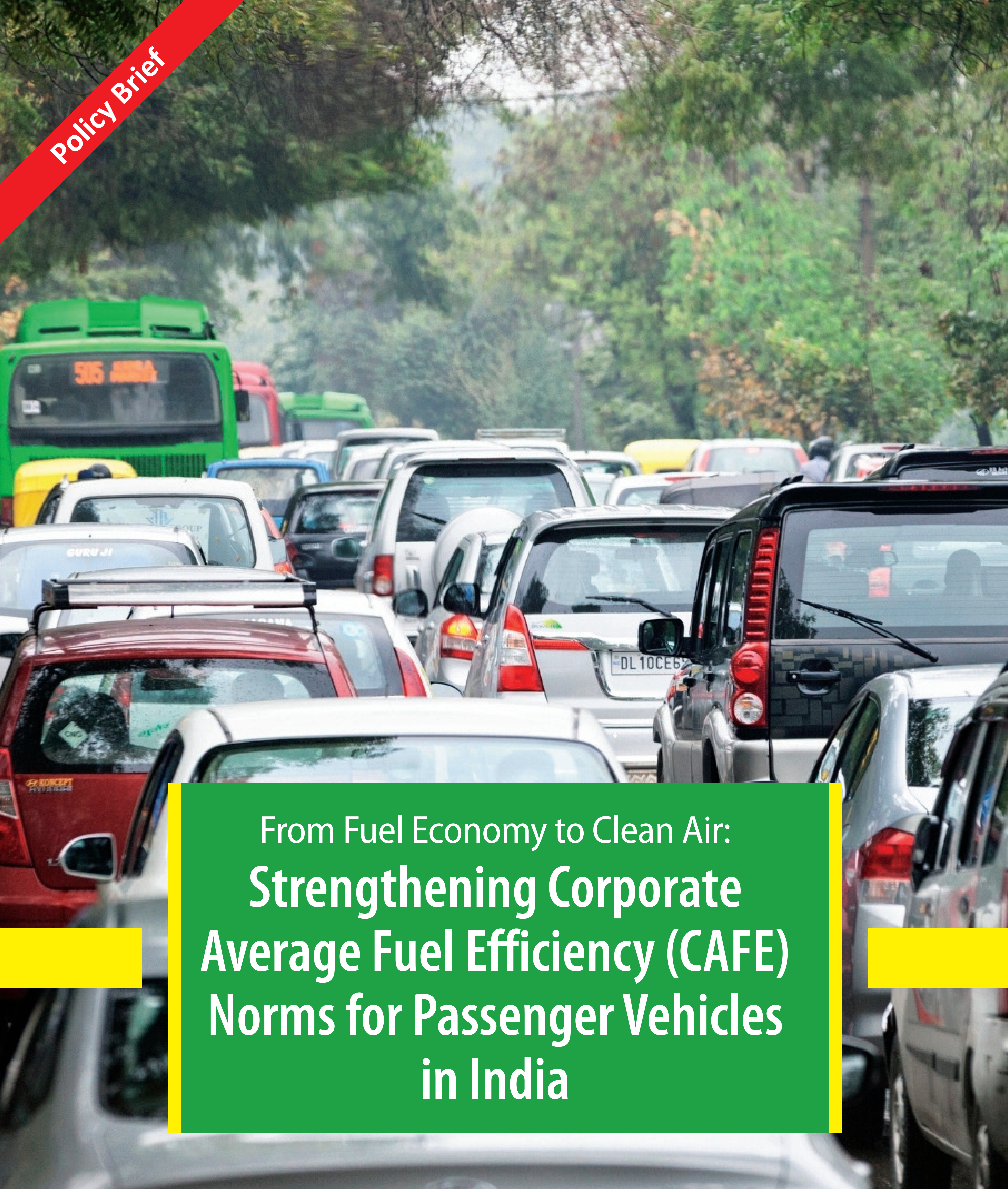
Policy Brief



From Fuel Economy to Clean Air:

Strengthening Corporate Average Fuel Efficiency (CAFE) Norms for Passenger Vehicles in India

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List of Abbreviations

AQI	Air Quality Index
BAU	Business as Usual
BEE	Bureau of Energy Efficiency
CAFE	Corporate Average Fuel Efficiency
CMVR	Central Motor Vehicle Rules
CNF	Carbon Neutrality Factor
CNG	Compressed Natural Gas
CO_2	Carbon dioxide
EPC	Environment Protection Charge
EU	European Union
GHG	Greenhouse Gas
$GtCO_2$	Giga tonne of carbon dioxide
GVW	Gross Vehicular Weight
ICE	Internal Combustion Engine
MIDC	Modified Indian Driving Cycle
Mtoe	Million Tonnes of Oil Equivalent
NFHS	National Family Health Survey
OEM	Original Equipment Manufacturer
PV	Passenger Vehicle
SIAM	Society of Indian Automobile Manufacturers
WLTP	Worldwide Harmonized Light Vehicles Test Procedures
ZEV	Zero Emission Vehicle

1. Introduction

As countries struggle to minimise the gap between current scenarios and climate commitments, the need for decarbonising transport sector becomes crucial. Globally, the transport sector has emerged as the second-largest contributor to emissions, accounting for about 8.4 Giga tonne of CO_2 ($GtCO_2$) in 2024.[1]

As per TERI analysis of the updated and latest Nationally Determined Contributions (NDC) documents submitted by about 160 countries and regions, high-income and upper-middle-income countries have managed to reduce their emission intensity of the respective transport sector with a higher uptake of zero-emission vehicle targets due to their stronger infrastructure, regulatory frameworks, and investment capabilities. In contrast, lower-middle- and low-income countries have reported increasing emission intensity from the transport sector with a clear preference for cost-effective strategies such as fuel efficiency improvements and other locally defined mitigation measures. It is to be noted that the high-income countries are ahead of the low/middle-income countries with regard to efficiency improvement regulations and targets.

No doubt, one of the most effective levers for emissions reduction is fuel efficiency improvement, particularly in road transport where zero emission vehicle (ZEV) technology already exist and policy signals can rapidly influence markets. The transport sector is India's third-largest emitter, accounting for approximately 12% of energy-related CO_2 emissions, with road transport contributing over 90% of total transport emissions.[2]

In terms of energy consumption, transport sector consumed nearly 72 million tonne of oil equivalent (Mtoe) in 2023-24 (20% increase from 60 Mtoe in 2019-20).[3] About 80% of diesel and 99% of petrol consumption in India is accounted by the transport sector. Further, the total volume of diesel and petrol consumption in the country has increased by about 2.5 and 5 times, respectively, between 2003-04 and 2024-25.

Passenger vehicles (PV) are growing quickly in India. Even though India's car ownership (cars per 1,000 population) remain low (~35) compared to Japan (496), China (195), USA (588), and Germany (582), the absolute numbers are rising fast due to increasing population and rising income.[4] As per the National Family Health Survey (NFHS)-5, approximately 7.5% of Indian household now own a car (up from 6% in 2018).[5] Therefore, vehicle efficiency improvement is central to mitigate emissions, import dependence, and public health outcomes.

