

8. Production of performance based (CO₂ emission) import duties on motor vehicles. [VED – Vehicle Emission Duty]

SECTOR: TRANSPORT

TECHNOLOGY: Production of performance based (CO₂ emission) import duties on motor vehicles. [VED – Vehicle Emission Duty]

Introduction

This technology intervention aims to change the way in which duties are charged on motor vehicles being imported into the country of Belize. The main result of this project will be to modernize the way vehicular import duties are charged, so that it encourages the country's citizens to import more fuel-efficient motor vehicles. The intervention will complement the objectives of the Belize National Transportation Master Plan, which is currently being drafted for adoption, and which will endeavour to regulate every facet of transportation in Belize, including land, air, and sea transport (Bonilla, *et al.*, 2017).

Currently duties are applied as shown in the table below. The rate of duty applicable to Motor Vehicles is according to the engine capacity in Motor Cars/SUVs; according to the weight for Trucks, and according to the seating capacity in Vans and Busses for Public Transport.

Duty Rate for Imported Vehicles into Belize

Type of Vehicle	Cylinders	Litres	ID	RRD	ET	GST	Total %
Pickups	4	up to 3.0	10%		2%	12.5%	26.00%
Cargo Van	6 & 8		10%	15%	5%	12.5%	47.94%
Cars, SUVs & minivans	4	up to 3.0	45%		2%	12.5%	65.38%
	6 & 8		45%	5%	5%	12.5%	76.91%
Motor cycle		Less than 50 cc			2%	12.5%	14.75%
		Above 50 cc	20%		2%	12.5%	37.25%
Vans & Buses	4	10 to 20 passengers	10%		2%	12.5%	26.00
	6 & 8	20 passengers	10%	5%	5%	12.5%	35.56%
Buses		21 passengers+	10%		5%	12.5%	29.38%
Trucks		5 tonnes ⁺	10%	10%	5%	12.5%	41.75%
Tractor trucks			5%	10%	5%	12.5%	35.56%

It is the intention of this technology intervention to formulate a system (Vehicle Emission Duty - VED) that charges duties on an imported vehicle not by the number of cylinders it has, but by the amount of Carbon Dioxide (CO₂) it emits per unit distance travelled (g CO₂/mile). The benefits will be a reduction in the transport sector carbon emissions, reduced air pollution and health risks, and a mode of assessing fuel quality.

Note that this technology factsheet does not propose a VED system, although an example is given in the following section. This factsheet will be used to initiate the consultative exercise in developing this VED system. The project

	will be carried out by a team of experts knowledgeable in the fields of customs and excise regulations, automotive systems and legislation. The ultimate goal is to produce a document of this VED system to be presented to the relevant stakeholders (government and non-government) for approval, and later, implementation.																					
Technology characteristics	The proposed VED system will use the manufacture’s data of emissions rates to calculate the percentage duty to be charge. It is envisioned that the system will comprise of categories designated by the vehicle emission rates – and duty percentage is assigned to each category. Table I below is a theoretical example of what the basic VED would look like. Table I: Proposed Vehicle Emission Duty <table><tr><th>Category of Vehicles</th><th>Vehicle Emission g CO₂/mile</th><th>Import Duty on Purchase Price</th></tr><tr><td>Electric</td><td>0</td><td>10%</td></tr><tr><td>A</td><td>1 - 100</td><td>25%</td></tr><tr><td>B</td><td>101 - 150</td><td>35%</td></tr><tr><td>C</td><td>151 - 200</td><td>45%</td></tr><tr><td>D</td><td>201 - 250</td><td>65%</td></tr><tr><td>E</td><td>250 - 350 +</td><td>85%</td></tr></table> Note that the table above is an example. The real system will need to be more complex and inclusive to ensure that all vehicle types are covered such as buses, trucks, tractors, etc. There will be the need for clauses that deal with vehicles in which the CO2 emission rates are not available from the manufacturer. <i>Vehicle Emission Technology</i> Motor vehicle exhaust emissions are a significant source of pollution, including carbon monoxide, nitrogen oxides and hydrocarbons (US EPA, 1994; EPA Illinois; [3]). These pollutants can be harmful to human health and the environment and lead to the formation of ground level ozone (smog). Exhaust emissions from cars and trucks are one of the single greatest sources of air pollution and CO₂ emission. Table II below.	Category of Vehicles	Vehicle Emission g CO ₂ /mile	Import Duty on Purchase Price	Electric	0	10%	A	1 - 100	25%	B	101 - 150	35%	C	151 - 200	45%	D	201 - 250	65%	E	250 - 350 +	85%
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Table II: Estimates of average passenger car emissions in the US for April 2000

U.S. Environmental Protection Agency estimates of average passenger car emissions in the United States for April 2000 ^[3]		
Component	Emission Rate	Annual pollution emitted
Hydrocarbons	2.80 grams/mile (1.75 g/km)	77.1 pounds (35.0 kg)
Carbon monoxide	20.9 grams/mile (13.06 g/km)	575 pounds (261 kg)
NO _x	1.39 grams/mile (0.87 g/km)	38.2 pounds (17.3 kg)
Carbon dioxide - greenhouse gas	415 grams/mile (258 g/km)	11,450 pounds (5,190 kg)

Hydrocarbons, carbon monoxide and oxides of nitrogen are created during the combustion process and are emitted into the atmosphere through the tail pipe. Hydrocarbons are also emitted as a result of vaporization of gasoline from the tank and crankcase of the automobile. The US Clean Air Act of 1977 set limits as to the amount of each of these pollutants that are emitted from automobiles. Some of the more popular emission control devices installed on automobiles are: EGA valve, Catalytic Converter, Air Pump, PCV valve, and Charcoal Canister.

