



Improving Vehicle Fuel Economy in the ASEAN Region

Working Paper 1/10



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About CAI-Asia

The Clean Air Initiative for Asian Cities (CAI-Asia) promotes better air quality and livable cities by translating knowledge to policies and actions that reduce air pollution and greenhouse gas emissions from transport, energy and other sectors. CAI-Asia was established in 2001 by the Asian Development Bank, the World Bank and USAID, and is part of a global initiative that includes CAI-LAC (Latin American Cities) and CAI-SSA (Sub-Saharan Africa).

Since 2007, this multi-stakeholder initiative is a registered UN Type II Partnership with almost 200 organizational members, eight Country Networks (China, India, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, and Vietnam) and the CAI-Asia Center as its secretariat. Individuals can join CAI-Asia by registering at the Clean Air Portal: www.cleanairinitiative.org. Its flagship event, the Better Air Quality conference, brings together over 700 air quality stakeholders.

LIST OF ABBREVIATIONS

AFTA	ASEAN Free Trade Agreement
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ATM	ASEAN Transport Meeting
BAQ	Better Air Quality
BEE	Bureau of Energy Efficiency (India)
CAFÉ	Corporate Average Fuel Economy
CAMA	Chinese Automotive Manufacturers Association
CBU	completely built up
CNG	compressed natural gas
CO	Carbon monoxide
CO ₂	Carbon dioxide
DIESEL	Developing Integrated Emissions Strategies for Existing Land Transport
EIA	Energy Information Administration of the U.S. Department of Energy
EST	Environmentally Sustainable Transport
EU	European Union
FCAI	Federal Chamber of Automotive Industry (Australia)
FIA	Federation Internationale de l'Automobile
GDP	Gross Domestic Product
GHG	greenhouse gas
HC	Hydrocarbons
HDV	Heavy-duty vehicles
I&M	Inspection and maintenance
ICCT	International Council for Clean Transport
IEA	International Energy Agency
ITF	International Transport Forum
JAMA	Japan Automobile Manufacturers Association
JARI	Japan Automotive Research Institute
KAMA	Korean Automotive Manufacturers Association
LDV	Light-duty vehicles
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
MEET	Ministerial Meeting on Environment and Energy in Transport
MLIT	Ministry for Land, Infrastructure, Transport, and Tourism (Japan)
MoSRT	Ministry of Shipping Road Transport and Highways (India)
NGV	Natural Gas Vehicles
NO _x	Oxides of Nitrogen
OMV	Original Market Value
PM	Particulate Matter
QA/QC	Quality assurance/ quality control
RON	Research Octane Number

STOM	Senior Transport Officials Meeting (ASEAN)
SUV	Sports Utility Vehicles
UNCRD	United Nations Centre for Regional Development
UNECE/WP29	United Nations Economic Commission for Europe Working Paper 29
UNEP	United Nations Environment Programme
US	United States
USD	United States Dollar
VAT	Value added tax
WHO	World Health Organization

Indonesia:

Gaikindo	Association of Indonesia Automotive Industries
MoT	Ministry of Transport
IDR	Indonesian Rupiah

Philippines:

NEECP	National Energy and Efficiency and Conservation Program
PETC	Private Emission Testing Centers
LTO	Land Transportation Office
DAO	Department Administrative Order
SVPCF	Special Vehicle Pollution Control Fund
ASB	Anti-smoke Belching
CFCERT	Committee on Fuel Conservation and Efficiency in Road Transport
GEMP	Government Energy Management Program
NGVPPT	Natural Gas Vehicle Program for Public Transport

Singapore:

GVR	Green Vehicle Rebates
ARF	Additional Registration Fee
FELS	Fuel Economy Labeling Scheme
EPMA	Environmental Protection and Management Act
FEL	Fuel Economy Label
COE	Certificate of Entitlement
PARF	Preferential Additional Registration Fee
NEA	National Environment Agency
LTA	Land Transport Authority

Thailand:

PCD	Pollution Control Department
MNRE	Ministry of Natural Resources and Environment
BoI	Board of Investments

EXECUTIVE SUMMARY

A survey on fuel economy in the Association of South East Asian Nations (ASEAN) was conducted to assist ASEAN and its Member Countries to adopt a pro-active approach to promote fuel economy by establishing a common framework for adopting fuel economy policies and measures. This survey was carried out by the Clean Air Initiative for Asian Cities Center (CAI-Asia Center) and funded by the FIA Foundation in support of the Global Fuel Economy Initiative (GFEI), which aims for an improvement of 50% worldwide by 2050 in average fuel economy (reduction in fuel consumption per kilometer).

Road transport is a key element in the mobility of goods and people. It is also a significant consumer of liquid fossil fuels worldwide and thus a major contributor to the increasing global greenhouse gas (GHG) emissions, especially CO₂, and air pollution. While most OECD countries have put in place vehicle fuel economy standards, China is the only developing country in Asia with such standards. While fuel consumption of individual Southeast Asian countries is small compared to that of China or India, it is significant if considered for Southeast Asia as a whole, and motorization levels (number of vehicles per thousand people) in Southeast Asia will continue to be larger than that of India and China for the next two decades. Moreover, fuel consumption by transport is expected to increase by more than 5% per year until 2030 because of rapid urbanization and economic growth resulting in greater demand for mobility. ASEAN countries increasingly rely on fuel imports, fuel prices are very volatile, and several countries heavily subsidize fuel putting pressure on national budgets. CO₂ emissions are expected to rise equally as fuel use increases. Air pollution, although also depending on the quality of fuel and emission control devices, will also increase. Of these, particulate emissions are of concern because of their health impacts as well as their contribution to global warming because they contain black carbon or “soot”.

The main reasons for fuel economy policies and measures are therefore fuel security and costs, climate change and air pollution. Such policies and measures could lead to up to 16% reductions in fuel and CO₂ emissions if applied to light duty vehicles (LDVs) and up to 26% if applied to both LDVs and high duty vehicles (HDVs). However, the development of fuel economy policies and measures varies largely between ASEAN countries. Thailand is furthest advanced with concrete proposals for such standards for LDVs and will be adding other vehicle types step by step.

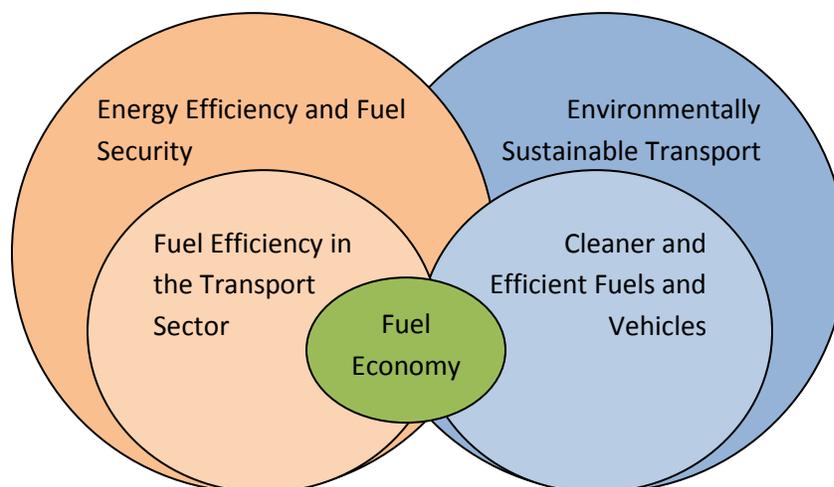
In spite of this, there is support for a common Framework for Fuel Economy Policies and Measures in the ASEAN, as witnessed by the various transport initiative and declarations by the ASEAN or with ASEAN representation and based on interviews with government officials from different ASEAN countries. The ASEAN could provide a platform for its Member Countries to help each other improving fuel economy while respecting individual countries' preference for certain policies and measures and timelines. The ASEAN can also provide a stronger voice to vehicle/engine manufacturers to adopt fuel economy standards, where individual countries are less able to do so, especially those with only vehicle assembly but no manufacturing.

The development of such a framework should

- Be linked to or placed into context of other policies and efforts on fuel, vehicles, energy, climate change and air pollution, as shown in the figure. One important reason is that fuel economy policies

and measures currently do not rate as highly in the agenda of government ministries as compared to alternative fuels and emissions management.

- Engage, at the country level, the various government agencies involved in setting policies for fuel, vehicles, energy and the environment, including transport, energy, environment, and finance ministries.
- Carefully select the body within ASEAN to lead the framework development, and other national agencies from ASEAN member countries to be involved at the ASEAN level to streamline the development of policies and measures, including at least the government agency that takes the lead in the respective ASEAN country on fuel economy for vehicles. Initial discussions on fuel economy could start with the ASEAN Senior Transport Officials Meeting (STOM) since most of the ASEAN Member Countries have acceded to some international declarations promoting fuel efficiency in the transport sector like the MEET and the EST Forum.
- Involve other stakeholders, in particular vehicle manufacturers, to ensure the smooth passage of fuel economy policies and measures, particularly standards and vehicle labeling programs.
- Facilitate awareness raising, knowledge sharing and capacity building between ASEAN countries and develop common guidelines on fuel economy policies and measures including the use of fiscal measures, and on the linkages between fuel economy and environmental issues. Input should be sought from especially China, Japan, the European Union, and the United States, to fast track the adoption and improve the quality of fuel economy policies and measures in ASEAN countries.
- Include a pilot study of how fuel economy policies and measures can be integrated and implemented in the transport plans of ASEAN countries.
- Address technical issues and other barriers, such as lack of data and quality control, perceived conflict with biofuels policies, enforcement issues with imported cars, purchaser consideration of fuel efficiency, and limited experience and capacity within government.
- Be supported by a concrete steps in the form of an Action Plan.



Fuel Economy in the context of Energy Efficiency and Sustainable Transport

1. INTRODUCTION

1.1 Background

Road transport is a key element in the mobility of goods and people. It is also a significant energy end-use sector worldwide and thus a major contributor to the increasing global greenhouse gas (GHG) emissions as well as air pollutant emissions. The entire transport sector consumes nearly 60% of the world's petroleum supply (IEA, 2008) and contributes approximately 25% of the world's energy-related GHG emissions (Ribeiro et al., 2007). According to the IEA, road transport accounts for almost 80% of the total energy demand from transport. Rapid shifts from the patterns of energy use in the transport sector towards fuel economy are much needed as the sector is expected to grow robustly in the coming decades.

The share of transport in the demand for liquid fuels is projected to increase more rapidly than any other end-use sector in the next 25 years. Developing countries are expected to contribute significantly to the projected increase in the transport sector energy demand growth where transportation energy use increases by an average of 2.7% annually from 2006-2030, whereas the average energy use growth rate in developed countries is 0.3% annually (EIA, 2009). China, India and other Asian developing countries, particularly the major ASEAN countries are expected to account for almost half of the increase in world GDP and 27% of world transport liquids consumption by 2030 (EIA, 2009).

China and India, the two main countries to contribute significantly to fuel consumption increase in the transport sector, have already taken steps in terms of formulating and adopting fuel economy standards. China put in place fuel economy standards in 2005 with the aim to reduce China's dependence on foreign oil and to encourage the entry of more fuel-efficient vehicles into the Chinese market (ICCT, 2009). India is currently in the process of developing mandatory fuel economy standards.

The Association of South East Asian Nations (ASEAN) and its Member Countries also contribute substantially to fuel consumption increase in the transport sector because of a surge in urbanization and rapid economic growth, resulting in greater demand for mobility. Based on estimated growth scenarios, the ASEAN motorization levels (number of vehicles per thousand people) will continue to be larger than that of India and China for the next two decades (see Figure 2).



Figure 1. The ASEAN Member Countries

According to the 2nd ASEAN Energy Demand Outlook (2009), the final energy consumption in ASEAN will grow at an average annual rate of 3.9% from 343 MTOE in 2005 to 901 MTOE in 2030 with the transportation sector experiencing the highest growth in consumption of 5.1 percent annually, corresponding to an equivalent growth in CO₂ emissions.¹

Fuel economy policies and measures will provide an opportunity for policy makers to reduce fuel consumption, providing savings for both importing and non-importing countries, and contributing to fuel security. In addition, such policies and measures will contribute to reducing CO₂ emissions from the transport sector. If no measures are taken immediately, emissions of both criteria air pollutants and GHGs will increase exponentially as a result of the increased demand for mobility and energy in the ASEAN region.

1.2 Objectives and Scope

Building on the discussions and recommendations from the Better Air Quality (BAQ) 2008 pre-event “Fuel Economy: Towards a Global Framework” supported by the FIA Foundation on behalf of the Global Fuel Economy Initiative (GFEI)², the survey aims to provide a basis for the ASEAN and its member countries to adopt a pro-active approach to promote fuel economy by establishing a common framework for adopting fuel economy policies and measures in support of the goals of the GFEI.

The survey also aims to inform the ASEAN and its member countries and as well as international organizations and development institutions on the status of fuel economy policies and measures in the ASEAN region. While the survey focuses on improving fuel economy of conventional light-duty vehicles, other transport modes like 2-wheelers and heavy-duty vehicles also play an important role. Other issues raised by

¹ 2nd ASEAN Energy Demand Outlook. March 2009

² The proceedings are available on the BAQ 2008 website (www.baq2008.org/preevent-fuels)

stakeholders in the ASEAN relate to alternative fuels, fuel quality and vehicle emissions management are intrinsic to the discussion of promoting fuel economy policies and measures. The survey also provides possible next steps on how fuel economy policies and measures can be implemented in the ASEAN and its member countries.

This survey is implemented in the context of the Global Fuel Economy Initiative launched by the FIA Foundation, International Energy Agency (IEA), International Transport Forum (ITF), and United Nations Environment Programme (UNEP) to facilitate large reductions of GHG emissions and oil use through improvements in automotive fuel economy.³ The objective of the GFEI is to promote further research, discussion and action to improve fuel economy worldwide and develop policy engagement strategies in each region.

The GFEI targets an improvement of 50% worldwide by 2050 in average fuel economy (reduction in fuel consumption per kilometer). Fuel economy is defined in the “50 by 50: Global Fuel Economy Initiative Report” as fuel consumption per kilometer. Improving fuel economy or reducing the fuel consumed per kilometer can be achieved through different sets of measures including improvement in vehicle efficiency, using more efficient fuels and changing behavior – e.g. promoting eco-driving.

The GFEI work will be practical, and focused on making a real difference - from working with governments in developing policies to encourage fuel economy improvement for vehicles manufactured, assembled or sold in their countries, to supporting regional awareness initiatives that provide consumers and decision makers with the information they need to make informed choices.

The activities of the GFEI include the following:

- Development of improved data and analysis on fuel economy around the world, monitoring trends and progress over time and assessing the potential for improvement.
- Work with governments to develop policies to encourage fuel economy improvement for vehicles produced or sold in their countries and to improve the consistency and alignment in policies across regions in order to lower the cost and maximize the benefits of improving vehicle fuel economy.
- Work with stakeholders including auto makers to better understand the potential for fuel economy improvement and solicit their input and support in working toward improved fuel economy.
- Support regional awareness initiatives to provide consumers and decision makers with the information they need to make informed choices.

³ See www.50by50campaign.org for more information

2 RATIONALE FOR FUEL ECONOMY POLICIES AND MEASURES IN THE ASEAN

As the ASEAN gears towards further development, it faces several transport-related challenges such as increasing demand for mobility and higher motorization, traffic congestion, higher fuel consumption. Unless averted, this will be accompanied by further shift from lower carbon intensive modes such as public transport and non-motorized transport to more carbon intensive motorized transport. Moreover, as the GDP per capita increases, a further shift from small cars and two wheelers to larger cars and SUVs will further compound negative transport externalities. There is a need to reconcile the increased desire for personal mobility and trade in order to reduce these transport externalities and to sustain the auto-manufacturing industries in the ASEAN region.

