

Automotive excise taxation: what reforms are needed to best utilise the ASEAN Economic Community?

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Abstract

This paper draws attention to reforms which, if implemented, would utilise the opportunity represented by the ASEAN Economic Community (AEC) 2015 in, for example, the automobile industry in the ASEAN region. A range of policy areas are identified where coordination by ASEAN members would strengthen the region's position to become a leading global automobile producer. In addition to examining vehicle types and their relative CO₂ emission levels and fuel efficiency, examples of the types of excise tax that is applied in the European Union (EU), South Africa, Cyprus, and Thailand are used to highlight areas that could be addressed, leading to a series of reforms that would enhance the opportunity to achieve this global role. In conclusion, the paper brings together the policy issues discussed and provides a possible standardised automobile excise structure which policymakers could consider.

1. Introduction

The ASEAN Economic Community (AEC) 2015 represents a significant opportunity for ASEAN¹ members to coordinate across a range of policy areas with the intention of building a leading automobile production region which is highly competitive globally. Today the ASEAN region is producing less than 4% of the world's passenger motor vehicles and less than 2% of commercial vehicles,² therefore significant potential exists to grow this figure and share in the wealth it creates. Excise taxation is applied to motor vehicles in all 10 ASEAN member countries and so is an important tax within the region. Several members manufacture motor vehicles, and the sector has become a major contributor to the economies of these countries whilst all members can and do form part of the distribution of these regionally produced vehicles. This paper looks at those relevant policies around excise taxation with a focus on passenger motor vehicles which will need coordinating to help the region attain this aspiration of becoming a leading global automobile producer. Motorcycles, auto rickshaws, and the like, are outside the scope of this study.

2. Regional opportunities, not competition in the automobile sector

The challenge for the existing and emerging automobile producing members of ASEAN is to move away from creating 'specialised' categories of motor vehicles, or creating special classification criteria for which substantial excise tax discounts will be applied that are not available for 'like' vehicles. This creation of 'national favourites' often leads to 'competition' between ASEAN members at a time when the region has an opportunity to work together to increase wealth.

Discounting excise rates to support ‘national favourites’ has other negative consequences including:

- the potential losses of excise revenue from reduced excise rates on favoured categories
- deterrence to potential overseas investment
- inefficiencies in production to meet ‘special criteria’
- distortion of markets, including over-supply, where special criteria may include minimum production levels.

In some cases, the establishment of ‘favourite’ categories within an excise system can effectively result in the creation of ‘non-tariff’ barriers to international trade. Whilst possibly seen as a ‘populist’ system in individual countries, the overall effect can be negative as trading partners ‘retaliate’ with similar non-tariff barriers or hold back on investment opportunities. Non-tariff barrier elimination has rightly been seen as an important element of the ‘free flow of goods’ component of the AEC 2015.

The challenge now is to view ASEAN in the same way as the AEC Blueprint views ASEAN, that is, as a ‘single market’ and ‘single production base’. An automobile manufacturer needs to see that they have a potential market of over 600 million customers, and have access to a supply chain for parts and labour which covers all 10 countries so that vehicles are built with the best ‘value for money’ options.

Should the visions of the AEC Blueprint emerge, all 10 ASEAN countries will benefit with all countries contributing to the growth of the ASEAN automobile sector and sharing in the wealth that it creates, and with customers having a larger range of affordable and locally produced vehicles from which to select. A strong regional automobile sector will then no doubt start attracting the attention of international investors leading to the increased development of new technologies which will further ensure the ongoing strength of the sector.

To achieve this, the region needs to start looking at a level of coordination of excise taxes, with these taxes often equalling more than the production value of the automobile itself,³ and so play a large role in both investment decisions and in consumer purchases. Further, there are benefits in any move to begin ‘standardising’ the product categories across the region so that at least these individual categories are recognisable across all 10 countries. This would mean that there are, in effect, ‘like’ categories with standard definitions and classification criteria, not unlike that which has been achieved in other regional projects such as the ASEAN Harmonised Tariff Nomenclature (AHTN) which offers international traders in the region a standard set of classifications and definitions.

3. Considerations for automobile excises in terms of products, tax structures and tax bases

The underlying principle of good tax policy is that taxes should be neutral or, in other words, the tax rate, tax base and tax structure should not impact markedly on investment, production or consumption. It certainly should not be used to ‘target’ or to ‘favour’ one particular industry, one particular product, or one particular taxpayer over another. However, in certain circumstances there can be justification to levy ‘special’ taxes or discriminatory taxes such as excise, to correct negative externalities associated with the consumption of certain goods. Automobiles do create a number of negative externalities and therefore can be justified on several grounds, including:

- Cost of operating public roads which is seen as an ‘economic charge’ on road users and would extend to addressing revenues required for road building as well as ongoing operations such as traffic lights, road signage, rescue and recovery, etc.⁴
- Costs of maintaining roads from damage caused during normal road usage.
- Emissions of CO₂ contributing to negative environmental impacts such as immediate air quality in urban areas and the broader impacts associated with climate change.

- Traffic congestion from the growing number of automobiles on the road and the increased volumes of trips being made by those vehicles particularly at certain peak periods. This is particularly the case where road infrastructure is unable to support the volume of vehicles. There are also connections with other environmental costs as emissions from idling vehicles are double those from moving vehicles.⁵ There is also an economic cost from the increased time taken for workers and businesses to move people and goods via road in terms of ‘travel cost’, ‘additional business operating costs’ and ‘lost productivity’.⁶

Notwithstanding these externality factors, the simple fact of raising revenue also remains an important aspect in automobile tax policy, particularly in developing economies. In such cases, owning a motor vehicle is seen as a ‘luxury’ and the excise tax system is used to capture this concept and will figure in policy considerations. It is important to note that rising living standards are seeing an increase in car ownership, as middle class populations increase and cars also become more affordable.

However, policy considerations will not be confined to revenue and the correction of negative externalities, particularly where the country concerned is an automobile manufacturer. In this case, it is usual for the automobile industry to contribute substantially to that country’s GDP and as such be of significant economic benefit.⁷ The automobile sector covers an entire supply chain adding value from ‘upstream’ industries such as mining and metals, rubber, plastics, glass, etc., through to ‘downstream’ industries such as distribution including to retail, service and repairs, marketing, finance, insurance, rentals and fuel products, and is not limited to component production and vehicle assembly. Value is added at each point of the automobile supply chain, employing many people across the economy.

Just as important to the economy is the development of new technologies and other intellectual property (IP). The value that this creates can be significant and ensures the long term position of the automobile sector, and can create potentially large export income opportunities for the country. In addition, some of the next technology or IP created in the industry can be utilised in other industries (for example, CO₂ emission reductions), further expanding the value of this sector.

In this context, excise policy considerations should be focused on designing a simple, fair and transparent tax system that provides the certainty and equity that facilitates investment decisions and allows for a sustainable flow of revenue for the government from a strong and viable industry that is contributing to the whole economy.

4. Determining and defining the products and tax bases

The best place to start an examination of how to determine and define automobile product categories and their tax bases is to look at how the industry views the products it trades and the important distinctions between these categories which will then apply throughout the remainder of this paper.

