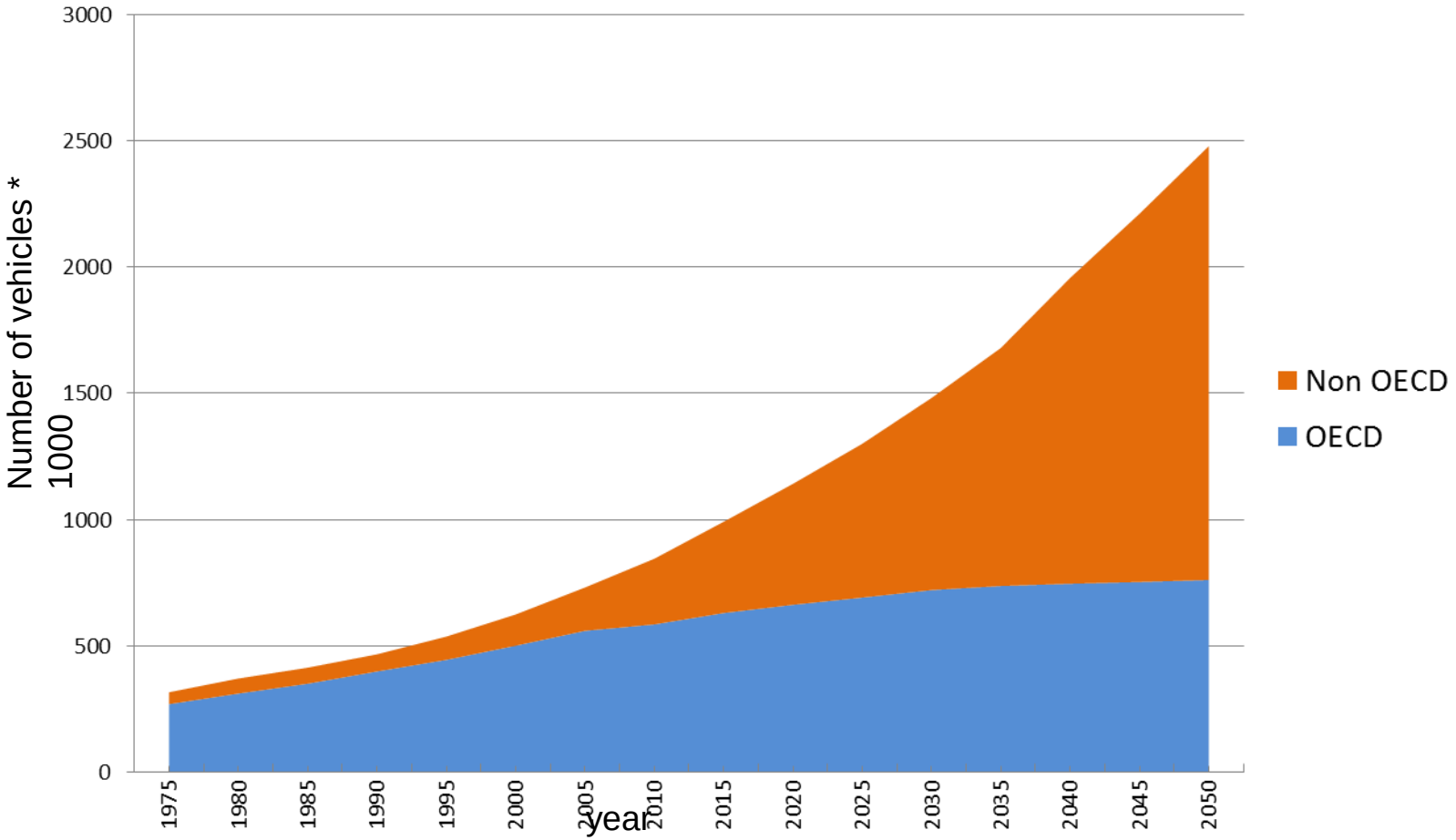
GFEI Project Objectives

Jane Akumu – UN Environnent

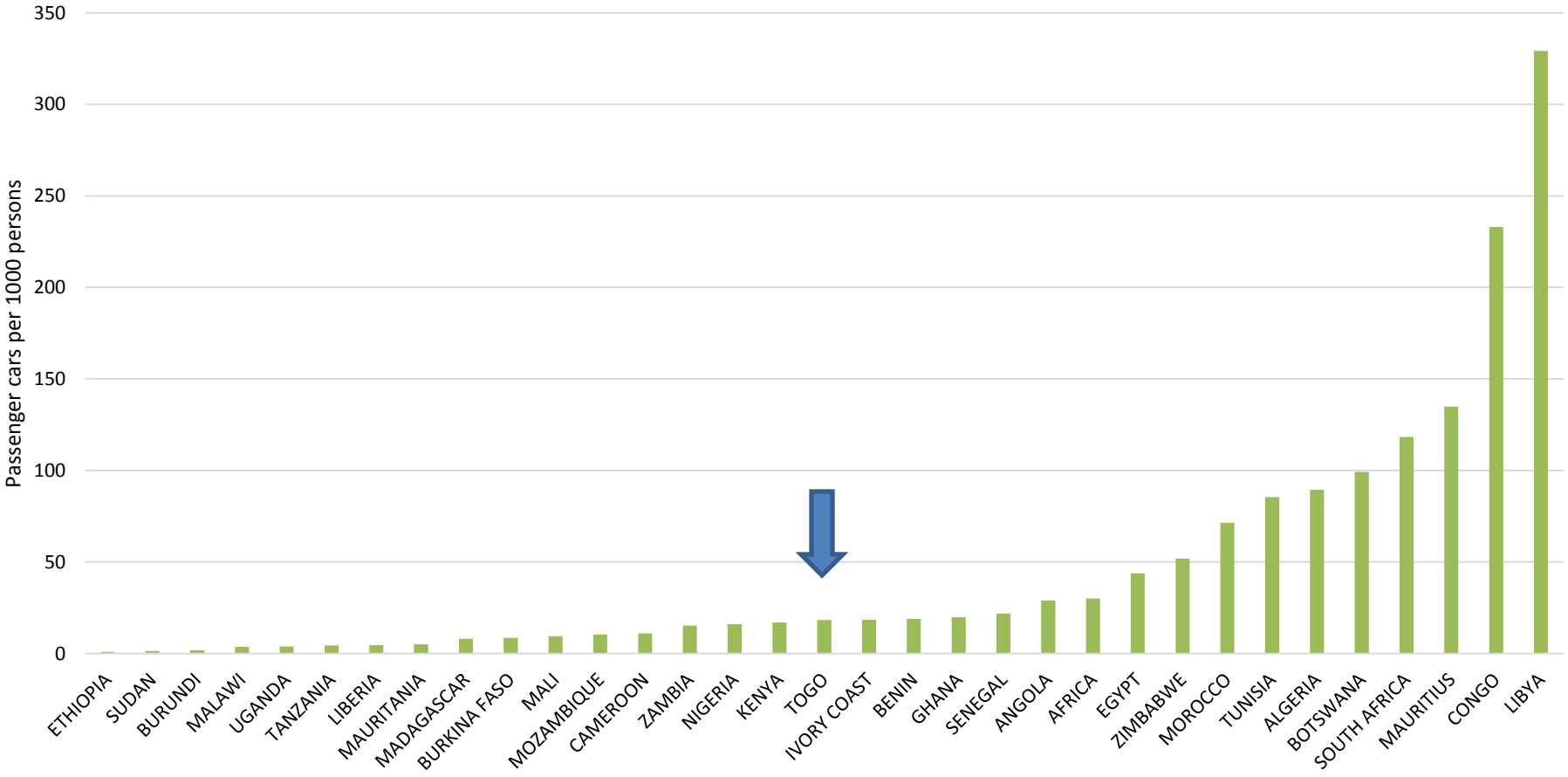
GFEI
GLOBAL FUEL ECONOMY INITIATIVE

Vehicle Growth

- *Global light duty vehicle fleet set to triple by 2050*
- *Almost 2/3 of all vehicle fleet growth will be in non-OECD countries; few have fuel efficiency strategies*

