards/>.

³ U.S. Department of Transportation (2014):

<https://www.transportation.gov/mission/sustainability/corporate-average-fuel-economy-cafe-standards>; Urja Dakshata Information Tool (UDIT): <https://udit.beeindia.gov.in/cafe/>.

⁴ Mackinac Center for Public Policy (2022):

https://www.jstor.org/stable/pdf/resrep50769.4.pdf?refreqid=fastly-default%3A08fdca3fb8caf1062a9d19cf029024cd&ab_segments=&initiator=recommender&acceptTC=1.

⁵ Team BHP (2023): <https://www.team-bhp.com/news/explained-corporate-average-fuel-efficiencycafe-how-its-calculated>.

⁶ Pew Center on Global Climate Change (2004):

<https://www.c2es.org/wp-content/uploads/2004/12/comparison-passenger-vehicle-fuel-economy-ghg-emission-standards-around-world.pdf>.

⁷ Fuel efficiency refers to how effectively a vehicle uses fuel, typically measured by its mileage (km/l) or the amount of CO₂ emitted per litre of fuel consumed. It is commonly used to compare vehicle performance based on the distance travelled per unit of fuel.

Different countries adopt varying standards to regulate fuel efficiency—some express it as litres of fuel consumed per 100 kilometres, while others use kilometres travelled per gallon of fuel, The Energy and Resources Institute (2023):

<https://www.teriin.org/sites/default/files/2023-08/1692266908Policy%20Brief%20Fuel%20%20Efficiency%20Improvement%20Emission%20Standards.pdf>.

⁸ International Research Journal of Modernization in Engineering Technology and Science (2024):

https://www.irjmets.com/uploadedfiles/paper/issue_10_october_2024/62700/final/fin_irjmets1729615663.pdf.

⁹ *Ibid.*

then, similar fuel economy or CO₂ emission standards have become commonplace in major automotive markets worldwide, although methodologies and targets vary.¹⁰

Framework in Indian Context

Bringing this concept to the Indian context, the CAFE standards are based on the Modified Indian Driving Cycle (MIDC), which is an adaptation of the EU's New European Driving Cycle (NEDC), customised to better reflect typical Indian driving conditions.¹¹ In 2015, the Government of India established corporate average fuel consumption standards for passenger cars, taking effect as two-phase targets for FY 2017–2018 and for FY 2022–2023 onward. In August 2017, fuel efficiency norms were established for heavy-duty vehicles (HDV), and in 2019, these Norms were established for light commercial vehicles.¹² These were established under the mandate of the Energy Conservation Act, 2001, with the Bureau of Energy Efficiency (BEE) under the Ministry of Power playing a key role in formulating the standards.¹³ The introduction of CAFE in India serves critical national objectives: firstly, to significantly reduce the country's substantial oil import bill by curbing overall fuel consumption in the rapidly growing transport sector, and secondly, to mitigate climate change by lowering CO₂, a major greenhouse gas. Lower fuel consumption also indirectly contributes to cleaner air.¹⁴ The CAFE mechanism directly links a manufacturer's sales-weighted corporate average fuel consumption (measured in L/100km or its CO₂ equivalent in g/km under standardised lab testing conditions like the MIDC) to their corporate average vehicle kerb weight, setting progressively tighter emission limits in distinct phases.¹⁵

Applicability to Vehicles

The CAFE standards specifically apply to manufacturers of 'M1' category passenger vehicles and having a Gross Vehicle Weight (GVW) below 3,500 kgs.¹⁶ This covers the vast majority of personal vehicles sold, running on petrol, diesel, CNG, and LPG, and importantly, it also integrates hybrid and electric vehicles into the compliance framework, often providing credits or multipliers for zero/low-emission vehicles.¹⁷

¹⁰ Pew Center on Global Climate Change (2004): <https://www.c2es.org/wp-content/uploads/2004/12/comparison-passenger-vehicle-fuel-economy-ghg-emission-standards-around-world.pdf>.

¹¹ IEA (2024): <https://www.iea.org/policies/8215-fuel-economy-standards-for-light-duty-vehicles>.