Fuel economy standards are being promoted worldwide as an effective means of reducing oil consumption and carbon and air pollutant emissions. In the IEA's 2009 report "Transport, Energy and CO₂", a review of fuel economy policies in selected countries and regions shows that implementation of progressively tighter mandatory fuel efficiency standards for LDVs has proven instrumental in achieving steady and rapid technology uptake while avoiding increases in vehicle size, weight and power, which erode the fuel savings provided by the technologies.⁴ These selected countries include the United States (Corporate Average Fuel Economy Standards or CAFE), Japan (established its fuel economy standards under its "Top Runner" energy efficiency program), the European Union, Korea, Canada, and China. Chapter 4 of the IEA report, entitled "Light-duty vehicle efficiency: policies and measures", captures the various experiences and the status of common measures to improve fuel efficiency in these countries and regions, such as regulatory standards, voluntary targets, financial incentives and improved consumer information.

This section summarizes relevant issues faced by the ASEAN and its member countries.

2.1 Motorization

Motorization in ASEAN countries is the main driver for transport externalities. Figure 2 shows the estimated growth in the total number of vehicles vis-à-vis the motorization index (number of vehicles per 1000 people) in selected countries and regions. It shows that compared to China and India, the motorization levels in major ASEAN countries will be higher until 2035. The ASEAN's motorization index will nearly double from 150 to approximately 327 by 2025 indicating that there would be major fleet renewal and expansion in the coming years. This influx of new vehicles makes it imperative that vehicle fuel economy measures are designed efficiently. Increasing motorization has become a major concern in many ASEAN cities as it continues to weigh on their carrying capacity of transport systems and on general urban development.

Figure 3 shows the growth of motor vehicles by mode for six ASEAN countries. Current estimates show that if the reference scenario prevails in the future, the vehicle increase will mostly come from motorcycles, but also from personal cars and light-commercial vehicles, in descending order.

⁴ OECD/ IEA, 2009. Transport, Energy, and CO₂. Available: <http://www.iea.org/w/bookshop/add.aspx?id=365>

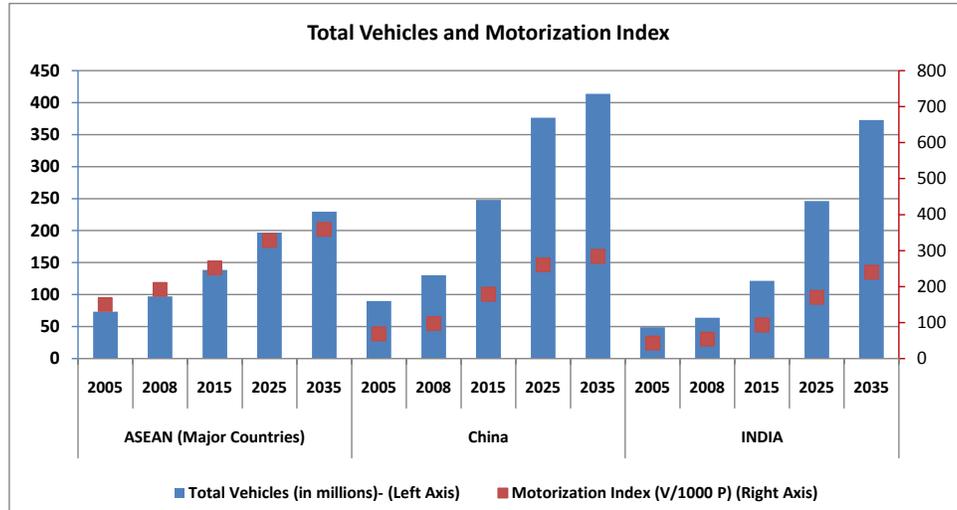


Figure 2. Motorization Index in ASEAN, China, and India

Note: ASEAN = Association of Southeast Asian Nations; ASEAN countries included are Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam.

Source: Asian Development Bank and Clean Air Initiative for Asian Cities. 2009.

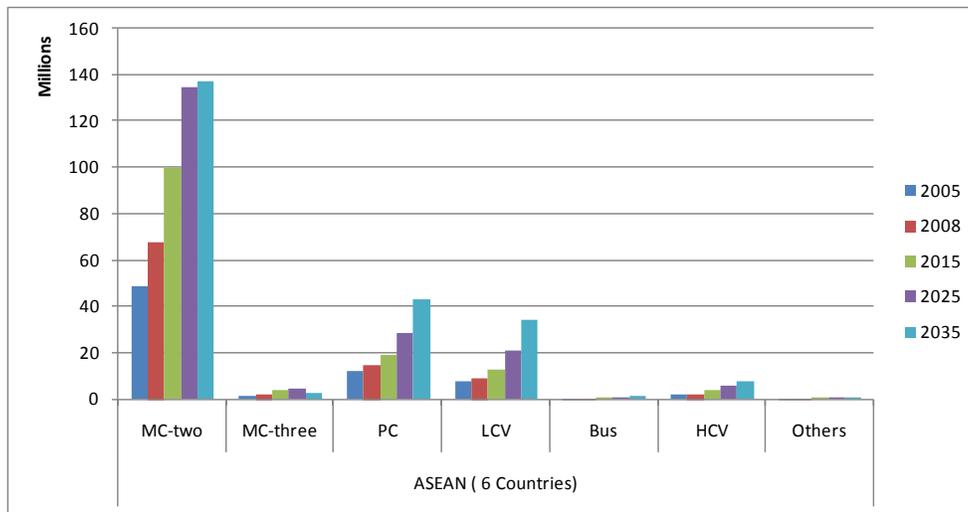


Figure 3. Growth of Motor Vehicles per Mode for 6 ASEAN Countries (Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam)

Notes:

MC-two = Motorized motorcycles

MC-three = Motorized three-wheelers

PC = Personal cars

LCV = Light commercial vehicles

HCV = Heavy commercial vehicles

Source: Asian Development Bank and Clean Air Initiative for Asian Cities. 2009.

Further to information on vehicle growth from Figures 1 and 2, new vehicle sales in the ASEAN market

(Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam) totaled 1.87 million units in 2007 and reached 2 million units in 2008. About 86% of the total sales in 2008 were produced by JAMA member companies and their ASEAN counterparts (JAMA, 2009).⁵

With continued economic growth and increasing cooperation and collaboration amongst ASEAN nations, the region is seen to play an increasingly important role in the global automobile market. In strengthening the automobile market while promoting sustainable mobility, the ASEAN is moving towards the abolition of regional tariffs, harmonization of automotive technical regulations, mutual recognition of certification, streamlining of customs procedures and distribution systems, fostering of supporting industries and human resources, promotion of safety, greater environmental protection, and other strategies (JAMA, 2008)⁶. According to the JAMA (2009), the establishment of AFTA (ASEAN Free Trade Area) is nearing completion and there is a significant progress towards the creation of ASEAN Economic Community (AEC).

2.2 Energy Security and Fuel Savings

Energy use in the transportation sector is an important issue in ASEAN countries especially during times of high oil prices. The key to energy security is the sustained supply of energy at affordable prices. The Asia Pacific Energy Research Centre defines energy security as “the ability of an economy to guarantee the availability of energy resource supply in a sustainable manner, with the energy price being at a level that will not adversely affect the economic performance of the economy” (APERC 2007). This definition is deemed more relevant in the context of Asia and the Pacific because it links energy security to two related fields: economy and environment (ADB, 2009).⁷

As shown in Figure 4, the road transport sector has an increasing share of total energy consumption in ASEAN countries. As this trend continues the impact of fuel use from the transport sector on energy security will also become increasingly significant.

⁵ Japan Automobile Manufacturers Association (JAMA), 2009. Powering up hand-in-hand: Partnership in the Auto Industry between ASEAN and Japan. Available: http://www.jama-english.jp/asia/publications/pamphlets/hand_in_hand_2009.pdf

⁶ Japan Automobile Manufacturers Association (JAMA). 2008. Hand-in-hand: Partnership in the Auto Industry between ASEAN and Japan

⁷ ADB. 2009. Improving Energy Security and Reducing Carbon Intensity in Asia and the Pacific <http://www.adb.org/Documents/Books/Improving-Energy-Security-Reducing-Carbon-Intensity/Improving-Energy-Security-Reducing-Carbon-Intensity.pdf>

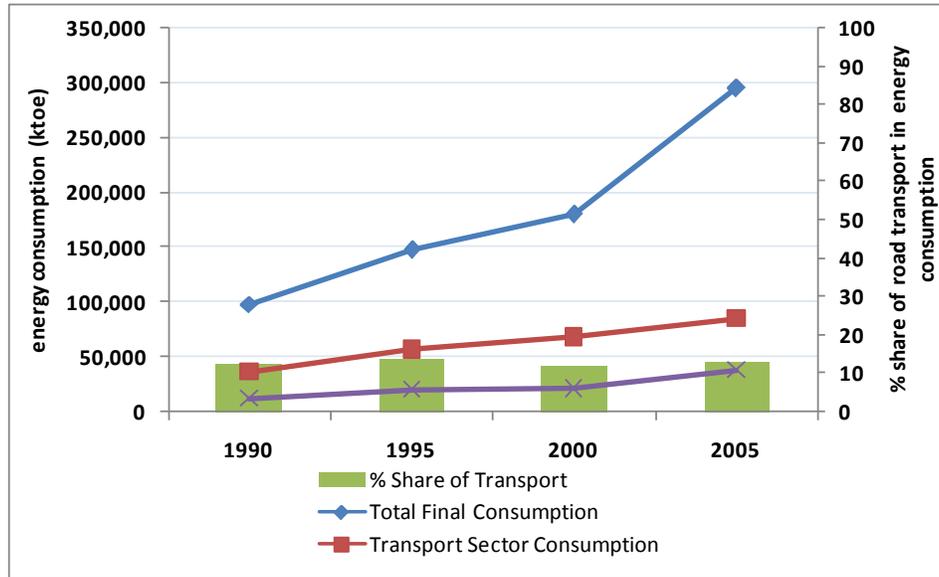


Figure 4. Energy Consumption from Transport in ASEAN

Note: Data is taken from the APEC Energy Database, Figures include data for Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam.

Figure 5 shows the import of petroleum products by selected ASEAN Economies. Except for Thailand, for most of the ASEAN countries fuel imports increased from 1990 to 2006. Since 2004 the dependence on imported crude oil exceeds indigenous production in the ASEAN region (Figure 6). This will put pressure on the ability of ASEAN governments to use financial resources for national development as these are also needed for importing crude and processed oil.

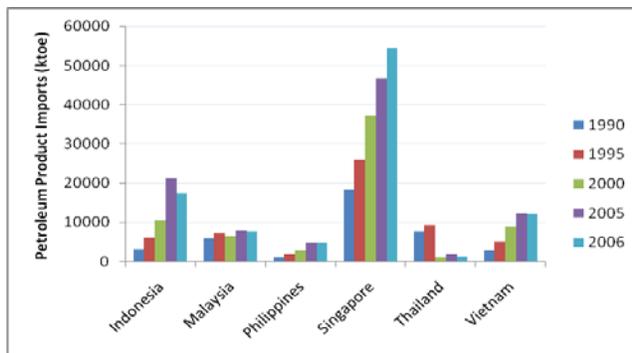


Figure 5. Petroleum Imports of Selected ASEAN Countries

Note: Data was taken from the APEC Energy Database

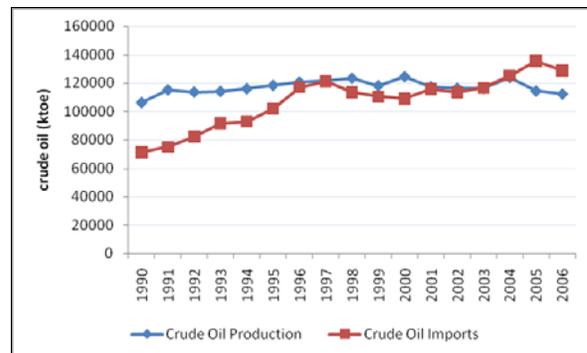


Figure 6. Crude Oil Imports in ASEAN

Note: Data was taken from the APEC Energy Database. Data for Indonesia, Malaysia, Philippines, Singapore, Thailand, Singapore and Vietnam are included in the graph.

Given the volatility and the generally increasing global oil prices, ASEAN nations should implement fuel economy standards to help alleviate dependence on imported crude oil and petroleum products. Even though new technologies based on non-conventional transport fuels are continuously being developed, these alone will not reduce dependence on imported fuel in the near term. Better vehicle fuel economy will substantially contribute to a more efficient use of conventional transport fuels.

Figure 7 shows the projected fuel consumption and costs related to fuel economy improvement of 35% for light-duty-vehicles and heavy-duty vehicles in 2035. Results show about 25% fuel cost savings compared to BAU for diesel and gasoline

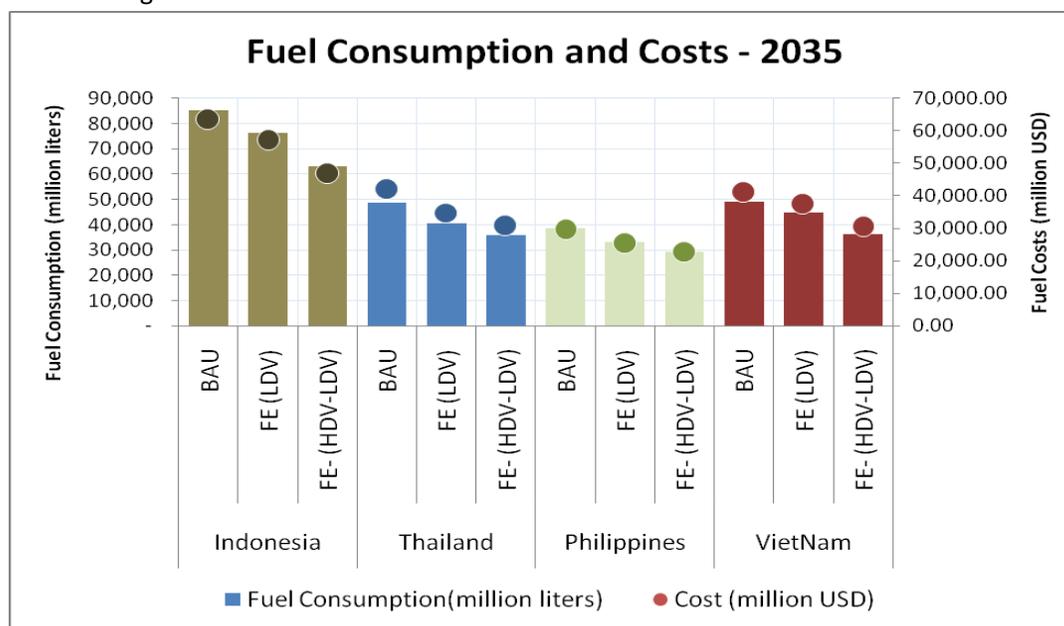


Figure 7. Total diesel and gasoline fuel consumption and costs in 2035 under a business-as-usual scenario

Note:

BAU = Business-as-usual

FE (LDV) = Fuel economy improvement for light-duty vehicles only

FE (HDV) = Fuel economy improvement for light-duty and heavy-duty vehicles

2.3 CO₂ Emissions from Fossil Fuel Combustion in the Transport Sector

The IEA estimated that, in 2006, the transport sector accounted for 23% of the world’s carbon dioxide (CO₂) emissions and 13% of global GHG emissions. Although the share of CO₂ emissions attributable to transport sector of developing countries is currently low, emissions are expected to increase by 45.6% between 2005–2030.⁸ Unlike traditional air pollutants that can be controlled at the ‘tail-pipe’, CO₂ emissions can only be controlled by reducing fuel consumption. In order to understand the potential emission reductions by

⁸ See Bellagio Declaration on Transportation and Climate Change. Available: http://www.sutp.org/bridgingthegap/downloads/cornie/Bellagio_Declaration_on_Transportation_and_Climate_Change-Final.pdf

improving fuel economy, the CAI-Asia Center as a part of this survey conducted a rapid assessment using existing fleet data available in various countries. It is noted that many ASEAN countries are yet to standardize fuel consumption surveys and derive local emission factors, which may significantly affect computations. The basic assumptions adopted in the computation are in line with FIA 50/50 assumptions:

- i. 2020- 20% improvement in stock average (on-road) efficiency, reflecting both the improvements in new car fuel economy (with some lag time for stock-turnover) and additional measures such as eco-driving, improved aftermarket components, better vehicle maintenance, etc.
- ii. 2030- 35% improvement in stock, roughly trailing new car improvements plus on-road improvement measures.
- iii. 2050- 50% (50 by 50: the Ultimate Goal) improvement in global stock average fuel economy, following the new car improvement in 2030 and with in-use improvement measures.