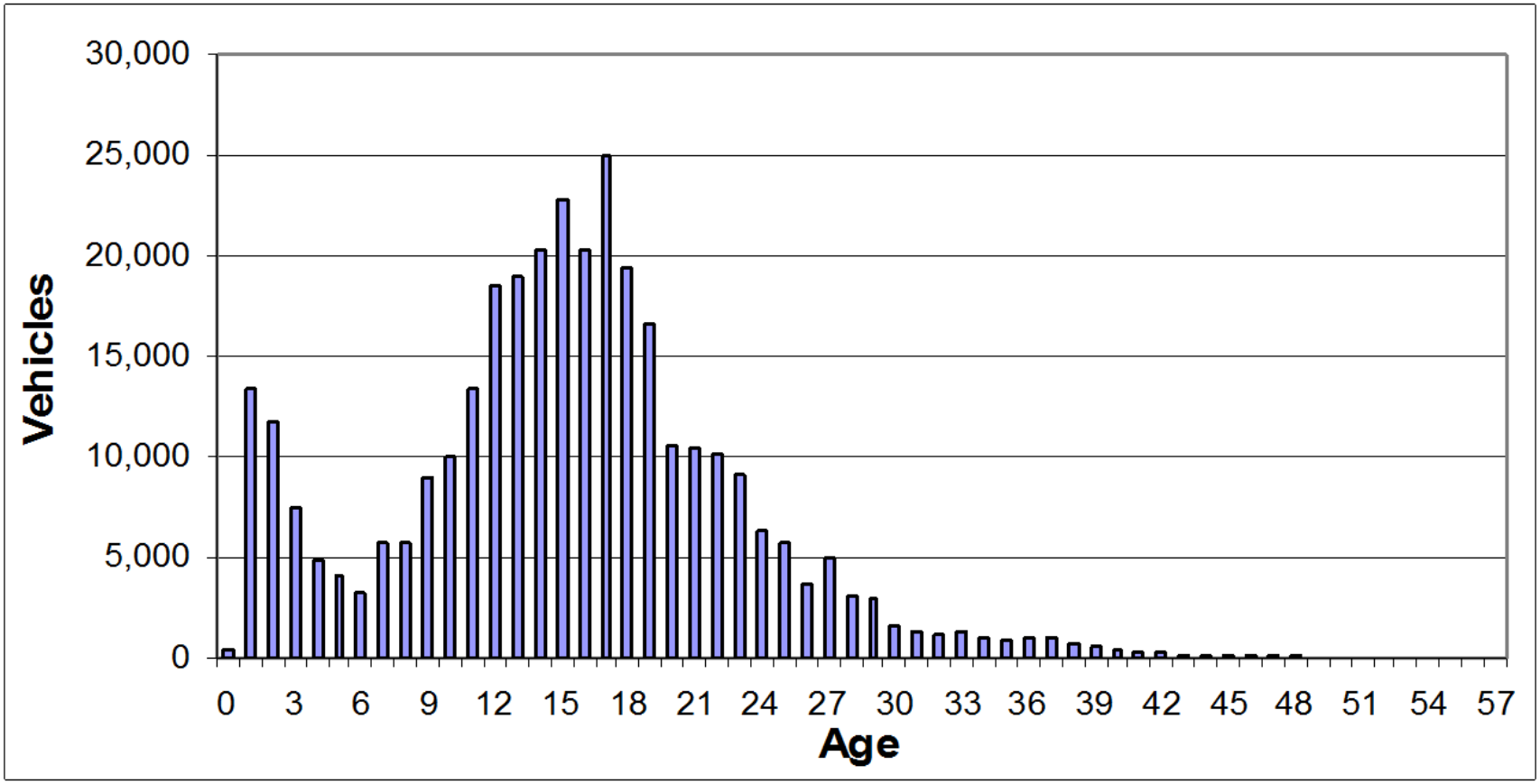


Motorization in Africa



ASTF
Africa Sustainable Transport Forum

Push For Cleaner, More Efficient Vehicles

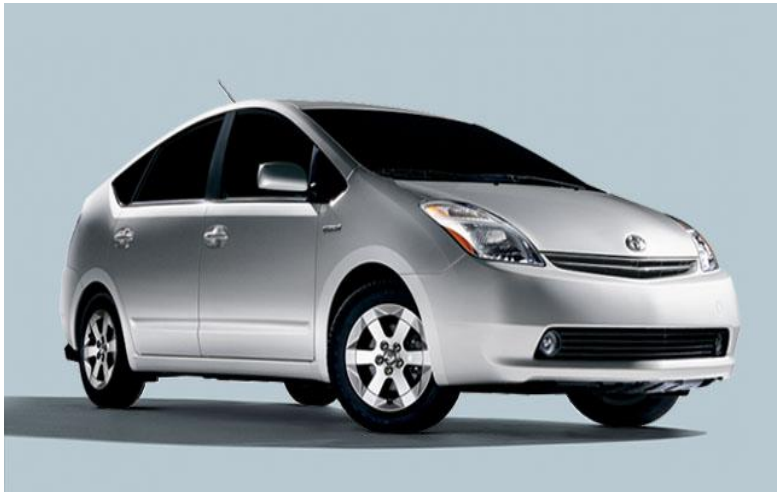


Vehicle age distribution in Tanzania.
Source: Tanzania Revenue Authority

What is fuel economy?

