Promoting Cleaner & Efficient Vehicles in Malawi

GFEI
GLOBAL FUEL ECONOMY INITIATIVE

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UN Environment

Impacts of Transport

Air Quality & Health

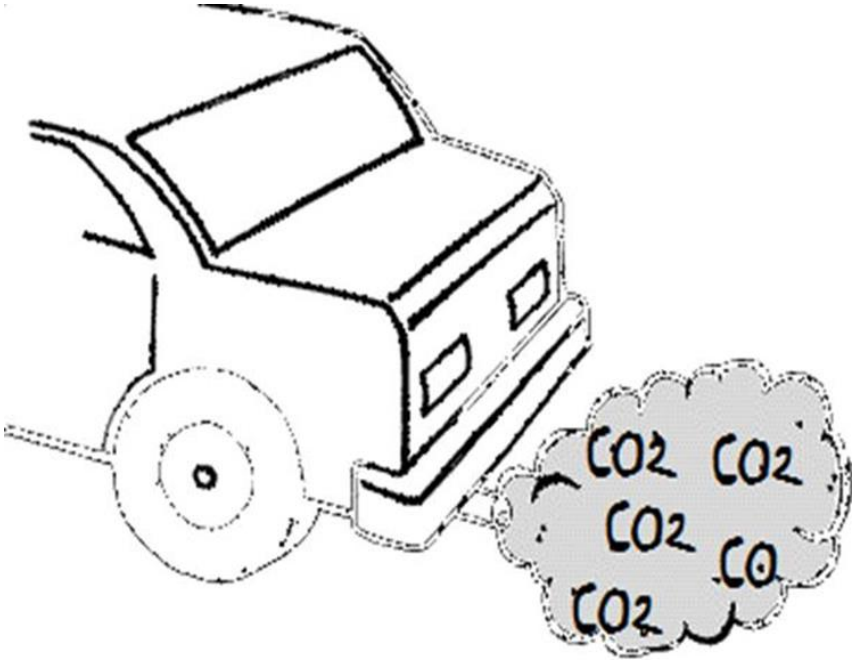
- Largest source of air pollution in cities, exceeding WHO standards and costing more than 5% GDP

Energy Security

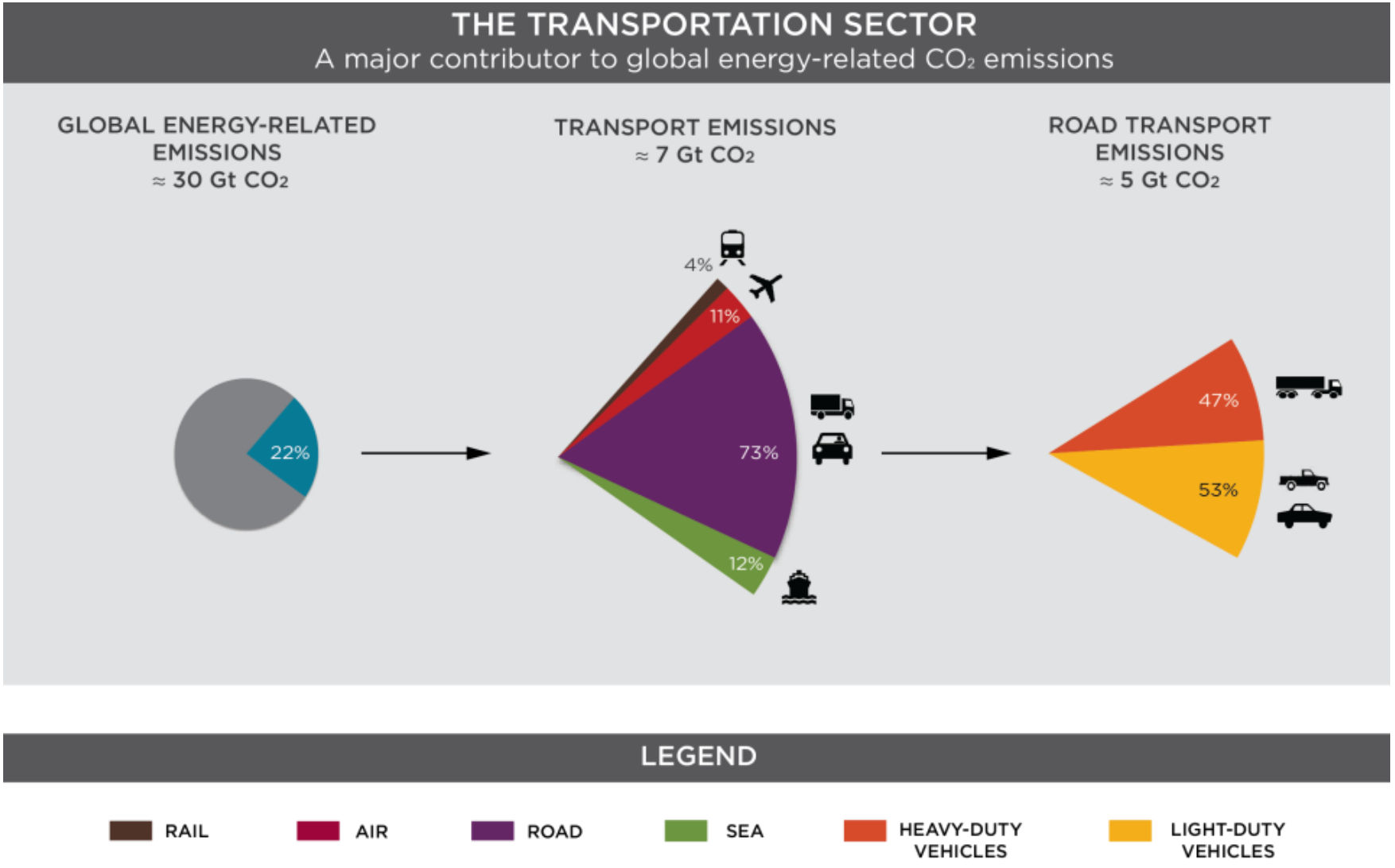
- Consumes 25% of world energy, 90% are fossil fuels

Climate Change

- Responsible for 23% global CO2 emissions & fastest growing sector in GHG emissions, 2.5% yearly until 2020



CO2 Emissions from Transport



Sources:
ICCT (2014). Global Transportation Roadmap Model. Version 2.0. More information available at http://www.theicct.org/global-transportation-roadmap-model.
IEA (2012). CO2 Emissions from Fuel Combustion: Highlights. 2012 edition. Retrieved from https://www.iea.org/co2highlights/co2highlights.pdf.