Furthermore, the fleet was segregated into gasoline and diesel-fueled vehicles (neglecting alternative fuels) and the improvement was initiated in 2012.⁹ As shown in Figure 7, the impact of fuel economy on LDVs is more pronounced in Thailand and Philippines because of the number of LDVs and the current and estimated vehicle-kilometer traveled (VKT) from these LDVs. The CO₂ reductions in 2035 range from 8% (Vietnam) to 16% (Thailand and Philippines). CO₂ estimates for Vietnam are relatively low because of the proliferation of motorcycle use and shorter trips. The CO₂ reductions from fuel economy measures for LDVs are relatively low compared to developed countries because the VKT of LDVs in developing countries is lower.

It is interesting to note that when fuel economy of LDVs and HDVs are taken together that the CO₂ reductions increase to 26-27% by 2035. The VKT of HDVs in the ASEAN region is substantial because of trip number and length. Most HDVs, particularly long-haul trucks and urban delivery trucks and vans, also have lower fuel efficiency because of vehicle age and poor maintenance practices. This means that fuel economy policies for HDVs will have a relatively large impact and it is thus preferred that fuel economy policies cover both LDVs and HDVs would be preferred.

The timing and severity of implementing new fuel economy standards are seen as important factors in maximizing the impacts of these standards. The ASEAN fleet renewal rate is a matter of debate as many engines are “transferred” during their usage life to other vehicles. Assuming an approximate life of fifteen years, even with rapid influx of new “efficient” vehicles, inefficient vehicles would dominate the fleet for several years. As seen in Figure 7, the introduction of fuel economy standards in 2012 may result in complete fleet renewal (conservative estimates) only in 2027. For this reason, an early introduction of standards for new vehicles is critical.

⁹ Estimating the impacts of fuel economy policies and measures are difficult as it depends on various issues – like type of vehicle sold, on road interaction, maintenance, location of use, type of operation etc. The analysis included only the improvement of fuel economy for LDVs.

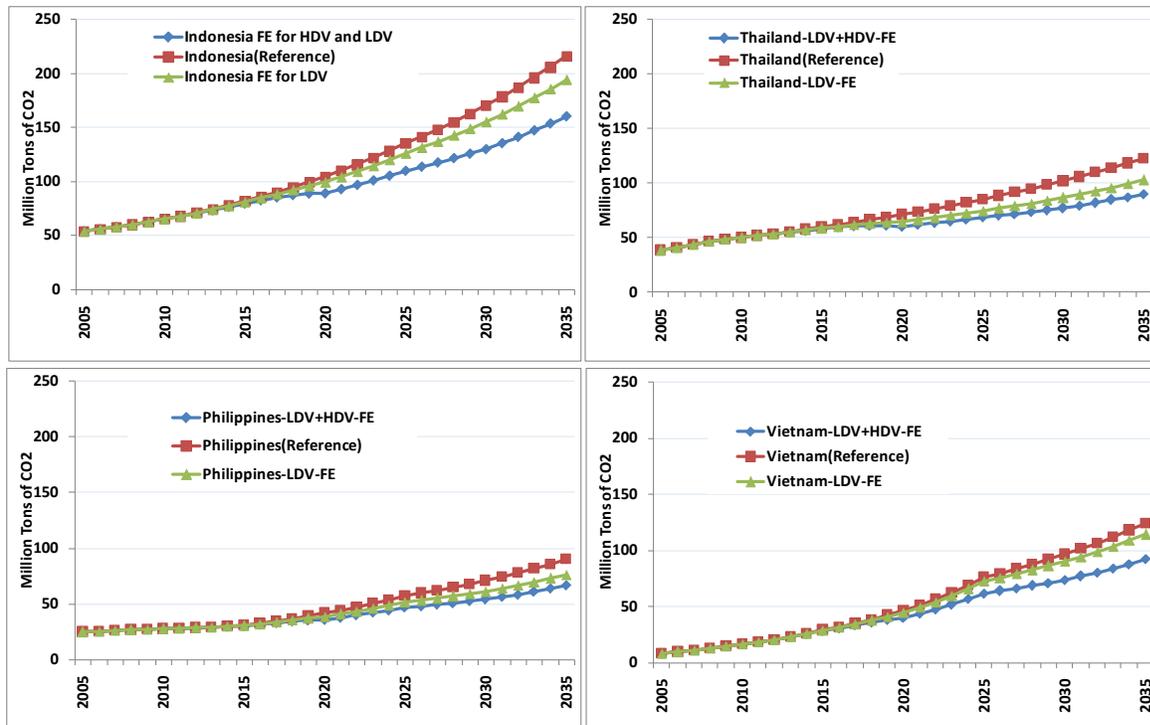


Figure 8. Impact of Fuel Economy Standards in selected ASEAN countries on CO₂ emissions

2.4 Air Pollution

Urban air pollution is a significant issue in many developing countries, including ASEAN countries. High concentrations of criteria air pollutants such as particulate matter (PM) pose a serious concern for public health. The World Health Organization (WHO) estimates that 531,000 premature deaths occur annually in developing Asian countries due to air pollution.¹⁰

Road transport is not only a significant contributor to GHG emissions but also to criteria air pollutant emissions. There is a variety of measures that governments can take to abate air pollution from road transport, like developing roadmaps for implementing vehicle emissions standards. Figure 9 shows the current and planned vehicle emissions standards for new LDVs in selected ASEAN countries. Fuel economy measures can be integrated in a wider set of measures i.e. vehicle emission standards, alternative fuel vehicles promotion, and strengthening inspection and maintenance standards.

Fuel economy explicitly tries to improve the efficiency of fuel combustion, and as inefficient fuel combustion causes more air pollution, better fuel economy contributes to the overall reduction of air pollutant emissions,

¹⁰ Kryzanowski. M. 2006. Why we need better air quality. Keynote presentation delivered at BAQ 2006 in Yogyakarta, Indonesia 13-15 December 2006. Available: <http://www.cleanairnet.org/baq2006/1757/propertyvalue-26669.html>

albeit marginally. Experience from the US (Greene et. al, 1994) suggests that the CAFÉ standards in the US have resulted to significant reductions of hydrocarbon emissions.¹¹

Country	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Indonesia												Euro 2									
Malaysia			Euro 1													Euro 2		Euro 4			
Philippines									Euro 1			Euro 2						E4			
Singapore ^a	Euro 1					Euro 2															
Singapore ^b	Euro 1					Euro 2					Euro 4										
Thailand	Euro 1					Euro 2			Euro 3							Euro 4					
Viet Nam												Euro 2									

Figure 9. Emission Standards for New Light-Duty Vehicles

Notes: Italics – under discussion; a – gasoline; b – Diesel;

Source: CAI-Asia. 2009 March. Emission standards for new vehicles (light duty). Available: http://www.cleanairnet.org/caiasia/1412/articles-58969_resource_1.pdf

2.5 Economic impacts

The global price of crude oil has been steadily increasing in the past several years. This steady price increase has had negative implications on ASEAN economies and has been a significant driver of fuel subsidy increases.

Figure 10 compares the primary total energy consumption with GDP per capita. It shows how larger ASEAN countries are still at the lower end of energy consumption and GDP per capita. In contrast, Figure 10 shows that subsidies can be as high as 70% of the fuel price. Considering the increasing share of the transport sector on energy consumption as shown in Figure 3, this will increasingly become an important issue for most ASEAN countries.

¹¹ Greene, D. et.al. 1994. Motor-vehicle fuel economy: The forgotten hydrocarbon control strategy? Available: <http://www.sciencedirect.com/science/article/B6VG7-466FHB8-5/2/0a11c5a08226c7e9c33b9447fb4bcd67>

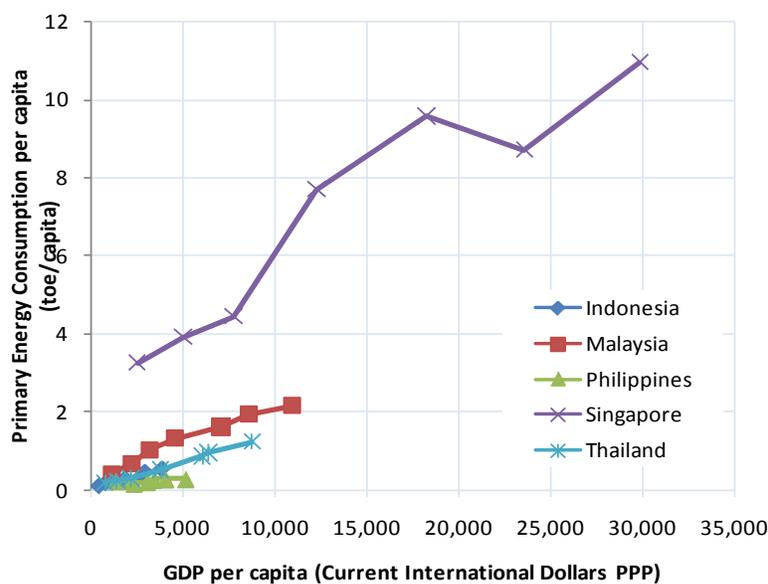


Figure 10. Total Energy Consumption and GDP per Capita in Selected ASEAN Countries

Note: Data was taken from the BP Statistical Review 2009 and from the UN Data Explorer website

Increased fuel subsidies hamper the ability of governments to fund other programs, including those directed towards improving the lives of the poor. Consumers who benefit from these subsidies are usually the middle and high-income classes of society. In Indonesia, for example, as much as 40% of high-income families benefit from 70% of the fuel subsidies, while 40% of the lowest income families benefit from only 15% of subsidies¹². Table 1 provides information on food and fuel subsidies of selected ASEAN countries in 2008.¹³ The Philippines and Thailand have deregulated markets for gasoline and diesel and therefore only targeted subsidies for public transport are provided. The table suggests that the fuel subsidies in Indonesia and Malaysia amounted to 2.9% and 2.5% of GDP respectively in 2008. In contrast, food subsidies amounted to 0.2% and 0.7% in Indonesia and Malaysia respectively.

With high oil consumption and subsidies, fuel economy policies and measures can contribute to the government’s efforts in energy conservation and liberalizing the pricing of fuel, thus allowing for more investments in other key sectors, like education and health.

Table 1. Fuel and Food Subsidies in selected ASEAN Countries in 2008

% of GDP	Total Subsidy	% of Total Expenditure	Fuel	Food	Remarks
Malaysia	3.3%	13%	2.6%	0.7%	Based on prices after June 2008 hike
Indonesia	2.9%	13.7%	2.7%	0.2%	Fuel prices were raised in late

¹² See Central Bank of the Republic of Indonesia. In one of the Indonesian government press releases in 2008, the government acknowledged that with the price of crude oil being at USD 120/barrel for 2008, the fuel subsidy will exceed Rp 200 trillion. Available: <http://www.bi.go.id/web/en/Publikasi/Investor+Relation+Unit/Government+Press+Release/Fuel+Subsidy.htm>

¹³ United Overseas Bank Quarterly Global Outlook 3rd Quarter 2008

% of GDP	Total Subsidy	% of Total Expenditure	Fuel	Food	Remarks
					May 08
Philippines	3.6%	4.3%	0.2%	3.4%	Fuel subsidy for public transport sector for 3 months starting April 2008, and cut import duties on oil
Thailand	0.9%	2.5%	0.8%	0.1%	Diesel subsidy for 3 months ending July 2008, subsidy for rice farmers to raise production
Singapore	0	0	0	0	

Source: UOB, 2008

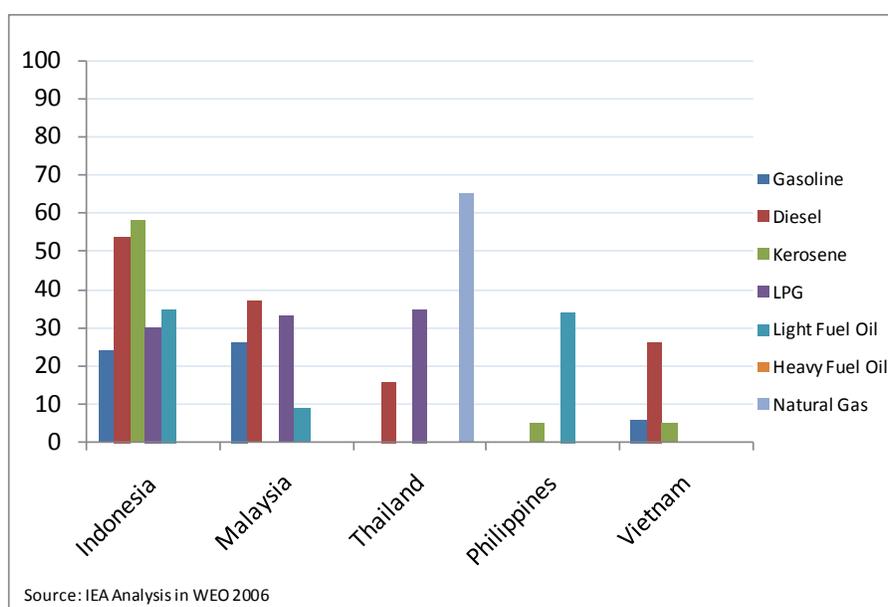


Figure 11. Consumption Subsidy as % of Reference Energy Price in Selected ASEAN Countries in 2005

Source: IEA Analysis in World Energy Outlook 2006

3 BRIEF REVIEW OF FUEL ECONOMY STANDARDS AND CO-BENEFITS

3.2 Review of Fuel Economy Standards

Over the years, many countries have initiated different fuel economy schemes. Figure 12 compares the initiatives, proposals and standards on an “equal basis”¹⁴ and shows that Japan and Europe lead in restricting the growth of emissions through fuel economy. However, strengthening standards in China may result in the highest reductions in CO₂, considering the sheer growth of vehicles in China in the next decade.

