POLICY BRIEF

Improving the fuel economy performance of trucks in Indonesia

Key messages

- The **energy demand of trucks is rising rapidly** in Indonesia, and fleet is projected to **almost triple by 2060**.
- **Fuel economy or CO_2 standards** for trucks could **support Indonesia's net zero ambitions**, reduce fuel imports, improve air quality, and strengthen industrial competitiveness.
- **International experience** shows that phased standards, flexible compliance mechanisms and targeted incentives can **make truck efficiency regulation practical and effective.** The People's Republic of China (hereafter "China"), the European Union, the United States, and others demonstrate different approaches to combining performance standards with policies such as sales mandates and incentives.
- **A staged policymaking pathway can help Indonesia build the data, testing capacity, and regulatory expertise needed for effective implementation.** Initial steps could include developing an interagency taskforce, improved data collection, and engine testing. Engine minimum energy performance standards could then help to build the capacity required to implement a simulation-based whole-vehicle standard, supported by labelling and policies to promote electric trucks.

Contents

The case for fuel economy or CO_2 standards

Between 2010 and 2021 the number of heavy trucks in Indonesia doubled to around 1.7 million, and is projected to reach around 2.5 million by 2030, and almost 5 million by 2060. Without stronger fuel efficiency policies, rising demand risks locking in high fuel consumption, meaning higher emissions and energy costs. In 2022, the average fuel consumption of new light duty vehicles sold in Indonesia was 35% higher than the world average. This is also above the level seen in many comparable middle-income countries. More strikingly, new vehicles are only marginally more efficient than the vehicles already on the road, implying limited progress over the past decade. The average fuel consumption of trucks in Indonesia is not yet well understood, so the energy efficiency of this segment of the market may be similarly lagging behind.

Establishing fuel economy standards (FES) could support Indonesia's efforts to reduce carbon emissions in the transport sector and its ambition to reach net zero emissions by 2060. Improving the fuel economy of Indonesia's trucks could achieve other important benefits including: improved air quality and human health, reduced fuel imports and improved energy security; enhanced competitiveness of Indonesian truck manufacturing; and cost reductions for truck operators and consumers. This policy brief presents options for introducing truck FES in Indonesia as well as complementary policies to incentivise the supply of electric trucks to the Indonesian market.

Current regulatory frameworks for truck efficiency

Indonesia has issued several strategic documents and regulations aiming to accelerate energy efficiency improvements, including the adoption of more efficient trucks:

- The Law on Energy promotes responsible energy use and empowers the government to introduce minimum efficiency standards, incentives, and penalties.
- The National Industry Development Master Plan identifies the vehicle industry as a priority and encourages the production of more efficient powertrain technologies.
- The National Energy Plan sets targets to reduce energy demand intensity and calls for FES to help meet energy and emissions goals.
- The Goods Transportation Regulation imposes technical and roadworthiness standards to reduce overloading and fuel waste.
- The Energy Conservation regulation requires large transport operators to implement energy management strategies and report truck category-level fuel use and efficiency data.
- Looking ahead, the National Long-Term Development Plan 2025-2045 outlines a national low-carbon pathway, emphasising energy efficiency, electrification, and carbon pricing to enable sustainable mobility by 2045.

International fuel economy and CO_2 standards for trucks

While approaches vary, most policies combine short-, medium, and long-term targets with flexible compliance mechanisms to give manufacturers and fleet operators clear signals and time to adjust.

China has implemented a phased approach fuel consumption standards for trucks. Since Stage 1 in 2012, the rules have been progressively tightened. Stage 4 (2025) regulates diesel and gasoline engines and is 15% more stringent than Stage 3 (2020). The standard now also covers hybrid electric trucks and uses a Minimum Energy Performance Standard (MEPS)-style vehicle-level regulation with CO_2-based performance comparisons.

The **European Union** applies fleet-average CO_2 standards for trucks and buses and has a target of a 45% reduction by 2030, and 90% by 2040. The standards initially applied to certain truck types and were expanded to include city buses, trailers, coaches, and vocational trucks. It promotes early adoption of zero-emission vehicles (ZEVs) by relaxing the CO_2 target for manufacturers with higher shares of ZEVs.

In the **United States**, fuel economy standards were introduced in 2011. Phase 2 (2016) tightened the standards, and expanded the scope to other components such as trailers and tyres. Phase 3 (finalised in 2024) requires a CO_2 reduction of up to 40% for tractor trucks by 2032 compared to the 2027 standard. The scheme includes "multipliers" to incentivise ZEV adoption.