What is fuel economy?

- Vehicles use energy, and fuel economy measures energy per unit of vehicle travel. It is the RATE of energy use.
  - Litres per 100km (Europe)
  - Km per litre (Japan)
  - Miles per gallon (United States)

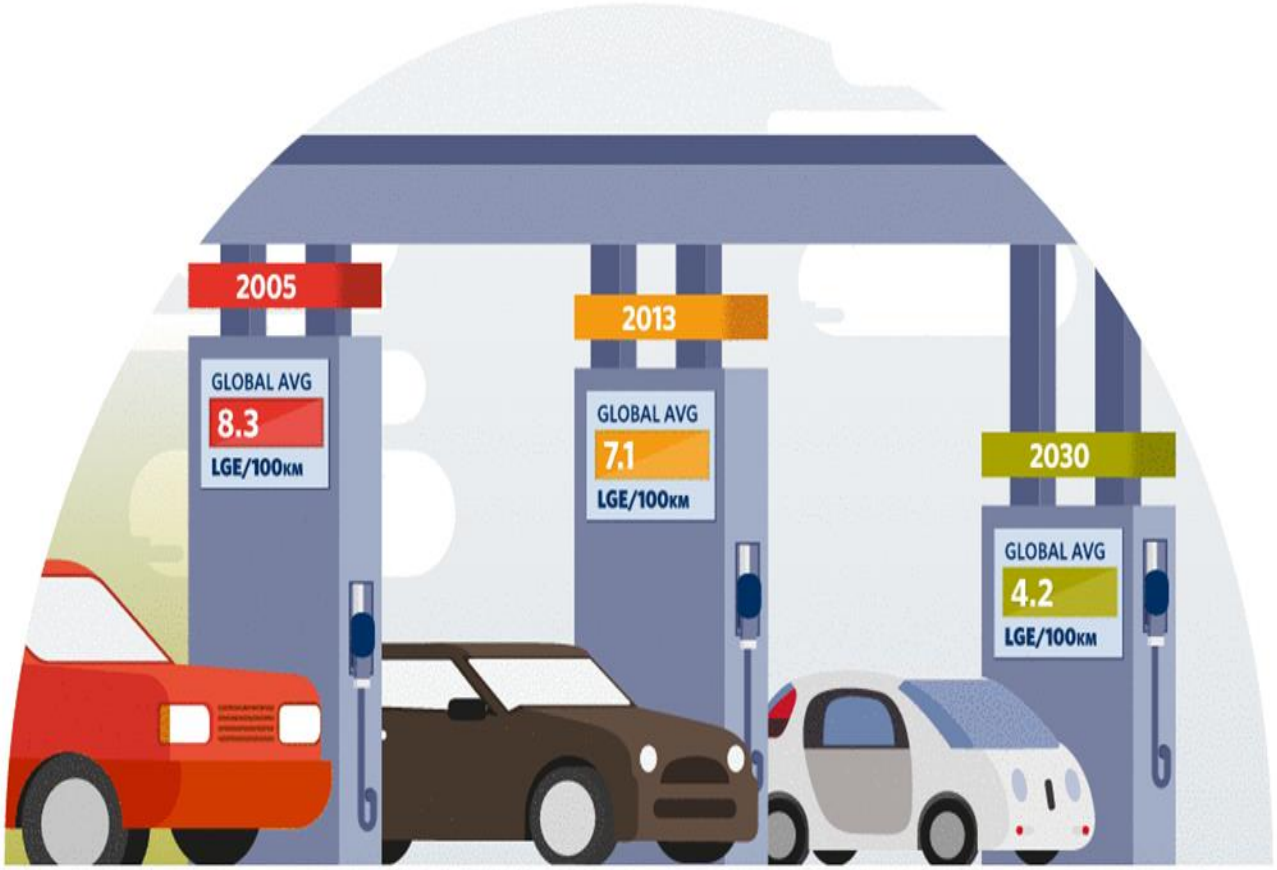
- Fuel economy, fuel efficiency, fuel intensity are all fairly interchangeable terms. But fuel economy always refers to fuel use relative to distance travelled.

- Also measured in CO_2 emissions=CO_2 g/km

THE GLOBAL GOALS:
FUEL ECONOMY

DOUBLE AVERAGE FUEL ECONOMY

OF NEW CARS BY 2030 AND ALL CARS BY 2050



GFEI Benefits

- Reduced urban air pollution
- Fuel savings: estimated at over USD 300 billion in 2025 and 600 billion in 2050
- CO2 reduction: estimated at over 1 gigatonne a year by 2025 and over 2 gigatonnes by 2050