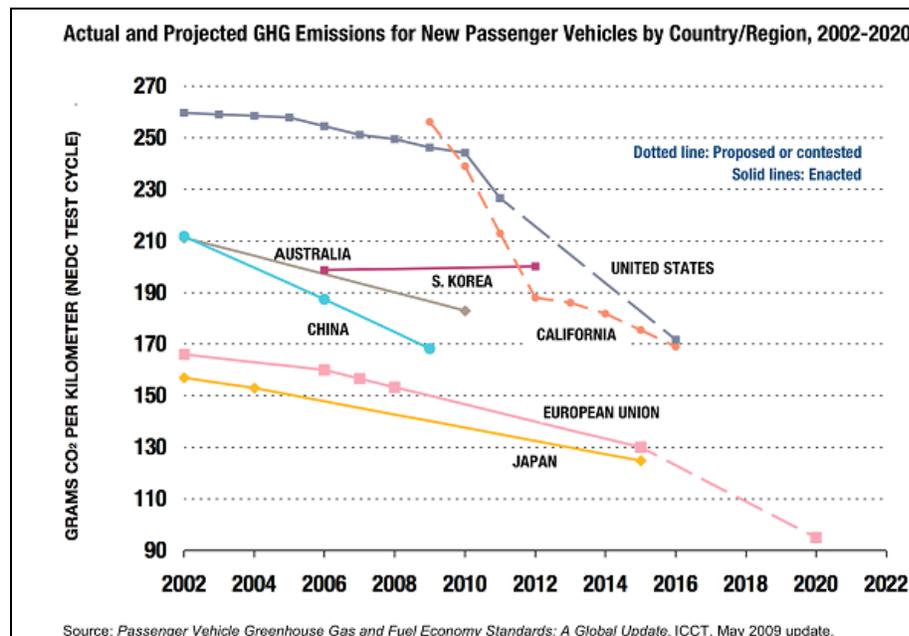


Figure 12. Actual and Projected CO₂ Emissions for New Passenger Vehicles by Country/Region, 2002-2020

Source: ICCT¹⁵

The success and failures of these various schemes provide useful case studies for the ASEAN. Table 2 gives examples, borrowing insights from leading institutions and researchers.¹⁶ A comprehensive review of these various experiences and policies are provided by IEA¹⁷.

¹⁴ When comparing different countries, it is important to normalize the drive cycles. Different countries have different driving behaviors, road types and location and topography. Though, different test cycles are used in U.S., E.U. and Japan, EU NEDC is preferred by many countries¹⁴. Interesting to note is that UN-ECE/WP29 is looking at harmonized test cycle

¹⁵ See http://www.theicct.org/documents/ICCT_PVStd_May09.ppt

¹⁶ The complete list of documents for detailed reading can be found at <http://www.cleanairnet.org/caiasia/1412/propertyvalue-26861.html>

¹⁷ Transport, Energy, and CO₂ study of the IEA (2009), Chapter 4, Light-duty vehicle efficiency: policies and measures

Table 2. Brief overview of experiences from selected fuel economy initiatives

Country/Region	Summary
Australia	The Federal Chamber of Automotive Industry first established voluntary fuel economy standards for new vehicles sold in Australia in 1978. In 2003, FCAI members committed to a voluntary target of 6.8L/100km for petrol passenger cars by 2010. This represents an 18% improvement in the fuel efficiency of new vehicles between 2002 and 2010.
Canada	Canada has a long history of voluntary agreements with the auto industry, which the government and industry initiated in the late 1970s to avert legislation. The initial program was designed to provide information on fuel consumption rates to consumers, and to improve the fuel efficiency of new vehicle fleets. In November 2007, a law was passed to enhance the Canadian federal government’s authority to regulate vehicle fuel efficiency, and regulations will take effect in 2011. The new mandatory fuel standards for cars and light trucks will be harmonized with current and future US fuel regulations aimed at curbing carbon emissions.
China	China’s National Development and Reform Commission announced in 2004 that it would introduce mandatory fuel efficiency standards for passenger cars. The standards are initially classified into 16 categories based on vehicle weight. Standard values are set for each category. In addition, there are different standard values for manual transmissions and automatic transmissions. Compared with the Japanese regulation, which also has weight based categories, the Chinese standards tend to be more stringent for heavier passenger cars than lighter ones. Many consider the Chinese standards to be the third most stringent globally. Interesting to note is that it does not differentiate based on fuel, but by weight. In 2006, excise tax on vehicles to provide a stimulus for sales of small-engine vehicles. In 2009, China announced that it will target a fleet wide average of 42.2 miles per gallon by the year 2015. In June 2010, the government approved subsidies for 16 car manufacturers to produce fuel efficient cars. Per car, 3,000 yuan will be granted if it is proven that they save at least 20% fuel.
European Union	In 1998/1999, the EU reached a voluntary agreement with the European Automobile Manufacturers Association, JAMA and KAMA to work towards a target of 140 g CO ₂ /km for passenger cars. Reports suggest that emissions from the average new car sold reached 163 g CO ₂ /km in 2004. Since the measure had limited success, in June 2007, the Council of Environment Ministers formally adopted a resolution on mandatory targets for passenger cars of 120 g CO ₂ /km by 2012. This target would be met through an “integrated approach”, whereby car manufacturers would achieve 130 g/km through technical improvements in vehicles and engines and the remaining reduction of 10 g/km would be achieved through other measures.
India	India’s fuel economy standards are taking longer to develop because of institutional arrangements. In 2007 the Bureau of Energy Efficiency (BEE) and the Petroleum Conservation Research Association raised the idea of fuel economy standards in India. Government departments debated on which department should take the lead and whether India should develop CO ₂ based standards or should have mandatory or voluntary fuel labeling scheme. After the Prime Minister’s office intervention, it was decided that implementation of mandatory fuel economy standards and fuel efficiency labeling for cars are needed to strengthen India’s energy security. The Bureau of Energy Efficiency (BEE), an autonomous energy regulator under the Ministry of Power, were given the responsibility to develop the standards and labels. The Ministry of Shipping Road Transport and Highways (MoSRTTH) will enforce these regulations. In January 2010, the Ministry of Environment and Forests announced that mandatory fuel efficiency standards will be introduced by the end of December 2011.
Japan	Regulatory “Top Runner” standards and the mandatory display of energy efficiency values were enabled in 1998. The standards have been introduced for LDVs (1999), LPG vehicles (2003) and

Country/Region	Summary
	HDVs (2006). It is also mandatory to ensure labeling of vehicles. The standards can be considered as effective as there is a strong disincentive for the customers in the form of progressively higher taxes levied based on the gross vehicle weight and engine displacement of automobiles when purchased and registered.
South Korea	The Average Fuel Economy program and fuel economy rating identification of motor vehicles were introduced in 2005. The reference average fuel economy standards are 12.4 km/l for vehicles with engine displacement of 1500cc or less, and 9.6 km/l for displacement exceeding 1500cc. Fuel economy standards were set for domestic cars in 2006 and imported cars in 2009 if sales are less than 10,000. If sales of imported cars exceed 10,000 then these must meet US CAFÉ standards
United States	The US unveiled revamped national policy aimed at both increasing fuel economy and reducing greenhouse gas pollution for all new cars and trucks sold in the United States in May 2009. The new standards, covering model years 2012-2016, and ultimately requiring an average fuel economy standard of 35.5 mpg in 2016, are projected to save 1.8 billion barrels of oil over the life of the program with a fuel economy gain averaging more than 5 percent per year and a reduction of approximately 900 million metric tons in greenhouse gas emissions. This would surpass the CAFE law passed by Congress in 2007 required an average fuel economy of 35 mpg in 2020. In May 2010, announcements were made by the US government on introducing stricter fuel economy requirements for trucks.

Sources: IEA (2008), and other research and news reports

From the perspective of the developing Asian countries, it is perhaps most relevant to look at the scheme employed by China and the benefits that arose from it. Calculations show that China will conserve around 2.3 billion liters (equivalent of 1.7 million tons) of gasoline per year after the implementation of its fuel economy standards.¹⁸ In 2006 alone, avoided gasoline consumption was about 1.3 billion liters. Moreover, gasoline demand was cut by almost 2% with expense savings due to avoided gasoline purchase equivalent to about 10 billion RMB. It is interesting to note that this improvement was made against international market trends (such as increasing vehicle weight and power) and tightening environmental and safety standards. These savings from fuel economy improvements would rise over time as motorization levels in Chinese cities continue to rapidly increase.

It can be expected that the developments of fuel economy standards as well as technological developments in vehicle manufacturing in China will influence the development of standards, the adoption of more fuel efficient technologies and thus the overall fleet fuel economy in ASEAN countries. As China is a major trade partner of ASEAN, China will also affect the ASEAN vehicle fleet through export of Chinese made cars to ASEAN countries. This is less the case for India as standards are yet to be mandated, however, technological developments, especially with regards to the Nano car by TATA as this is a small affordable car that is relatively fuel efficient, will likely be of influence to fuel economy developments in the ASEAN.

3.3 Co-benefits of Fuel Economy

Although fuel savings would provide co-benefits such as reduced air pollution, the extent of co-benefits would depend on of the stringency of fuel economy standards and incentives provided. As the ASEAN is tightening its fuel quality and vehicle emissions standards, it would be helpful if the member countries try to

¹⁸ Oliver, H.H., et al., 2009. China's fuel economy standards for passenger vehicles: Rationale, policy process, and impacts. *Energy Policy* (2009), doi:10.1016/j.enpol.2009.06.026.

link air pollution mitigation efforts with fuel economy initiatives. This could result in faster adoption of fuel economy policies and measures and would allow for maximization of air pollution reduction.

The DIESEL project¹⁹ quantified the emission factors for Bangkok and derived benefits for various policies. It showed that simple measures influencing inspection and maintenance and preventive maintenance can reduce both air pollutants and GHG emissions. Including inspection and maintenance policies to supplement fuel economy policies is particularly important as many researchers have observed significant drops in fuel economy values over the period of usage.

It can be argued that the co-benefits of fuel economy measures may not be substantial (or even that there may be little rebounds due to improper implementation) from a traffic congestion, noise pollution and road safety perspective. However, considering the high potential impact of fuel economy on vehicle purchase choice, if “incentives” provided to buy fuel efficient cars (e.g. subsidies and taxes) are linked with low emission cars, the benefits will be maximized. Another argument to link fuel economy policies with fuel quality and vehicle emissions policies is to address the concern that particulate matter, NO_x and other emissions would increase if drivers decide to drive more because the reduced fuel costs per km driven makes this affordable. Finally, as the ASEAN fuel market is volatile and imperfect as described earlier, designing fuel economy standards in conjunction with broader fuel policies most importantly in the form of reduced fuel subsidies, would allow financial savings to be directed to social programs such as education and health.

From the ASEAN region, some of the best examples for promoting co-benefits of fuel economy measures are found below. Other examples in ASEAN Countries are provided in Annex 2.

- **Promoting Green Vehicles in Singapore** – To encourage the purchase of hybrid and compressed natural gas (CNG) vehicles a Green Vehicle Rebate (GVR) was introduced in 2001. The GVR was further enhanced in December 2005, providing green vehicles an Additional Registration Fee (ARF) rebate of 40% of the Open Market Value (OMV) of the car, up from 20%. Since the enhancement of the rebate, which is valid until 2009, the number of green vehicles has increased substantially from about 140 in 2005 to more than 1500 by end of 2007. The resulting change in fleet composition has a major impact on fuel economy and air pollutant emissions.
- **Eco car in Thailand** – An “Eco car” meets minimum pollution standards of Euro 4 or higher and emitting no more than 120 g CO₂/km. To promote the sales of fuel efficient cars, the Ministry of Finance put in place a tax incentive scheme which reduces the excise tax rate on standard passenger cars that meet fuel-efficiency criteria, and qualify as eco cars. Starting from October 2009, the excise tax rate for eco cars was cut from 30% to 17%. Cars eligible for the 17% tax rate must have an engine size of not more than 1,300 cc for gasoline engines and not more than 1,400 cc for diesel engines.

¹⁹ Developing Integrated Emission Strategies for Existing Land Transport (DIESEL). See http://www.cleanairnet.org/caiasia/1412/article-48845.html#h2_11

4 THE ASEAN AND ITS TRANSPORT INITIATIVES

The ASEAN, as a bloc, is strengthening its transport and environment cooperation with international and regional organizations and also among its member countries. Increasingly, ASEAN countries are looking at the transport issue from a holistic perspective.

Fuel economy provides a unique opportunity for ASEAN member countries to learn from existing policies, institutional arrangements and strengthen the emission measurement knowledge and capacity. This section describes the key institutional and policy frameworks that exist in the ASEAN region.

The Association for Southeast Asian Nations (ASEAN) was formed in August 1967 as a mechanism to promote regional cooperation in Southeast Asia. Transport has been one of the key sectors discussed by governments under ASEAN since its establishment. The initial framework for improving the transport regional infrastructure was established during the period 1999-2003 by the ASEAN Transport Cooperation, which focused on the development of the trans-ASEAN transportation network, finalization of the ASEAN transport facilitation agreements, capacity building programs, policy-development projects and studies, and mutual sharing of best practices and experiences.

Environment was, however, not an important part of the initial discussions in ASEAN on transport. However it received major impetus during the Ninth ASEAN Transport Ministers (ATM) Meeting in Yangon (2003) which formulated the **Transport Policy Agenda for 2005-2010**. One of the actions in the Transport Policy Agenda stated that: "*Environmentally sustainable regional transport strategies, including accession to the relevant international conventions and protocols, promotion of environmental-friendly transportation technology and transportation modes.*"²⁰

ASEAN, at the 13th ASEAN Summit in Singapore (2007), adopted the **ASEAN Declaration on Environmental Sustainability**.²¹ This declaration recognized the adverse impacts of climate change caused by global emissions of greenhouse gases, particularly to the developing countries. The declaration emphasized that the ASEAN would, amongst others:

- Work through bilateral, regional and global partnership to promote the development and transfer of low carbon technologies including cleaner and climate friendly technologies.
- Work with international financial and development cooperation institutions to encourage innovative financing options to stimulate investment in climate-friendly technology and development.

ASEAN representatives, along with other international delegates participated in the fourth regional Environmentally Sustainable Transport (EST) forum in Seoul in 2009, organized by the United Nations Centre for Regional Development (UNCRD). The meeting contributed to the **Seoul Statement** which suggested to:

²⁰ ASEAN Transport Action Plan 2005-2010. Available: <http://www.aseansec.org/16596.htm>

²¹ ASEAN Declaration on Environmental Sustainability. Available: <http://www.aseansec.org/21060.htm>

“address transport issues with the broader environmental aims of green growth to encompass the transport-energy-carbon emission nexus, from energy consumption to the emissions and climate change perspectives.”

It is noted that the **Ministerial Declaration on Global Environment and Energy in Transport** (16 January 2009), which included representatives from all ASEAN countries, committed to combating climate change by various measures, which included encouraging fuel economy standards. The declaration stated that:

“Improve fuel/energy efficiency of motor vehicles, railways, and domestic aircraft and ships, through approaches such as: introducing fuel efficiency or GHG emission standards and improving vehicle components, noting IEA’s energy efficiency policy recommendations and its development of energy efficiency indicators; strengthening international cooperation to develop and harmonize procedures for testing fuel efficiency or measuring GHG emissions through the UNECE/WP29 and other regional or international forum ; and facilitating, as appropriate, the introduction of energy-saving equipment and advanced technologies into ports and other transport facilities” ²²

In the subsequent follow-up during the Senior Officials Meeting on Global Environment and Energy in Transport (June 2009), the delegates observed the importance of properly valuing the co-benefits of transport projects such as air quality improvement, energy savings, economic efficiency, security and safety. The Meeting emphasized and shared the importance of the “Avoid-Shift-Improve” framework to grasp and formulate sustainable transport policies.²³

During the Fourteenth ASEAN Transport Ministers (ATM) Meeting in Metro Manila²⁴, the Ministers highlighted that the rapid urbanization and motorization in ASEAN has put a heavy strain on the health, mobility and safety of the population. In this regard, the Ministers affirmed the importance of pursuing sustainable transport programs to improving road safety and energy efficiency and thus reduce fuel consumption and emissions in the transport sector. The Ministers stressed the need for concerted multi-sectoral collaboration and partnerships among government institutions, private and business sectors and civil societies as well as relevant international organizations.