Table III: US Exhaust Emission Standards

United States Light-Duty Vehicle, Light-Duty Truck, and Medium-Duty Passenger Vehicle—Tier 2 Exhaust Emission Standards (for Bin 5)		
Component	Emission Rate	Annual pollution emitted
NMOG (Volatile organic compounds)	0.075 grams/mile (0.046 g/km)	2.1 pounds (0.95 kg)
Carbon Monoxide	3.4 grams/mile (2.1 g/km)	94 pounds (43 kg)
NO _x	0.05 grams/mile (0.0305 g/km)	1.4 pounds (0.64 kg)
Formaldehyde	0.015 grams/mile (0.0092 g/km)	0.41 pounds (0.19 kg)

(Source: epa.gov, 2000).

	In 2000, the United States Environmental Protection Agency initiated a more stringent emissions standard for light duty vehicles. The requirements were phased in with 2004 vehicles and all new cars and light trucks were required to meet the updated standards by the end of 2007 ^[3]. These Standards may likely be adopted in Belize with some minor adjustments. <i>Proposed Vehicle Emission Duty Concept</i> The main requirement for this technology transfer (i.e. VED Concept) will be the choice of a reliable and consistent vehicle emission testing protocol. Two systems that can be used are: 1) A laboratory emission testing facility; 2) Portable emissions measurement system. A Laboratory Emission Testing facility is a major infrastructure and institutional investment that requires planning and institutional capacity. The cost – benefits has to be closely evaluated. A portable emissions measurement system (PEMS) is a lightweight ‘laboratory’ that is used to test and/or assess mobile source emissions (i.e. cars, trucks, buses, construction equipment, generators, trains, cranes, etc.) for the purposes of compliance, regulation, or decision-making [3]. The PEMS technology for emission testing has its advantages and advantages, but the technology is being improved, The VED proposal will have to investigate these and other vehicle emissions measurement systems and protocols, and make recommendations to the government on the most appropriate systems that can be used to achieve the goals carbon emission reduction in the transport industry and reduce the health risks to Belizean.
Costs, including cost to implement mitigation options	This vehicle performance based system will require a minimum of eight (8) months of work by a consulting firm to formulate the system, and another six (6) months for vetting and adoption. The approximate cost of USD 100,000.00. The cost breakdown is a follow: Eight months Literature review, consultation (workshops), draft the proposal, presentation, and draft review. 20 day-work/month @ USD 500/day = 80,000 Travel to and from Belize Three return trips @USD 1500/trip = 4,500 Contingency: 15 % = 15,500 Total USD 100,000
cost of not modifying the project	Continuing with this archaic system that does not encourage the importation of more efficient vehicles such as hybrids and electrics.
Potential development impacts, benefits	

Economic	Country will spend less money on fuel. Hence it will have more for other areas of the economy.
Social	More money can go towards more essential functions such as health care and education.
Environmental	GHG emissions will be lowered
Status	No mention of this type of change is seen on the Belize Customs and Excise Department.
Barriers	- Cultural change. Urgent need of a cultural shift as a society to driving smaller, more fuel-efficient vehicles; - lack of political will-power to implement this carbon emission based vehicle duty system if it results in lower revenues
Endorsement by experts	- The Department of Energy has expressed some interest in such a venture. - The National Determined Contribution (NDC) for Belize expresses the need for the development of a domestic transportation policy and a National Transportation Master Plan. Note that this Master Plan is currently being executed by a team of consultants. The main aim of the plan should be to achieve a 20% reduction in conventional transportation fuel use by 2030 and promote energy efficiency in the transport sector through appropriate policies and investments.
Timeframe	Within a year to implement.
Institutional capacity	There is enough in-country capacity to conduct this exercise. Lawyers, Engineers etc.
References: 1. Belize Customs and Excise Department website: http://www.customs.gov.bz/index.php 2. National Determined Contribution under the United Nations framework Convention on Climate Change, 2015. 3. Exhaust Gas. Retrieved April 10, 2017, from https://en.wikipedia.org/wiki/Exhaust_gas. 4. Vehicle emissions testing programme: National Ambient Air Quality Standards for Ozone. Retrieved April 10, 2017 from http://epa.illinois.gov/topics/air-quality 5. India's Vehicle Emission Control Programme. Retrieved April 10, 2017 from www.theicct.org/indias-vehicle-emission-control-program. 6. Retrieved May 18, 2017 from www.epa.gov/emissions	