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[1] *UN Emissions Gap Report 2025*

[2] *Bureau of Energy Efficiency 2024*

[3] *Ibid.*

[4] *IRF World Road Statistics 2025*

[5] *Ministry of Health and Family Welfare (2022)*

India introduced Corporate Average Fuel Efficiency (CAFE) norms in 2017, aimed at steering original equipment manufacturers (OEMs) towards producing more fuel-efficient and lower-emitting PVs. These norms are applicable to petrol, diesel, liquified petroleum gas (LPG), compressed natural gas (CNG), hybrid and electric PVs with gross vehicular weight (GVW) <3,500 kg.

While CAFE norms were primarily designed to reduce fuel consumption from PVs, their relevance to curb CO_2 emissions is becoming increasingly evident. More efficient vehicles consume less fuel per km, leading to lower emissions, particularly when scaled across crores of vehicles.

1.1. India's Air Quality Challenge and the Role of CAFE Norms

Tailpipe emission mitigation measures are need of the hour, particularly as major cities in North India routinely experience AQI levels of 400-500, with severe implications for public health. The vehicular emissions are often blamed as one of the major contributors to air pollution; they constitute a significant and growing share of urban pollution. Parliamentary Standing Committee on Air Quality have highlighted that incremental or weak transport-sector interventions might be insufficient to address persistent pollution levels, particularly in non-attainment cities.[6] The Supreme Court mandated to levy 1% Environment Protection Charge (EPC) on diesel vehicles registered in Delhi-NCR region, reflecting a clear link between pollution burden associated with ICE vehicles.[7]

According to TERI's projection, demand for four-wheelers is expected to reach 24.4 crore vehicles by 2047-48, from 5.5 crore in 2024-25, accounting for 138.1 Mtoe under BAU scenario (with 2019-20 as the base year).[8] This anticipated growth underscores the critical role of fuel efficiency standards as a core policy instrument for accelerating the adoption of ZEV technology, and limiting the future emissions footprint of PV sector.

Strengthening CAFE norms (proposed from 2027 onwards) offers a pathway to align climate goals with clean air objectives including net-zero by 2070. Robust CAFE norms will catalyse India to achieve long-term benefits such as lower CO_2 emissions, reduced fuel consumption, improved urban air quality, and better public health outcomes, while supporting a credible transition towards ZEV. This policy brief provides analytical inputs to the proposed CAFE norms and examines how India's CAFE framework can be recalibrated to strengthen its effectiveness.

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[6] *Details available at: https://prsindia.org/files/policy/policy_committee_reports/Environment_Air_Pollution.pdf*

[7] *Supreme Court (2016): Vardhaman Kaushik v/s Union of India*

[8] *Details available at: https://teriin.org/sites/default/files/202411/Roadmap%20for%20India%20Energy%20Transition_FINAL%20REPORT.pdf*

2. Indian Passenger Vehicle Market

As discussed in the previous section, India's transport sector accounts for 12% of the total energy-related CO_2e emissions, with PVs contributing an estimated 2-3% of national emissions.[9] In absolute terms, transport emissions stood at nearly 370 $MtCO_2e$ in 2023, of which PVs accounted for 62.5 $MtCO_2e$. Given the scale and continued growth of PV market in India, fuel efficiency regulations such as CAFE regulations play a critical role in aligning India's transport sector growth with climate objectives.

The Central Motor Vehicles Rules (CMVR), 1989 defines M1 category as motor vehicles used for carriage of passengers, comprising not more than eight seats in addition to the driver's seat.[10] This category includes passenger cars, utility vehicles and vans (together constitute the PV segment covered under CAFE norms).

This section reviews annual domestic sales, production, and export trends in the PV sector and assesses their implications for fuel efficiency standards.

Box Item 1: Classification of Vehicles (as per MoRTH)

- Pure Electric Vehicle means vehicle powered by an electric powertrain only
- Hybrid Electric Vehicle (HEV) means a vehicle, that, for the purpose of mechanical propulsion, draws energy from both on-vehicle sources of stored energy/power (a consumable fuel, and a battery, capacitor, flywheel/generator or other electrical energy/power storage device
- Strong Hybrid Electric Vehicle (Strong HEV) means a hybrid electric vehicle which has a "stop-start" arrangement, 'electric regenerative braking system' and a 'motor drive' (motor alone is capable to propel the vehicle from a stationary condition
- Plug-in Hybrid Electric Vehicle (PHEV)/Range Extended Electric Vehicle (REEV) means a "strong HEV" vehicle which has a provision for 'off vehicle charging' (OVC) of 'rechargeable energy storage system'
- Flex Fuel Ethanol Vehicle means a flex fuel vehicle that can run on petrol or a mixture of petrol and ethanol up to an 85/100 per cent ethanol blend (E85/E100)

[9] *Society of Indian Automobile Manufacturers (SIAM)*

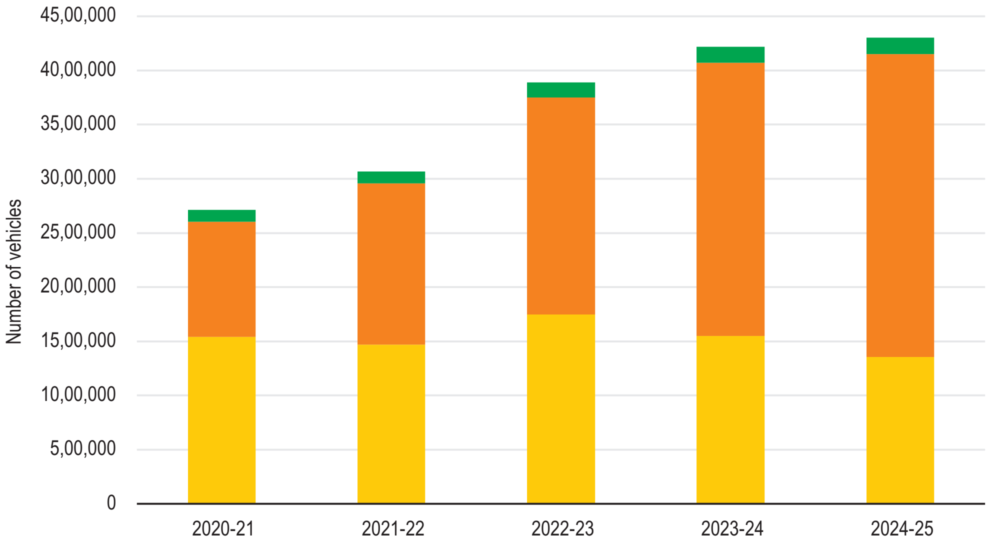
[10] *Details available at: https://morth.nic.in/sites/default/files/CMVR-chapter1.pdf*

2.1. Annual Domestic Sales

India's PV market has witnessed strong growth over the last five financial years (FY), with annual domestic sales increasing by nearly 40%, from 27 lakhs (2020-21) to 43 lakhs (2024-25). While total sales have increased, the composition of the market has changed significantly. Utility vehicles sales have nearly tripled, increasing from 10 lakhs (2020-21) to 28 lakhs (2024-25).