- Fuel economy measures energy per unit of vehicle travel
  - Litres per 100km (Europe)
  - Km per litre (Japan)
  - Miles per gallon (United States)
- Fuel economy, fuel efficiency, fuel intensity are all fairly interchangeable terms
- Also measured in CO_2 emissions
  - CO2 g/km
- Look for the tested fuel economy number for the vehicle

GLOBAL FUEL EFFICIENCY INITIATIVE



Goal: improvement in fuel economy across the global vehicle fleet by 2050

Currently: Global average 8L/100km

The goal: Global fleet average 4L/100km (25km/L)

- ***Emission reduction***
- ***Fuel savings***
- ***Global greenhouse gases reduction***

GFEI
GLOBAL FUEL ECONOMY INITIATIVE

GFEI has set graduated global fuel economy improvement targets

Based on a 2005 Baseline:

30% by 2020: All new cars in OECD countries

50% by 2030: All new cars GLOBALLY, (**from 8 to 4 L/100km, on avg.)**

50% by 2050: All cars GLOBALLY

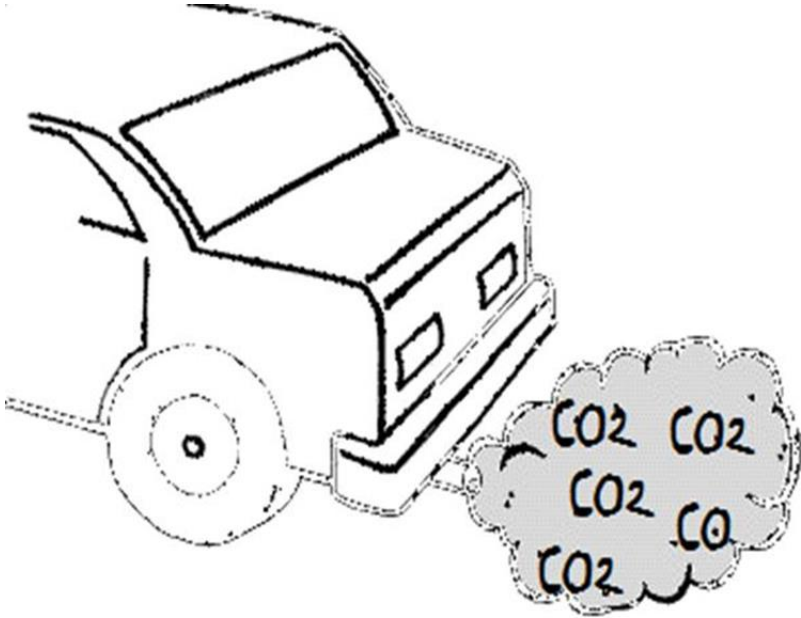
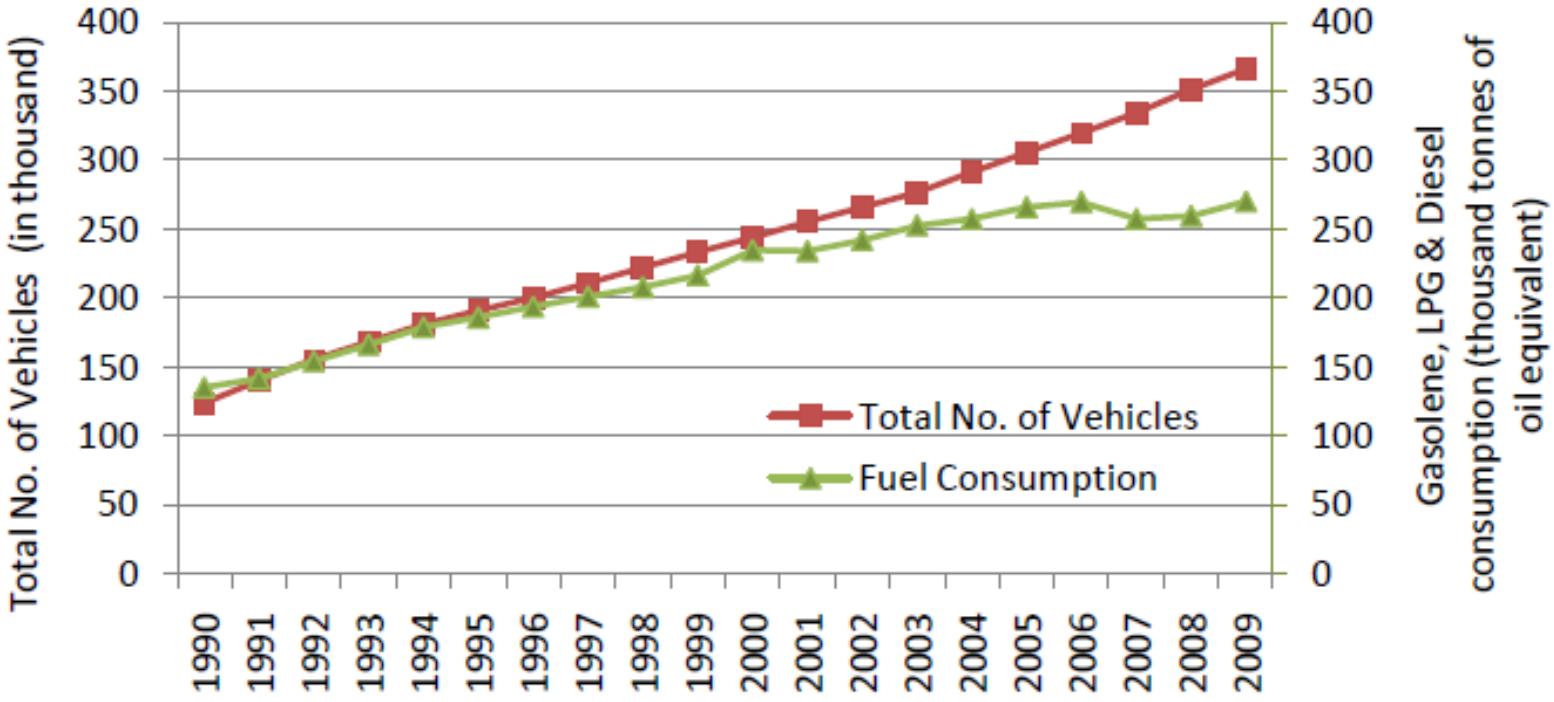