¹² Bureau of Energy Efficiency (2021): https://beeindia.gov.in/sites/default/files/publications/files/BEE_Final%20Report_Website%20version.pdf.

¹³ Bureau of Energy Efficiency (2024): <https://beeindia.gov.in/sites/default/files/2024-06/Inviting%20Comments%20on%20Proposal%20of%20Future%20CAFE%20-%20III%20and%20IV.pdf>.

¹⁴ Urja Dakshata Information Tool (UDIT): <https://udit.beeindia.gov.in/cafe/>.

¹⁵ Nangia & Co.: <https://nangia.com/storage/2024/06/Analysis-of-the-Proposed-CAFE-III-and-CAFE-IV-Norms.pdf>.

¹⁶ The Energy and Resources Institute (2023): <https://www.teriin.org/sites/default/files/2023-08/1692266908Policy%20Brief%20Fuel%20%20Efficiency%20Improvement%20Emission%20Standards.pdf>.

¹⁷ *Ibid.*

For other vehicle categories, distinct testing methods and regulatory frameworks exist, but comprehensive CAFE-style norms are still lacking. For HDVs with a GVW above 12 tonnes, fuel consumption standards have been mandated since April 2023, using the CAFE cycle, which measures efficiency at steady speeds under full load. However, light and medium-duty commercial vehicles (M2, M3, N2 categories) currently lack finalised fuel efficiency norms, although testing is done using the MIDC.¹⁸

As per one of the reports published by the Shakti Foundation, India initially developed fuel efficiency standards for heavy-duty vehicles in 2016–17, but their implementation was delayed. After the rollout of BS-VI emission standards in 2020, these fuel efficiency norms were revised and finally notified for enforcement in April 2023. The postponement was largely due to resistance from the industry, which opposed the design of the standards. Unlike the CAFE norms applied to passenger cars, which consider the average performance across all models sold by a manufacturer, the heavy-duty vehicle norms were designed as per-vehicle standards, requiring each vehicle model to undergo certification testing. This approach posed challenges because chassis and engines in heavy-duty vehicles are used in a wide range of applications, often with highly varied body designs and configurations. These vehicles are frequently not tested as fully assembled units, making it difficult to apply a uniform testing protocol. As a result, the per-vehicle testing model created complications that contributed to the industry's reluctance and the subsequent delay in implementation.¹⁹ As per one report of the Energy and Resources Institute, the evaluation of fuel economy using the constant speed fuel consumption (CSFC) driving cycle test has been mandated for HDVs from April 2023.²⁰

Two-wheelers and three-wheelers, which dominate India's vehicle market, do not have mandatory fuel efficiency regulations despite being inherently fuel efficient. This fragmented approach indicates a regulatory gap and the need for a more unified and inclusive framework covering all vehicle segments.²¹

Credits under the Framework

To encourage the production of cleaner and more efficient vehicles, the CAFE framework includes a system of super credits. Original Equipment Manufacturers (OEMs) earn these credits for producing battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs). These vehicles are given higher weightage (volume derogation factors)—3 for BEVs, 2.5 for PHEVs, and 2 for HEVs—when calculating the corporate average fuel consumption. Moreover, certain technologies like regenerative braking,

¹⁸ *Ibid.*

¹⁹ Shakti Foundation:

<https://shaktifoundation.in/wp-content/uploads/2021/09/INDIAS-FUEL-ECONOMY-BENCHMARKS.pdf#:~:text=So%20far%2C%20India%20has%20implemented%20fuel%20efficiency,duty%20vehicles%2C%20two%2Dwheelers%20and%20other%20commercial%20vehicles.>

²⁰ The Energy and Resources Institute (2023):

<https://www.teriin.org/sites/default/files/2023-08/1692266908Policy%20Brief%20Fuel%20%20Efficiency%20Improvement%20Emission%20Standards.pdf>.