Partners

FIA Foundation for the Automobile and Society

UNEP

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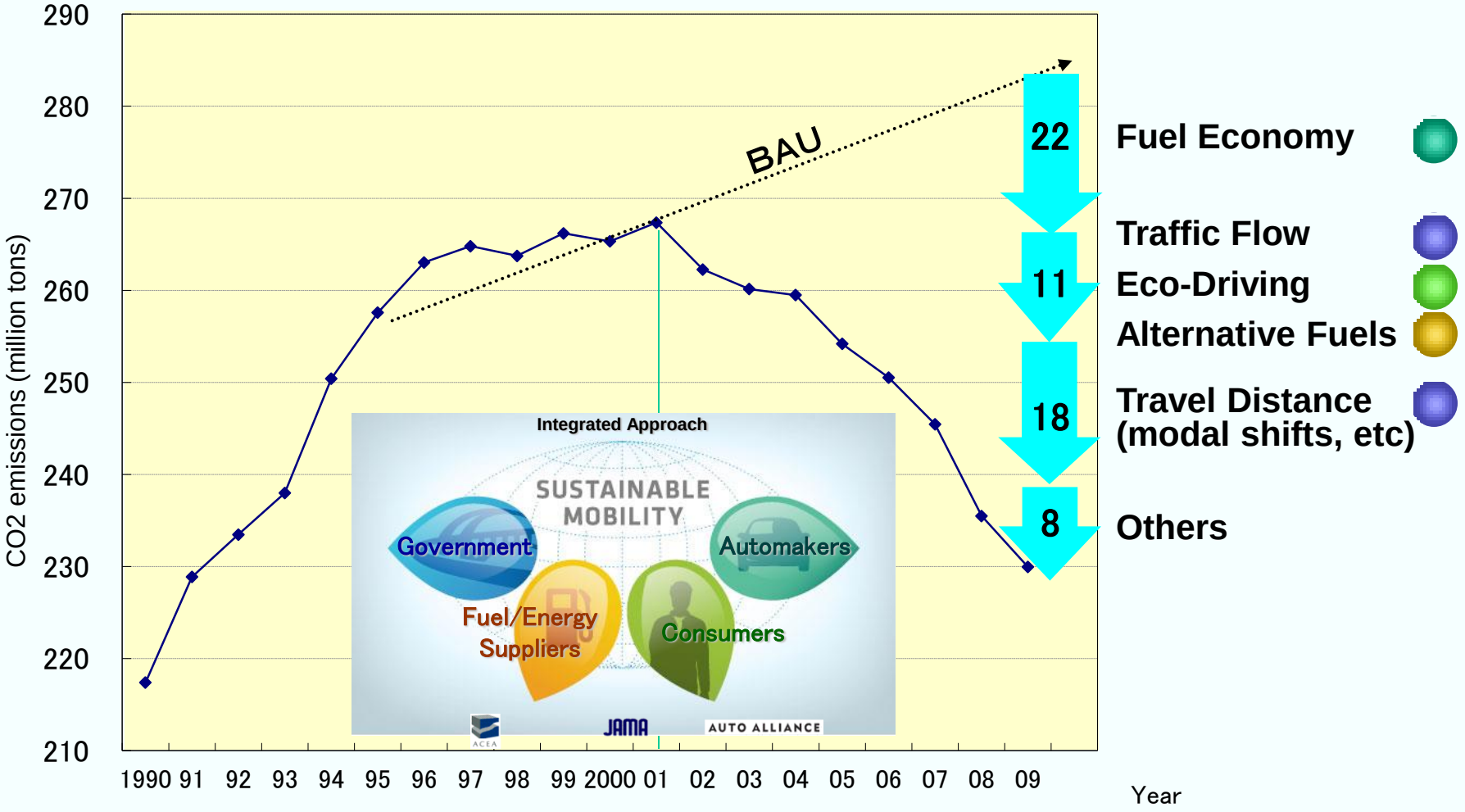
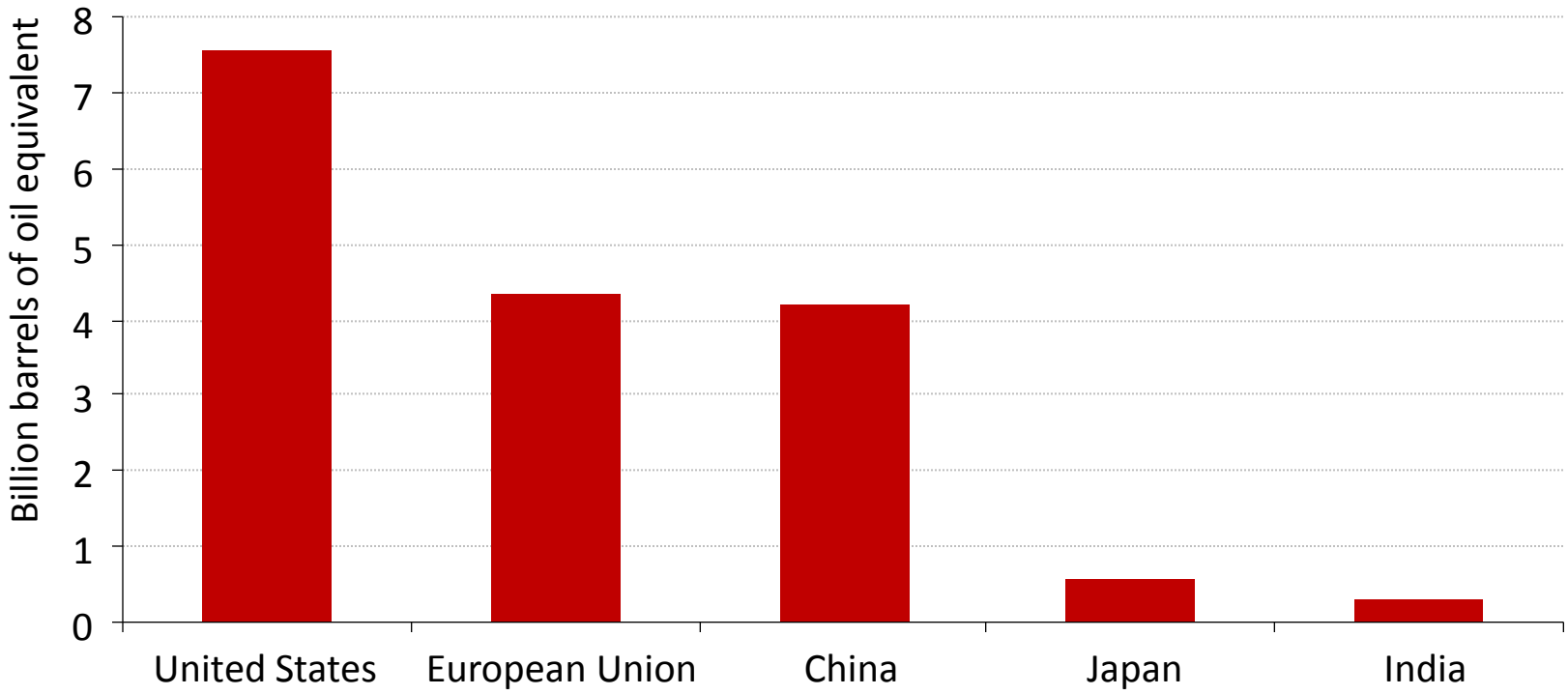
◆ CO2 Emission Reduction in Japanese Transportation Sector