4.1 Automobile trade terminology

In the trade setting, the automobile industry looks at products in terms of being:

- CBU (Completely Built Up) – or in a state of finished assembly and ready for distribution and sale, or
- CKD (Completely Knocked Down) – or comprising components which when assembled will be a finished unit ready for sale. In other words, a ‘kit’ which in some cases provides for more cost efficient transportation such as in shipping containers, and further often facilitates tax advantages at the destination from reduced import values declared at Customs, or from incentives for undertaking some local value-add processes, or
- SKD (Semi Knocked Down) – similar to CKD but the kit is not completely knocked down to individual parts, that is, some assembly has occurred or remains, and less assembly is required at the destination.

In terms of CBU, CKD and SKD, the differentiation applies primarily to customs and import classification and tariff policy, with CBU classifications often attracting higher rates of import duty than imported kits, to reflect the economic benefits of the local value-add which will take place when the kits are assembled for delivery into the market.

It is important to establish that for excise tax policy, CBU and knocked-down kits should be attracting the same excise duties as is the final product being taxed. However, given most of the regions' automobile excises are fully *ad valorem* and that import valuations are mostly⁸ based on a customs CIF valuation and customs duty sum, there is a connection between import and excise tax policies in this context to consider. However, given the following section is focused on excise taxation, discussion will be at the CBU level, unless otherwise indicated.

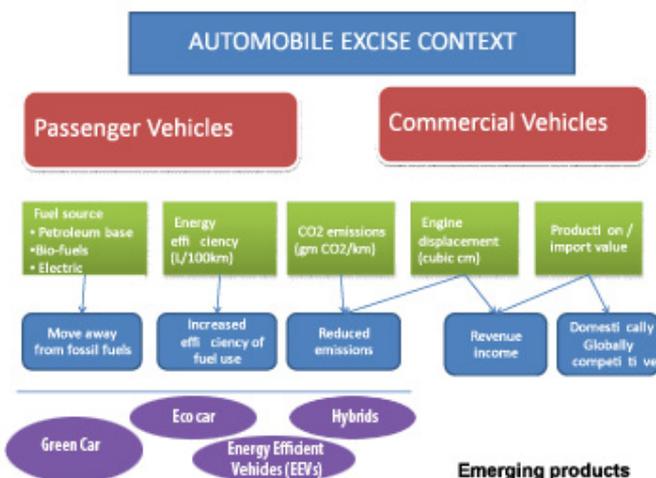
For the purposes of this paper, and consistent with the automobile market, automobile products will be divided into two broad categories: 'Passenger Motor Vehicles', and 'Commercial Motor Vehicles'. This section will also look at the main product categories falling within each of these broader categories and propose a number of definitions taken from the literature which best reflect the specifications of the product contained within each.

This is seen as an important issue as excise taxation in the region does often lack clear definitions of automobile categories and products, and where definitions are available there are often differences that make cross-border analysis difficult. The concept of moving to adopt 'standard' definitions, along with other initiatives in place such as the AHTN, would further facilitate trade in excisable goods in the region.

This paper now looks at and further aligns much of the current and emerging policy considerations in automobile excise taxation and the future direction of these, and highlights a number of new products being established in response to these emerging policies.

A snapshot of the context behind the thinking in this paper is found in Figure 1 which looks at some of the main drivers of excise taxation and their objectives, as well as the emerging products which result from developments in the automobile sector. The paper then considers the key product categories of the market and discusses how these categories are defined in the sources studied. Discussion of likely product categorisation and definitions follows before the main drivers of automobile excise taxation are addressed.

Figure 1: Outline of automobile excise: areas to categorise, standardise and define



Source: Author.

4.2 Broadly defining product categories

To broadly define product categories in the regional automotive industries, a number of sources have been utilised and combined to provide the most comprehensive and ‘useful’ definitions for use in local policy development.⁹ However, for clarification, at this point there is a need to define, at the ‘high level’, ‘motor vehicle’ for which the following is proposed:¹⁰

‘Motor vehicle’ is any power-driven vehicle which is normally used for carrying persons or goods by road, or for driving on the road, or vehicles used for the carriage of persons or goods.

Starting with two broad product categories ‘passenger motor vehicles’ and ‘commercial motor vehicles’ to reflect the different purposes of the vehicles (and possible different tax policy treatments) a number of sub-product categories have been identified within both passenger and commercial vehicles. Table 1 captures this output.

Table 1: Standard high level automobile definitions for excise policy development

Broad Product Category	Definition	Sub-Product Category	Definition
Passenger Motor Vehicles	Motor cars and other motor vehicles principally designed for the carriage of persons (less than 10), including the driver	Passenger Cars	Road motor vehicle, other than a motor cycle, intended for the carriage of passengers and designed to seat no more than nine persons (including the driver)
		Sports Utility Vehicles (SUV)	Includes vehicles designed as off-road vehicles with four-wheel drive capability (or two-wheel where other specifications of this definition are met), high ground clearance and a wagon body type, seating up to nine people (including the driver)
		Passenger Pick-up Vehicles (PPV)	Pick-up vehicles designed with an extended or dual cab for the carriage of no more than nine people (including the driver)
		Other	Reserved
Commercial Motor Vehicles	Motor vehicles principally designed for the carriage of goods, or persons (10 or more) including the driver, or for special purposes	Pick-up Vehicles	Any vehicle which contains both a passenger compartment designed for the carriage of less than four persons and open cargo bed for the carriage of goods
		Van	Any vehicle with a closed cargo bay designed for carriage of goods with no more than two axles
		Bus	A vehicle designed for the carriage of 10 or more persons (including the driver)
		Truck	A vehicle with a power unit and either a permanently fixed or detachable cargo carrying capability with two or more axles
		Truck tractor	A non-cargo carrying vehicle designed to tow trailers and other devices
		Special purpose	Including vehicles with specific purposes such as fire-fighting, ambulances, spraying, concrete mixing, mounted cranes, etc.

Source: Author

4.3 Excise-related specifications in classifying automobiles

An issue relating to definitions that the region needs to manage is that of recent trends of restructuring of automobile excise tariffs to reflect certain government policies in relation to areas such as energy, environment, and investment. The result is that new or additional product items and sub-items are being added to existing automotive tax categories, creating excise duty rate differentials to give effect to these policies.¹¹

This section discusses these policy considerations and the impact they have on excise policy so that recommendations can be made in relation to appropriate tax bases and the need to refine or create standard definitions for emerging products. What is important to note is the often high level of ‘cross-over’ between these policy areas, including:

- energy policy (including energy security) and the need for alternative and renewable fuel sources
- fuel efficiency in vehicles
- reducing emissions into the atmosphere from motor vehicles
- engine displacement which is often seen as a proxy for several key externalities.

4.3.1 Energy policy considerations

A country’s energy policy may have several components including, for example, the need to address energy consumption in the context of finite fossil fuels and the issues of reducing reliance on those fuels as a long term energy source. This can be achieved in several ways, for example, by:

- increasing the fuel efficiency in the design of new vehicles
- increasing the use of alternative fuels including renewables
- encouraging the continued development of alternative energy sources such as electric cars, use of hydrogen fuel cells, gaseous fuels such as LNG, or CNG.

In terms of fuel efficiency, there is a full discussion in section 4.3.2 as to its potential role in automobile excise tax policy considerations. However, it is worth noting that fuel efficiency is an area that is becoming increasingly subject to government regulation, and thus excise tax policy needs in this case to be consistent with and supportive of those regulations, otherwise the drive towards more fuel efficient technologies is best left out of the excise systems and left to regulation that incentivises industry and consumers to reduce their emissions intensity.