²¹ *Ibid.*

tyre pressure indicators, and start-stop systems also help manufacturers earn extra credits by adjusting the CO₂ emission values during assessment.²²

Different Phases of CAFE in India²³²⁴

Phases of CAFE		
Phase	Implementation Period	Target(s)
CAFE I	Financial Year 2017-18 to 2021-22 (Effectively April 1, 2017, to March 31, 2022)	Required manufacturers' corporate average CO ₂ emissions to be less than 130 g/km. This was based on an average kerb weight assumption of 1037 kg for the fleet.
CAFE II	Started from Financial Year 2022-23 onwards (Effective April 1, 2022).	The target was tightened, requiring average corporate CO ₂ emissions to be less than 113 g/km. This is based on a revised average kerb weight assumption of 1082 kg.
CAFE III (proposed)- Currently proposed and under discussion with stakeholders	Proposed Implementation Period: Financial Year 2027-28 to 2031-32 (Block period: 2027-2032).	It is proposed to switch the testing cycle from the current MIDC to the Worldwide Harmonized Light Vehicles Test Procedure (WLTP) from March 31, 2027. The proposed target of 91.7 g/km is based on this WLTP cycle.
CAFE IV (proposed)- Also part of the current proposal alongside CAFE-III	Financial Year 2032-33 to 2036-37 (Block period: 2032-2037).	Aims for average corporate CO ₂ emissions of 70 g/km (based on WLTP cycle).

Comparison: CAFE Norms vs. BS (Bharat Stage) Emission Standards

While both CAFE and BS norms aim to make vehicles cleaner, they focus on different aspects of vehicle emissions:²⁵²⁶

²² International Research Journal of Modernization in Engineering Technology and Science (2024):

https://www.irjmets.com/uploadedfiles/paper/issue_10_october_2024/62700/final/fin_irjmets1729615663.pdf.

²³ Bureau of Energy Efficiency: <https://beeindia.gov.in/en/programmesenergy-efficiency-in-transport-sector/fuel-efficiency>.

²⁴ Bureau of Energy Efficiency Proposal on CAFE:

https://www.acma.in/uploads/otherdocmanager/Draft_CAFE_III_&_IV_Norms_9Jun24.pdf.

²⁵ TVS Motor (2021): <https://www.tvsmotor.com/media/blog/bs-vi-cafe-and-bs-vi-norms>; <https://jyote.com/Bsvinorms>.

²⁶ International Research Journal of Modernization in Engineering Technology and Science (2024):

https://www.irjmets.com/uploadedfiles/paper/issue_10_october_2024/62700/final/fin_irjmets1729615663.pdf.

Comparative Analysis		
Feature(s)	CAFE Norms	BS (Bharat Stage) Emission Standards
Primary Focus	Fuel Efficiency / CO ₂ Emissions	Tailpipe pollutants (NO _x , SO _x , HC, PM, CO)
Objective	Reduce fuel consumption, combat climate change	Improve air quality by reducing harmful pollutants
Scope	Looks at the average performance across a manufacturer's entire fleet sold	Set limits that each vehicle model must meet when tested
Metric	Corporate average CO ₂ emissions (g/km)	Maximum permissible pollutant levels per vehicle
Governing Body	Ministry of Power (under Energy Conservation Act)	Ministry of Environment, Forest & Climate Change via CPCB
Basis	Fleet average efficiency	Based on European (Euro) emission standards
Driving Force	Pushes for overall efficiency improvements and adoption of technologies like lightweighting, efficient engines, and electrification (hybrids/EVs) to lower average CO ₂	Drive the adoption of advanced exhaust after-treatment systems (like catalytic converters, Diesel Particulate Filter, Selective Catalytic Reduction) and cleaner engine combustion technologies to reduce specific toxic emissions
Latest Standard	CAFE Phase 2 (from April 2022)	BS-VI Stage 2 (from April 2023)

Despite their different focuses, CAFE and BS norms are complementary. Technologies developed to meet the stricter BS-VI pollutant limits (especially BS-VI Stage 2, which emphasises real-driving emissions and On-board diagnostics (OBD) monitoring) often involve engine efficiency improvements that also help in meeting CAFE targets. On the other hand, improving fuel efficiency to meet CAFE norms reduces the total volume of fuel burned, potentially leading to lower overall pollutant emissions. Both sets of regulations work in tandem to drive the Indian automotive industry towards producing vehicles that are both less polluting and more fuel-efficient.