source : JAMA

Cumulative oil savings from selected vehicle fuel-economy standards, 2010-2035

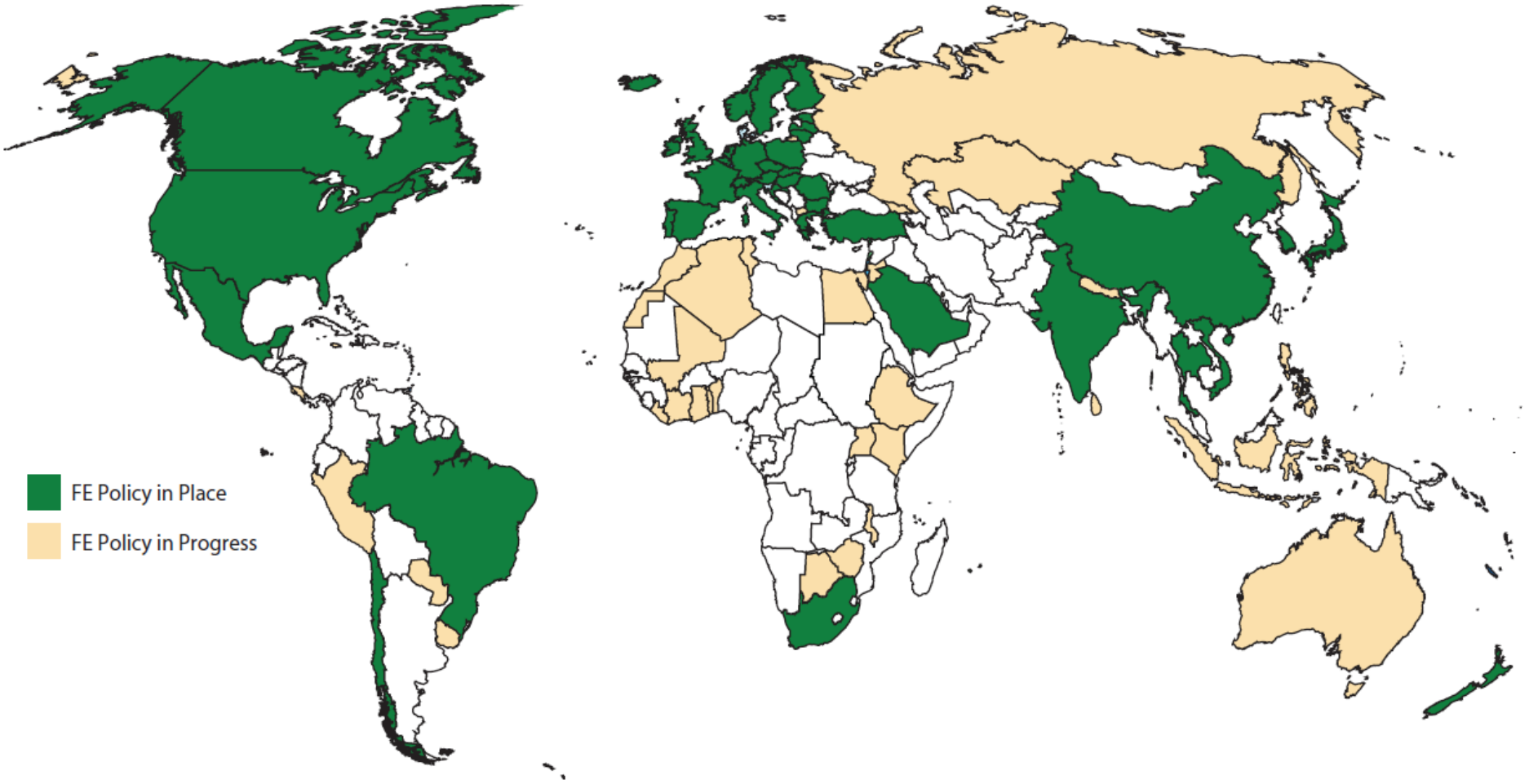


Already adopted & planned fuel-economy standards for passenger vehicles in the US, Japan, EU, China & India alone are set to save cumulatively 17 billion barrels of oil

GFEI Country Engagement

countries with ongoing projects	new countries 2016/2017	Countries expressed interest
1Chile	28Malaysia	63Panama
2Ethiopia	29Bangladesh	64Iran
3Indonesia	30Kazakhstan	65Angola
4Kenya	31Mali	66Bhutan
5Georgia	32Nigeria	67Burkina Faso
6Ivory Coast	33Togo	68Burundi
7Mauritius	34Tanzania	69Cambodia
8Jamaica	35Rwanda	70Cameroon
9Montenegro	36Bolivia	71Cape Verde
10Macedonia	37Argentina	72D.R. Congo
11Costa Rica	38Ecuador	73Eritrea
12Vietnam	39Ukraine	74Fiji
13Morocco	40Jordan	75Guinea
14Bahrain	41Colombia	76Iran
15Tunisia	42Djibouti	77Kyrgyzstan
16Thailand	43Dominican Republic	78Laos
17Peru	44Guatemala	79Lesotho
18Russia	45Moldova	80Marshall Islands
19Benin	46Pakistan	81Mongolia
20Algeria	47Barbados	82Namibia
21Uruguay	50St. Lucia	83Niger
22Nepal	51Lebanon	84Papua New Guinea
23Paraguay	52Zambia	85Senegal
24Sri Lanka	53Ghana	86Sierra Leone
25Philippines	54Malawi	87Solomon Islands
26Uganda	55Zimbabwe	88South Africa
27Egypt	56Honduras	89Tajikistan
	57Nicaragua	90Turkmenistan
	58El Salvador	91Turkey
	59Botswana	92Armenia
	60Mozambique	93Azerbaijan
	61Myanmar	94Serbia
	62Liberia	95Samoa
		96Gambia
		97Uzbekistan
		98Bosnia-Herzegovina
		99Albania

Global Progress on Fuel Economy Policy (2017)