By 2024-25, utility vehicles accounted for approximately 65% of the total PV sales, compared to just 39% in 2020-21, highlighting market shift. Passenger cars represent around 31%, while vans account for the remaining 4%.

Figure 1: Annual domestic PV sales



Source: SIAM

In 2024-25, around 43.01 lakh PVs were sold in India. The market was primarily led by Maruti Suzuki (41%), followed by Hyundai (14%), Tata Motors (13%), and Mahindra (13%), with these four OEMs collectively accounting for about 80% of total PV sales during the year.

2.2. Production & Export Trends

Production trends closely mirror domestic sales pattern. Total PV production increased from 2020-21 to 2024-25, driven primarily by utility vehicles. Utility vehicle production rose from 11 lakh units to 31 lakh units, making it the dominant segment in overall PV manufacturing.

Export trends also indicate a growing international footprint for Indian-made utility vehicles. While passenger cars continue to form a substantial share of exports, utility vehicle exports increased sharply in 2024-25, suggesting rising global competitiveness of Indian OEMs in this segment. Van exports remain marginal in comparison.

Figure 2: Annual PV production trends

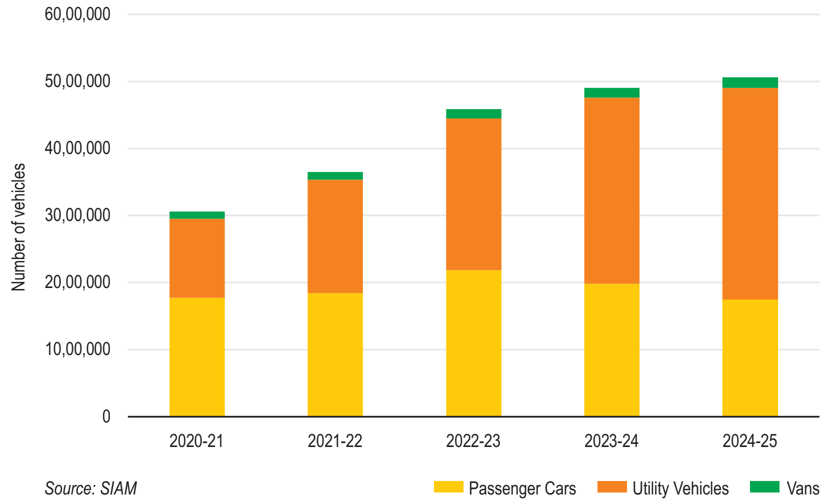
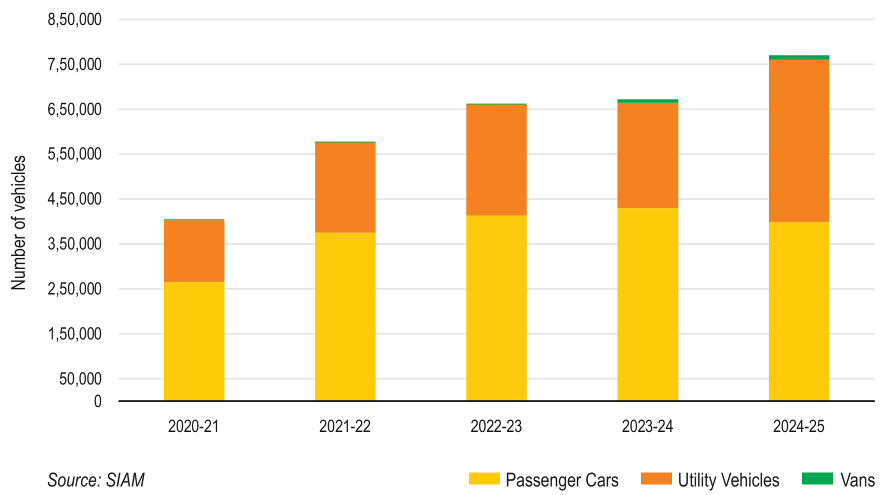


Figure 3: Annual PV export trends



2.3. Implications for Fuel Economy Regulations

India is the third-largest PV market globally, after China and the United States. The rapid shift in India towards heavier and larger-bodied utility vehicles has significant implications for fuel economy and emissions trajectory. Utility vehicles typically have higher curb weight and higher real-world fuel consumption compared to conventional passenger cars. As their share in vehicle mix increases, improvements in fleet average fuel efficiency under the CAFE norms may slow, unless future CAFE framework adequately account for evolving market composition and vehicle weight profiles.

Additionally, compliance with tighter domestic standards incentivizes the production of cleaner and more fuel-efficient vehicles, enhancing their suitability for export markets. The adoption of stringent fuel economy regulations strengthens the global competitiveness of Indian OEMs, and may contribute to emissions reduction beyond national boundaries, particularly in regions such as Southeast Asia that import PVs from India.

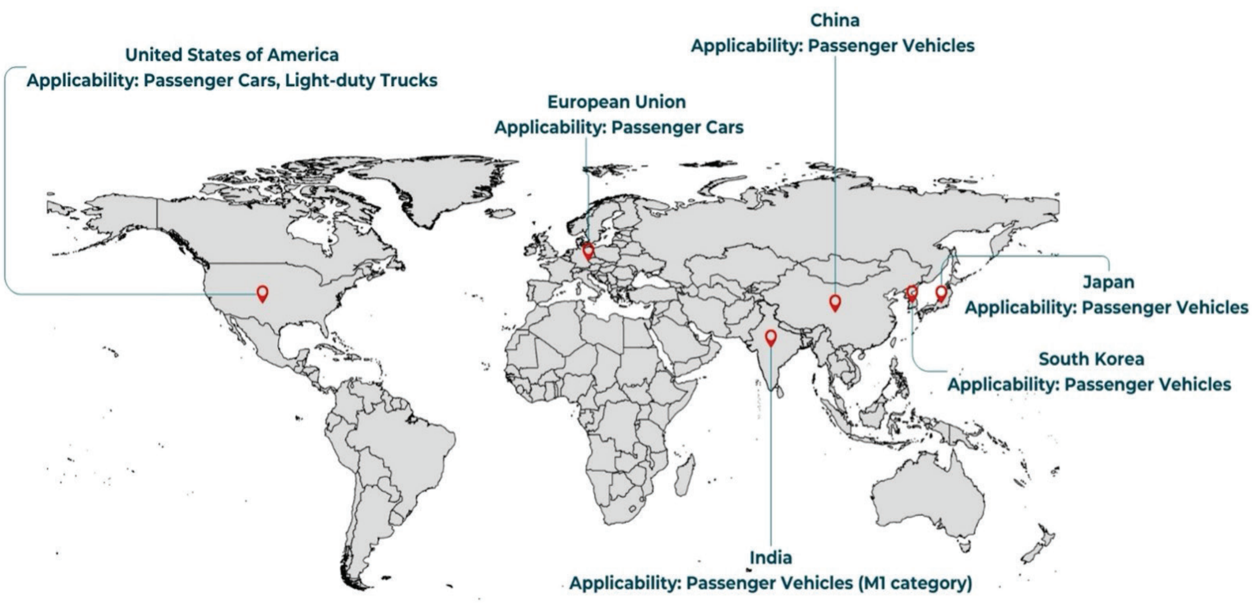
3. International Experience: Glimpse of CAFE Norms

In the wake of first oil shock in the 1970s, USA established CAFE regulations for passenger cars and light-duty trucks in 1978.[11] These regulations assign FE standards by vehicle and size, and require the weighted average fuel economy of new vehicles to meet the regulatory values. However, with global warming becoming a worldwide social issue starting in the 1990s, various countries followed and established automotive fuel economy and CO_2 emissions regulations.