Figure 2.4: Number of Registered Vehicles, 1999 – 2009



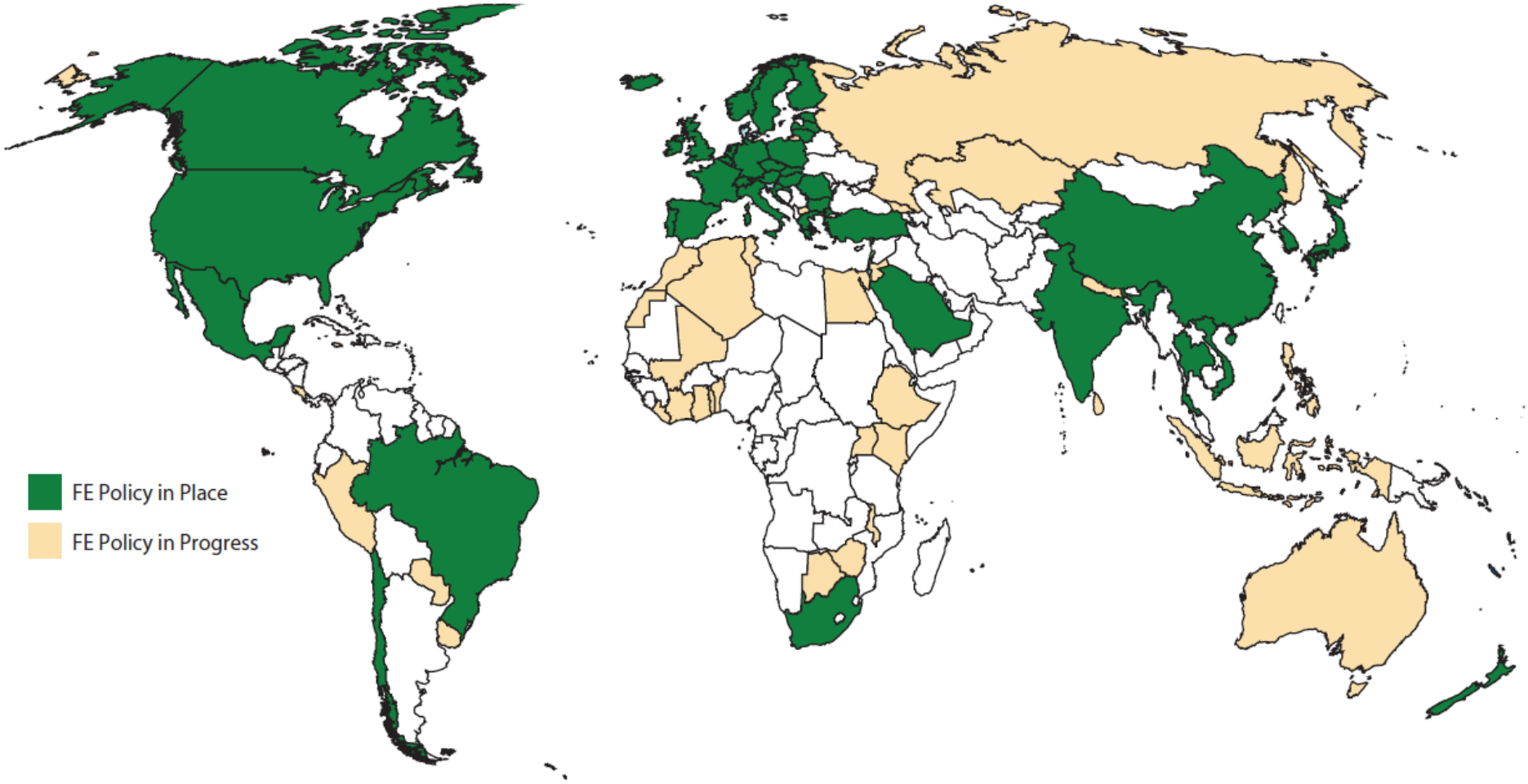
Source: CSO - Digest of Road Transport & Road Accident Statistics, 2009

Partners and Donors

Partners:

Donors:

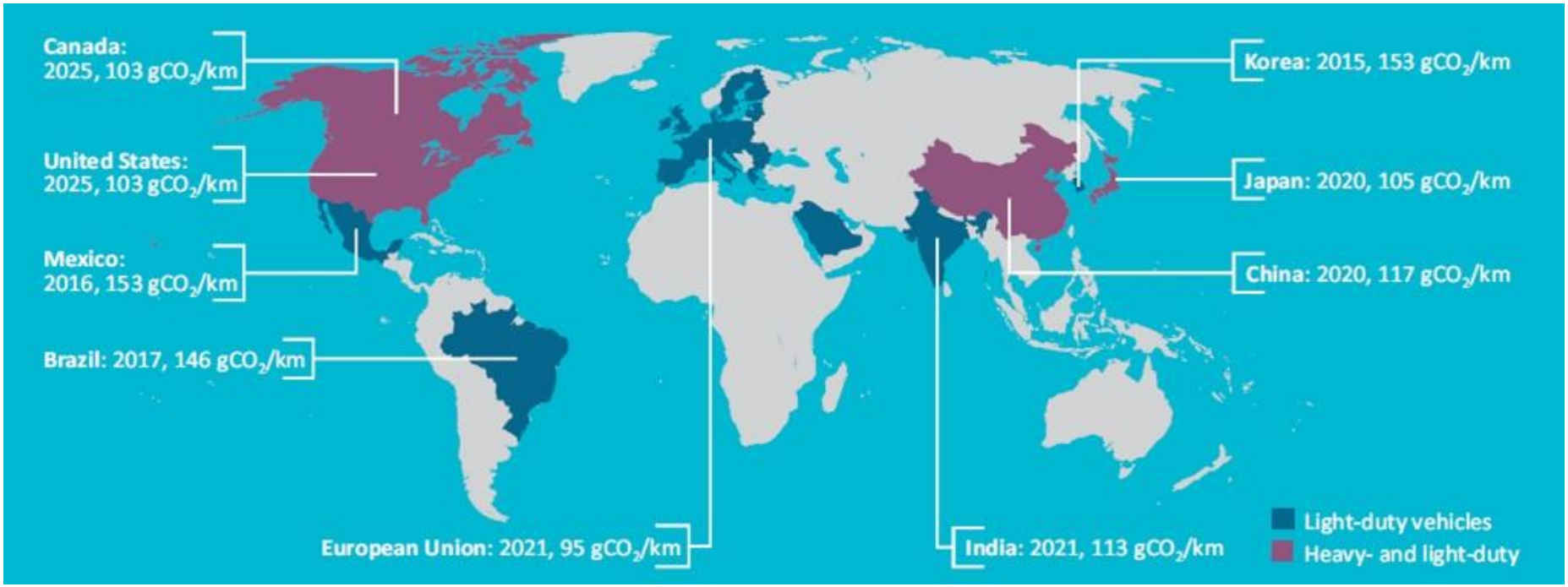
Global Progress on Fuel Economy Policy (2017)



February 2017 - For more information visit www.globalfueleconomy.org

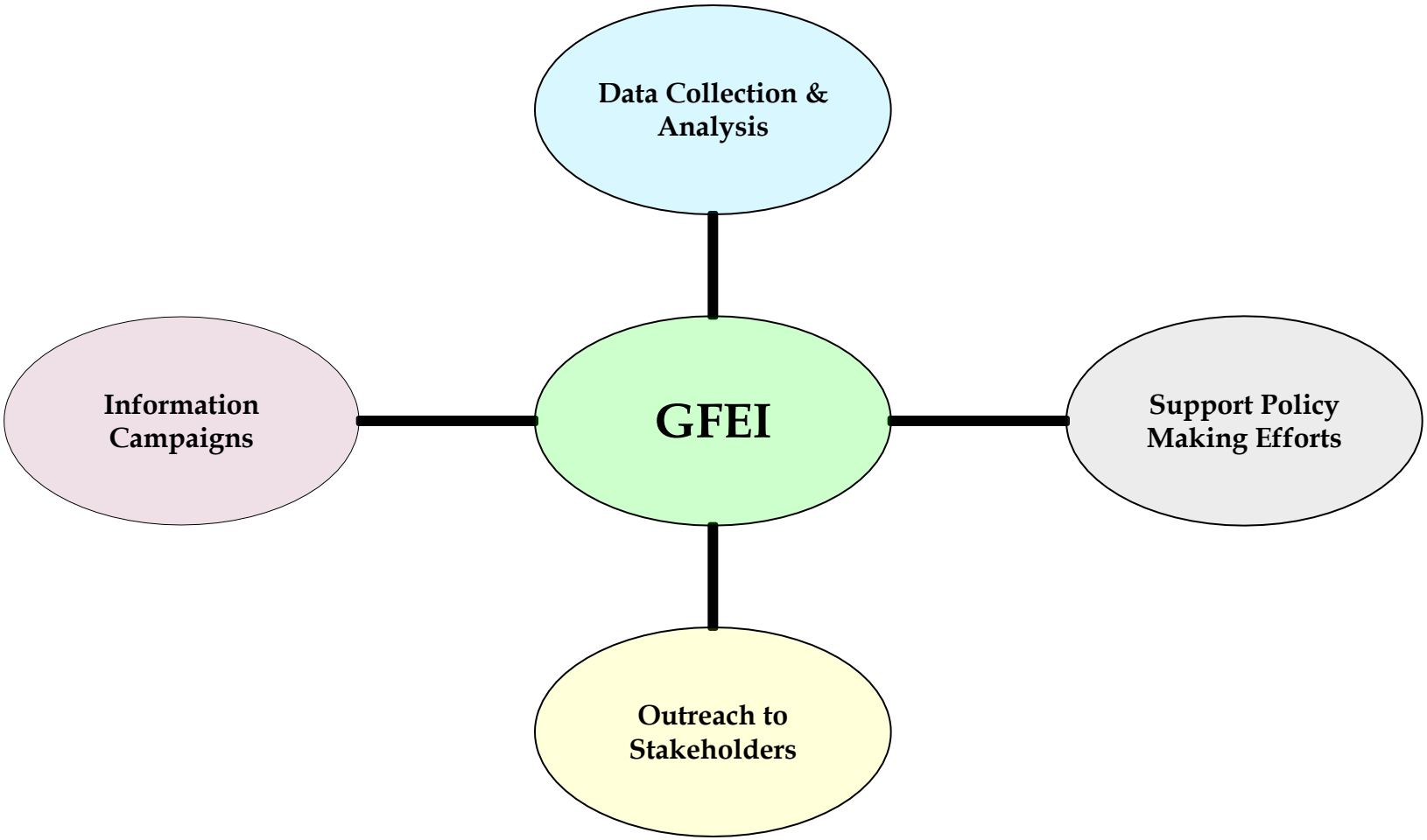
Global Fuel Economy Initiative (GFEI)