The Sixth ASEAN and Japan Transport Ministers Meeting held in Manila (2008) proposed a development of action plan on environment improvement measures in the transport sector. In October 2009, an ASEAN-Japan Meeting on the proposed Environmental improvement Action Plan was convened to discuss the possible assistance and policy measures that Japan and the ASEAN can pursue to achieve low-pollution and low-carbon transport systems.

²² Ministerial Declaration on Global Environment and Energy in Transport . Available: http://www.mlit.go.jp/kokusai/MEET/documents/Ministerial_Declaration.pdf

²³ Senior Officials Meeting on Global Environment and Energy in Transport. Available: http://www.mlit.go.jp/kokusai/MEET/MEETFUM_en.html

²⁴ Joint Ministerial Statement of the Fourteenth ASEAN Transport Ministers (ATM) Meeting. Available: <http://www.aseansec.org/22055.htm>

5 SUMMARY OF FINDINGS

There are varying levels of maturity in the development and implementation of fuel and vehicle policies and measures, including fuel economy in the ASEAN member countries. While air pollution and energy security are the primary concerns in the ASEAN, there is an increasing awareness on the need to include climate change considerations in policies.

This section provides a summary of discussions and research on issues related to fuel, vehicle, and energy, policies and measures and their inter-linkages with fuel economy. This also includes the discussion on the perception of ASEAN policymakers and government officials on fuel economy policies and measures. Annex 1 provides information at the country level for selected ASEAN countries.

5.1 Fuel Economy in the Context of Other Fuel, Vehicle, and Energy Issues

The discussion on fuel economy policies and measures needs to be linked to other fuel and vehicle policies as well as energy policies. This is mainly because fuel economy policies and measures currently do not rate as highly in the agenda of government ministries as compared to alternative fuels and emissions management. As such, the introduction of fuel economy policies and measures, particularly the setting of standards, will need to be complementary to or at least not undermine other energy and emissions-related policies and programs of the ASEAN Member Countries. For example, if vehicles were not able to meet proposed fuel economy standards, or if they used fuel mixes including biofuels that are being promoted separately, then this could increase resistance to such standards. Similar resistance could occur if the development and implementation of fuel economy standards for new vehicles would delay efforts to strengthen fuel quality and vehicle emissions standards, or weaken other efforts to reduce fuel use and emissions from existing vehicles.

Most ASEAN Countries have introduced standards that regulate emissions of motor vehicles and fuel quality because of the growing air pollution problem in major and secondary cities. This was the result of a combination of international and local initiatives starting from the late 1990s to early 2000, which lobbied with national governments to establish such standards to protect public health. Figure 7 showed the current and planned vehicle emissions standards in selected ASEAN countries, which are based on the Euro standards for light-duty vehicles. ASEAN countries have also aggressively adopted policies promoting the use of biofuels for transportation and most countries already have a biofuel mix in conventional gasoline and diesel.

The ASEAN and its Member Countries have also increasingly dealt with energy issues. In 1999, the ASEAN Centre for Energy (ACE) in 1999 was established as a successor to the 10-year old ASEAN-EC Energy Management Training and Research Centre. ACE oversaw the development of the ASEAN Energy Demand Outlook with support from the Japanese government. Its major programs included the Energy Supply Security Planning and the Promotion of Energy Efficiency and Conservation.

In several instances, the pressure from increasing fuel prices and dwindling supply are more potent initiators for change. During the high fuel prices in mid-2007 to early 2008, the development and enactment of the Biofuels Law and Renewable Energy Law was fast-tracked in the Philippines. In the same time period, most

taxis in Metro Manila shifted to LPG as fuel. The Thai Ministry of Energy has also developed policies to promote the use of biofuels (ethanol, biodiesel, biogas) to reduce dependency on imported oil and create employment/economic opportunities within Thailand for producing biofuels. Other alternative fuels (LPG/CNG) are also promoted under these policies.

5.2 Multiple Government Institutions Regulate Fuel, Vehicle, and Energy Issues

As is common in developed countries, there are often several different government agencies involved in setting and developing standards related to fuels, vehicles and energy. For example, transport ministries may be responsible for eco-driving measures and energy ministries for fuel efficiency and conservation measures. The implication is that there may be difficulties aligning policies and efforts within individual countries to promote fuel economy standards because of the number of government agencies that needs to be involved. Moreover, it will differ per country in the ASEAN as to which government agency will take the lead in the development of fuel economy for vehicles. This means that the selection of agencies from ASEAN member countries to be involved in any effort at the ASEAN level to streamline the development of policies and measures needs to be carefully thought through.

The ASEAN could benefit from experience elsewhere, including Australia, Canada, China, the European Union, South Korea, and the United States. The potential to gain co-benefits of fuel economy in terms of CO₂ and air pollution reduction is high, as witnessed by examples from Singapore and Thailand explained in the previous section.

Table 3 provides an overview of the various government agencies involved in the development and setting of standards on vehicle emissions standards and fuel quality in the different ASEAN member countries. It also includes agencies responsible for setting of tariffs and taxes for vehicles and as well as fuel taxes and subsidies. There are various agencies involved in the development and setting of standards related to vehicle emissions and fuel quality, but most of the time the environment agencies take the lead in emissions standards while the energy agencies take the lead in fuel quality. In all cases, there is a need to include the finance agencies early on, as they would be instrumental in endorsing or blocking proposed standards.

Table 3. Overview of National Ministries/Departments leading Vehicle and Fuel Related Policies

Development				
ASEAN Countries	Vehicle Emissions Standards	Fuel Quality	Vehicle Tariffs/ Taxes and Fuel Subsidies/ Taxes	Energy Efficiency and possibly Fuel Economy
Indonesia	Environment	Energy	Finance	Energy
Malaysia	Environment	Energy	Finance	Energy
Philippines	Environment	Energy	Finance	Energy
Singapore	Environment	Environment	Finance	Environment
Thailand	Environment	Energy	Finance	Energy
Vietnam	Transport	Environment	Finance	Transport

5.3 Varying Status of Fuel Economy Policies and Measures in ASEAN Member Countries

Table 4 lists main developments in the ASEAN on fuel economy for vehicles in the ASEAN. More details on vehicle and fuel taxes/subsidies are provided in Annex 3.

The development of fuel economy policies and measures varies largely between ASEAN countries. Thailand is furthest advanced with concrete proposals for such standards for LDVs and will be adding other vehicle types step by step. Most other countries are considering standards but have yet to start developing these.

Table 4. Main Developments on Vehicle Fuel Economy Policies and Measures in the ASEAN

ASEAN Countries	Fuel Economy Policies and Measures
Indonesia	<ul style="list-style-type: none"> • Eco-driving practices for public transport fleet being pursued • No fuel economy standards as of 2010 • Initial cost-benefit analysis conducted on improving transport fuel efficiency as part of a World Bank Study
Malaysia	<ul style="list-style-type: none"> • No fuel economy standards as of 2010
Philippines	<ul style="list-style-type: none"> • Department of Energy undertaking fuel economy measures like promoting eco-driving and conducting fuel economy runs (testing of fuel use of commercial passenger cars by running a pre-selected route and distance) • No fuel economy standards as of 2010
Singapore	<ul style="list-style-type: none"> • Launched a voluntary Fuel Economy Labeling Scheme in 2003 to provide fuel economy information to buyers • No fuel economy standards as of 2010
Thailand	<ul style="list-style-type: none"> • A Royal Decree for highly efficient vehicles based on the Japanese “top-runner” approach drafted by the Department of Energy Development and Alternative Energy • Timing of legislation is expected to take 2 years • No fuel economy standards as of 2010
Vietnam	<ul style="list-style-type: none"> • Interest in developing fuel economy policies for motorcycles in 2011 • No fuel economy standards as of 2010

5.4 Need to involve Vehicle Manufacturers and other Stakeholders

In order to ensure the smooth passage of fuel economy policies and measures, particularly standards and vehicle labeling programs, there is a need to involve vehicle manufacturers at an early stage. Other stakeholders like the academic and research institutes, NGOs, and other experts also need to be involved as it is expected that policy lobbying and technical aspects will become a major hurdle in institutionalizing fuel economy standards.

The following issues were raised in the discussions with various ASEAN government agencies on the concerns that vehicle manufacturing groups have raised

- Fuel economy standards may cause difficulties in selling cars. If people do not know about fuel efficiency of engines/vehicles then it is easier to sell the car
- Manufacturers that produce fuel efficient models will have less efficient models that will be harder to sell
- There is a general sentiment that the market is not yet mature enough to understand that fuel economy ratings are based on laboratory conditions and with controlled-environment, and that the actual fuel consumption is largely dependent on the vehicle condition, road condition, driving habits, etc.
- Vehicle labeling campaign is not preferred because a car is sold on the basis of a km/l basis but the actual km/l will be lower because of driver behavior, road quality, idling in slow traffic, etc. A possible solution is not to put a number for km/l on the car but only a ranking/rate, e.g. like the stars on appliances and engines achieving high efficiency performance standards would receive extra recognition
- Car manufacturers from Japan and US where models are newer tend to export, manufacture or assemble older/less efficient models in developing countries (Note that EU cars are imported but not manufactured or assembled in Thailand)
- It will be harder to influence vehicle manufacturers for which cars are assembled within the countries but car components (including the engine) are manufactured elsewhere
- The costs associated with testing and test facilities and whether these will be covered by car/engine manufacturers (Note that it takes about 2 years to change engine manufacturing processes if engines don't meet the minimum standards)
- There are some threats from car manufacturers to move to China or other countries if fuel economy standards are introduced.

5.5 Consideration of Technical Issues and other Barriers

There will be a need to further develop the knowledge base on fuel economy policies and measures including the use of fiscal measures. In addition, the linkages between fuel economy and environmental issues will also need to be clearly understood and acknowledged by governments and other stakeholders. The development of "common methodologies" or "guidelines" to give the ASEAN and its member countries a clear guidance on how to develop their own fuel efficiency policies and measures are also needed.

Some of the perceived technical issues and other barriers in implementing fuel economy policies and measures raised by various stakeholders are the following:

- Lack of basic statistical data necessary to set regulation and to assess the regulatory impact
- Perceived conflict with other policy objectives like biofuels – i.e. having lower calorific values and thus engines running on biofuels or a fuel mix containing biofuels would be less fuel efficient. It is noted that each engine is tested with a standard fuel, therefore if one engine has a higher efficiency than another engine then this will remain the same if biofuels mix is tested. However, resistance from government could come if fuel economy standards are perceived to work against the introduction of biofuels (e.g. if the public becomes more aware of fuel efficiency of biofuels versus

conventional fuels). It is noted that this would not happen with LPG/CNG as these fuels are more efficient compared to gasoline/diesel.

- Fuel efficiency is not considered in car purchase choice. A survey of people in Bangkok found that people are aware of the safety features and energy use of different cars, but that the decision on which car to buy is made for different reasons. This is why public awareness raising is important in the campaign phase of implementation. Availability of the most advanced technical information of and the cooperation by industries is needed.
- In several cases, economic incentives to promote the sale of cars with more fuel efficient engines have not yet been considered (but could be considered in the implementation of the law). Thailand PCD is developing a “Green Vehicle Program” that would identify green/efficient cars, i.e. providing a carrot not a stick, which is based on vehicle size and weight and provides tax incentives for smaller / lighter cars.
- Reliability of test results
 - Engines are tested for one standard fuel for diesel or gasoline only, i.e. no tests are done for different fuel qualities. Tests are also not conducted for different fuel mixes, e.g. ethanol mixed in with gasoline.
 - Engine performance will depend on the car model/brand in which it is installed, i.e. the engine is not tested in combination with each car model/brand in which it is installed.
 - TISI law requires that tests are conducted in Thailand (with a few exceptions if testing is really not possible in Thailand). Each engine is only tested once.
 - It is not clear what kind of test methodologies should be employed for testing fuel economy of vehicles. Because most vehicles and also in terms of vehicle production are Japanese, it may be that testing methodology will be close to that of Japan.
- Control at the borders especially with importation of second-hand/ used cars.

6. A COMMON FUEL ECONOMY FRAMEWORK FOR THE ASEAN

The rationale behind implementing fuel economy policies and measures is that they contribute towards improved fuel security and reduced oil imports and costs. In addition, resulting reductions of air pollution and CO₂ emissions also play a major role. Implementing fuel economy policies and measures can be argued as one of the “low-hanging fruits” that countries could easily pick in order to address issues related to fuel security, air pollution, and GHG emissions.

This section further outlines the support for a common Framework for Fuel Economy Policies and Measures in the ASEAN, criteria this framework should meet, a possible framework structure, and a proposed Action Plan to establish the framework. It builds on this survey as well as recommendations made at the event “Fuel Economy: Towards a Global Framework”, which was held as a pre-event to the Better Air Quality 2008 conference in Bangkok (see <http://www.baq2008.org/preevent-fuels>).

6.1 Support for a Fuel Economy Framework under ASEAN

Government officials and other stakeholders were largely in favor of the development of a common framework for fuel economy. Main comments included:

- The ASEAN will be important for the region to establish harmonized policies between Member Countries that will be important for trade between countries
- The ASEAN can provide the platform to facilitate and accelerate the introduction of fuel economy policies and measures in Member Countries
- ASEAN can also serve as a “catchment” where other organizations and international development institutions contribute to assist the ASEAN and its member countries in its fuel economy efforts
- Fuel economy can also be integrated better in the various institutional frameworks that already exist at the regional or sub-regional level relevant to ASEAN countries, such as the MEET and the EST Forum (see section 6)
- The ASEAN can provide a stronger voice to vehicle/engine manufacturers to adopt fuel economy standards, where individual countries are less able to do so, especially those with only vehicle assembly but no manufacturing
- Countries should retain the right to make individual choices in adopting specific policies and measures and the timing of their implementation.
- There is no clear body within the ASEAN that could lead this effort. Some suggested the ASEAN Senior Transport Officials Meeting (STOM) but others suggested that energy or industry ministries are more appropriate.

6.2 Criteria that a Fuel Economy Framework should meet

Based on findings in section 7 and the BAQ pre-event on fuel economy, the development of a Fuel Economy Framework should:

- Be linked to or placed into context of other policies and efforts on fuel, vehicles, energy, climate change and air pollution. Figure 13 shows the position of fuel economy issues based on the various fuels, vehicles, and energy policies and measures in the ASEAN region and the current international initiatives. The fuel economy bubble is slightly towards the energy efficiency and fuel security bubble because it can be argued that in the context of the ASEAN, fuel economy policies and measures are higher in the agenda of policymakers and other stakeholders compared to environmentally sustainable transport. However, both policies complement each other and in some cases goes hand-in-hand.
- Engage, at the country level, the various government agencies involved in setting policies for fuel, vehicles, energy and the environment.
- Carefully select the body within ASEAN to lead the framework development, and carefully select other national agencies from ASEAN member countries to be involved at the ASEAN level to streamline the development of policies and measures, including at least the government agency that takes the lead in the respective ASEAN country on fuel economy for vehicles. .
- Facilitate awareness raising, knowledge sharing and capacity building between ASEAN countries and develop common guidelines on fuel economy policies and measures including the use of fiscal measures, and on the linkages between fuel economy and environmental issues. Input should be sought from especially China, Japan, the EU, and the USA, to fast track the adoption and improve the quality of fuel economy policies and measures in ASEAN countries.
- Include a pilot study of how fuel economy policies and measures can be integrated and implemented in the transport plans of ASEAN countries.
- Involve other stakeholders, in particular vehicle manufacturers, to ensure the smooth passage of fuel economy policies and measures, particularly standards and vehicle labeling programs
- Address technical issues and other barriers described in section 7.5
- Be supported by a concrete steps in the form of an Action Plan

Table 5 below summarizes the points above in a model for the development of a Fuel Economy Framework.