Globally, CAFE norms have been implemented in various countries/regions, including Australia, China, EU, India, Japan, USA, etc. However, the variations in these regulations are mainly due to differences in policy approaches, test drive cycles, and units of measurements. CAFE norms encourage OEMs to invest in more fuel-efficient technologies, such as hybrid and electric vehicles, resulting in a wider availability of fuel-efficient vehicles for consumers.

To contextualise India's path forward, it is essential to look at mature regulatory landscapes. Table 1 highlights the comparative assessment of international CAFE norms.

Figure 4: Global CAFE Norms



Source: TERI

[11] *https://www.jsae.or.jp/files_publish/page/1229/77_8-2_The_Automobile_Regulations.pdf*

Table 1: Assessment of International CAFE norms

Countries	United States	European Union	China	Japan	South Korea	India
Regulation Type	Corporate Average Fuel Economy (CAFE)	Corporate Average Fuel Economy (CAFE)	Corporate Average Fuel Consumption (CAFC)	Fuel Efficiency Standards	Fuel Economy & GHG Standards	Corporate Average Fuel Efficiency (CAFE)
Guiding Regulation	Energy Policy & Conservation Act	EU Emissions Performance Regulations	Energy Conservation & Automotive Industry Regulations	Energy Conservation Act	Clean Air Conservation Act	Energy Conservation Act, 2001
Applicability (Vehicle Category)	Passenger Cars, Light Trucks (LDVs)	Passenger Cars (M1 Category)	PVs	PVs	PVs	PVs (M1 Category)
Regulatory Authority	National Highway Traffic Safety Administration (NHTSA)	European Commission	Ministry of Industry and Information Technology (MIIT)	Ministry of Economy, Trade, and Industry (METI)	Ministry of Climate, Energy, and Environment	Bureau of Energy Efficiency (BEE), Ministry of Road Transport & Highways
Approach	Footprint based	Mass-based limit curve	Weight-class based	Weight-based (Top runner by class)	Weight-based	Weight-based
Measurement Metric	mpg	g CO_2/km	l/100km	Km/l	Km/l and gCO_2/km	l/100 km and gCO_2/km
Timeline	1975 onwards	2009 onwards	2005 onwards	1985 onwards	2006 onwards	2017 onwards
Super-credits	Yes	Yes	Yes	Yes	Yes	Yes
Pooling & Averaging	Yes	Yes	Yes	Yes	Yes	Yes
Penalty Provisions for Non-Compliance	Yes	Yes	Yes	Yes	Yes	Yes
Specific to Small Cars	Sloped footprint curve; Smaller cars generally face more stringent mpg targets but can generate credits	Implicit relaxation for lighter cars via mass curve	Lower fuel consumption targets for lighter vehicles; small EVs incentivized	Lower targets for lighter weight class	Scaled targets by vehicle mass	Draft CAFE-III proposes further small-car relaxation (<909 kg unladen mass)

Source: TERI

Globally, countries use either CAFE or CAFC standards to drive decarbonization and avoid broad exemption for small cars. Instead, they use footprint-based or weight-based targets. Given that India has historically aligned its vehicle emission regulations with the EU, through the adoption of BS norms in-line with EURO norms, it is important to examine the evolution of CAFE internationally, most CAFE norms avoid broad exemption for small cars. Instead, they use footprint based or weight-based targets.

In 2009, European Union established mandatory CO_2 emission performance standards for new passenger cars under circular number 443/2009. Subsequently, in response to limitations associated with the New European Driving Cycle (NEDC), the EU transitioned to the World-wide Harmonized Light Vehicles Test Procedure (WLTP) from 2021 onwards which provides more robust and representative real-world emissions data. EU has progressively tightened average CO_2 emission targets (from 95 g CO_2/km in 2020-24, 93.6 g CO_2/km from 2025-29, to 0 g CO_2/km from 2035 onwards for new passenger cars). In early 2025, the EU proposed a three-year averaging mechanism (2025-2027) for meeting CO_2 targets, which weakens the 2025 CO_2 target and delays EV deployment compared to the original regulatory ambition.[12] Compared to EU, India's current CAFE norms are less stringent, underscoring the need to strengthen CAFE regulation in line with global best practices.

[12] *https://www.transportenvironment.org/articles/how-the-3-year-average-flexibility-weakens-the-2025-car-co2-target-and-delays-bevs?utm_source=chatgpt.com*

4. CAFE Norms in India

Before delving into the technical details of CAFE norms, it is important to understand how the fuel efficiency of an individual PV (M1 category) is determined. In India, vehicle level fuel consumption is measured during type approval through chassis dynamometer in accordance with Automotive Industry Standard (AIS)-137 (Part 3), as notified by the Ministry of Road Transport and Highways under the Central Motor Vehicle Rules.

Under the current testing procedure, vehicle exhaust emissions (including CO_2) are measured with 150 kg load and with the air-conditioning (AC) system not in operation. Once notified, the recent Draft AIS-213 will mandate the measurement of fuel consumption with AC system in operation, using the Modified Indian Driving Cycle (MIDC). The resulting vehicle-level fuel consumption and CO_2 values form the basis for calculating the fleet average performance of each OEM, which is evaluated against OEM specific CAFE targets linked to their corporate average kerb weight. The amount of fuel consumed by a PV is directly related to the amount of CO_2 it emits.

Under the CAFE norms, the average fuel consumption is estimated as:

Average Fuel Consumption Standard = a x (W-b) + c;

where,

a = Constant Multiplier

Average Fuel Consumption Standard = Average Fuel Consumption Standard of manufacturer in petrol equivalent (L/100km);

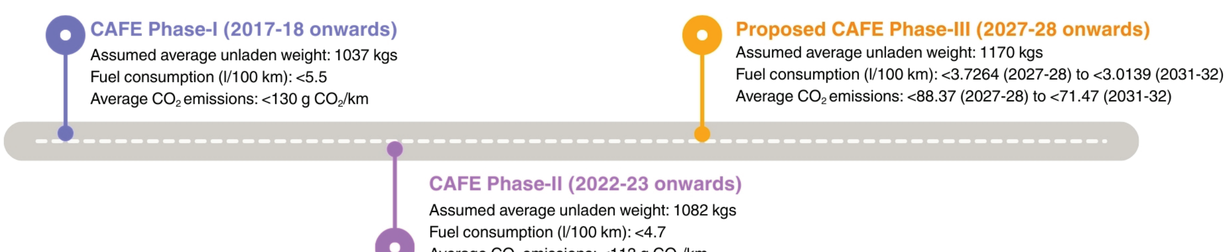
b = Fixed Constant;

c = Fixed Constant;

W = Weighted average of unladen mass in kilogram (kg) of all new said motor vehicle, manufactured or imported for sale by the manufacturer;

The details of parameters considered in CAFE-I and CAFE-II have been summarized in Figure 5.