Countries are at various points in developing fuel economy policies



Note: light vehicle fuel economy values normalized or NEDC test cycle
Source: IEA ETP 2015 and ICCT

Activities under GFEI



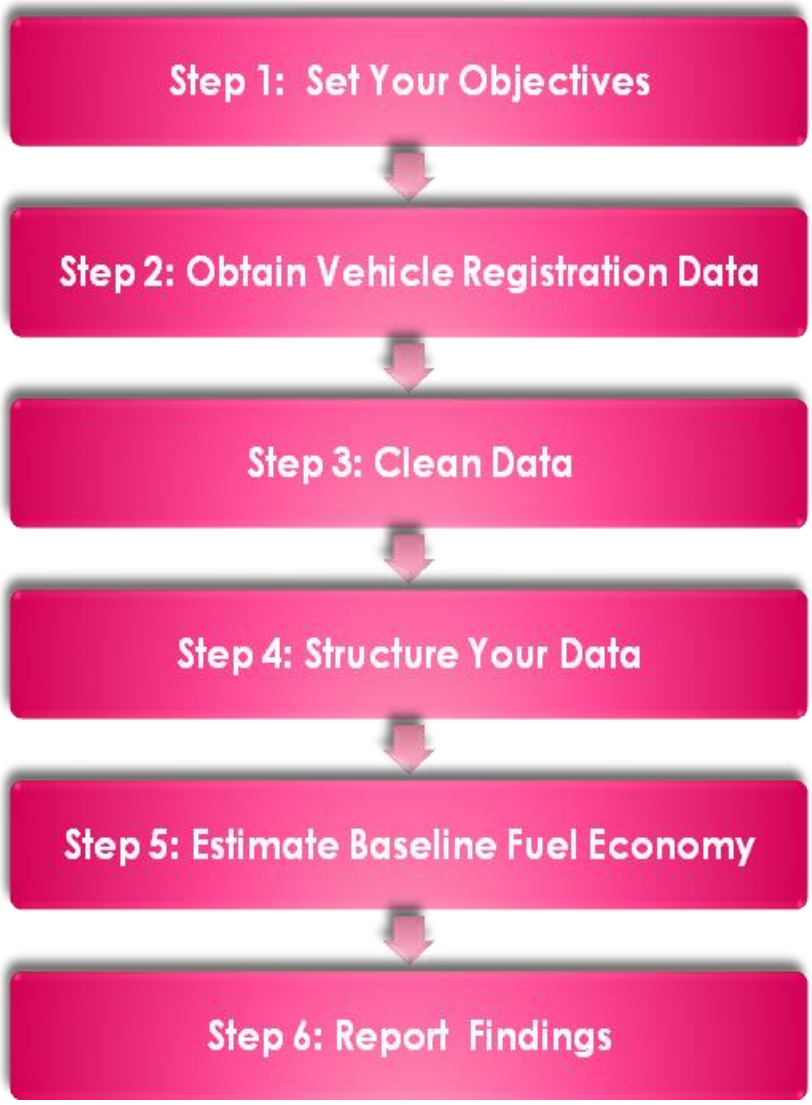
Support Policy Making Efforts

- Develop improved data and analysis of the current situation on fuel economy
- Work with government to develop sound policies to encourage fuel economy improvement for vehicles produced and/or sold in their country
- Work with stakeholders (such as auto makers, importers) to better understand the potential for fuel economy improvements and solicit their support
- Support awareness initiatives to provide consumers and decision makers with information on options

Oversight of the project

- Agreement signed with local partner
- National working group (multi-sector - Energy, Transport, Finance, Environment, Academia)
- Technical experts supporting analysis the data
- National, regional and International consultation

The GFEI Process



GFEI Implementation Steps

- Data collection and analysis
  - Vehicle fleet – light duty vehicles (3500kgs and below)
  - Vehicle regulations
  - Fiscal incentives
  - Fuel standards
- Baseline setting -2005
- Analysis of trend (2008, 2011, 2013, 2015, possibly 2016)
- Policy options based on cost benefit analysis
- National consultations

Vehicle Data Categories

- Data to be collected is for all vehicles entering a country for the first time:
  - new vehicles manufactured/assembled in the country
  - new vehicles imported
  - Used vehicles imported into the country
  - *car that is already in-country, but re-registered because re-sold should not be counted*
- Useful to keep separate track of these three categories of vehicles, as well as creating a combined average set of information

Minimum Information Required

- Vehicle make and model
- Model production year
- Year of first registration
- Fuel type (petrol or diesel)
- Engine size
- Domestically produced or imported
- New or used import
- Rated Fuel Economy per model and test cycle basis
- Number of sales by model

IEA Data Frame of Key Variables

Vehicle Type
Model
Manufacturer
Body type
Simplified Body Type
Segment
Axle configuration
Driven wheels
Engine cylinders
Engine ccm
CC Category
Engine kW
KW class
Engine horse power
Engine valves
Fuel type
Model year
Number of gears
Transmission type
Turbo
Gross vehicle weight
Height
Length
Number of seats

Average fuel economy

At the simplest level, taking a weighted average (by sales) of all new (including newly imported second hand) vehicles in the database will provide the average fuel economy of new vehicles sold in the country in the given year:

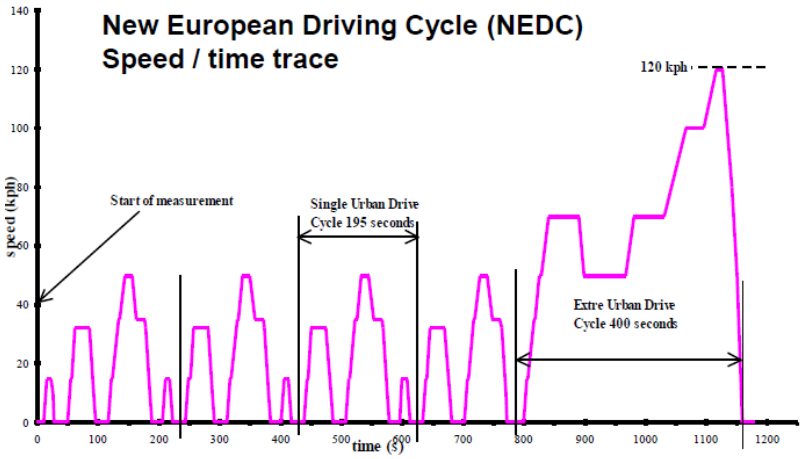
$$Harmonic\ average\ annual\ fuel\ economy = \frac{Total\ sales\ in\ the\ year}{\sum_1^n \frac{sales\ model\ i}{fuel\ economy\ model\ i}}$$

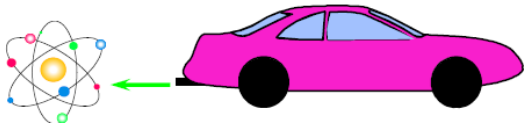
In a similar way, average CO_2 intensity can be obtained through weighted average with the sales of each model:

$$Average\ annual\ emission = \frac{\sum_1^n sales\ model\ i * emission\ model\ i}{Total\ sales\ in\ the\ year}$$

Estimating average fuel economy

- Look for the tested fuel economy number for the vehicle
- If not available the fuel economy figures for a given make, model and year can usually be retrieved from the vehicle manufacturers
- GFEI partners are compiling a list of fuel economies into a common database for use by countries undertaking baseline-setting exercise
- For the sake of comparison, all drive cycle data obtained be converted to the NEDC cycle
- Conversion factors can be downloadable from ICCT website www.theicct.org/info/data/GlobalStdReview_Conversionfactor.xlsx





Final Data

Make	Model	Condition	Body Type	Engine CC	Fuel Type	Model Year	Registration Date	L/100km	CO2
BMW	316I	Used	S.WAGON	1596	Petrol	1989	2005	7.5	176
CHEVROLET	OPTRA	Used	SALOON	1799	Petrol	2005	2005	6.2	145
CHEVROLET	NULL	Used	S.WAGON	1799	Petrol	2005	2005	6.2	145
NISSAN	SUNNY	Not Specified	SALOON	1970	Diesel	1998	2005	6.6	177
MITSUBISHI	LANCER	Used	SALOON	1600	Diesel	1998	2005	6.9	185
SKODA	OCTAVIA	Used	SALOON	1800	Diesel	2004	2005	7.0	188
SKODA	OCTAVIA	Used	SALOON	1800	Diesel	2005	2005	7.0	188
TOYOTA	COROLLA	New	S.WAGON	1970	Diesel	1998	2005	7.0	188
TOYOTA	COROLLA	New	SALOON	2000	Diesel	1998	2005	7.0	188
FORD	RANGER	New	VAN	2500	Petrol	2005	2005	8.1	170
HONDA	CR-V	NULL	S.WAGON	1970	Petrol	1998	2005	9.3	217

Additional information

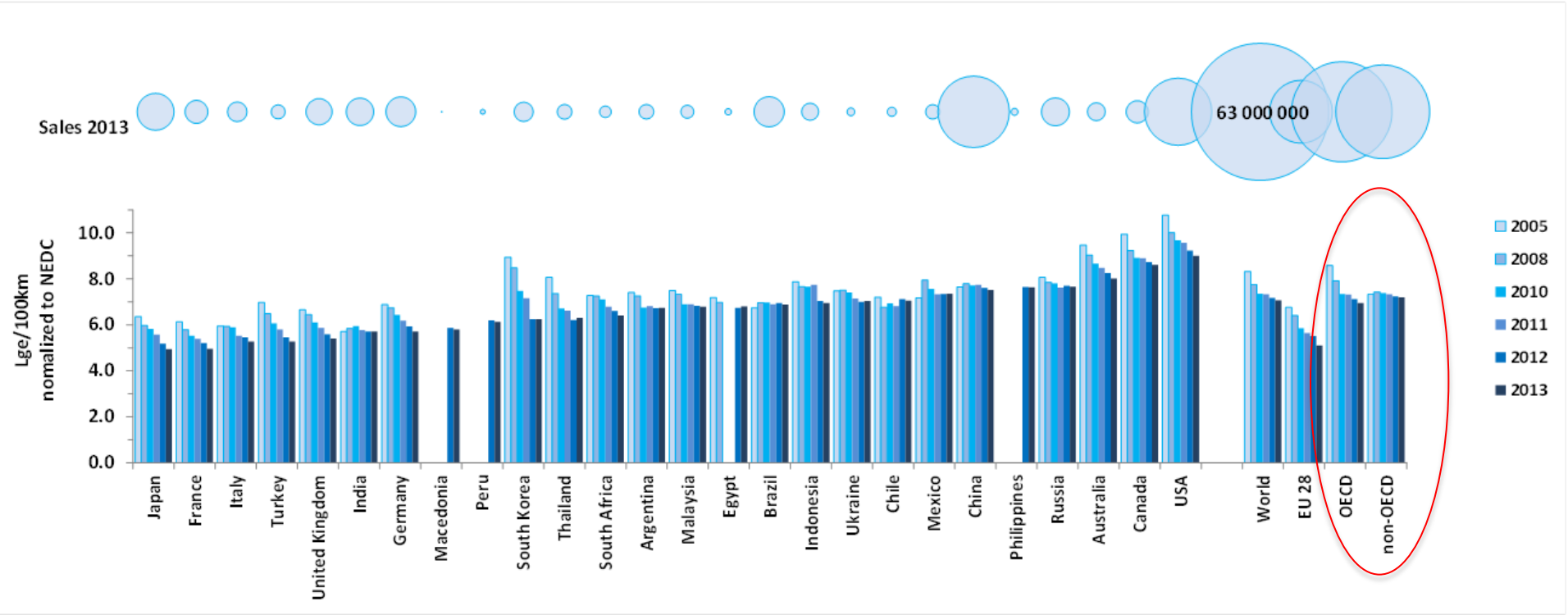
- **Fuel economy rates**: http://www.carfolio.com/specifications/models; www.edmunds.com/toyota; http://www.carfolio.com/specifications/models/?man=4131; http://www.epa.gov/fueleconomy/gas-label-1.htm; http://www.carfolio.com/
- South African Comparative Passenger Car Fuel Economy AND CO2 Emissions Data: http://www.naamsa.co.za/ecelabels/
- U.S. Auto Fuel Economy Database: http://www.fueleconomy.gov/feg/findacar.htm
- A global comparison of Vehicle Fuel Economy Standards: http://www.theicct.org/passenger-vehicles/global-pv-standards-update/
- U.S. Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends (1975 through 2010): http://www.epa.gov/OMS/fetrends.htm
- U.S. Fuel Economy Policy: http://www.fueleconomy.gov/
- U.S. Fuel Economy Regulations: http://www.epa.gov/oms/climate/regulations.htm