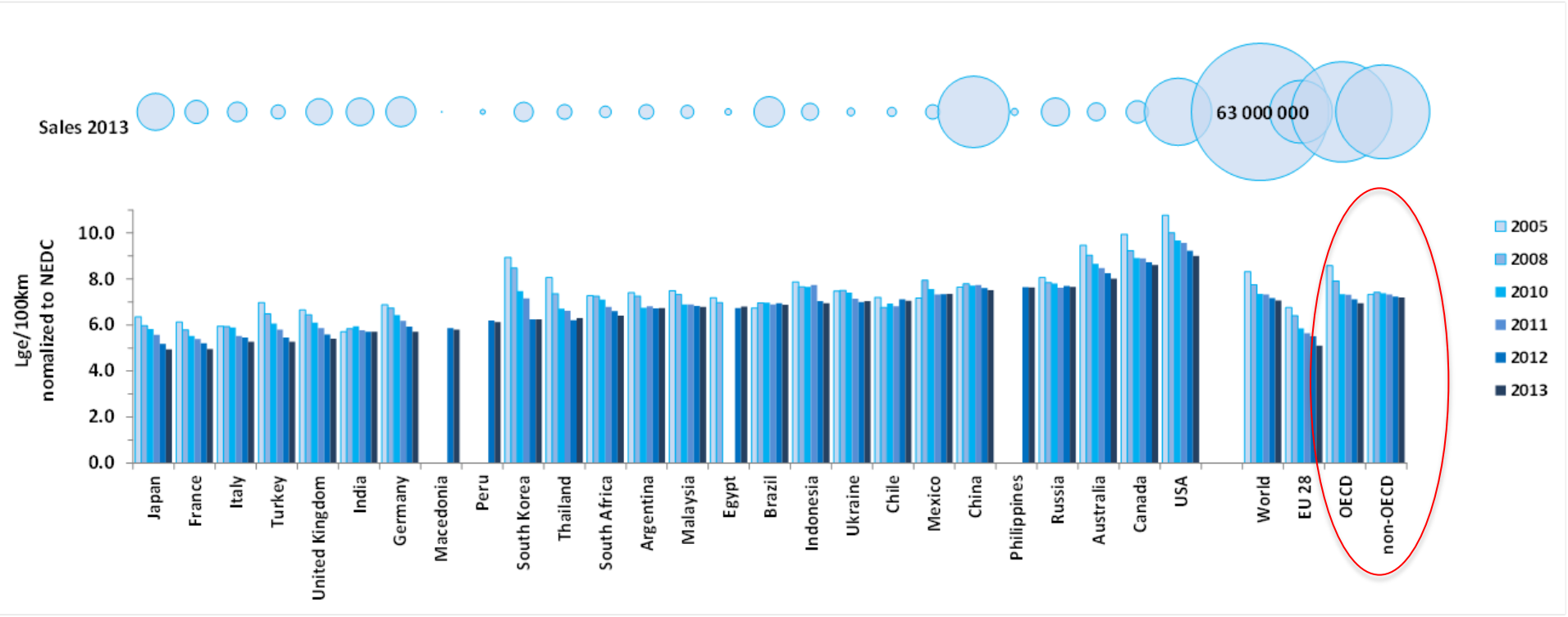


February 2017 - For more information visit www.globalfueleconomy.org

Global Fuel Economy Initiative (GFEI)

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

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

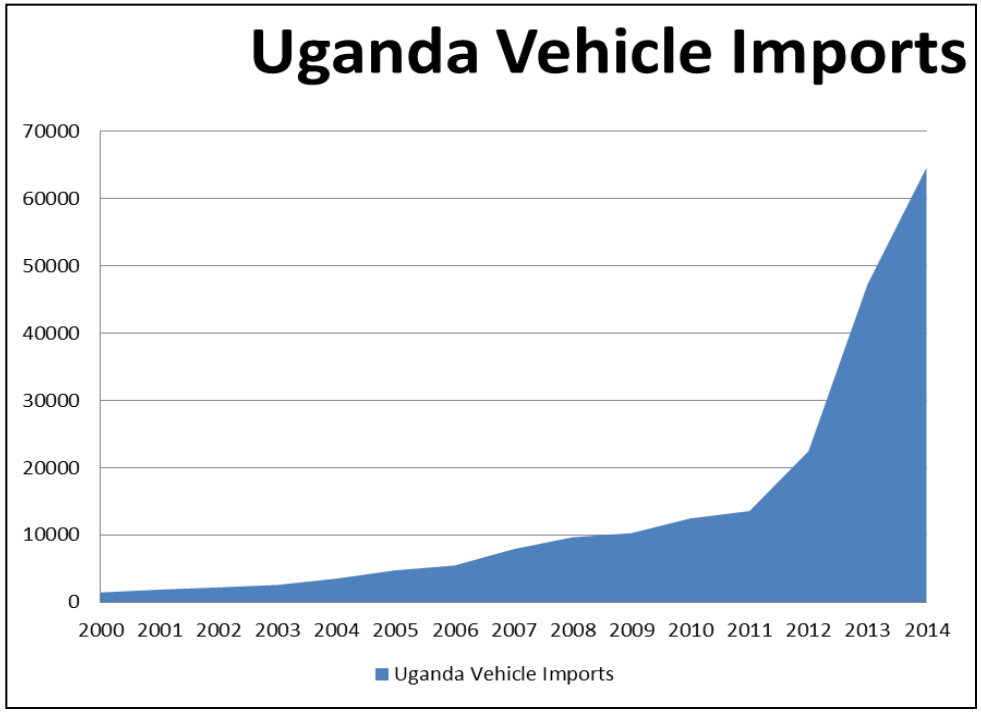
Uganda	2005	2008	2011	2014
Average (l/100km)	10.94	11.14	11.34	12.15

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

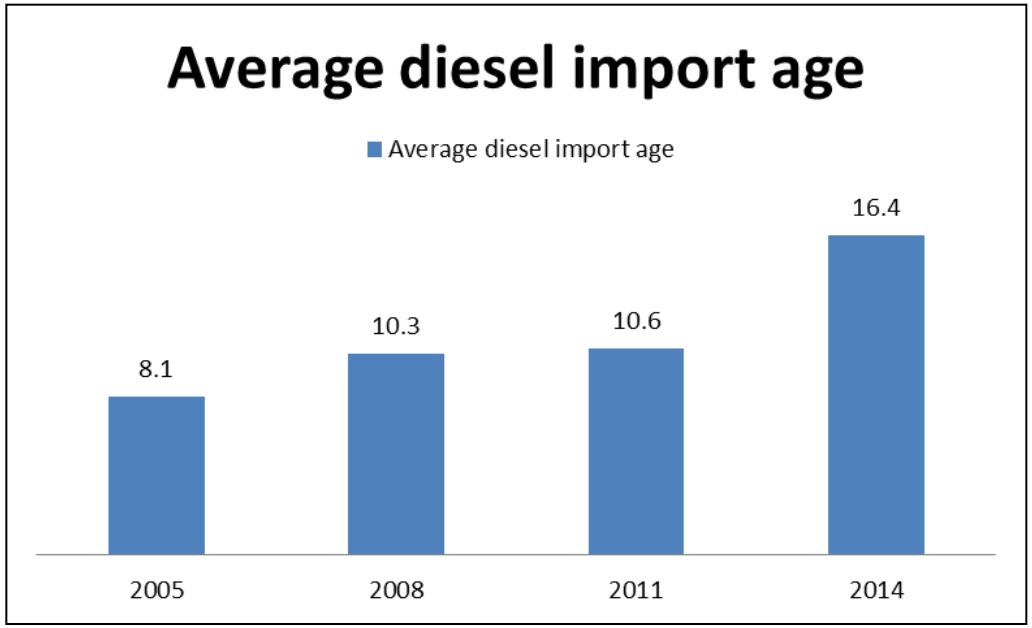
Algeria	2005	2008	2013
Average (l/100km)	7.5	7.4	7.0