Figure 5: CAFE norms in India



Source: CAFE notifications

4.1. OEM Performance under CAFE-I

The targets under the first phase of CAFE (CAFE-I) were modest. Based on annual fuel consumption compliance data published by the Ministry of Road Transport & Highways (MoRTH), all PV OEMs met their respective targets during the period from 2017-18 to 2021-22. The annual corporate average CO_2 performance (P) in g/km is presented in the Table 2.

There is a significant variation in absolute CO_2 intensity due to the portfolio of products sold in that particular year. Mass market OEMs such as Maruti Suzuki, Hyundai, and Tata Motors consistently recorded lower corporate average CO_2 values, driven by higher sales volumes of fuel-efficient models and continuous efficiency improvements in ICE technology. Premium and utility-oriented OEMs (including BMW, Mercedes Benz, Jaguar Land Rover, Volvo) have substantially higher fleet average CO_2 intensities throughout the period, yet remained within their allowable limits under CAFE-I.

However, the overall trend suggests that compliance was achieved largely through marginal efficiency gains and portfolio adjustments rather than accelerated shift towards low-carbon technologies. While the framework institutionalized corporate level monitoring and reporting, stringency of CAFE-I was inadequate to drive accelerated decarbonization of the PV segment.

As per BEE, CAFE norms have resulted in cumulative savings of 6.9 $MtCO_2$, from the year 2017-18 to 2022-23. The resultant year-wise CO_2 reductions along-with domestic sales figures have been provided in Table 3.

Table 2: Annual Corporate Average CO_2 Performance (in gCO_2/km) for CAFE-I

Manufacturer / Importer	Annual Corporate Average CO_2 Performance (P)* (in g CO_2 /km)				
	2017-18	2018-19	2019-20	2020-21	2021-22
BMW India Pvt. Ltd	141.2	142.3	147.9	153.3	156.5
FCA India Automobiles Private Limited	155.2	155.9	159.6	159.1	160.3
Force Motors Limited	239.3	240.7	245.9	138.4	270
Ford India Pvt. Ltd	129.8	127.5	133.3	-	147.4
General Motors India & CSIPL	157.5	-	-	-	-
Hindustan Motor Finance Corporation Limited	224.1	223.6	-	-	-
Honda Cars India Limited	124.0	120.4	123.0	127.8	128.6
Hyundai Motor India Limited	123.9	123.7	122.9	122.9	122.1
Isuzu Motors India Pvt. Ltd.	211.3	211.9	209.6	182.1	179.4
Jaguar Land Rover Ltd.	168.0	169.9	176.6	181.1	159.7
JT Special Vehicles Private Limited	-	150.3	-	-	-
KIA India Pvt Ltd	-	-	138.2	131.5	131.6
Mahindra & Mahindra Limited	159.5	156.4	156.6	156.5	158.8
Maruti Suzuki India Limited	109.6	108.7	111.2	113.1	111.1
Mercedes-Benz India Pvt Ltd	162.7	162.6	162.3	167.4	155.0
MG Motor India Pvt. Ltd.	-	-	165.8	167.2	150.3
Nissan Motor India Private Limited	112.9	116.1	113.9	122.4	126.8
PCA Automobiles India Private Limited	-	-	-	136.4	-
Renault India Private Limited	112.4	112.7	118.1	121.1	122.0
Skoda Auto Volkswagen India Private Limited	136.9	134.8	134.9	134.5	134.1
Tata Motors Limited	136.6	135.4	129.5	123.5	117.5
Toyota Kirloskar Motor Pvt. Ltd	160.8	156.7	150.4	149.1	151.6
Volvo Auto India Pvt. Ltd.	233.2	242.9	205.2	173.5	175.5

**values rounded to the nearest first decimal. Under CAFÉ-I, the reference target was 130 g CO_2/km at kerb weight of 1,037 kg; however, OEM-specific targets vary depending on their fleet's average unladen mass.*
Source: Ministry of Road Transport & Highways (MoRTH)

Table 3: CO_2 emissions reductions ($MtCO_2$) under CAFE Norms

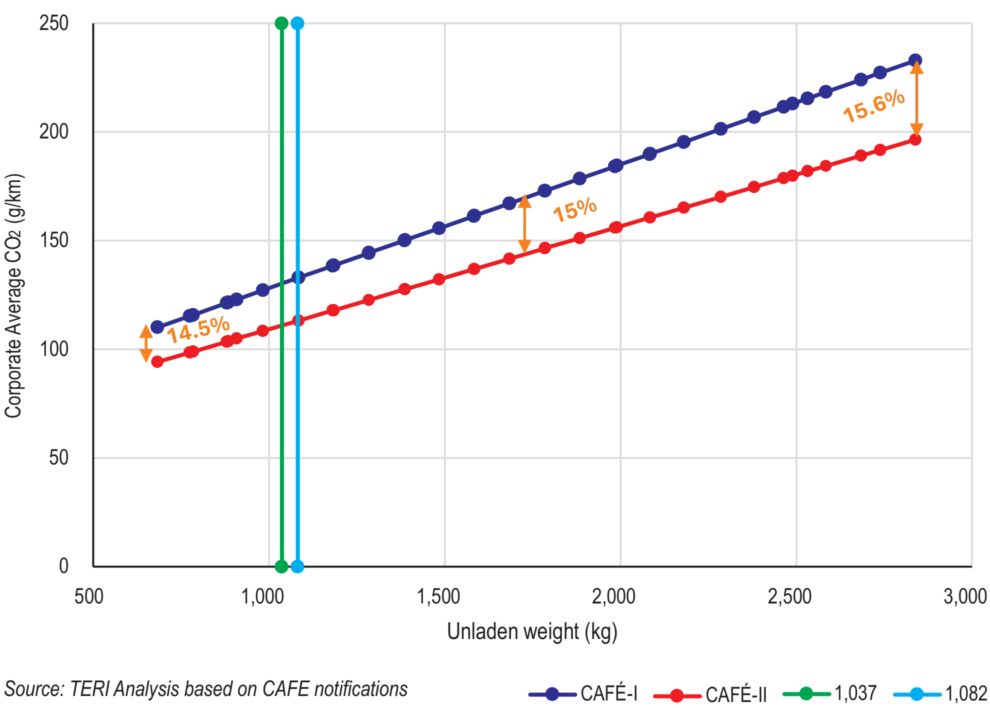
Year	CO_2 emissions reductions ($MtCO_2$)	Domestic Sales (M1)
2017-18	1.24	32,88,581
2018-19	1.29	33,77,436
2019-20	1.08	27,73,519
2020-21	0.92	27,11,457
2021-22	1.09	30,69,523
2022-23	1.32	38,90,114

Source: UDIT Dashboard (BEE)

4.2. CAFE-I v/s CAFE-II

Figure 6 compares the target curves derived from the equations notified under CAFE-I and CAFE-II, plotted against unladen vehicle weight (kg). The downward shift of the CAFE-II curve across the full weight spectrum indicates a clear tightening of permissible corporate average CO_2 limits relative to CAFE-I. This demonstrates that CAFE-II introduced a broadly uniform increase in stringency (15% compared to CAFE-I) across all weights, rather than concentrating regulatory pressure on a specific weight segment.