The area of developing new technologies for alternative fuel sources is considered in several places throughout this paper. Currently, the drivers here are around manufacturers having the right environment in which to invest in designing and developing the new technologies that will produce consumer-accepted (including affordable) vehicles which can capture a market share to ensure ongoing viability. As a result, vehicles of alternative fuel source technology are generally not subject to excise taxes, or where they are, they are given significant discounted rates.¹²

The other outcomes from greater fuel efficiency and greater use of alternative fuels and fuel sources relate to the environment. This is a positive and desirable outcome, and again is dealt with more fully in the discussions below relating to emissions.

Therefore, the question to address in this section is whether ‘fuel type’ is an appropriate means by which to classify automobiles for excise taxation policy purposes. A study of the literature on this area finds that classification by fuel type is not a common attribute of automobile excise systems, although it is seen currently in the region in Thailand.

The European Union (EU), apart from Cyprus, does not use automobile excise taxation. Energy use and environmental-based objectives, including those encouraging the use of alternative fuels, are instead delivered through energy taxation and road use taxation policies, that is, through fuel taxation and through

initial and annual vehicle registrations levies. It should be noted that the EU is trying to eliminate initial vehicle registrations in favour of ‘circulation’ or annual taxes to avoid market distortions from member states having different registration levies and open borders.

An example of a circulation tax is the United Kingdom’s ‘Vehicle Excise Duty’ (VED)¹³ system which classifies vehicles primarily by their CO₂ emissions, then applies a rate depending on whether the vehicle uses petrol/diesel or ‘alternative fuels’. However, it should be noted that VED is actually an annual road tax despite being levied on the vehicle owner and despite the tax being called an ‘excise’.

The other approach is ‘non-tax’ through standards and regulation as is used in the United States (US). Through its *Energy Independence & Security Act 2007*, the US government has extended a current fuel efficiency level target, due to expire in 2016 to 2025. The result is forecast to almost double current fuel efficiency requirements by 2025 with an aspiration for motorists to be using 2 million barrels of oil less per day, and in turn significantly reducing dependence on oil imports.¹⁴

As with the US and the EU above, this paper does not see a strong need to create excise structures, or to complicate existing excise structures by incorporating product categories or sub-categories according to specific fuel types. Fuel tax policy and regulation may be more appropriate places to capture these energy security and energy supply issues. Environmental issues can also be captured through fuel taxation and regulation but may also have a place in automobile taxation and this aspect will be discussed in detail below.

Alternatively, those same policy issues surrounding energy and environmental outcomes may also be considered separately in terms of automobile initial registration and/or annual circulation taxes, however, both of these types of taxes are currently outside the scope of this paper which is excise tax-focused.

4.3.2 Fuel efficiency

An emerging area of automobile excise policy is the importance of developing a higher level of fuel efficiency in vehicles, which in turn is seen as being related to the other key policy area around CO₂ emissions. In a growing number of countries, there are moves to go beyond the use of excise taxation as a fiscal instrument but to also look at regulation in respect to standards for fuel efficiency (and CO₂ emissions) for new vehicles.¹⁵

‘Fuel efficiency’ relates to a vehicle’s consumption of fuel and is generally measured as litres per 100 kilometres. At this point, no formal universal standard or benchmark exists to define a ‘fuel-efficient’ vehicle and this is set in local legislation based upon local policy objectives. Moreover, minimising fuel consumption is an ongoing aspiration for manufacturers in a market with a growing demand for fuel-efficient vehicles.

The standard of ‘fuel efficiency’ is also changing with governments often revising downwards the litres to be consumed per set distances. As outlined above, the US will almost halve the current fuel consumption requirements rising from the current 29 miles per gallon, to 35.5 miles per gallon by 2017 and eventually, to 54.5 miles per gallon by 2025. To illustrate the differences in approaches and standards, Figure 2 highlights a number of examples of locally set ‘fuel efficiency’ definitions.

The main reasons that ‘fuel efficiency’ would be used by excise tax policymakers is to reduce energy use and dependence on imports of energy, and to achieve environmentally positive outcomes from reduced burning of fuels.

Use of energy efficiency in automobile excise taxation is not common and where it does occur it is used with other criteria to effectively create a ‘sub-category’ or ‘special product’. Where it is used, ‘energy efficiency’ is a measure by which a reduction or discount is applied to a ‘benchmark’ excise tax rate.

Figure 2: What is fuel efficient? The different approaches

<p>Australia (Simple):</p> <ul style="list-style-type: none">• Increased tax-free threshold if fuel consumption does not exceed 7 litres per 100 km¹⁶ <p>European Union (Fuel type):¹⁷</p> <ul style="list-style-type: none">• Petrol – 2015 target of 5.6 litres per 100 km (2021 target of 4.1 litres/100 km)• Diesel – 2015 target of 4.9 litres per 100 km (2021 target of 3.6 litres/100 km) <p>Malaysia (Curb weight – Kilograms):¹⁸</p> <ul style="list-style-type: none">• Up to 800 – 4.5 litres per 100 km• 801-1,000 – 5.0 litres per 100 km• 1,001-1,250 – 6.0 litres per 100 km• 1,251-1,400 – 6.5 litres per 100 km• 1,401-1,550 – 7.0 litres per 100 km• 1,551-1,800 – 9.5 litres per 100 km• 1,801-2,050 – 11.0 litres per 100 km• 2,051-2,350 – 11.5 litres per 100 km• 2,351-2500 – 12.0 litres per 100 km

As shown in Figure 2, Australia’s Luxury Car Tax regime provides a higher tax-free threshold for fuel efficient cars, with the minimum value threshold for those vehicles set at values that are 20% higher than for other luxury cars. Another example is from Cyprus, which is the only member state of the EU to have an automobile excise tax. The Cyprus automobile excise system comprises a ‘base excise’ dependent upon model, engine displacement and CO₂ emissions. In addition to the base component, reductions in excise can be obtained for secondhand vehicles and/or those vehicles deemed to have high levels of fuel efficiency.¹⁹

Fuel efficiency is not seen as an appropriate basis on which to structure an automobile excise tax system. Where it is a key policy objective of the government, fuel efficiency can be used as a criterion to access certain incentives within that excise system. However, if fuel efficiency is part of the excise classification criteria, it becomes essential that fuel efficiency be measured in an open and transparent manner and applied equally to all vehicles and vehicle manufacturers. This is an important excise administrative issue and applies equally to the testing of CO₂ emissions and likely, at the same time. This is discussed in more detail in section 4.4.

4.3.3 Emissions-based approaches

The literature in relation to CO₂ emissions from vehicles shows it to be a priority area, with leadership coming from the EU and the US. There is a trend towards automobile excise taxation adopting the level of CO₂ emissions as part of the classification criteria or tax design. As found with fuel efficiency however, shifts towards CO₂ emission reductions are primarily a result of regulations and standards being applied to manufacturers (although in some cases this has been or will be supported by certain tax measures).