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



Example of Uganda

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

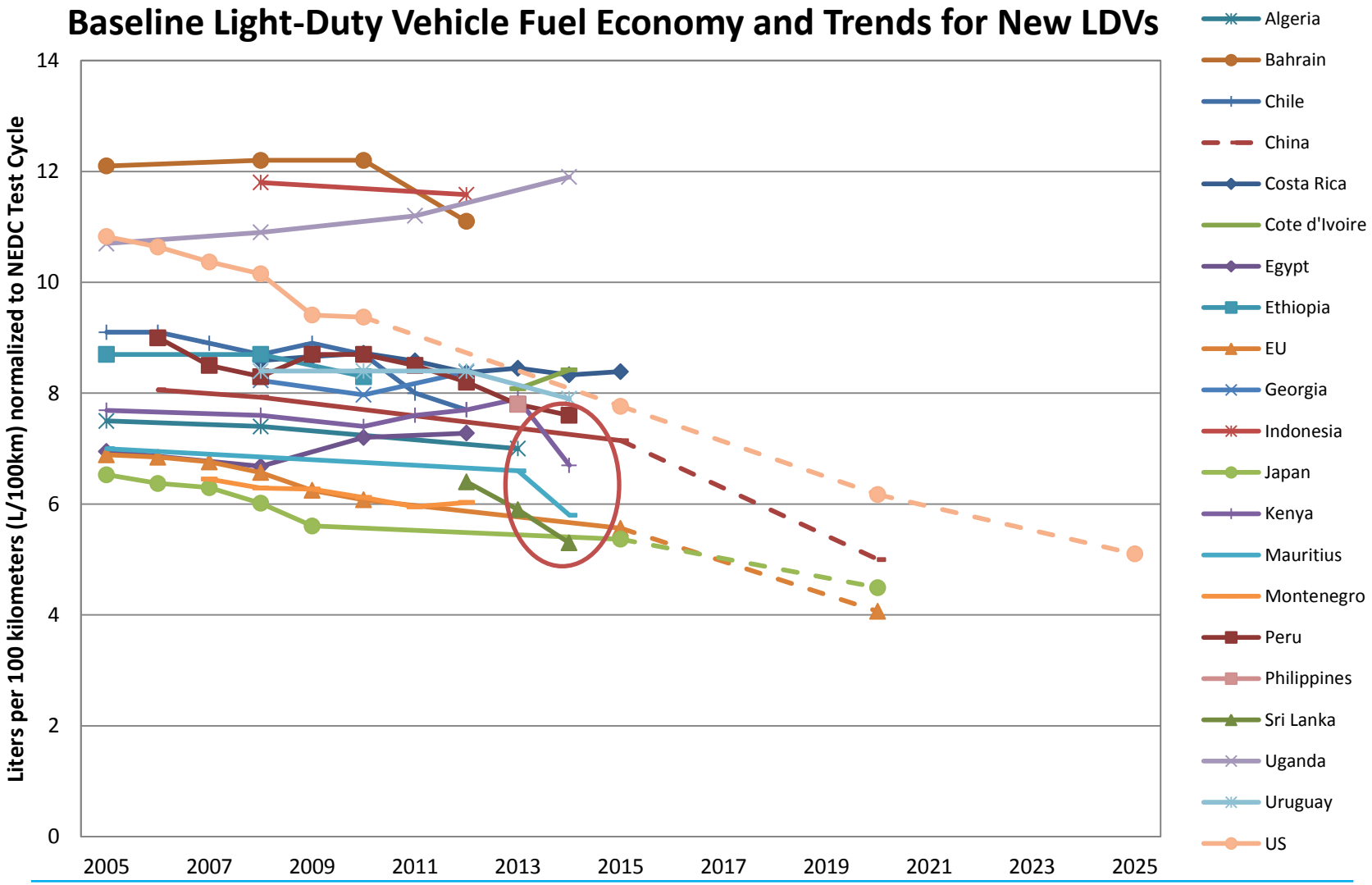


Kenya Fuel Economy

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

Fuel economy policies can work substantially



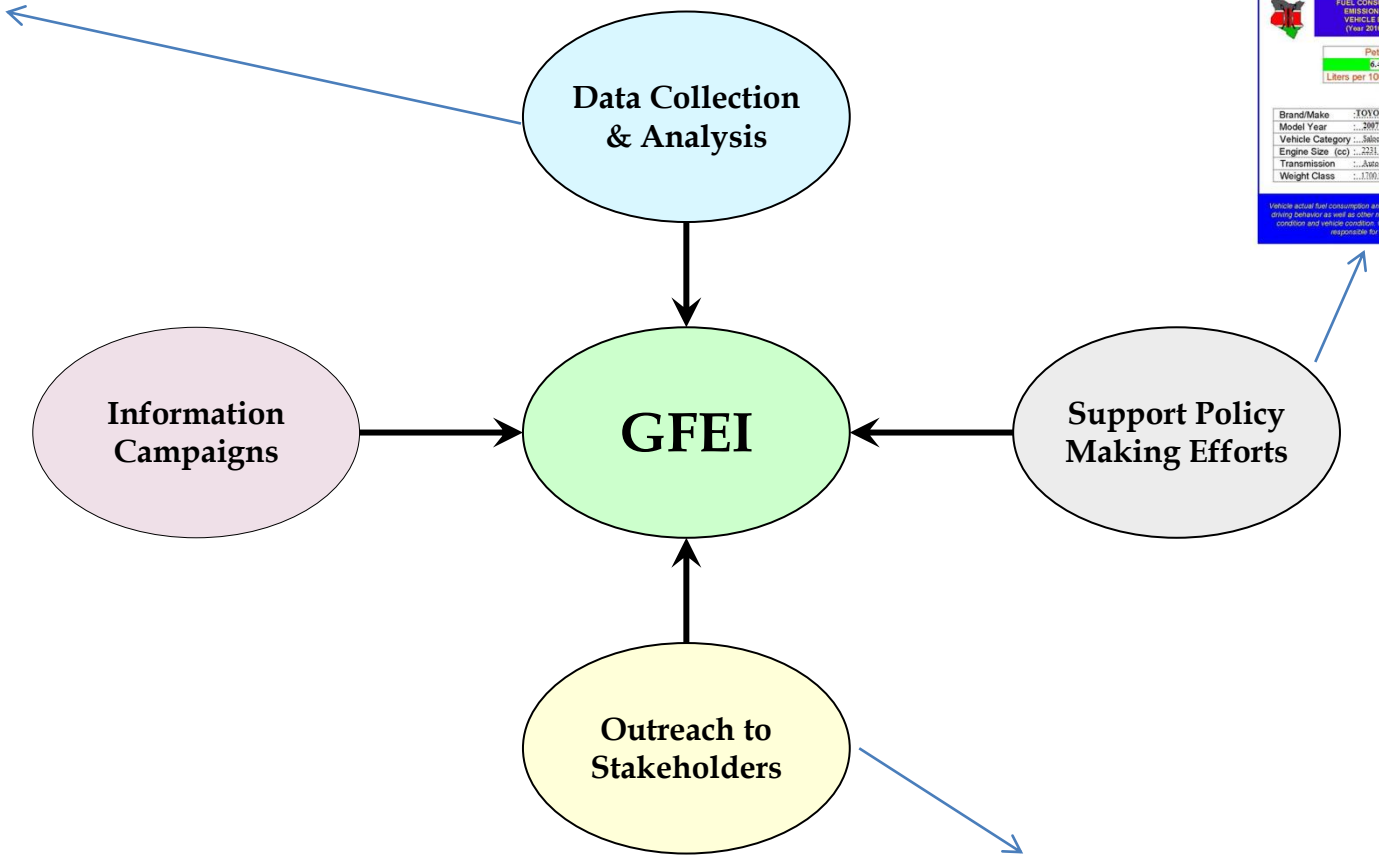
Source: UNEP, 2017 (unpublished).

GFEI objectives at country level

- Inventory of the current situation on fuel economy
- Support government agencies to develop sound policies to encourage fuel economy improvement for vehicles produced and/or sold in their countries
- Involve stakeholders 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
- Long term strategy that will involve multiple policy interventions

GFEI Activities

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



GFEI is important to African countries

- The project provides a good understanding of vehicles imported into the country e.g. models, sizes, technologies
- This will allow policymakers to choose the right combination of policy instruments to meet
  - national emission targets
  - energy security, and
  - efficiency goals

Fuel Economy Estimation

- Data Collection
  - Baseline Setting - 2005
  - Analysis of Trend (2010, 2013, 2016)
- Analysis of