Figure 6: CAFE-I v/s CAFE-II



Source: TERI Analysis based on CAFE notifications

The vertical reference lines indicate the assumed industry average unladen mass under CAFE-I (1037 kg) and CAFE-II (1082 kg). While CAFE-II delivers lower allowable CO_2 limits at any given unladen weight, the rightward shift in assumed weighted average mass of all PVs partially offsets the effective stringency of the standard. In a market characterised by increasing vehicle weights (primarily driven by enhanced safety requirements and a growing preference for SUVs), there is a need for future CAFE phases to complement tighter target curves with design features that better account for structural weight growth and evolving market composition.

CAFE-I was formulated on the assumption of an industry average unladen mass 1,037 kg. However, data for FY 2021-22 indicates that the actual industry average unladen mass had increased to 1095 kg, approximately 6% higher than the assumed baseline. Similarly, CAFE-II was formulated on the assumption of an industry average unladen mass of 1082 kgs, while analysis of FY 2022-23 data shows that the average weight had increased to around 1170 kg, 8% higher than the assumed value. This consistent increasing weight indicates a clear trend towards heavier PVs, with important implications for the effectiveness and calibration of mass-based CAFE targets.

The observed increase in average unladen mass may partly reflect the progressive strengthening of vehicle safety regulations in India over the CAFE-I and II periods. Key safety mandates such as the introduction of frontal offset and side impact crash standards under Bharat New Car Assessment Programme (BNCAP) from October 2019, the mandatory fitment of driver airbags from July 2019, and dual front airbags from April 2021, have required additional structural reinforcements and safety systems, contributing to higher vehicle weights. In parallel, the PV market has undergone a shift towards larger and heavier vehicle segments, particularly SUVs, which typically have higher unladen mass compared to hatchbacks and sedans.

As discussed in earlier sections, OEMs achieved universal compliance with the targets specified under CAFE-I. However, compliance data for CAFE-II has not yet been placed in the public domain, underscoring the lack of transparency regarding CAFE-II compliance outcomes and enforcement processes. In August 2025, the Ministry of Power issued Draft Energy Conservation (Compliance Enforcement) Rules, 2025 which empower BEE to levy penalties to OEMs (as per Section 26 of the Energy Conservation Act, 2001) that fail to meet CAFE targets.

4.3. Proposed CAFE-III Norms in India

The new CO_2 targets as per the proposed CAFE-III norms (Office Memorandum dated September 25, 2025) are as follows:

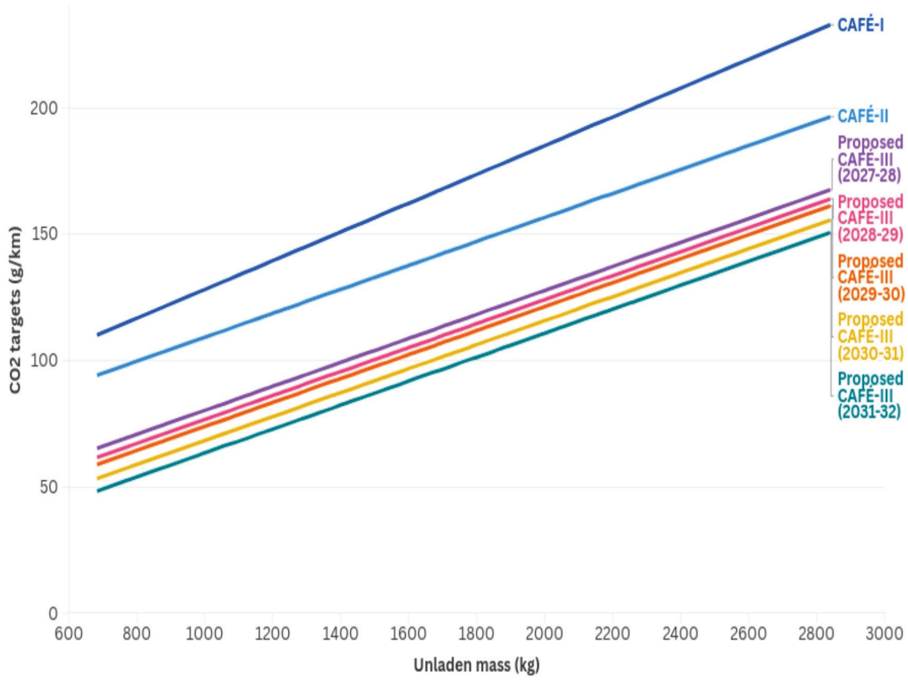
Table 4: CO_2 targets under CAFE-III norms

Financial Year	2027-28	2028-29	2029-30	2030-31	2031-32
CO_2 targets (g/km)	88.37	84.75	81.98	76.41	71.47

Note: CO_2 targets based on MIDC

Figure 7 represents unladen mass v/s CO_2 targets (g/km) for CAFE-I, II, and year-on year targets for proposed CAFE-III norms.

Figure 7: CO_2 targets under CAFE-I, II and proposed CAFE-III norms



Source: TERI analysis based on CAFE notifications (without applying CNF & other relaxations

The average stringency for year-wise CAFE-III vis-à-vis CAFE-II ranges from 21% (2027-28), 24% (2028-29), 26% (2029-30), 32% (2030-31), 34% (2031-32). The comparative assessment of CAFE-I, II, and proposed CAFE-III is as shared in the following Table 5.

4.4. Gaps in the Current CAFE Framework

The revised draft CAFE-III notification (released in September 2025) introduces several measures aimed at broadening compliance pathways and ensuring phased tightening of targets. A key change is the step-by-step tightening of CO_2 targets, which provides OEMs with a clearer compliance roadmap compared to the fixed-stringent benchmarks under CAFE-I and II. For instance, while the corporate average CO_2 target of 88.37 g/km of applies in 2027–28, the phased approach enables OEMs to integrate cleaner technologies gradually, increasing the share of low-emission vehicles in their fleets over time. However, there are a few gaps in the current CAFE framework which may hamper the uptake of low carbon technologies.