Other complementary policies

Many countries use broader policy packages that include mandates, industrial support, and financial incentives. These complementary policies help accelerate the deployment of ZEVs, create market certainty, and support long-term compliance with regulatory targets.

The **European Union** CO_2 standards directly set mandatory minimum ZEV sales requirements for urban buses of 90% by 2030 and 100% by 2035.

At COP 26, the **United Kingdom** announced phase-out dates for the sale of new non-ZEV trucks weighing 26 tonnes or less by 2035, with all new trucks sold in the United Kingdom to be ZEVs by 2040. The government is developing regulations to meet these targets.

In 2024, **China** announced goals to reduce the carbon intensity of commercial transport by 9.5% by 2030 compared with 2020 levels, and for battery, plug-in hybrid and fuel-cell electric vehicles, to comprise 45% of new vehicle sales by 2027.

California's Advanced Clean Trucks rule includes a minimum ZEV sales share of 30-50% in 2030. To support these targets California also introduced a range of economic incentives.

Potential policymaking pathway

Create taskforce and technical working groups

A taskforce with decision-making authority could bring together relevant ministries and agencies to clearly define responsibility for elements of the policy process, and to oversee the analytical outputs required to inform policy decisions. The taskforce could be supported by technical working groups comprising policymakers, industry representatives and technical experts.

International experience can help build capacity within relevant ministries and clarify the trade-offs associated with different regulatory designs. Indonesia could assess which approaches are most suitable, including:

- the adequacy of existing data sources and gaps in the foundational information
- the selection of performance measures (i.e. fuel economy-based or CO_2-based standard)
- whether components or full vehicles should be tested, and which combination of simulation and physical testing should be used for type approval and certification
- whether phased implementation would be appropriate
- labelling design options
- approaches to setting targets and increasing stringency over time
- fleet-average compliance flexibilities
- compliance measures, and monitoring and evaluation procedures.

Using sales data from Gaikindo, paired with real-world operations/usage data from Aptrindo, Kamselindo, and POME, Indonesia can develop initial estimates of fuel consumption by segment. Segment definitions should reflect logical operational categories and should be developed in consultation with industry stakeholders and technical experts. The goals of this action are to:

1) identify the segments representing the majority of fuel consumption
2) characterise the major operations within these segments (e.g. to develop test cycles)
3) pinpoint the main technology providers and technical characteristics of engines and other key components
4) inform subsequent analytical and designs steps, including testing/certification procedures and test cycles, potential simulation models and modelling specifications, technology benchmarking and cost-benefit analysis.

Fill gaps and implement engine fuel economy testing

Indonesia could undertake a dedicated assessment of the cost, infrastructure and administrative capacity needed to support future FES. This should cover physical equipment and facilities required for compliance testing given the various approaches that could be taken. As well as the legal and technical expertise required to administer the testing and certification schemes required as part of a FES. Indonesia could investigate recognising certified component performance from other countries, such as for tyres, transmissions, and other components. This assessment could proceed in parallel with the adoption of international testing methodologies.

However, as the component with the greatest effect on fuel economy and sensitivity to operating conditions, a robust FES would also require reliable data for engine performance, ideally using a local test cycle. Domestic manufacturers use engine dynamometer testing to verify compliance with pollution emissions standards (NO_X, PM, CO), and government agencies monitor compliance, meaning adding fuel economy testing offers a practical solution. Policymakers could build capacity by focusing initially on engines, while also generating essential data for later implementation of a simulation-based whole-vehicle standard.

Implement Minimum Engine Performance standards (MEPS)

Although full-vehicle fuel economy standards can be developed without component standards, MEPS could provide an effective early measure. These standards would set minimum efficiency thresholds for engines. By removing the least efficient products from the market, MEPS could deliver near-term fuel savings and emissions reductions while allowing manufacturers and regulators to build experience before more complex fleet-average regulation is introduced. Component standards could therefore provide an efficiency floor while supporting the gradual development of a broader regulatory framework.

Promote efficient and electric trucks

Measures to promote efficient and zero-emission trucks could be integrated into the fuel economy standard or introduced as a parallel policy. Crediting mechanisms or gradually increasing minimum ZEV sales shares for manufacturers could provide clear market signals, support early deployment and build domestic capacity. This would complement the wider policymaking pathway and support a more ambitious transition to cleaner road freight.