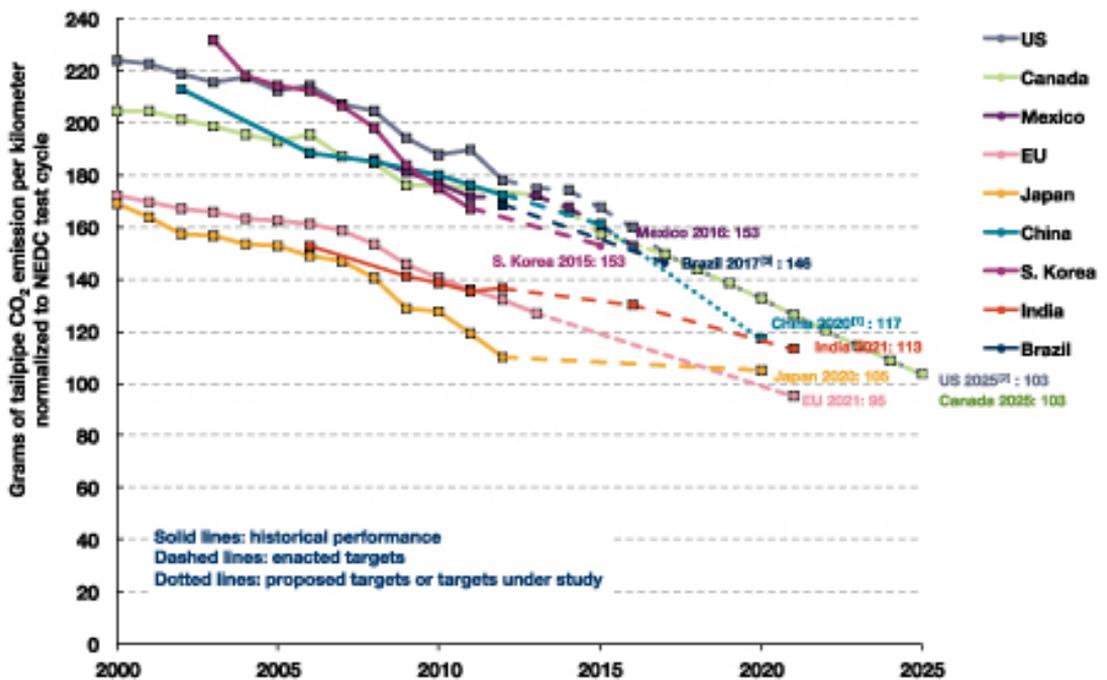
CO₂ emissions are principally measured in grams per kilometre (g/km), although the actual measurement process has often led to some debate as there are several testing methodologies and processes which have been adopted by different countries. In the context of regionally coordinated taxation, it will be important to adopt an appropriate standard CO₂ emissions test. The issue of testing of CO₂ emissions on new vehicle products for tax (and regulatory) purposes will be examined in greater detail below, with discussion focusing on the United Nations Economic Commission for Europe (UN/ECE) standards which have a greater global usage.

CO₂ standard emissions are based on a ‘fleet-wide’ survey of new vehicle products rather than individual cars or models, recognising that a manufacturer will have a mix of products to offer for different markets and that in the mix of products – depending on size, weight and displacement – different products will have different emission levels. This is an issue in the use of CO₂ as an excise base, as manufacturers look to meet CO₂ emission standards on a ‘fleet-wide’ basis rather than individual models. As such, different policy approaches can bring environment and tax policies into conflict. Target CO₂ emission standards will also generally be set slightly higher for commercial vehicles over passenger vehicles.

In terms of regulation, there are positive outcomes being observed already in the major economies with current and future emissions levels in new vehicles being driven down through this regulatory approach. Currently, Japan has the lowest emission standards at 110 g/km with plans to reach 105 g/km by 2020, whilst the EU currently at 130 g/km plans to be the lowest reaching 95 g/km by 2021. Presently, the US emissions standards sit at approximately 156 g/km falling to 103 g/km by 2025.²⁰

Figure 3 shows the current standards for levels of CO₂ emissions in new vehicle fleets, as reported by the International Council for Clean Transportation.²¹ The analysis includes major economies around the world and the future direction of these standard levels into the 2020s. At the time of writing, most CO₂ emissions levels in the study below appear to sit between 160 and 180 g/km.

Figure 3: Reducing CO₂ emissions in new vehicles²²



[1] China's target reflects gasoline vehicles only. The target may be higher after new energy vehicles are considered.
 [2] US fuel economy standards set by NHTSA reflecting tailpipe GHG emission (i.e. exclude low-GWP refrigerant credits).
 [3] Gasoline in Brazil contains 22% of ethanol (E22), all data in the chart have been converted to gasoline (E0) equivalent
 [4] Supporting data can be found at: <http://www.theicct.org/info/tools/global-passenger-vehicle-standards>.

In this context, it is important to look at how the excise system is designed to support these standards and be consistent with government environment policies when looking at excise tax design. There are several ways to deliver this; however, the main priorities are to avoid building complexity into the automobile excise tax structure and equally, to avoid creating tax structures which discriminate against particular manufacturers or discriminate against importers of like products produced domestically. This section looks at several options.

One option is to build CO₂ emission tiers for each of the various product categories. This approach has been utilised more in terms of initial and annual registration taxes, rather than excise taxes – again in the EU where excise taxation for automobiles is rarely used by member states but the community has a strong desire to reduce CO₂ emissions. This discussion will return to the EU below, where such CO₂ emission tiers are utilised in several member states in conjunction with a ‘fee-bate’ approach.

In terms of creating CO₂-based tiers, from 1 January 2016, Thailand will adopt this approach for vehicles under engine displacements of 3,000 cc (3,250 cc for PPV). As can be seen from Table 2, the various product categories each have a set of CO₂-based emissions tiers, although the tiers are set at different levels for each product type.

Table 2: Thailand: new automobile excise structure from 1 January 2016

Vehicle type	Category (CO₂ emissions)
Passenger cars not more than 10 seats	≤ 100 g/km
	101 - 150 g/km
	151 - 200 g/km
	> 200 g/km
	> 3,000 cc
Space-cap Pick-up	Cab type: Rate differs for Double, Space, or Single
	≤ 200 g/km
	> 200 g/km
Passenger Pick-up Vehicle (PPV)	≤ 200 g/km
	> 200 g/km
Space-cap Pick-up & PPV	> 3,250 cc
Eco cars	< 100 g/km
	101 – 120 g/km
Electric vehicle/fuel cell/hybrid	≤ 3,000 cc
	> 3,000 cc
OEM Natural Gas Vehicle (NGV)	≤ 3,000 cc
	> 3,000 cc

Source: Excise Department, Ministry of Finance, Thailand.

In Table 2, the new Thai automobile excise system, the following points should be noted:

- the CO₂ emissions range bands for commercial vehicles are higher than for passenger vehicles (reflecting larger engines needed for commercial uses)
- CO₂ emission bands for ‘eco’ cars are lower than for other passenger vehicles (to capture discounted rates) and non/low CO₂ emission vehicles remain taxed on engine displacement
- CO₂ emissions are based on individual models, not on ‘fleet-wide’ averages as CO₂ emission standards are based. As such, this approach has the potential to create ‘winners’ and ‘losers’ in terms of models in the market. This risk needs to be managed to ensure this does not occur.

These are typical policy issues needing to be addressed if moving towards a CO₂ emissions-based excise, as well as the ‘certification’ of CO₂ emissions for tax purposes which is discussed in section 4.4.