The automotive industry has expressed mixed views on the proposed relaxation for small cars. Some OEMs have argued that relaxations are required given the resource efficiency of small cars, higher fuel economy as compared to heavier vehicles and limited scope for ICE

Table 5: Comparative Assessment of CAFE-I, II and proposed CAFE-III in India

Parameters	CAFE-I	CAFE-II	Proposed CAFE-III
Notification status	Notified	Notified	Proposed
Applicability	PV (M1 category)		
Effective Year	2017-18 onwards	2022-23 onwards	2027-28 onwards
Average Fuel Consumption Standard Equation	= a x (W-b) + c		
Average unladen weight (kg)	1,037	1,082	1,170
Slope	0.0024	0.002	0.002
Corporate Average CO_2 Emissions (grams of CO_2/km)	<130	<113	88.37 (2027-28) 84.75 (2028-29) 81.98 (2029-30) 76.41 (2030-31) 71.47 (2031-32)
Stringency with respect to previous phase	-	15%	21% - 35%
Compliance Outcome	Universal Compliance by OEMs	Mixed Performance; Based on data for FY 2022-23, 8 OEMs (out of 18) failed compliance	-
Technology Pathway Implied	ICE optimisation, fleet mix effects	Advanced ICE technology, limited hybridisation	Strong push towards ZEV technology
Limitation	Lenient targets	Stringency	Risk of dilution

Source: TERI Analysis based on CAFE notifications

technology improvement (resulting in additional cost). At the same time, while incremental ICE efficiency improvements may be reaching their limits, maintaining stringent CAFE norms remain important to provide clear long-term regulatory signals that encourage a shift towards zero-emission vehicle technologies and provide sufficient lead time for OEMs to plan their product portfolio in advance.

4.4.1. Proposed Relaxation for Small Cars

The proposed relaxation for compact petrol cars (unladen mass < 909 kg, engine capacity <1200 cc, and length <4000 mm), capped at 9 gCO_2/km for a reporting period, is quite concerning. **These cut-offs are arbitrarily defined and may not adequately promote a level playing field across OEMs (as highlighted in Figure 8), potentially slowing the pace of innovation, particularly in the small car segment.**

As per SIAM 4W data, during the year 2017-18, a total of 30 models or variants were offered under the portfolios of five OEMs, all falling within the unladen weight of below 909 kg and engine capacity of less than 1200 cc. Over time, by 2020–21, both the number of models and the participating OEMs in this segment had declined, reflecting a consolidation trend within this market segment.

Further, **based on SIAM 4W fuel efficiency data for 2020, 28 petrol models or variants fall within this threshold, belonging to three OEMs** (Renault India Pvt Ltd., Nissan Motor India Pvt Ltd., and Maruti Suzuki India Ltd.). However, **maximum models or variants fall within the portfolio of only one OEM (as per SIAM FE Data for 2020)**. This clearly suggests that the existing relaxations are not technology-neutral and instead provide a competitive advantage to a single OEM.

In 2024-25, around 43.01 lakh PVs were sold in India. The market was primarily led by Maruti Suzuki (41%), followed by Hyundai (14%), Tata Motors (13%), and Mahindra (13%), with these four OEMs collectively accounting for about 80% of total PV sales during the year. Based on SIAM's 4W fuel efficiency dataset (2020) and sales data for 2024-25 , approximately 21% of the PVs sold in 2024-25 fall within the small car category (models falling under the category of vehicles with an unladen weight below 909 kg and petrol engines under 1200 cc).

Such relaxations weaken the regulatory intent as they allow OEMs to continue pushing ICE technologies rather than investing in cleaner alternatives. While vehicle mass is a defined design parameter and any changes would require engineering modifications, regulatory certification, and time, the 909 kg cut-off may influence design optimisation choices. Therefore,

Figure 8: BE-VI FE data for 4W (for the year 2020)

SIAM BS VI Fuel Efficiency (FE) Data as on 1st April 2020 – Passenger Vehicles								
S.no.	Manufacturer	Vehicle Model / Variant	Kerb Weight (Kgs)	Engine cc	Emission Stage	Fuel Type (Gasoline/Diesel/CNG etc.)	Declared FE (Kmpl)	Declared CO2 (g/km)
1	Renault India Pvt. Ltd.	Renault KWID 0.8L MT	737	799	BS-VI	Gasoline	20.71	114.50
2	Nissan Motor India Pvt. Ltd.	DATSUN redi GO 0.8L MT	740	799	BS-VI	Gasoline	20.71	114.50
3	Maruti Suzuki India Ltd.	S-Presso [Std, LXI]	740	998	BS-VI	Gasoline	21.40	110.81
4	Renault India Pvt. Ltd.	Renault KWID 1L MT	751	999	BS-VI	Gasoline	21.70	109.30
5	Renault India Pvt. Ltd.	Renault KWID 1L AMT	756	999	BS-VI	Gasoline	22.00	107.80
6	Maruti Suzuki India Ltd.	TOUR H1	757	796	BS-VI	Gasoline	22.05	107.54
7	Maruti Suzuki India Ltd.	Alto	762	796	BS-VI	Gasoline	22.05	107.54
8	Maruti Suzuki India Ltd.	S-Presso [VXI, VXI+]	763	998	BS-VI	Gasoline	21.70	109.28
9	Maruti Suzuki India Ltd.	S-Presso AGS	767	998	BS-VI	Gasoline	21.70	109.28
10	Maruti Suzuki India Ltd.	TOUR H2	815	998	BS-VI	Gasoline	21.62	109.63
11	Maruti Suzuki India Ltd.	WagonR 1.0	820	998	BS-VI	Gasoline	21.79	108.78
12	Maruti Suzuki India Ltd.	WagonR 1.0 AGS	825	998	BS-VI	Gasoline	21.79	108.78
13	Maruti Suzuki India Ltd.	WagonR 1.2	835	1,197	BS-VI	Gasoline	20.52	115.51
14	Maruti Suzuki India Ltd.	Celerio	840	998	BS-VI	Gasoline	21.62	109.63
15	Maruti Suzuki India Ltd.	Celerio AGS	840	998	BS-VI	Gasoline	21.62	109.63
16	Maruti Suzuki India Ltd.	WagonR 1.2 AGS	845	1,197	BS-VI	Gasoline	20.52	115.51
17	Maruti Suzuki India Ltd.	Alto	850	796	BS-VI	CNG	31.59	86.80
18	Maruti Suzuki India Ltd.	Celerio X	850	998	BS-VI	Gasoline	21.62	109.63
19	Maruti Suzuki India Ltd.	Celerio X AGS	850	998	BS-VI	Gasoline	21.62	109.63
20	Maruti Suzuki India Ltd.	S-Presso	854	998	BS-VI	CNG	31.19	87.91
21	Maruti Suzuki India Ltd.	Ignis	855	1,197	BS-VI	Gasoline	20.89	113.52
22	Maruti Suzuki India Ltd.	Ignis AGS	865	1,197	BS-VI	Gasoline	20.89	113.52
23	Maruti Suzuki India Ltd.	Swift	880	1,197	BS-VI	Gasoline	21.21	111.79
24	Maruti Suzuki India Ltd.	Swift AGS	885	1,197	BS-VI	Gasoline	21.21	111.79
25	Maruti Suzuki India Ltd.	Dzire	890	1,197	BS-VI	Gasoline	21.21	111.79
26	Maruti Suzuki India Ltd.	Baleno	890	1,197	BS-VI	Gasoline	21.01	112.88
27	Nissan Motor India Pvt. Ltd.	DATSUN GO MT	891	1,198	BS-VI	Gasoline	19.02	124.68
28	Maruti Suzuki India Ltd.	Dzire AGS	895	1,197	BS-VI	Gasoline	21.21	111.79
29	Maruti Suzuki India Ltd.	WagonR 1.0	910	998	BS-VI	CNG	32.52	84.30
30	Hyundai Motor India Ltd.	Santro 1.1MT Era Executive & variants	910	1,086	BS-VI	Gasoline	20.00	118.57
31	Maruti Suzuki India Ltd.	New Dzire	910	1,197	BS-VI	Gasoline	23.26	101.93
32	Maruti Suzuki India Ltd.	Baleno Smart Hybrid	910	1,197	BS-VI	Gasoline	23.87	99.34
33	Hyundai Motor India Ltd.	Santro 1.1AMT Era Executive & variants	911	1,086	BS-VI	Gasoline	20.00	118.57
34	Nissan Motor India Pvt. Ltd.	DATSUN GO CVT	913	1,198	BS-VI	Gasoline	19.59	121.05
35	Maruti Suzuki India Ltd.	New Dzire AGS	915	1,197	BS-VI	Gasoline	24.12	98.31
36	Hyundai Motor India Ltd.	Grand i10 NIOS 1.2MT Kappa Era & Magna	921	1,197	BS-VI	Gasoline	20.70	114.56
37	Honda Cars India Ltd.	AMAZE 1.2 E MT (I-VTEC) & Its Variants	924	1,199	BS-VI	Gasoline	18.60	127.49
38	Hyundai Motor India Ltd.	Grand i10 NIOS 1.2 AMT Kappa Era & Magna	925	1,197	BS-VI	Gasoline	20.50	115.68