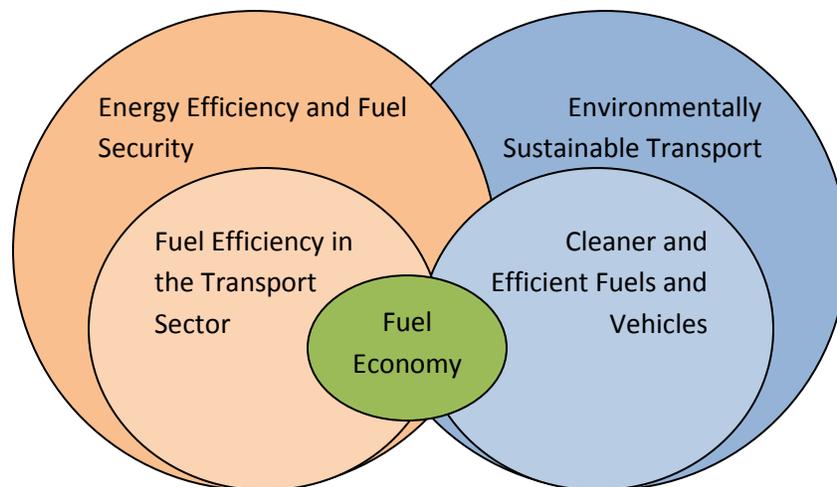


Figure 13. Fuel Economy in the context of Energy Efficiency and Sustainable Transport

Table 5. Model for Development of a Fuel Economy Framework

	First Tier	Second Tier
ASEAN bodies	Senior Transport Officials Meeting <i>(proposed)</i>	Others to be determined, in particular relating to energy and the environment
National Government	Agency that takes the lead in fuel economy	Agencies involved in setting policies for fuel, vehicles, energy and the environment
Stakeholder involvement	Car manufacturers	Vehicle manufacturers, oil/fuel companies, academic and research institutions, NGOs, other experts
Vehicles	LDV / cars	Trucks, buses, motorcycles
Policies and measures	Fuel economy	Link to other policies for fuel, vehicles, energy and the environment
Assistance	Awareness raising, knowledge sharing, capacity building, and pilot study for at least 1 ASEAN country	Financing and other assistance needed to implement fuel economy policies and measures

6.3 Organization within ASEAN

The establishment of a common framework for fuel economy policies and measures in the ASEAN has to be wholly owned by the ASEAN body and the member countries in order for this to be sufficiently implemented. Although fuel economy issues include various topics and involve various ministries, it is envisaged that the initial organization of the framework falls under the auspices of the Senior Transport Officials Meeting (STOM). The main reason is that most of the ASEAN Member Countries have acceded to some international declarations promoting fuel efficiency in the transport sector like the MEET and the EST Forum. Other relevant or equivalent ASEAN bodies for energy and environment will also need to be involved at a later stage in order to link efforts on these issues. Despite the fact that different agencies are responsible for fuel economy developments in different ASEAN countries, the integration into national transport policies and link to other transport related policies (fuel quality, vehicle emissions, alternative/biofuels) will be essential. This is also in line with the support of the ASEAN STOM to multi-lateral agreements such as the Global Declaration on Environment and Energy in Transport and the Kyoto Declaration on Environmentally Sustainable Transport of the United Nations Centre for Regional Development (UNCRD).

International organizations and development institutions can then properly liaise with the ASEAN STOM in strengthening and supporting the development of the common framework for fuel economy policies and measures in the ASEAN. The involvement of other key stakeholders, such as vehicle manufacturers, is tantamount to development of the common framework.

Annex A. Selected ASEAN Member Country Profiles

1. Indonesia

a) Vehicle Emission and Fuel Quality Standards

There are several relevant policies in Indonesia which pertain to vehicle road worthiness and vehicle emissions. Indonesia's Act No. 14 (1992) on Road Traffic and Transport states that in order to prevent air and noise pollution, every motor vehicle must meet emission and noise standards. The newly enacted Act No. 22/2009 which replaces the Act No. 14/1992 on Traffic and Road Transportation is the legal basis for the management of land transportation, including the control of vehicle emissions. The Act stipulates that the vehicle emission test is an integral part of the roadworthiness test. Hence, the responsibility for vehicle emission testing lies with the transportation office, not with the environment office.

It is also important to note that local governments are allowed to develop and apply their own standards as long as they are at least as stringent as the national ones, under the Government Regulation No. 41 (1999). The Decree allows provincial governments to set regional vehicle emission standards, industrial emission standards and ambient air quality standard that are more stringent than or at least equivalent to the national standards. However, city governments have no authority to issue either emission standards or ambient air quality standards.

For new vehicles, government regulations mandate that new vehicles sold in Indonesia must comply with the Euro 2 standard starting January 2005. However, this regulation became effective in January 2007 with the phase out of leaded gasoline. According to the Chairman of the Association of Indonesia Automotive Industries (Gaikindo), all new gasoline vehicles and motorcycles sold in Indonesia complied with the Euro 2 standard in 2007²⁵.

Exhaust gas emission test is part of vehicle roadworthiness test (Government Regulation No. 44/1993 currently being revised following the enactment of new Act. No. 22/2009 on Traffic and Road Transport). The question on which agency – environment or transport – has the authority to conduct emission test for in-use vehicles arose because of the different interpretations of the Government Regulation No. 44/1993 Article 148 which states that only certain vehicle categories such as bus, goods vehicle, specialized vehicle or commercial vehicle are required to undergo a periodic roadworthiness test every 6 months. While for other vehicle categories (passenger car and motorcycle), the need for a roadworthiness test will be covered by a separate Government Regulation which has yet to be issued.

b) Fuel Subsidies

The Indonesian Government has a policy of subsidizing the cost of transportation fuel since 1967.²⁶ Until the 1980s, there was still an oil surplus in Indonesia and fuel subsidies were directed at helping the poor, thus subsidies were considered as both manageable and beneficial. However, due to the rapid increase in

²⁵ Association of Indonesia Motorcycle Industries (AISI) 2008

²⁶ Harbrinderjit Singh Dillon, Tara Laan and Harya Setyaka Dillon. 2008. Biofuels - At what Cost? Government support for ethanol and biodiesel in Indonesia One of a series of reports addressing subsidies for biofuels in developing countries

motorization, coupled with the indiscriminate targeting of the fuel subsidies between poor and non-poor people, fuel subsidies have taken their toll on the government and the society in general. In 2008, for example, the government officially stated that the fuel subsidy is mainly consumed by those who are not targeted by the program, as 40% of high income families' benefit from 70% of the subsidy, while 40% of the lowest income families only benefit only 15%.²⁷ -

In 2008, fuel subsidies in Indonesia were estimated to be equivalent to 2.9% of the total GDP of the country.²⁸ Approximately 67% of the total fuel subsidies in Indonesia go to subsidizing transportation fuel.²⁹ In the same year, the Indonesian Government implemented a compensation program which included a direct cash assistance component which amounted to Rp 14.1 billion which benefited 19.1 million families to alleviate the burden of the rise in fuel prices to the Indonesian society.

The Indonesian government has been trying to counter the economic implications of their fuel subsidies through price increases. In October 2005, the Indonesian government was forced to raise fuel prices by 126% because of the rapid increase in fuel prices.³⁰ In May 2008, the government made a bold announcement of its plan to reduce fuel subsidies and its consideration of resorting to further fuel price increase as a final alternative. The reason was that after raising fuel prices by 28.7% earlier that year, Indonesian fuel prices are still far lower than the other ASEAN nations such as the Philippines, Thailand and Singapore. In July 2010, the Finance Ministry stated that it is considering the allocation of additional fuel subsidy because of the overshoot in actual consumption from the targeted levels during the first half of 2010.³¹

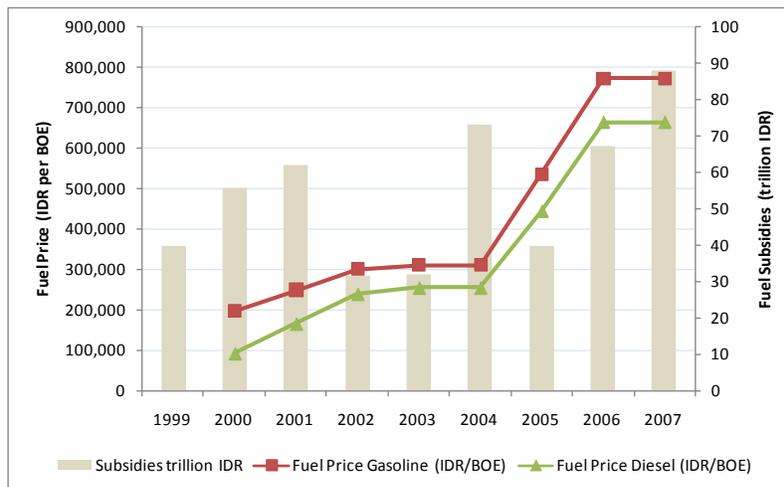


Figure 14. Fuel Subsidies vs Fuel Price in Indonesia³²

²⁷ Coordinating Ministry for Economic Affairs, Republic of Indonesia. 2008. Government Explanation On The Reduction Of Fuel Subsidy And Other Related Policies.

²⁸ United Overseas Bank. 2008. Asia: Inflation Risks Sharply Higher as Countries Grapple with Expensive Fuel Subsidies.

²⁹ Taken from a presentation of Ms. Dollaris Riauaty Suhadi, Project Manager of Swisscontact Indonesia and Ms. Linda Krisnawati, Head of the Alternative Fuels Development of the Ministry of Environment at the FIA side event at the Better Air Quality Workshop held in Bangkok last November 2008.

³⁰ Oxford Business Group. 2006. Emerging Malaysia 2006. Oxford Business Group.

³¹ Suharmoko, A. 2010, The Jakarta Post. Available: <http://www.thejakartapost.com/news/2010/07/08/govt-likely-increase-fuel-subsidy-minister.html>

³² The fuel subsidies data was taken from Dillion, et. al, 2008. The fuel prices are taken from the Handbook of Energy and Economics Statistics of Indonesia.

c) Vehicle Taxes and Tariffs

Tariffs on completely built-up (CBU) passenger vehicles are dependent on the engine displacement and ranges from 65% to 80% while a 45% tariff is applied to CBU commercial vehicles and tariff rates range from 5% to 40% for CBU pickup trucks and buses depending on engine size. Tariffs on non-passenger car kits are fixed at 25% and auto components and parts imported for local assembly of passenger cars and minivans are fixed at 15%.

There is also a vehicle acquisition luxury tax which is based on engine size in Indonesia. There is also a 10% value added tax (VAT) over and above the luxury tax.³³ Second-hand imported vehicles and automotive parts are prohibited in Indonesia.

In August 2009, the Jakarta city administration has announced its intention to implement a progressive taxation system on motor vehicle ownership whereby the ownership of more than one motor vehicle will be subject to a progressively increasing tax rate. The Jakarta city administration has requested the Home Affairs Ministry to study to assess the feasibility of applying the said system to the whole country to avoid the loophole of registering the vehicles outside of Jakarta just to avoid the additional taxes.

d) Proposed Fuel Economy Standards

No fuel economy standards have been implemented yet.

e) Other Measures

As part of the national energy saving program, MoT distributed more than 2,000 gas converter kits since 2006 to taxi and public microbus operators in cities where CNG supply is available. The program promotes shift of high usage public vehicles from gasoline to gas. CNG has been used as a transport fuel in Jakarta and other cities since the 1980s, reaching its peak during 1997-2000 but then continuing to decline up to the present.

More than 500 dated two-stroke three-wheelers (bajaj) of 14,000 targeted in Jakarta have been scrapped and replaced by new compressed natural gas (CNG) three-wheelers. The program was initiated by the city government of Jakarta in collaboration with the bajaj operators association and Bajaj Auto Ltd. which sell CNG bajajs on credit financing scheme to bajaj owners. To ensure the phase-out of old bajaj, the government only issues licenses for new bajaj. For bajaj owners, the conversion gives benefits, i.e. low fuel and maintenance costs and higher return. However, upgrading of old bajaj to CNG-powered ones has been slow. The main reason for the slow progress is the high taxation involved in acquiring a CNG bajaj which includes a 45% customs office tax and a 10% luxury tax. The tax regime in Indonesia is still not in favor of environmentally sustainable or energy efficient practices.

The government of Jakarta has been struggling to implement the decentralized I&M system for private vehicles as mandated in the Air Pollution Control Bylaw. The system is still voluntary because emission test is not associated with the extension of annual vehicle registration. As long as I&M is not mandatory, it cannot be considered an effective method to reduce air pollution. Other cities have followed Jakarta by issuing

³³ United States Department of Commerce International Trade Administration Office of Aerospace and Automotive Industries. 2008. The Compilation of World Motor Vehicle Import Requirements

similar regulations, but are faced with practical enforcement problems, lack of capacity and enforcement strategy.

2. Malaysia

a) Vehicle Emissions and Fuel Quality Standards

The Malaysian Government has developed several policies to control emissions from vehicles, namely the:

- Environmental Quality (Clean Air) Regulations 1978
- Environmental Quality (Control of lead concentration in automobile gasoline) Regulations 1985
- Environmental Quality (Control Emission from Diesel Engine) Regulation of September 1 1996
- Environmental Quality (Control of Emission from Gasoline Engines) Regulation on November 1 1996.

Euro 1 standards are in place for diesel vehicles while Euro 2 standards are in place for gasoline vehicles. Malaysia is moving towards the adoption of Euro 2 standards for diesel vehicles and Euro 3 standards for gasoline vehicles. There is a mandatory six months inspection for commercial vehicles to check for safety and level of emissions.

b) Fuel Subsidies

Petroleum fuels have been heavily subsidized in Malaysia where subsidies have been put in place to alleviate the potential effects of external energy shocks. Malaysia has been subsidizing liquefied natural gas (LNG) since January 1990, diesel since October 1999, and gasoline since June 2005.³⁴

The average spending on fuel subsidies was 2% and 3% of the Government's total operating expenditure in the 1990s, by 2005, it was 14%.³⁵ In 2006, the figure slightly went down to 10% of the nation's total operating expenditure. Malaysia's government spent about 40 billion Ringgit (RM) (USD 12.4 billion) on fuel subsidies in 2007.³⁶ The fuel subsidy for 2008 was estimated at RM18.31 billion based on the assumption that the price of crude oil would hover around USD105 per barrel. By the first week of June 2008, however, the price of oil had hit USD127 per barrel, way beyond earlier assumptions.³⁷ Fuel subsidies have taken their toll in the fiscal deficit of the country and have had negative implications on the nation's budget.