Another approach to recognising CO₂ emission levels is to use ‘surcharges’ in existing or new automobile excise tax design. By ‘surcharging’, a ‘base’ excise rate applies to which an additional amount of duty is calculated when emissions exceed a policy target level.

This type of approach is currently seen in South Africa, and to some limited extent in the aforementioned Cyprus automobile excise system.²³ The Cypriot excise tariff is a little different, in which there are two categories of vehicle based on the HS codes. Passenger vehicles and light commercial vehicles are exempt from paying excise if CO₂ emissions are below 120 g/km. Once above this threshold, vehicles are levied by increasing ‘base excise’ and increasing surcharge rates according to a table of emissions tiers. The other category is ‘other commercial vehicle’ which pays a flat rate of EUR 0.26 per cc. Also to note is that Cyprus has a fully specific rate excise system for automobiles, levied by a monetary amount per unit (vehicle), rather than as a percentage of the value of unit (*ad valorem* system).

To highlight this type of approach, Table 3 outlines these examples from South Africa and for passenger vehicles/light commercial vehicles in Cyprus.

Table 3: South Africa and Cyprus: emissions-based ‘surcharge’

South Africa	Cyprus (Passenger/Light Commercial)
<p><i>Ad valorem</i> excise according to engine displacement²⁴</p> <p>Plus</p> <p>‘Environmental levy’ set at a specific rate per gram of CO₂ exceeding:</p> <ul style="list-style-type: none"> • 120 g/km = R90 per gram of CO₂ emissions exceeding 120 g/km; and • 175 g/km = R125 per gram of CO₂ emissions exceeding 175/km²⁵ 	<p>(a) For vehicles with carbon dioxide (CO₂) emissions (combined cycle) less than or equal to 120 g/km:</p> <ul style="list-style-type: none"> • ‘Zero’ <p>(b) For vehicles with carbon dioxide (CO₂) emissions (combined cycle) exceeding 120 g/km but not exceeding 150 g/km:</p> <ul style="list-style-type: none"> • EUR 25 per g/km of carbon dioxide (CO₂) emissions over 120 g/km <p>(c) For vehicles with carbon dioxide (CO₂) emissions (combined cycle) exceeding 150 g/km but not exceeding 180 g/km:</p> <ul style="list-style-type: none"> • EUR 750 plus EUR 50 per g/km of carbon dioxide (CO₂) emissions over 150 g/km <p>(d) For vehicles with carbon dioxide (CO₂) emissions (combined cycle) exceeding 180 g/km:</p> <ul style="list-style-type: none"> • EUR 2,250 plus EUR 400 per g/km of carbon dioxide (CO₂) emissions

Source: South African Revenue Service, Ministry of Finance, South Africa and Customs & Excise Department of Cyprus, Ministry of Finance, Cyprus.

Finally, building on from this CO₂ emissions-based ‘surcharging’ method, is an approach sometimes referred to as ‘fee-bates’. The term, according to the United Nations Environment Program (UNEP), is based on the fiscal measures of levying ‘fees’ on inefficient vehicles and ‘rebates’ on efficient vehicles based on a policy ‘pivot point’. This determines the crossover between efficient and inefficient vehicles in terms of CO₂ emissions and fuel economy.²⁶ ‘Fee-bates’ can be seen today in the EU, China and Canada and can be applied either as a form of subsidy to manufacturers or to initial (and annual) vehicle registration taxes. Where applied as forms of subsidies to manufacturers, the ‘fee’ can also be considered a ‘negative rebate’ with manufacturers required to contribute a tax or levy for inefficient vehicles produced.

However, whilst the ‘fee-bate’ concept is not applied directly in an excise tax system (and in the case of China operates with the excise system), the principles could equally apply and could be legitimately considered in excise tax design. ‘Target’ or ‘standard’ CO₂ emission levels can be set and then additional tax burdens can be added to those vehicles which exceed the standard CO₂ emission level. Conversely, the excise tax burden can reduce for those vehicles that are below the standard emission level. The excise tax rate increases, linked to CO₂ emission levels, can be exponentially applied if so desired. Furthermore, excise rates can all reduce exponentially for lower emitting vehicles to further incentivise through the excise system. In such cases, effective excise rates increase significantly the higher the CO₂ emissions levels are, or decrease significantly the lower they are.

Figure 4 provides two examples of ‘fee-bating’ within a tax setting. These include the registration tax in Denmark, and a bonus/penalty payment on new car sales in France. In effect, the approach impacts the retail price for new cars and therefore consumer demand. The objective is to shift that demand towards lower emission (and fuel-efficient) vehicles. As such, these examples are not dissimilar to the effect of excise taxation, which is also widely used internationally to impact price and therefore influence consumption.

Figure 4: Use of ‘fee-bates’ in the European Union

Denmark – registration tax		
In addition to a (heavy) tax based on vehicle purchase price, a CO ₂ -based correction is applied.		
<i>Reductions in tax:</i> For petrol-powered cars the registration tax is reduced by DKK 4,000 for every kilometre that the car covers more than 16 km/litre fuel (equivalent to 145 g CO ₂ /km). For diesel-powered cars the registration tax is reduced by DKK 4,000 for every kilometre that the car covers more than 18 km/litre fuel (equivalent to 147.2 g CO ₂ /km).		
<i>Increases in tax:</i> For petrol-powered cars the registration tax is raised by DKK 1,000 for every kilometre that the car covers less than 16 km/litre fuel. For diesel-powered cars the registration tax is raised by DKK 1,000 for every kilometre that the car covers less than 18 km/litre fuel.		
France – bonus payment/penalty tax on new car sales		
Pays buyers of new cars a ‘bonus’ for low emission vehicles and applies a ‘penalty tax’ on higher emission vehicles as follows:		
Class of vehicle	CO₂ Emissions (g/km)	Rebate Euro
A+	Up to 60	5,000
A-	61-100	1,000
B	101-120	700
C+	121-130	200
C-	131-140	0
D	141-160	0
E+	161-165	-200
E-	166-200	-750
F	201-250	-1,600
G	>251	-2,600

Source: Author.

In terms of using CO₂ emissions as a criterion for taxation, several issues arise. First, as we saw above, CO₂ emissions policy is set on a ‘fleet-wide’ average and not for individual models. This results in greater tax burdens falling on certain manufacturers depending on their product mix. The second issue is with regard to the process of certifying the CO₂ emissions of the vehicle itself. Certification is increasingly required for environmental purposes, consumer information purposes and now also increasingly for tax

purposes. This requires alignment and consistency between those agencies who oversee environmental policy, oversee manufacturing standards (that is, issue vehicle type approval) and now, those who oversee excise taxes.