EXPECTED OUTCOMES

- Vehicle Inventory
- Cost-benefit analysis
- Policy recommendations
- Publicise adoption
- Awareness campaign
- Long term strategy

Regional fuel economy trends

- Countries with FE policies in place show encouraging improvement rates
- Size shift vs. technology evolution moderates non-OECD improvement



Source: IEA 2014

Average Fuel Economy Levels

Global	2005	2008	2011	2013
Average (l/100km)	8.07	7.67	7.2	7.1
OECD Average	8.1	7.6	7.0	6.9
Non-OECD Average	7.5	7.6	7.5	7.2

Uganda	2005	2008	2011	2014
Average (l/100km)	10.94	11.14	11.34	12.15

Kenya	2010	2011	2012
Average (l/100km)	7.4	7.6	7.7

Mauritius	2005	2013	2014
Average (l/100km)	7.0	6.6	5.8

Algeria	2005	2008	2013
Average (l/100km)	7.5	7.4	7.0

Ethiopia	2005	2010
Average (l/100km)	8.4	7.9

Kenya Fuel Economy

Year	Average fuel consumption metric combined (L/100km)	Average CO_2 emission (g/km)
2010	7.4	178.2
2011	7.6	182.0
2012	7.7	185.4
Grand Average	7.5	181.7

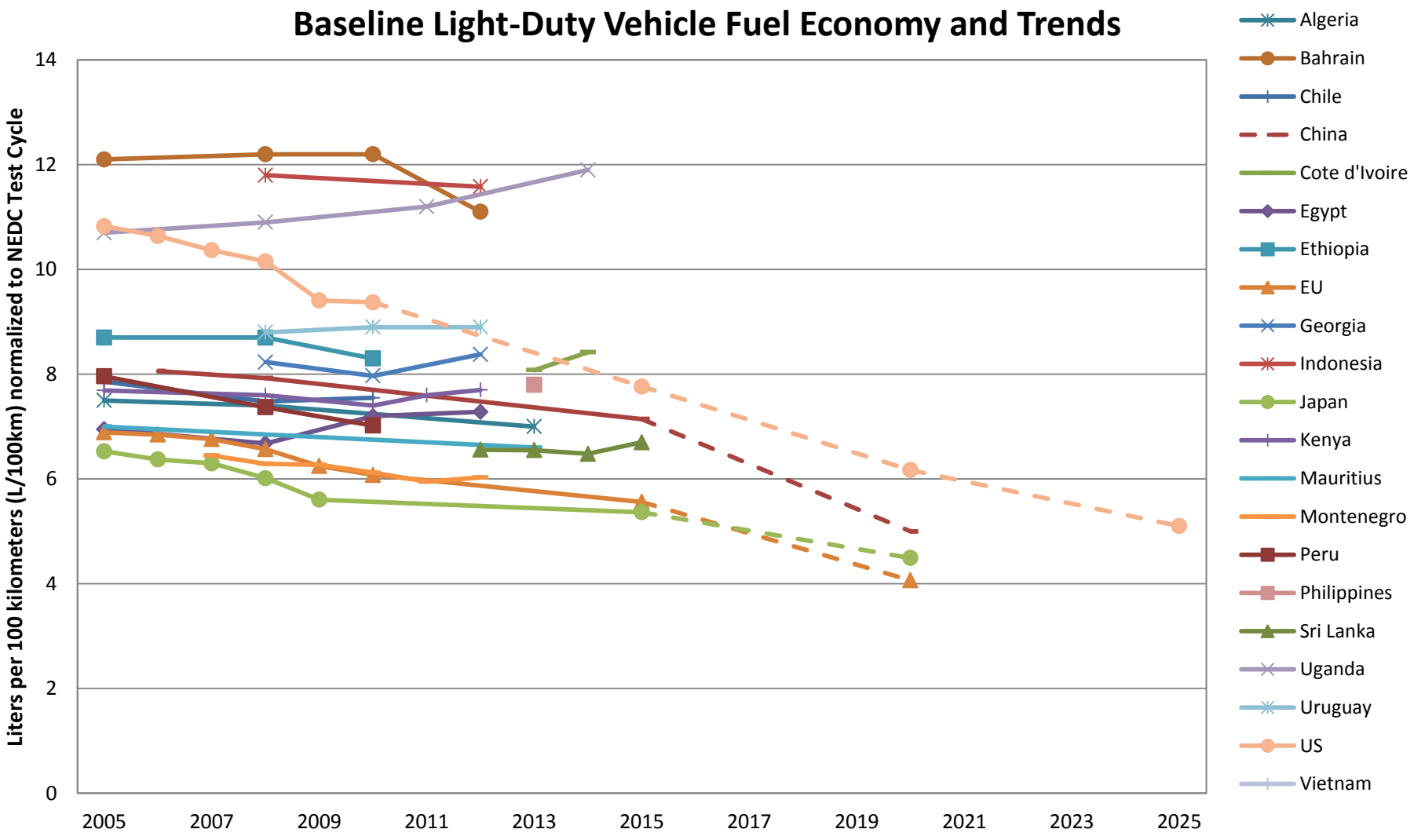
Year of vehicle registration	Fuel Type		
	Diesel	Petrol	Grand Average
2010	8.0	7.2	7.4
2011	7.9	7.5	7.6
2012	8.0	7.6	7.7
Grand Average	8.0	7.4	7.5

Policy Options

VEHICLE FUEL EFFICIENCY STANDARDS	• Introduce and regularly strengthen mandatory standards • Establish and harmonize testing procedures for fuel efficiency measurement.
FISCAL MEASURES	• Fuel taxes and vehicle taxes to encourage the purchase of more fuel-efficient vehicles. • Infrastructure support and incentive schemes for very fuel-efficient vehicles.
MARKET-BASED APPROACHES	• Voluntary programs such as U.S. SmartWay and other green freight programs
INFORMATION MEASURES	• Vehicle fuel economy labels • Improving vehicle operational efficiency through eco-driving and other measures.

source : ICCT

GFEI baseline setting – little progress in fuel economy improvement in countries without policies



Next steps

Introduction

Instruments

Case Studies

Resources

Global View

Instruments

- ***Regulatory***
  - ***Standards***
- ***Economic***
  - ***Feebate***
  - ***Registration Tax***
- ***Information***
  - ***Labeling***

Regulatory policies
+ National Standards
• Import Restrictions
• Technology Mandates
Economic instruments
Traffic control measures
Information
Technology

Case Studies

- ***Europe***
- ***North America***
- ***Africa***
- ***Latin America***
- ***Asia***
- ***Middle East***

Case Studies
+ Europe
+ North America
+ Africa
• South Africa
• Kenya
• Mauritius
+ Latin America
+ Middle East West Asia
+ Asia Pacific