³⁴ Ariff. 2008. Downsizing Fuel Subsidies

³⁵ Ang. 2008 January 14. Experts say Fuel Subsidy Unsustainable. The Star

³⁶ Ibid.

³⁷ Ariff. 2008. Downsizing Fuel Subsidies

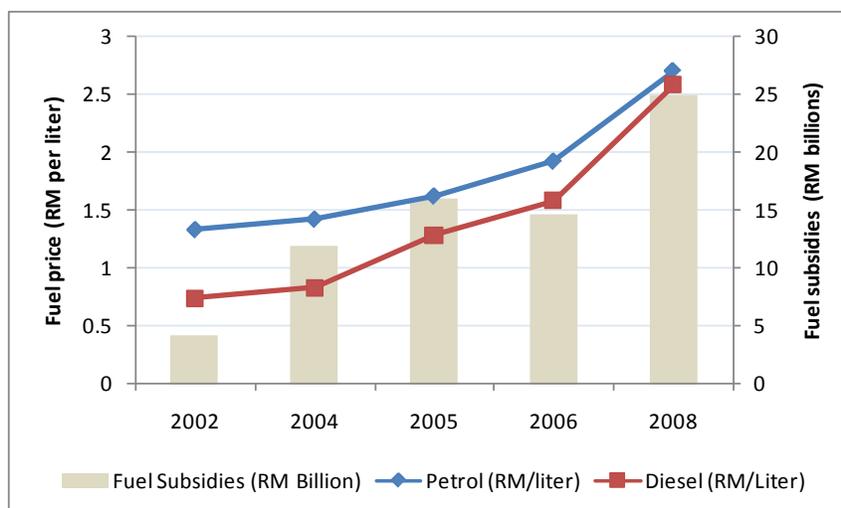


Figure 12. Fuel Subsidies in Malaysia

Source: Ariff, 2008

Diesel subsidies constitute a big part of the total spending on fuel subsidies. In 2004, diesel subsidies accounted for 70% of total fuel subsidies, followed by LPG (16.7%) and gasoline (13.3%).³⁸ In 2008, the Malaysian government announced its intention to remove controls on the prices of gasoline and diesel to reduce the government's financial burden from fuel subsidies. In July 2010, the government announced the reduction of subsidies for petrol, diesel and CNG. The subsidies for RON 95³⁹ diesel and petrol will be cut by 5 sen per liter, while RON 97 fuel is no longer subsidized. Subsidies for LPG will be cut by 10 sen a kilogram.⁴⁰

c) Vehicle Taxes and Tariffs

The government amended its vehicle tax structure to meet its commitments under the ASEAN Free Trade Agreement (AFTA). The National Automotive Policy (NAP) was put in place in March 2006, the tax regime was further streamlined, resulting in the overall reduction in tax rates on most motor vehicles, both imported and locally produced. The import duty of ASEAN CBUs has been reduced to 5%.⁴¹ The import duty for passenger cars is between 140-300 percent, based on engine displacement. New Diesel cars (CBUs) are charged a rate of 120 percent, while used diesel cars are charged the same rates as gasoline engine vehicles.⁴² The percentage for excise duty for passenger cars, vans and 4 wheel-drives are dependent on the engine capacity, whereby higher engine capacity vehicles are subject to a higher excise duty.

Starting 2009, hybrid cars receive a 100% tax exemption of import duty and a 50% exemption of excise duty under a government measure to promote fuel economy.⁴³ This exemption is applicable to vehicles which comply with the United Nations' definition of – "a vehicle with at least two different energy converters and

³⁸ Oxford Business Group. 2006. Emerging Malaysia 2006. Oxford Business Group.

³⁹ Research octane number

⁴⁰ Bernama, 2010. Government to Reduce Subsidies for Petrol, Diesel, and LPG. Available: http://www.bernama.com.my/bernama/v3/news_lite.php?id=513940

⁴¹ United States Department of Commerce International Trade Administration Office of Aerospace and Automotive Industries. 2008. The Compilation of World Motor Vehicle Import Requirements

⁴² <http://www.eautoportal.com/eap/data/country/country.asp?show=Malaysia>

⁴³ FIA. 2008. Fuel Economy: Towards a Global Framework

two different energy storage systems (gasoline and electric), on-board the vehicle for the purpose of vehicle propulsion.” The exemption is also limited to new CBU hybrid passenger cars with an engine capacity of below 2,000 cc and with an engine specification of at least Euro 3 technology. The hybrid cars are to be certified by the Road Transport Department to have achieved not less than a 50% increase in the city-fuel economy or not less than a 25% increase in combined city and highway fuel economy relative to a comparable vehicle that is an internal combustion gasoline fuel.⁴⁴

As a measure to conserve conventional transport fuel, the government has allocated tax exemptions on necessary components and kits for natural gas conversion of vehicles. Moreover, natural gas vehicles are given a 50% discount on road taxes while a 25% discount is given to vehicles powered by bio-fuels.⁴⁵

To encourage better participation in NGV use, the Government set aside import duties and offers a sales tax exemption on conversion kits. Together with road tax reductions up to 50%, more and more companies and car owners are switching to this cheaper fuel.

d) Proposed Fuel Economy Standards

No fuel economy standards have been implemented yet.

3. Philippines

a) Vehicle Emissions and Fuel Quality Standards

As of July 2007, all new motor vehicles introduced in the market beginning January 1 2008 must comply with EURO 2 emission limits as specified in the Revised Emission Standards for Motor Vehicles Equipped with Compression- Ignition and Spark-Ignition Engines (DAO 2007-27) Vehicle Taxes and Tariffs⁴⁶. The requirement of passing an emission test before registration was put in place since 2003. Private Emission Testing Centers (PETCs) authorized by the DOTC and duly accredited by the DTI are implementing the vehicle emission testing in the country.

The Land Transportation Office (LTO) is working on the intensification of the Anti-Smoke Belching Operations as a measure to control vehicular emissions. The LTO will be funded thru the Special Vehicle Pollution Control Fund (SVPCF) to strengthen their respective manpower and provide proper-anti-smoke belching (ASB) equipment and training necessary to sustain regular roadside smoke-belching operations.⁴⁷

b) Fuel Subsidies

The Downstream Oil Industry Deregulation Act of 1998 liberalized and deregulated the downstream oil industry in the Philippines and thus, the price of petroleum products have not been significantly subsidized by the government. However, in 2008, the government gave funding for fuel discounts for tricycle drivers which

⁴⁴ Malaysian Industrial Development Authority (MIDA). 2009. Malaysia - Investment in the Manufacturing Sector.

⁴⁵ Energy Information Bureau. <http://eib.ptm.org.my/index.php?page=article&item=98,107,113,165>

⁴⁶ Asiapulse News.http://goliath.ecnext.com/coms2/gi_0199-6863905/PHILIPPINES-TO-IMPLEMENT-REVISED-VEHICLE.html

⁴⁷ ERIA Research Project Working Group. 2009. Philippine Country Report presented at the Meeting of Experts for the “Sustainable Automobile Society in Asia” held last February 2009 in Bangkok.

has continued up to 2009. This was done in an effort to alleviate the impacts of the continuous rise in fuel prices on the livelihood of the drivers.

c) Vehicle Taxes and Tariffs

Tariffs on completely-built up units are based on engine displacement (for passenger vehicles) and gross vehicle weight (for goods vehicles).⁴⁸ The automobile excise tax structure in the country is based on the displacement of the engine, as the displacement goes higher, the higher the tax rate for the vehicle is (ranging from 15% to 100%).⁴⁹ There is also a 12% VAT on which covers domestic sales of all goods, including motor vehicles and automotive parts.

In 2004, President Arroyo signed an Executive Order No. 397 to promote the low engine displacement and hybrid vehicles by reducing the rates of import duty on completely-knocked-down parts and components for such vehicles. The Executive Order No. 396 was also signed in 2004 which reduced the import duties on natural gas motor vehicles to 0% in an effort to promote CNG vehicles in the country.

The House Bill 2637 or the Alternative Fuel Vehicles Act 2004 promotes the manufacture, importation, sale, distribution and use of hybrid and alternative fuel vehicles through tax exemptions and provision of incentives was authored. As of today, the document is still in the hands of the Committee on Trade and Industry with a pending status.

Imported used motor vehicles have an additional specific duty of 500,000 pesos, as stated in Executive Order 418 of 2005. In addition, the rates of import duty of high engine displacement completely built up vehicles were temporarily increased in 2005.

d) Fuel Economy Standards

The Philippines has a comprehensive National Energy and Efficiency and Conservation Program (NEECP) which aims to contribute towards the achievement of 60% energy self-sufficiency by 2010 and the avoidance of 50.9 million tons of CO₂ emissions for the period 2005 to 2014. However, the program does not include the development and implementation of fuel economy standards.

e) Other Measures

Information Campaign

Recognizing the fact that the transportation sector contributes a significant portion of the energy consumption in the country and contribute to the degradation of the environment, the government initiated an information campaign, the "Road Transport Patrol," through Executive Order No. 472 – Institutionalizing the Committee on Fuel Conservation and Efficiency in Road Transport (CFCERT) on 25 March 1998. The program targets a 10% reduction in fuel consumption. The activities focus on the campaign that provides consumers with information on the efficient use of fuel through proper vehicle maintenance, efficient driving

⁴⁸ United States Department of Commerce International Trade Administration Office of Aerospace and Automotive Industries.2008. The Compilation of World Motor Vehicle Import Requirements

⁴⁹ <http://www.bir.gov.ph/taxcode/2083.htm>

and values formation among drivers through seminar/workshops, and the use of the tri-media.⁵⁰ The government also has a fuel economy run program that aims to obtain data on fuel economy rating in a safe and normal driving condition that employs energy efficiency measures and driving techniques.⁵¹

A Government Energy Management Program (GEMP) was put in place in 2006 which has specific directives in improving the efficiency and conservation of fuel use in government vehicles. It sets a target of 10% reduction from the average monthly consumption for the first semester of 2004 for all government entities. Also, vehicles to be purchased by the government should have displacements of no more than 1600cc and 2500cc for gasoline and diesel engines, respectively.

Alternative Fuels Program

The government is also implementing an "Alternative Fuels Program" which taps into the country's domestic produce as viable sources of energy. The Alternative Fuels Program has four (4) major subprograms, namely Biodiesel Program, Bioethanol Program, Natural Gas Vehicle Program for Public Transport (NGVPPT), and Autogas Program. Other technologies advocated under the program are hybrid, fuel cell, hydrogen and electric vehicles. The use of four-stroke engines for motorcycles and tricycles is also being encouraged and entry of electric-powered motorcycles or electric bikes is being facilitated to eliminate two-stroke motorcycles in the fleet.

4. Singapore

a) Vehicle Emissions and Fuel Quality Standards

Since 1 October 2006, all new diesel vehicles are required to comply with the Euro IV emission standard. All taxis will be of Euro IV standard by 2014, while all public buses will only be so in 2023. The Land Transport Authority will also work with the bus operators to accelerate the conversion of their buses to Euro IV standard by 2020. LTA will also look beyond Euro IV diesel buses/taxis, and incentivize operators to consider even cleaner technologies and fuel sources, such as using CNG, to further improve air quality.⁵²

b) Fuel Subsidies

Singapore does not provide any fuel subsidies.

c) Vehicle Taxes

The promotion of green or clean vehicles is also identified by the government to improve the energy efficiency of the transport sector in Singapore. Hybrids and CNG vehicles are promoted by a Green Vehicle Rebate (GVR) scheme which has been in place since 2001. A special tax exemption is given to CNG passenger vehicles up to December 31, 2011. For electric cars, the road tax is pegged to that for gasoline equivalents, which is 20% lower than their diesel equivalents.⁵³ It is important to note that these special tax rates are not applicable to buses and commercial vehicles.

⁵⁰ <http://www.doe.gov.ph/EE/IECC.htm>

⁵¹ <http://www.doe.gov.ph/EE/IECC.htm>

⁵² Land Transport Authority. 2008. Singapore Land Transport Master Plan

⁵³ National Environment Agency, Government of Singapore Website Available: <http://app.nea.gov.sg/>

In 2005, the Additional Registration Fee (ARF) rebate rate was increased from 20% to 40% of the open market value of the green vehicles to further encourage the buyers to shift towards purchasing such cleaner vehicles. A 10% ARF rebate is also given to purchasers of electric motorcycles. The number of green vehicles has been reported to increase substantially (approximately 140 in 2005 to more than 1500 by the end of 2007).⁵⁴

Singapore imposes road taxes on vehicles depending on their engine displacement. Higher road tax rates are paid by owners of larger engine displacement vehicles. Vehicle owners are also encouraged by the government to de-register their cars as to prevent the additional environmental pollution loads coming from older vehicles through rebates such as the Certificate of Entitlement (COE) and Preferential Additional Registration Fee rebates.

The costs of vehicle ownership in Singapore have declined in the recent years, as the government has relied more and more on vehicle usage charges. According to the 2008 Singapore Land Transport Masterplan, the ARF for cars has been reduced from 150% of the OMV to 100% in 2008. Road taxes for all vehicles have also reduced, for example, the road tax for a 1,600 cc car has been reduced from \$1,440 before 1997 to \$874 in 2008.

d) Fuel Economy Standards

In 2003, Singapore launched a voluntary Fuel Economy Labeling Scheme (FELS) to provide fuel economy information to buyers of passenger cars. By the end of 2007, vehicle models which provide fuel economy information were still less than 20%⁵⁵. In an effort to improve the scheme, fuel economy labeling was made mandatory for passenger cars as motor vehicles (not being secondhand goods) constructed for the carriage of

- not more than 7 passengers (exclusive of the driver) and having an unladen mass not exceeding 3,000 kilograms
- goods and having an unladen mass not exceeding 2,500 kilograms were included as “registrable goods” under the Environmental Protection and Management Act (EPMA) which are goods which are covered by the mandatory energy labeling.