4.3.4 Displacement (as a proxy for ‘all’ policy objectives)

Engine displacement is the most common criterion to classify automobiles for excise duty purposes, and it is used to classify all imports of CBU, CKD and SKD vehicles. The primary benefit of this approach is that engine size can act as a proxy for many of the other negative externalities discussed above. If we look at these:

- *Energy policy.* Governments are increasingly conscious of the need to secure sufficient fuel reserves. This takes in many considerations such as greater fuel efficiency in new vehicles, greater use of alternative fuels, particularly renewables, and greater investment in alternative fuel sources such as electric vehicles. In conjunction with fuel use, it can generally be considered that there is a relationship between fuel use and displacement, with larger engine sizes generally consuming larger quantities of fuel. Thus larger engine sizes will attract higher effective excise rates.
- *Fuel efficiency.*²⁷ One of the primary factors governing fuel efficiency is engine size. Manufacturers have been continually improving fuel efficiency with initiatives such as new technology, new aerodynamic designs and weight reductions. Furthermore, the way a vehicle is driven contributes to fuel use, however engine size remains the main factor. Thus, again, larger engine sizes have generally attracted higher effective excise rates.
- *CO₂ emissions.* Again, manufacturers are continually improving emissions from new model vehicles, however, the level of CO₂ emissions still relates to the amount of fuel which is burnt and the larger engines consume larger quantities of fuel. As with fuel efficiency, engine size has played a part in seeing higher effective rates being applied to larger engine vehicles.
- In addition to fuel efficiency and emissions, another factor is that of ‘wear and tear’ on public roads which itself often relates to the weight of the vehicle. Larger engine vehicles will likely carry more weight than vehicles of a smaller engine size.

There is a clear trend in the automotive industry generally to improve fuel efficiency and reduce emissions. With this there is a correlation with greater numbers of new vehicle models having smaller but more efficient engines.²⁸ Some vehicle types may retain a large overall body size given their primary purpose or demand in the market for larger vehicles. However, even such larger vehicles are increasingly utilising smaller and more efficient engines.

The combination of the drive to improve fuel consumption, and reduce emissions, including through alternative fuels, has seen the emergence of new ‘sub-categories’ appearing in industry (and, in some cases, excise and other taxes) terminology. We are seeing examples of these in the ASEAN region, including:

- ‘Eco Car’ – Thailand
- ‘Electric Car’ – Thailand, Vietnam
- ‘Energy Efficient Vehicle’ – Malaysia
- ‘Low Cost Green Car’ – Indonesia.

The creation of these new sub-categories is generally linked to some form of favourable tax treatment (including excise) which in turn stimulates demand for these environmentally more friendly vehicles. The categories are also being used outside of excise taxation and for other forms of tax and investment incentives to attract the production of these new products locally.

Including some or all of these new sub-categories in an excise system risks adding to the complexity of the system through the need to add additional (and defined) items to existing taxable categories.

Complexity will arise when a vehicle is manufactured (or planned to be manufactured) or imported and can fit into several possible excise tariff items – with each likely to have different duty rates. In summary, excise tax policymakers need to be aware of the following risks:

- what criteria will be used to differentiate between say, a small car and an ‘eco car’
- how those criteria will be established
- whether all manufacturers and importers will be able to meet the criteria
- how the criteria will be confirmed, including testing issues (see section 4.4)
- what the ‘fall back’ position will be if criteria are not met.

This paper would generally support the region using the excise system to encourage the production of ‘greener cars’ and continue the trend of smaller and more efficient engine technology. As such, keeping within the key principles of simplicity and equity, engine displacement remains a good proxy for an excise tax structure with rate adjustments/discounts for vehicles which meet certain policy priority criteria. This will be further discussed below as part of a standardised approach to automobile excise structure.

4.4 Fuel efficiency and CO₂ emissions testing: issues for excise classification

Where a government has decided to utilise CO₂ emissions (and/or possibly fuel efficiency) as either part of the classification criteria or setting of the effective excise rate, measurement of CO₂ emissions and fuel efficiency becomes a critical part of the excise system. As stated above, a number of agencies may have an interest, and indeed regulations to administer, in relation to CO₂ emissions and fuel consumption. These types of interests may include:

- being part of the certification process to issue a ‘vehicle type approval’ which indicates that the vehicle has met the ‘standards’ (also known as ‘homologation’)
- production of a ‘label’ to be affixed to new vehicles for consumers to note fuel efficiency and CO₂ emissions
- determination of tax classification and tax payments.

In this context, it is important for the testing regime to be consistent and consistently applied against the following key principles:

- be based on a widely accepted international set of standards
- not designed to ‘favour’ a particular product, product type or manufacturer
- not designed to discriminate against imports and recognise the homologation processes of trading partners where applicable
- be an efficient process to minimise the costs to industry.

The main issues around the testing process, which cause some debate globally, can be summarised as follows:

- What test cycles (or simulated vehicle-running patterns) are to be measured for CO₂ emissions and fuel efficiency, or in other words, what combinations of urban stop/start, country cruising, idling, etc., should be used in the cycle?
- What testing methodologies and processes are to be used (for example, chassis dynamometer, tail pipe capture, start with cold engine, start with warm engine, etc.)?
- What happens if national laboratories cannot conduct accurate testing, for example, should manufacturers’ specifications be used, should automobile association data be used?

- Whether some testing requirements can be utilised to ‘favour’ certain vehicles, and/or discriminate against others to the point of creating ‘non-tariff’ trade barriers.

These questions have not been answered at a global level and no one true global standard for testing is in place. The UN/ECE has for some time had a ‘working group’ developing a set of global standards of vehicle regulations, including CO₂ emissions and fuel efficiency (and its testing) to facilitate international trade in vehicles.²⁹ These regulations cover CBU, CKD and SKD categories.

Non-European nations may be signatories to the regulations and, at present, some 58 countries are now signatories including Thailand and Malaysia from the ASEAN region. Furthermore, Japan and South Korea, both major automobile manufacturing countries with trade agreements with ASEAN, have also signed on. Significantly the US, Canada and China are major automobile producing nations which are not signatories and operate their own developed test standards.

Given the broad international acceptance of the UN/ECE’s regulations, adoption of these standards is seen as moving towards ‘best practice’ testing as opposed to trying to develop a coordinated testing regime between various agencies for national markets. This paper is not a technical document relating to CO₂ emissions and fuel efficiency test design, rather an automobile excise tax design resource.

Ministries of finance are unlikely to, and indeed should not, be involved in CO₂ emission and fuel efficiency testing design. Conversely, they should be advocating the relevant technical agencies to adopt internationally accepted best practices that are in line with best practice in tax design. These principles (outlined above) include equity, non-discrimination and ensuring minimal financial impact on industry/disruption to the economy. In short, excise tax policy in relation to certifying CO₂ emission levels for tax purposes should be linked to a widely accepted international standard as part of the classification process.

Therefore, as information for excise tax policymakers, Figure 5 is a ‘high level’ summary of the relevant UN/ECE Regulations 101 and 83.

Figure 5: UN/ECE Regulations: CO₂ emissions and fuel efficiency testing

<p>High Level Outline: CO₂ Emission Testing Extracted from Regulation No. 101 and Regulation No. 83 of the UN/ECE</p> <p>Regulation 101 For internal combustion engines</p> <ul style="list-style-type: none"> • CO₂ emissions measured as grams per kilometre (g/km) • Fuel consumption measured as litres per 100 kilometres (Natural gas metres cubed per 100 kilometres) • Test as per Annex 6, which for CO₂ emissions will be per Type I Test as defined in Annex 4 to Regulation No. 83. <p>Regulation 83 <u>Type I Test</u></p> <ul style="list-style-type: none"> • Urban cycle (representing city driving) x 4 • Extra-urban cycle (representing non-city driving) • Vehicles on dynamometer, emissions captured and measured • Vehicle type approval granted by testing authority • International standard identification of approval for UN/ECE signatories <p><u>Type II – Type VI Tests (not applicable)</u> Other emissions (that is, not CO₂)</p> <p><u>Conformity of Production (COP)</u></p> <ul style="list-style-type: none"> • Representative vehicle tested • Minimum 3 more cars chosen at random to ensure conformity across vehicle type • Can select more if sample cars outside a tolerance of emission levels and fuel consumption of representative vehicle
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Source: Author.