Source: SIAM (last accessed on January 18, 2026)

these relaxations dilute the stringency of CAFE-III, distorts market competition, and risk delaying the transition to clean technologies.

4.4.2. Proposed Super-Credits for Technologies

Super-credits are intended to reward OEMs for deploying clean technologies that reduce average fuel consumption. They are a critical regulatory lever for directing the industry toward future technology pathways. While super-credits lower the cost of compliance for OEMs, they can be dilutionary. This means that if an OEM gets too many credits from a few EVs, they may feel less pressure to improve the efficiency of their high-volume ICE models.

As per MoRTH GSR 180 (E), Plug-in Hybrid Electric Vehicles (PHEVs) and Range-Extender Hybrid Electric Vehicles (REEVs) have been defined as strong hybrid electric vehicles with off-vehicle charging or rechargeable energy storage. **A REEV has an on-board engine and therefore cannot be equated with Battery Electric Vehicle (BEV), which are zero-emission at the tailpipe. Treating REEVs like BEVs weaken the intent of super-credits.**

The earlier draft of CAFE-III had included Hydrogen Fuel Cell Electric Vehicles (FCEVs) within the super credit framework. However, their removal in the revised CAFE-III notification marks a regressive step, as it disincentivizes a clean technology pathway. **Retaining super credits for Hydrogen FCEVs is crucial to ensure policy neutrality and to foster long-term R&D investments in the mobility sector.**

The existing and suggested super-credits have been highlighted in Table 6.

Table 6: Super-credits (existing and suggested)

Vehicle Type	CAFE-II (Existing)	CAFE-III (First Draft, 2024)	CAFE-III (Revised Draft, 2025)	Suggested super-credits
Hydrogen FCEV	3	5	–	5
Battery Electric Vehicle	3	4	3	3
Range-Extender Hybrid Electric Vehicle (REEV)	–	–	3	2.5
PHEV /Strong Hybrid (Flex Fuel Ethanol)	–	–	2.5	2.5
Strong Hybrid Electric Vehicle	–	–	2	2
Flex Fuel Ethanol Vehicle	–	–	1.5	1.5

Source: CAFE Notifications (BEE)

Therefore, there is a need to reinstate super-credits for Hydrogen FCEVs and correct the misclassification of REEVs. Super-credits shall be phased out as the technology matures, to increase the penetration of clean energy in the road transport sector.

5. Way Forward

Stringent CAFE norms represents one of the most effective lever for nudging OEMs towards the adoption of ZEV technologies. Compared to technology mandates, CAFE norms provide flexibility to industry while ensuring overall emission reductions. However, the cumulative emissions reduction achieved under CAFE norms (~6.9 $MtCO_2$) from 2017-18 to 2022-23 accounts for less than 2% of India's annual transport emissions, indicating that the current approach is insufficient to meet the net zero target by 2070. **There is a need to expand CAFE norms to other vehicle segments to decarbonise the transport sector.**

Accelerating the deployment of ZEVs is essential to keep India on a pathway towards net zero target by 2070. In view of the evolving geopolitical uncertainties and energy security concerns, CAFE norms should be viewed through the lens of reducing India's dependence on imported fossil fuels.

Key recommendations

- While incremental ICE efficiency improvements may be reaching their limits, maintaining stringent CAFE norms remain important to provide clear long-term regulatory signals that encourage a shift towards zero-emission vehicle technologies.
- Super-credits shall be phased out as the technology matures, to increase the penetration of clean energy in the road transport sector. REEV has an on-board engine and therefore cannot be equated with Battery Electric Vehicle (BEV), which are zero-emission at the tailpipe.
- With the rapidly increasing average unladen weight of the passenger vehicle segment, future CAFE norms should consider the current industry average unladen mass.
- Given the rapid evolution of vehicle technologies and shifts in industry-average unladen mass, CAFE norms should include a mid-term review (2-3 years) to reassess industry average unladen mass thresholds and the appropriateness of super-credit provisions.
- Overachievement of targets should be incentivized through ZEV credit scheme – traded with the OEMs underachieving the targets.
- Need to expand CAFE norms to other vehicle segments to decarbonise the transport sector.

While revised proposal for CAFE-III outlines the cut-off criteria for small car relaxations, limited transparency exists regarding the rationale behind the selection of unladen weight thresholds (909 kg). Based on TERI's analysis, approximately 20% of the vehicles sold in 2024-25 falls under the relaxation criteria. Such relaxations risk weakening the stringency of CAFE-III, as OEMs may continue to meet compliance requirements without significantly investing in cleaner technologies within this segment. Given that the market is increasingly shifting towards utility vehicles and the average unladen mass of the industry stood at approximately 1200 kg (in 2024-25), relaxing norms for small cars is unlikely to revive the segment on its own. These relaxations dilute the stringency of CAFE-III, distorts market competition, and risk delaying the transition to clean technology. **Future CAFE norms shall consider the current industry average unladen mass (for FY 2025-26).**

As per SIAM data on four-wheeler fuel efficiency, a total of 30 models or variants were offered under the portfolios of five OEMs during the year 2017-18, all falling within the unladen weight category of less than 909 kg and engine capacity of less than 1200 cc. Over time, by 2020-21, both the number of models and the participating OEMs in this segment had declined, reflecting market consolidation.

The continued provision of super-credits for hybrid and REEVs, which involves use of generators combustion engine to charge batteries needs reconsideration. **As hybrids do not deliver zero tailpipe emissions, extending super-credits to these technologies risks undermining the core objective of CAFE norms.**

Finally, CAFE currently offers limited incentives for over-achieving beyond compliance. **Going forward, surplus emission reductions achieved by OEMs could be explored for linkage with market-based mechanisms such as ZEV credits, under subsequent phases such as CAFE-IV.** Such an approach could further strengthen the effectiveness of India's transport decarbonisation strategy.

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