Resources

- ***Baseline***
- ***Finance***
- ***FE Resources***

Global View

http://www.unep.org/transport/gfei/autotool/

European Union

- 12% of total CO_2 emissions from transport
- average for all new cars is 130 grams of CO2 per kilometre (g/km) by 2015 and 95g/km by 2021
- reductions of 18% and 40% compared to 2007 -158.7g/km
- 2015 fuel consumption target
  - 5.6 l/100 km of petrol
  - 4.9 l/100 km of diesel
- 2021 target
  - 4.1 l/100 km of petrol
  - 3.6 l/100 km of diesel

Chile

- Adopted a mandatory fuel economy labelling scheme from February 2013 becoming the first Latin American country to adopt such a scheme

- In September 2014 adopted a taxation scheme that puts a tax on less efficient and polluting vehicles, based on CO2 and NOx ratings

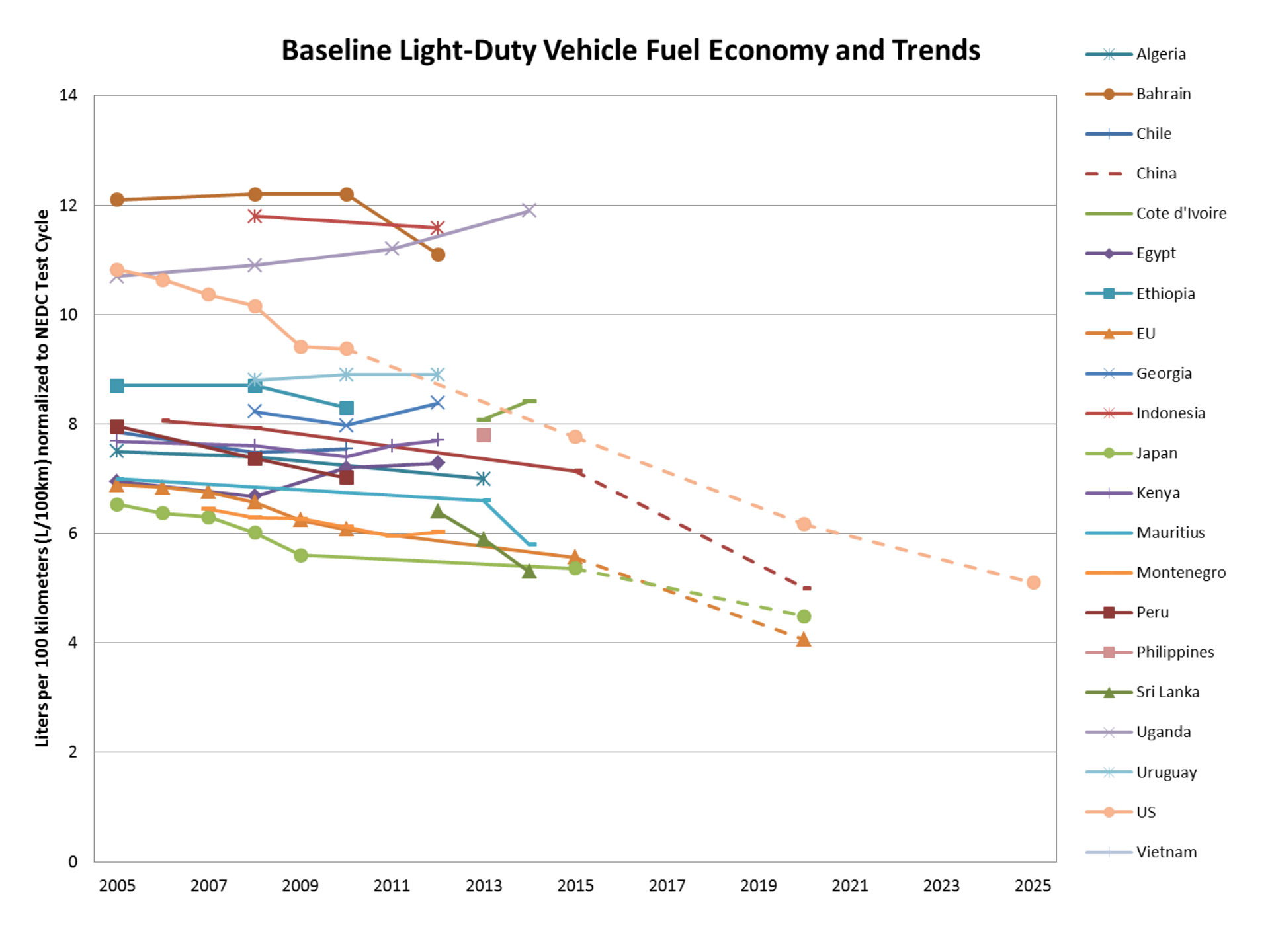
- In 2015 was adopting a scheme to provide subsidies for cleaner and more efficient taxis based on the fuel economy labeling scheme, with the aim to replace the 60,000 taxi fleet over the next 8 years

Vietnam

- Adopted voluntary fuel consumption limits for light-duty vehicles and motorcycles in 2013
- Adopted fuel economy labelling for new domestically assembled and imported cars - must be labelled with energy labels before selling to consumers

Mauritius

- Vehicle CO2-based tax introduced 2011
- This was a feebate scheme that puts a fee/rebate on cars above/below 158 CO2g/km
- 2013 amended to 150 CO2g/km
- Scheme resulted to an improvement of fuel economy from 7l/100km in 2005 to 5.8l/100km in 2014
- In July 2016 this was abolished and excise duty on cars with 1,001 - 1,600 cc was lowered from 55% to 50%
- Duty on hybrid motor cars was reduced by 30% for all cars
- The rate on a hybrid car below 1,600 cc will decrease from 55 to 25%
- From 2009 to 2014, the number of hybrid and electric cars has increased from 43 to 1824 and from 0 to 8 respectively


Baseline Light-Duty Vehicle Fuel Economy and Trends
Liters per 100 kilometers (L/100km) normalized to NEDC Test Cycle
0
2
4
6
8
10
12
14
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023
2025
Algeria
Bahrain
Chile
China
Cote d'Ivoire
Egypt
Ethiopia
EU
Georgia
Indonesia
Japan
Kenya
Mauritius
Montenegro
Peru
Philippines
Sri Lanka
Uganda
Uruguay
US
Vietnam

Two-wheelers Emissions Comparison – Total Emissions [g CO_2 –equivalents / km]

One two-stroke scooter emits double the NOx emissions of a modern passenger car, 300 times the HC emissions and 80 times the CO emissions.

Two-stroke Scooter

Four-stroke motor cycle

Electric scooter
(China energy mix: 724g/kWh)

Passenger Car
(petrol, Golf segment)

Particle Emissions [g PM/ km]

0.5g/km

0.1g/km

0.017g/km
(China energy mix)

0.002g/km

UNEP

Graphics based on data from: Swiss EMPA, Materials Science & Technology "Umweltnutzen von E-Scootern"; TÜV NORD CERT, Bericht-Nr.: 8000410537-1 "Umweltprädikat Golf Modelljahr 2012"; ADB 2009 "Electric Bikes in the People's Republic of China Impact on the Environment and Prospects for Growth"

Transport Unit
Economy Division
United Nations Environment
Nairobi, Kenya

E-mail : Jane.Akumu@unep.org
www.unep.org/transport/gfei