5. What are the optimal taxation approaches to structure and tax base?

This part of the paper brings together the discussions above and adds the following discussion on the tax base, with a view to outlining a potential excise tax structure for consideration.

5.1 Tax bases in automobile taxation

Automobile excise taxes are primarily levied on an *ad valorem* basis, and given the nature of the product, *ad valorem* taxes remain the most appropriate tax base for automotive products.

In relation to specific or unitary tax rates, there are no real or equitable tax bases to use:

- *Per car* would be quite regressive and not recognise the differentials in externalities from larger vehicles
- *Per cylinder*, or *per cubic centimetre* does not recognise or incentivise any move towards technology which increases fuel efficiency and reduces emissions
- *Per g/km of CO₂ emissions* would leave no revenue from certain vehicles with very low or zero emissions.

As such, *ad valorem* taxation is seen as the most appropriate; however, some discussion is required with respect to the appropriate taxable value (tax base). Generally, excise taxes are levied on an ex-factory basis (or Cost + Insurance + Freight + Import duty for imports), and this is still seen as appropriate provided that certain areas are addressed in the taxable value.

These areas of discussion are the treatment of certain costs when establishing an ‘ex-factory’ value, and the confirmation of ex-factory values when the manufacturer sells to a related party distributor or retailer of the vehicle. These issues are further examined below.

One source to start looking at the issues of ‘ex-factory’ is that of customs laws on valuation. Such law is comprehensive and backed by global agreements and conventions which provide guidance on import valuations, including those between related parties. Customs laws and conventions can provide guidance to revenue authorities and taxpayers where their values are not clear – offering several possible methods to deduce the value.³⁰ However, one principle is clear in customs law, and that is that no customs agency should assign an arbitrary value over imported goods. This principle should carry over to excise valuation processes.

5.2 The ‘benchmark’ rate

When setting excise duty rates the first requirement is to determine a ‘benchmark’ rate which will then represent the starting point for all excise rates on products. The benchmark rate is the rate that the government wishes to levy on automobiles. Where government policy is to provide an exemption or preferential treatment to a particular product, the excise rate exemptions or discounts are made to the benchmark rate to set a ‘policy effect rate’ and are treated as ‘tax expenditures’ in recognition that some revenue has been forgone by that policy. In short, the benchmark rate should be set first then discounts made to that rate for policy considerations such as smaller engine displacement, lower CO₂ emissions, and/or greater fuel efficiency, etc.

In terms of setting this benchmark rate for automobiles, it is generally seen that commercial vehicles will have lower excise rates than passenger vehicles as this reflects the desire to reduce input costs for business. This, however, will be a policy decision for each country and will require that passenger vehicles do not become substitutes for commercial vehicles so that excise duties are avoided.

Other considerations then follow the priority objectives outlined above, as with general internal tax

policy considerations at the national level. For automobile excise taxation, these are seen as including (in no priority order):

- raising revenue
- reducing CO₂ emissions
- increasing fuel efficiency
- developing technologies to reduce CO₂ emissions and increase fuel efficiency
- attracting investment including technology development.

5.3 Aligning categories, definitions, and policies for excise tax design

In this part of the paper, the policy issue discussions above are brought together and captured in Table 4 which represents a starting point in capturing a standardised automobile excise structure for policymakers to consider, and applies to CBU, CKD and SKD products. The table represents:

- *Two product categories* – passenger and commercial vehicles, with associated differentiations via standard definitions
- *Four product sub-categories* within the passenger vehicle category and six within the commercial vehicle category differentiated via standard definitions
- Classification of individual vehicle models via engine displacement, aligned with HS codes (petrol displacement HS categories for passenger vehicles and diesel displacement HS categories for commercial vehicles)
- Excise duty based on *ad valorem* rates applied on an ex-factory basis (for domestically produced vehicles) or CIF + Customs Duty basis (for imports)
- Benchmark rate expressed as ‘A%’ with differential rates which decrease as engine displacement decreases (B%, C% and D%) for passenger vehicles
- Benchmark rate expressed as ‘E%’ with differential rates which decrease as engine displacement decreases (F%, G% and H%) for commercial vehicles
- Adjustments to excise duty rates to apply when one or more criteria are met as they relate to either CO₂ emissions, fuel consumption, or alternative fuel sources, including hybrid models utilising two fuel sources.

Table 4 attempts not to propose standards in terms of categories, definitions and adjustments, but rather to keep the structure and design relatively simple. Whilst not intended to be a recommendation for any country’s automobile excise tax system, it sets out a range of useful information. In terms of simplicity, the structure keeps away from creating new ‘designer’ products such as the ‘eco car’, the EEV, the LCGC, rather these types of products are classified by their specifications and local policies than set the adjusted rate. For example, an ‘eco car’ as defined in the Thai excise laws includes:

- engine size less than 1300 cc (<1400 cc diesel); and
- minimum of 5 L/100 km; and
- CO₂ emissions less than 120 g/km.

In this case, any product falling into 1a1) or 1a2) and which met the adjustment criteria would be subject to the policy rate for ‘eco cars’ as defined in Thailand.

Table 4: Possible standard automobile excise structure

Product Category	Product Sub-category	Classification By displacement measured in cubic centimetres (cc)	Excise Duty Ex-factory	Adjustments to Excise Duty Rates A, B, C & D	
1. Passenger Motor Vehicles Motor cars and other motor vehicles principally designed for the carriage of persons (less than 10), including the driver	1a. Passenger Cars Road motor vehicle, other than a motor cycle, intended for the carriage of passengers and designed to seat no more than nine persons (including the driver)	1a1) up to 1000 1a2) 1001 - 1500 1a3) 1501- 3000 1a4) above 3000	D% C% B% A%	Discounts to policy rate - For CO ₂ < g/km meet local policy target <u>And/or</u> - For Fuel < target L/100 km Discount to policy rate - For electric car Discount to policy rate - hybrid (2-fuel source)	
	1b. Sports Utility Vehicles (SUV) Includes vehicles designed as off-road vehicles with four wheel drive capability (or two wheel where other specifications of this definition are met), high ground clearance and a wagon body type, seating up to nine people (including the driver)	1b1) up to 1000 1b2) 1001 - 1500 1b3) 1501- 3000 1b4) above 3000	D% C% B% A%		Discount to policy rate - For fuel cell
	1c. Passenger Pick Up Vehicles (PPV) Pick-up vehicles designed with an extended or dual cab for the carriage of no more than nine people (including the driver)	1c1) up to 1000 1c2) 1001 - 1500 1c3) 1501- 3000 1c4) above 3000	D% C% B% A%		
	1d. Other	1d1) up to 1000 1d2) 1001 - 1500 1d3) 1501- 3000 1d4) above 3000	D% C% B% A%		

(Continued next page)