The scheme mandates that registered suppliers supplying motor vehicles must affix a Fuel Economy Label (FEL) on the units that they supply in Singapore. Information on the FEL shall be based on the Certificate of Registration issued for the model. Registered suppliers are only allowed to display models that have the label affixed on them. Full implementation of the mandatory labeling for the specified types of motor vehicles was scheduled for April 1, 2009, but certain exemptions were allowed up to October 1, 2009. Cars which qualify for the extension are those which had already been approved by the Land Transport Authority but for which the fuel consumption data is not yet available.⁵⁶

⁵⁴ Singapore Climate Change Strategy

⁵⁵ Singapore National Climate Change Strategy

⁵⁶ <http://www.asiaone.com/Motoring/News/Story/A1Story20090326-131328.html>

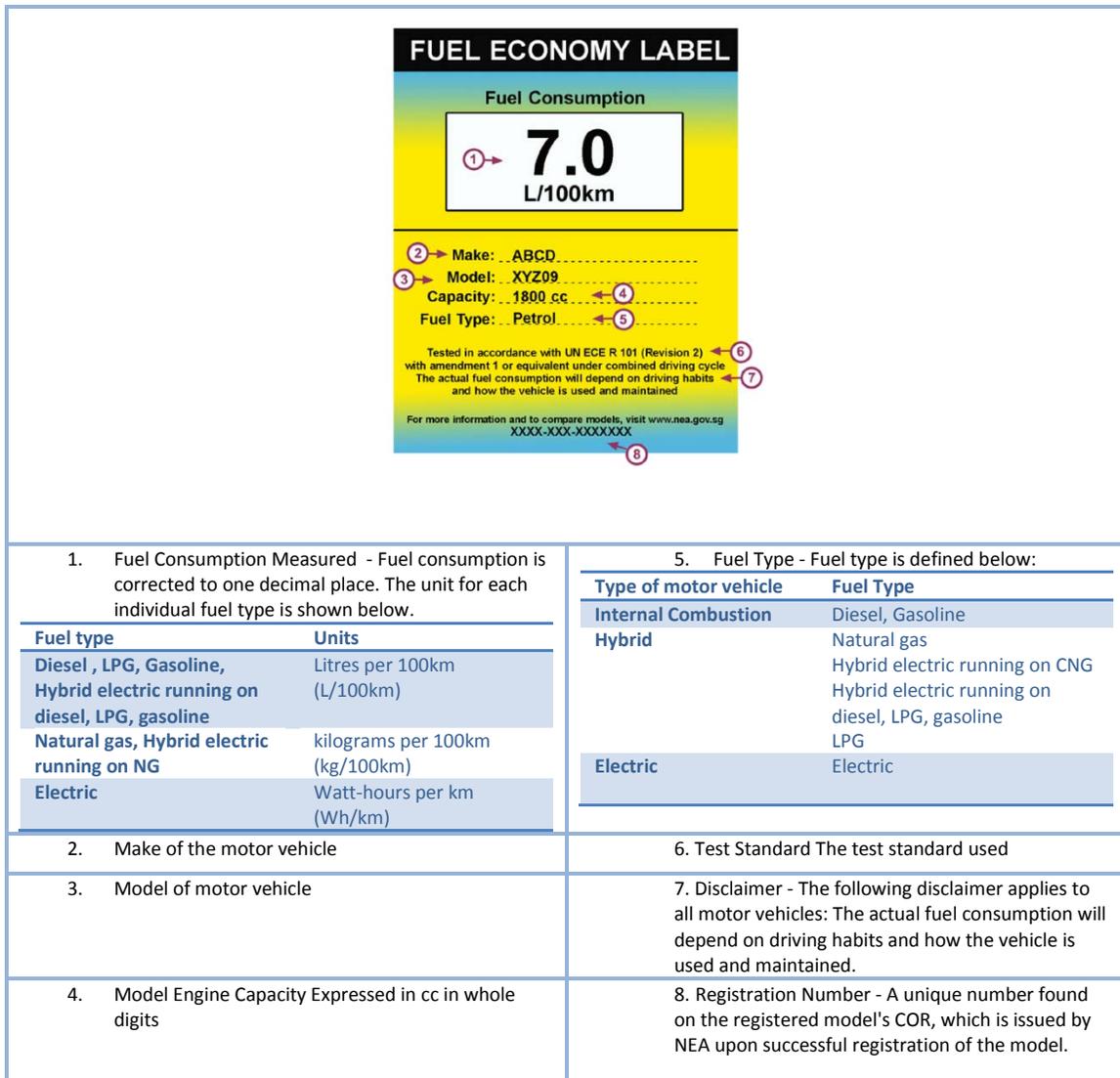


Figure 13. Example of a Fuel Economy Label for Vehicles

Source: National Environment Agency

e) Other Measures

Promoting Fuel-Efficient Driving Habits - The government is also promoting fuel efficient driving as a strategy to improve fuel economy. The government is making citizens aware that fuel-efficient driving habits, such as avoiding hard braking and acceleration, maintaining the appropriate tire pressure and reducing idling, can save up to 10% of the fuel without any increase in travel time. These habits also result in safer driving, better comfort, less pollution and less noise.⁵⁷

Vehicle Inspection and Maintenance - Singapore has had the most success in implementing vehicle inspection and maintenance in the ASEAN region. All in-use vehicles must undergo mandatory inspection test supervised by National Environmental Agency and Land Transport Authority. They must pass the test of "in-

⁵⁷ Singapore Climate Change Strategy. Available: http://app.mewr.gov.sg/data/ImgUpd/NCCS_Full_Version.pdf

use standard" to ply on the street. Cars are not required to go through such test for first 3 years, thereafter, mandatory frequency increases, as cars grow older. Smoky vehicles are also strictly monitored in the streets by a team of inspectors.⁵⁸ The passing rates of motor vehicles on the first inspection has been increasing since 1998 which is indicative of the success of the different measures that are taken by the government to ensure that the pollution from the vehicles in the country are kept minimal.

5. Thailand

a) Vehicle Emissions and Fuel Quality Standards

The Pollution Control Department (PCD) of the Ministry of Natural Resources and Environment (MNRE) and the Department of Land Transport of the Ministry of Transport and the Police Department are responsible for managing end-of-pipe emissions from mobile sources.

Emission standards for new vehicles are now comparable to Euro 3 for both gasoline and light duty diesel vehicles. New heavy duty vehicles were required to comply with Euro 3 since January 2007 while new motorcycles should comply with 97/24/EC which requires CO emission no more than 3.5 g/km, and HC+NOx emission of no more than 1.8 – 2 g/km.⁵⁹

All in-use vehicles are required to renew registration annually. As a pre-requisite to renewal of registration, emissions of in-use vehicles are checked to ensure they are within the allowable emission limits. The emission limits differ depending on the type of in-use vehicle and on the original year of registration (Annex 4). For example, the emission limits for in-use gasoline vehicles registered before November 1, 1993 is CO of 4.5% and HC within 600 ppm. The emission limits are more stringent for vehicles registered after then (CO 1.5% and HC 200 ppm). While those registered since January 1, 2007 are controlled at CO 0.5% and HC 100 ppm levels. Different emission limits apply to in-use diesel vehicles and motorcycles (including Tuk-Tuks).⁶⁰

The Department of Land Transport has local offices in all 76 provinces, where the annual renewal of vehicle registration is done across the country. Registered private garages check the vehicle emissions. Supporting national projects include PCD's Emission Clinic program which promotes QA/QC of garages and sets up a good garage network which is expanding into the smaller cities each year.

b) Fuel Subsidies

The Thai government began its efforts in fuel price stabilization back in 2003 when the oil prices rose rapidly because of the U.S.-Iraq conflict. In the same year, gasoline subsidies were taken out and diesel subsidies were reduced, effectively leading to a 20% fuel price hikes. In 2008, the newly-elected government re-instituted diesel subsidies which was initially planned to run from March to July 2008. The United Overseas Bank estimates that the costs of fuel subsidies in Thailand in 2008 equates to 1.2% of its GDP.⁶¹

⁵⁸ Dhakal. 2002. De-coupling of urban mobility need from environmental degradation in Singapore. Available: http://www.iges.or.jp/en/ue/pdf/dhakal/dhakal_singapore.pdf

⁵⁹ Thailand Pollution Control Department. Available: http://www.pcd.go.th/info_serv/reg_std_airsnd02.html#s3

⁶⁰ Thailand Pollution Control Department. Available: http://www.pcd.go.th/info_serv/en_reg_std_airsnd02.html#s3

⁶¹ See <http://www.energybulletin.net/node/6005>

The Thai Ministry of Finance raised fuel excise taxes by 2 baht in 2009 but the retail prices have not been affected because the Energy Ministry decided to extend the fuel price subsidies provided by the State Oil Fund up to the end of September 2009. The Oil Fund plunged into a massive debt of nearly 100 billion baht because of a one-year fuel subsidy in 2004. Currently, the State Oil Fund pays a monthly subsidy of 6 million baht for E20 and E85 gasoline, and 570 million baht for B5 bio-diesel. The fund also shouldered the debt for liquefied petroleum gas imports totaling around 7.1 billion baht, which will be repaid by the year 2010.⁶²

The Thai government is subsidizing retail prices at 1.6 baht per liter, around 4 billion baht a month, according to the Energy Minister of Thailand.⁶³ In August 2009, the government cut back the price of diesel by 2 baht per liter by providing additional subsidies to oil traders. Money from the Energy Conservation Fund, which is originally intended to help pay for mass transit projects are to be transferred to the State Oil Fund to cover additional cuts in oil prices.⁶⁴

c) Vehicle Taxes and Tariffs

Import duties for vehicles in Thailand vary according to vehicle types. Pick-up trucks, heavy trucks and buses are assessed a 40% import duty, passenger cars are assessed with 80% import duty. Excise taxes for vehicles are computed for depending on the vehicle price (including tariff) and excise tax rate. There is also a 10% municipal tax and a VAT which is 7% of the vehicles price. There is a ban on imported second-hand vehicles as well.

Vehicle age is a major determinant of the vehicle tax system in Thailand. However, the relation between vehicle age and the amount of tax to be paid by the *owner is quite peculiar since as the vehicle gets older, the lower the tax is to be paid*. For vehicles up to five years old the price is fixed depending on the engine size and type of car. After five years the tax will reduce by 10 percent every year up to a maximum of 50 percent.⁶⁵

To promote the use of bi-fuels and conservation of conventional fuels, the Thai government has placed a 5% reduction in the excise tax of passenger cars which can consume E20 and E85 gasoline. Similar measures for models which can run on electricity and fuel cells are in place, the excise tax for such cars is pegged at 10%. Also, the upcoming “eco-cars” which would consume less fuel have an excise tax of 17%. The annual vehicle registration fees for CNG-fueled and bi-fueled vehicles are reduced by 50% and 25% respectively to encourage shifts towards these types of vehicles.⁶⁶

d) Proposed Fuel Economy Standards

The Department of Energy Development and Alternative Energy has prepared a draft royal decree for highly efficient vehicles based on the Japanese “Top Runner” approach. The proposed royal decree shall initially cover passenger vehicles and 1-ton pick-up trucks (diesel and gasoline) and shall employ a vehicle

⁶² See <http://www.thailandoutlook.tv/toc/ViewData.aspx?DataID=1016633>

⁶³ See <http://www.bangkokpost.com/print/17759/fuel-subsidies-to-cost-b16bn>

⁶⁴ See <http://bangkokpost.com/business/economics/21697/pm-orders-cut-in-price-of-diesel>

⁶⁵ See <http://thailand.angloinfo.com/countries/thailand/driving.asp>

⁶⁶ Silpachai and Supat. 2009. THAILAND Transport for Sustainable Development. Presented at the 4th Regional EST Forum

classification scheme that is weight-based. It shall employ the New European Driving Cycle in the testing protocol.

e) Other Measures

Voluntary Labeling Program - Other efforts on this issue include a voluntary program launched in 2005 by the Pollution Control Department limiting the level of CO₂ emissions and the National Energy Policy Office for a Voluntary Labeling Program in 2006.⁶⁷

Eco-Car Manufacturing - which covers the production of cars which have good fuel economy, environmentally sound and safe to drive - is being promoted by the government of Thailand. A car can be called as an "eco-car" if it consumes less than 5 liters of fuel for every 100 kilometers driven, emit exhaust emissions under the Euro IV limits and emit less than 120 grams per kilometer. As for the safety component, the car must pass ECE regulations-based crash tests (or more stringent tests). In 2007, the Thai government has set out an incentive package for the production of these "eco-cars" which includes the exemption from corporate tax up to 8 years, for those who are setting up assembly plants. Producers availing of this package must have an output of 100,000 units by the 5th year of production.⁶⁸ In July 2009, the Thailand's Board of Investment (BoI) has added to the incentives on offer for carmakers investing in new production facilities for small fuel efficient cars. The 'eco car' programme will now extend a 90% reduction in import tariffs on parts to manufacturers, providing the parts in question are not available from local suppliers.⁶⁹

6. Vietnam

a) Vehicle Emissions and Fuel Quality Standards

Vietnam is currently at Euro 2 and sulfur levels in both gasoline and diesel is 500ppm under TCVN 5689:2005 for diesel and TCVN 6776: 2005 for gasoline. There are plans to move to Euro 3 in 2012 but current initiatives of the CAI-Asia Center and the UNEP PCFV encourages leapfrogging to Euro 4. These organizations are working with the government to establish a roadmap using this as a basis.

b) Fuel Subsidies

Vietnam through the ministries of Finance and of Industry and Trade removed fuel subsidies in 2008.⁷⁰ Fuel subsidy in 2008 was equivalent to around 1.4 percent of the country's gross domestic product of around \$57 billion.⁷¹

⁶⁷ FIA. 2008. Fuel Economy: Towards a Global Framework

⁶⁸ See <http://www.autosinsight.com/file/46326/thailand-encourages-green-carmakers.html>

⁶⁹ Autosinsight~ <http://www.autosinsight.com/file/79539/boi-adds-to-eco-car-package.html>

⁷⁰ Fuel decision was tough but necessary. Available:

<http://vietnamnews.vnagency.com.vn/showarticle.php?num=01BUS290208>

⁷¹ Vietnam to scrap oil product subsidies by end-2008 Available: <http://sg.biz.yahoo.com/060810/3/42pbe.html>

c) Vehicle Taxes and Tariffs

The Special Consumption Tax (SCT) for vehicles is 50 percent for vehicles with five seats or less, 30 percent for those with 6 to 15 seats, and 15 percent for those with 16 to less than 24 seats. The SCT for both Completely Knocked-down vehicles (CKD) and Completely Build-up vehicles (CBU) are harmonized (effective January 1, 2004). The provision on SCT reduction for local auto assembler has been eliminated. The Value Added Tax (VAT) is 5 percent for all vehicles⁷²

Other relevant information includes:

- CBU MFN rate is 90 percent for all vehicles
- CKD ASEAN Free Trade Area (AFTA) Common Effective Preferential Tariff (CEPT) rates are 0 or 5 percent, going to 0 percent by 2012 for all vehicles
- CBU passenger cars are still on the GE list. The latest proposal of CEPT Roadmap to reduce AFTA rates for CBU passenger cars, which is approved by the Prime Minister is:
- CBU vehicles with 10 to 30 seats: 20 percent (2007) and 5 percent (2009)
- CBU vehicles under 10 seats 20 percent (2008) and 5 percent (2010).
- CKD MFN rates, scheduled to increase 5 to 10 points per year, appear to be holding at 25 percent and rising for passenger cars and PPV and 15 percent and rising for minivans/bus, pickups, and trucks equal or less than 5 tons
- MFN rate for all used autos and trucks not exceeding 5 tons is 150 percent

d) Proposed Fuel Economy Standards

No fuel economy standards have been implemented yet.

⁷² United States Department of Commerce International Trade Administration Office of Aerospace and Automotive Industries.2008. The Compilation of World Motor Vehicle Import Requirements

Annex B. Overview of Fiscal Measures on Vehicle Ownership and Use in the ASEAN

Stage		Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
Acquisition	Acquisition (Registration Fee)	Yes			COE, Additional Registration Fee (ARF)		Registration tax: 12%; Registration fee: 2-3 million VND/case
	Excise Tax	Yes		Yes	Exercise Duty, Goods & Services Tax (GST = 7%)	HEV (<3,000cc), EV, FCV = 10%; Eco-car = 17%; E20 & E85 2,001-2,500cc = 30%; NGV = 20%; Otherwise, <2,000cc = 30% 2,001-2,500cc = 35%	VAT: 5% (before 10%)
	Import Tax	Yes		Income Tax Holiday & Duty-free		Yes	
Ownership	Local Tax	Yes				Yes	
	Ownership (Annual Tax)			Yes	Road tax, Road tax surcharge (for vehicles over 10 years), Special tax for diesel-driven vehicles		
Fuel	Fuel	Subsidy for fuel		Subsidy for public transport fuel	Tax on Gasoline	Cheaper biofuel tax	Road and Bridge fee (separated and sometimes included in fuel price)
	Incentives		Incentives for public transport companies		Partial additional registration fee (PARF) Rebate, Green vehicle rebate (GVR)	Clean energy vehicle	

Source: ERIA Database (Adapted)



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