Develop whole-vehicle performance testing

The use of simulation tools in testing and certification can mitigate the need for physical whole-vehicle testing; which is expensive and resource heavy. Indonesia could streamline development while ensuring alignment with established international best practice by basing their tool on the European Union's open-source tool. Simulated whole-vehicle testing could then be applied at a low marginal cost to the wide range of truck configurations seen on the market, providing a robust and accurate approach to implementing the FES.

Provide information and labelling.

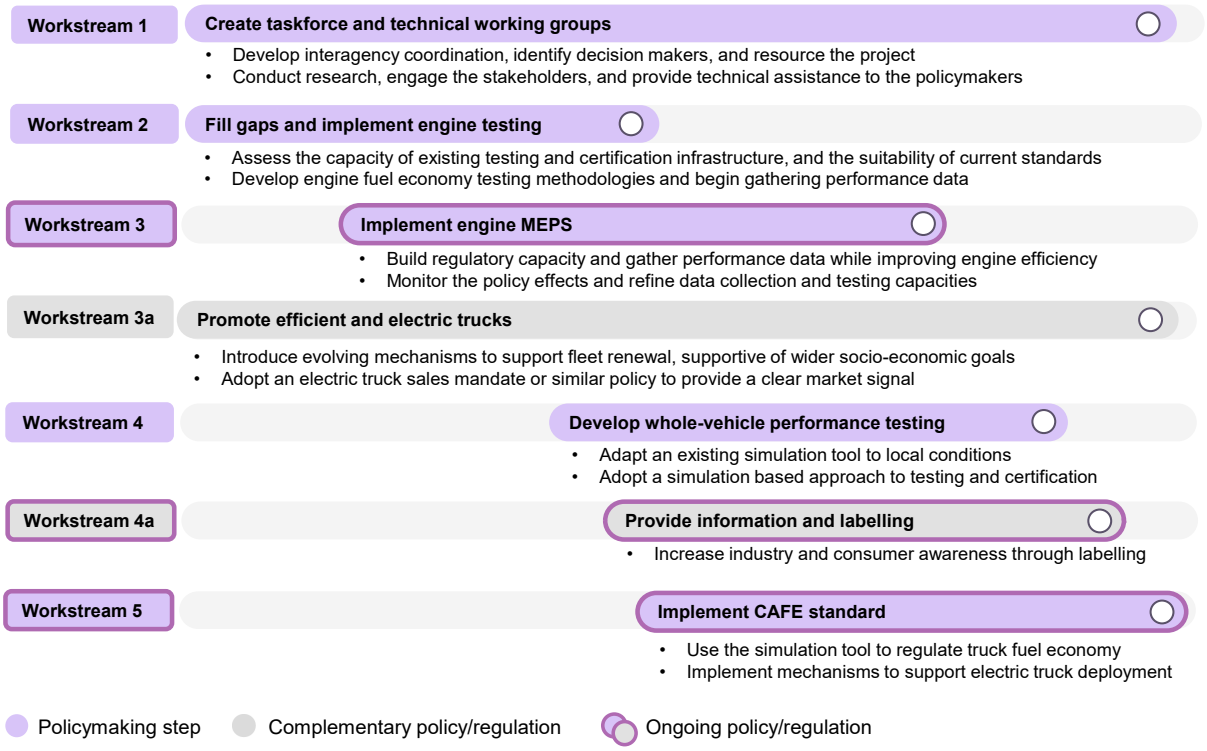
Though not essential to the development of a FES, this step would raise truck consumer awareness and thereby encourage manufacturers to improve fuel economy. Labelling would be based upon the certified performance data, and therefore offers a potentially very low marginal cost to both manufacturers and the government.

Implement Corporate Average Fuel Economy (CAFE) standard

A staged approach would allow Indonesia to align regulatory implementation with the development of testing capacity, data systems and administrative expertise. Rather than regulating all vehicle segments and technologies at once, Indonesia could introduce fleet-average FES as testing and certification systems mature.

A CAFE-style standard would allow manufacturers to balance lower-performing trucks with more efficient models, provided their overall fleet average meets the regulatory target. This would give manufacturers flexibility, encourage innovation and support progressive improvements in truck efficiency. If CAFE were to be combined with engine MEPS, the FES would establish both a minimum efficiency floor and an average performance requirement.

Potential policymaking pathway to improve truck efficiency



CAFE = Corporate average fuel economy, MEPS = Minimum energy performance standard

Implementation

By sequencing governance, data collection, engine testing, simulation tool development, labelling, and finally fleet-average regulation, Indonesia could develop a practical approach to improving truck efficiency while limiting implementation risks. Early action on engines could support near-term gains, while preparing the technical and institutional foundations for more comprehensive standards over time.