Product Category	Product Sub-category	Classification By displacement measured in cubic centimetres (cc)	Excise Duty Ex-factory	Adjustments to Excise Duty Rates A, B, C & D	
2. Commercial Motor Vehicles Motor vehicles principally designed for the carriage of goods, or persons (10 or more) including the driver, or special purposes	2a. Pick Up Vehicles Any vehicle which contains both a passenger compartment designed for the carriage of less than four persons and open cargo bed for the carriage of goods	2a1) up to 1000 2a2) 1001 – 1500 2a3) 1501- 3000 2a4) above 3000	H% G% F% E%	Discounts to policy rate - For CO ₂ < g/km meet local policy target <u>And/or</u> Discounts to policy rate - For Fuel < target L/100 km Discount to policy rate - For electric car Discount to policy rate - hybrid (2-fuel source)	
	2b. Van Any vehicle with a closed cargo bay designed for carriage of goods with no more than two axles	2b1) up to 1000 2b2) 1001 - 1500 2b3) 1501- 3000 2b4) above 3000	H% G% F% E%		Discount to policy rate - For fuel cell
	2c. Bus A vehicle designed for the carriage of 10 or more persons including the driver	2c1) up to 1000 2c2) 1001 - 1500 2c3) 1501- 3000 2c4) above 3000	H% G% F% E%		
	2d. Truck A vehicle with a power unit and either a permanently fixed or detachable cargo carrying capability with two or more axles	2d1) up to 1000 2d2) 1001 - 1500 2d3) 1501- 3000 2d4) above 3000	H% G% F% E%		
	2e. Truck tractor A non-cargo carrying vehicle designed to tow trailers and other devices	2e1) up to 1000 2e2) 1001 - 1500 2e3) 1501- 3000 2e4) above 3000	H% G% F% E%		
	2f. Special purpose Including vehicles with specific purposes such as fire-fighting, ambulances, spraying, concrete mixing, mounted cranes, etc.	2f1) up to 1000 2f2) 1001 - 1500 2f3) 1501- 3000 2f4) above 3000	H% G% F% E%		

Source: Author.

6. Conclusions

The AEC 2015 provides a unique opportunity to develop an industry with great potential into a truly global participant. The automobile industry has the infrastructure in place today with several countries producing automobiles with local and foreign investment. Using the AEC 2015, these producers should be viewing ASEAN as a single market to create a strong base from which to grow exports, and a single production base supplying and producing the components and assembling the vehicles to support this export drive.

Excise taxation with its important role in each member country of correcting negative externalities and raising revenue will need to be coordinated to achieve this. Barriers to the single market and production base through ‘national product champions’ and structures which often serve as non-tariff barriers, need to be broken down and product categories subject to excise need to be better aligned using standard or common definitions and classification criteria.

Recognising the future of the industry, the excise system can be appropriately used to incentivise new technology in reducing CO₂ emissions and increasing fuel efficiency, and opportunities could exist for that technology to be designed in the region provided automobile manufacturers, through coordinated excise systems, are able to sell into the whole ASEAN market.

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Notes

- 1 Brunei Darussalam, Cambodia, Indonesia, Laos PDR, Malaysia, Myanmar, The Philippines, Singapore, Thailand, and Vietnam.
- 2 European Automobile Manufacturers' Association 2013, p. 39 (adjusted for Australia and Taiwan).
- 3 Indonesia (125%), Malaysia (105%) and Thailand (111% effective), for example, all have excise rates on vehicles with larger displacements which are more than 100% of ex-factory valuations.
- 4 Cnossen 2005, p. 598.
- 5 www.islington.gov.uk/services/parks-environment/sus_pollute/air_quality/Pages/Vehicle-air-pollution.aspx.
- 6 Weisbrod, Vary & Treyz 2003, p. 3.
- 7 See, for example, Thailand 12% (Board of Investment), Malaysia 3.2% (EXIM Bank), China and India 7% and globally approximately 3% (Klink, Mathur, Kidambi & Sen 2013, p. 3).
- 8 The Philippines valuation for excise is based on a net selling price (of either the manufacturer or importer) under RA 9224.
- 9 Including the World Customs Organization (WCO) Harmonised System (HS) notes, chapter 87; United States Code of Federal Regulations (CFR) 40 CFR, chapters 1 and 23 CFR Part 658.17; Australian Bureau of Statistics Catalogue 9314.0 'Sales of New Vehicles', January 2014; New South Wales Government (Australia) 'Categorisation of Motor Vehicles - Definitions'; and UN/ECE's 'Classification and Definition of Motor Vehicles'.
- 10 Asia Pacific Tax Forum 2013, ASEAN Excise Study Group Discussion Paper (unpub.).
- 11 See, for example, Thailand where rate differentials exist for vehicles less than 3000 cc that run on ethanol, electric batteries, fuel cells, natural gas, and hybrids as well as a category known as the 'eco car'. See also Vietnam which applies a rate of 50% of headline rate for vehicles running on biofuels, a rate of 70% of the headline rate for Hybrids, and discounts for electric vehicles dependent on passenger capacity.
- 12 See, for example, Thailand which applies 10% excise for electric and fuel cell vehicles rather than the benchmark 50%, and Vietnam which for electric vehicles applies rates between 10% and 25% rather than the benchmark rates of between 45% and 60%.

- 13 UK Driver and Vehicle Licensing Agency 'Vehicle Excise Duty' 2014, www.gov.uk/government/uploads/system/uploads/attachment_data/file/299797/V149__2014-15.pdf.
- 14 See www.whitehouse.gov/the-press-office/2012/08/28/obama-administration-finalizes-historic-545-mpg-fuel-efficiency-standard.
- 15 Anderson, Parry, Sallee & Fischer 2010.
- 16 Section 25.1 A New Tax System (Luxury Car Tax) 1999, Commonwealth of Australia.
- 17 See http://ec.europa.eu/clima/policies/transport/vehicles/cars/index_en.htm.
- 18 Malaysia National Automobile Policy (NAP) 2014.
- 19 Customs & Excise Department, Republic of Cyprus, www.mof.gov.cy/mof/Customs/customs.nsf/All/56C4D9A3AB5A5B0AC2257488003A6B03?OpenDocument.
- 20 Converted from grams per mile by multiplying by 0.625.
- 21 Vehicle fleets means an average CO₂ emission target across all makes and models of a manufacturer.
- 22 www.theicct.org/info-tools/global-passenger-vehicle-standards.
- 23 Excise is only applied to vehicles imported from outside the EU; those imported from inside the EU can claim excise duty relief (along with customs duty relief).
- 24 www.sars.gov.za/AllDocs/LegalDoclib/SCEA1964/LAPD-LPrim-Tariff-2012-06%20-%20Schedule%20No%201%20Part%202B.pdf.
- 25 www.sars.gov.za/AllDocs/LegalDoclib/SCEA1964/LAPD-LPrim-Tariff-2012-11%20-%20Schedule%20No%201%20Part%203D.pdf.
- 26 See www.unep.org/transport/gfei/autotool/approaches/economic_instruments/fee_bate.asp.
- 27 See www.carfuelconsumption.com/.
- 28 KPMG International 2012; Tuttle 2011; Tuttle 2012.
- 29 See www.unece.org/trans/main/welcwp29.html.
- 30 See Article VII of the GATT 1994, and WTO Customs Valuation Agreement.

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