  - Vehicle fleet
  - Vehicle regulations
  - Fiscal incentives
  - Fuel standards
- Policy Options
- National Consultations
- Regional Consultations

Vehicle data categories

- Data to be collected is for all vehicles entering a country for the first time:
  - new vehicles manufactured in the country
  - new vehicles imported
  - second hand 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 categories of vehicles, as well as creating a combined average set of information

Minimum vehicle 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 second hand import
- Rated Fuel Economy per model and test cycle basis
- Number of sales by model

Additional information

- Vehicle Information / Identification Number
- Injection system type
- Body type
- Transmission type and other vehicle configuration details, as available
- Vehicle foot print
- Vehicle curb weight
- Emissions certification level
- Use of vehicle (private, public, for hire, etc.)

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

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:

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

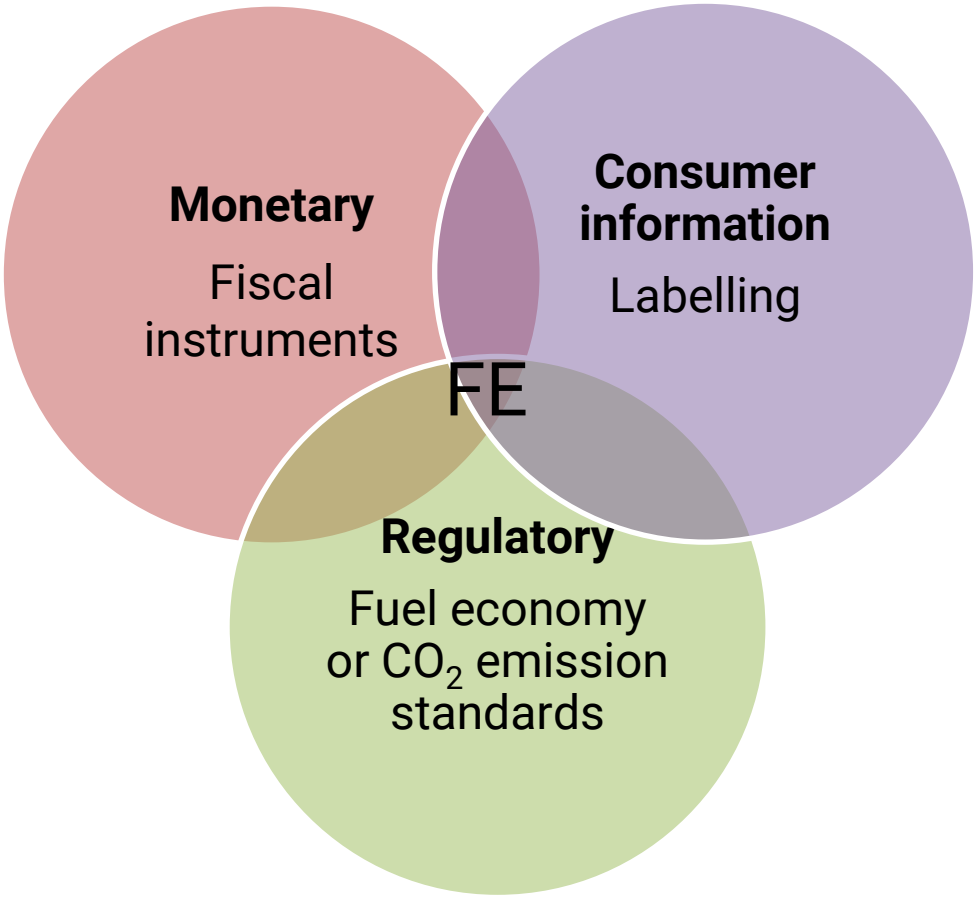
In a similar way, average CO_2 intensity can be obtained through weighted average with the sales of each model:

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

Additional information

- A Test Cycle Conversion Tool: www.theicct.org/info/data/GlobalStdReview_Conversionfactor.xlsx
- A global comparison of Vehicle Fuel Economy Standards: http://www.theicct.org/passenger-vehicles/global-pv-standards-update/
- South African Comparative Passenger Car Fuel Economy AND CO2 Emissions Data: http://www.naamsa.co.za/ecelabels/
- UNEP Vehicle Fuel Efficiency Baselines: Practicalities and Results - Global Fuel Economy Initiative in Africa, Working Session, November 2010. Summary and Country Case Study Presentations: www.unep.org/transport/PCFV/PDF/GFEIAfricaSummary_30%20November2010.pdf
- 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
- U.S. Auto Fuel Economy Database: http://www.fueleconomy.gov/feg/findacar.htm

Fuel economy policies & instruments



Target group:

Consumer

Manufacturer

China's Example

- China introduced Fuel Economy Standards for LDV in September 2004: phase 1 from July 2005 and 2 phase from Jan 2008
- 3rd most stringent in the world, behind the EU and Japan
- requires display fuel economy labels from 2009
- banned the import of used vehicles for uses other than personal, diesel vehicles (except Jeeps) and two-stroke engine cars
- penalize large-engine cars and encourages the purchase of fuel efficient cars

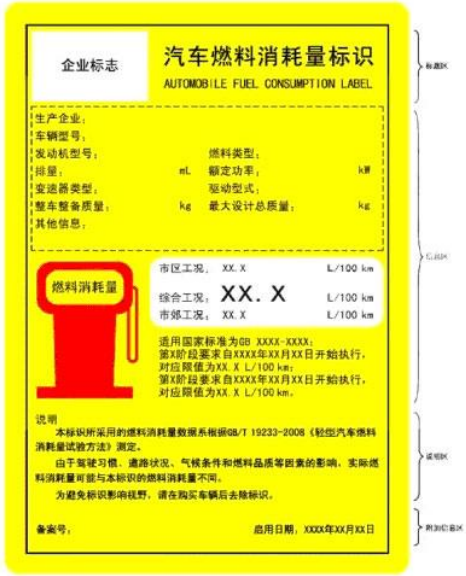


图 A.1 标识各功能区分布示意图

European Union

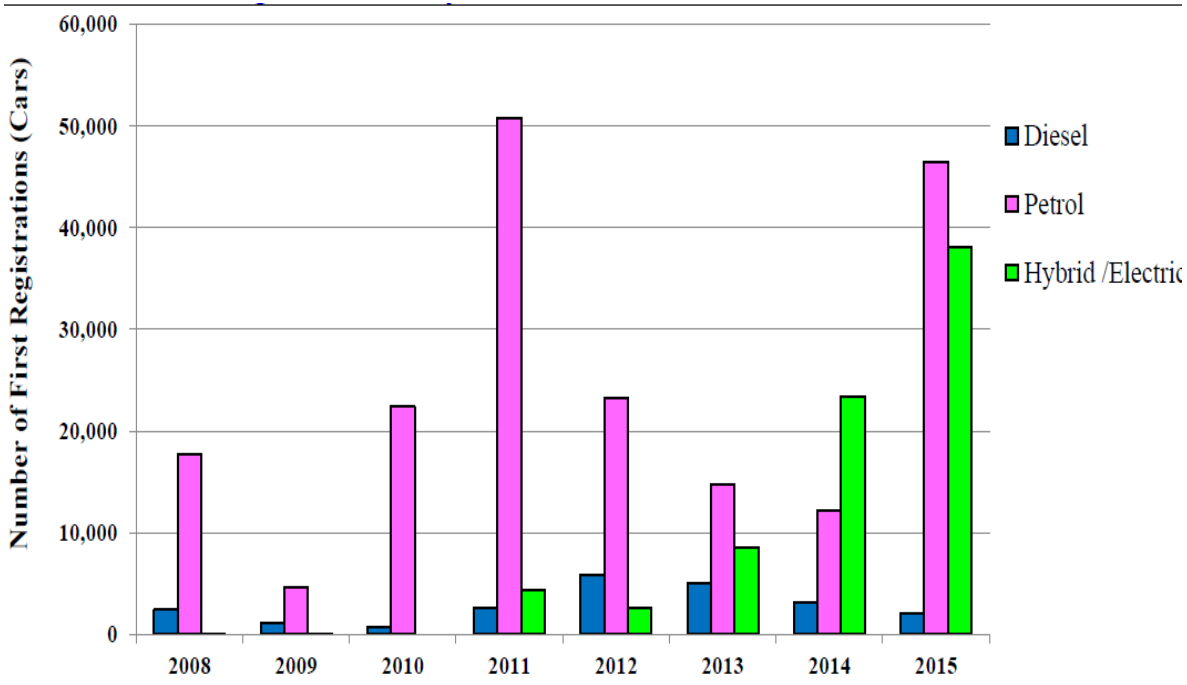
- 12% of total CO2 emissions from transport
- mandatory emission reduction targets for new cars
- average for all new cars is 130 grams of CO2 per kilometre (g/km) by 2015 and 95g/km by 2021
- reductions of 18% and 40% compared to 2007 -158.7g/km
- fuel consumption, the 2015 target is 5.6 l/100 km of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

Mauritius

- Vehicle CO2 tax introduced 2011
- Adopted a feebate scheme in 2011 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
- 50 % excise duty waived on electric and hybrid cars and Registration fee also reduced by 50%
- From 2009 to 2014, the number of hybrid and electric cars has increased from 43 to 1824 and from 0 to 8 respectively
- 2016 feebate abolished and moved to taxation system with additional incentives to electric vehicles

Hybrid and Electric cars in Sri Lanka

- Hybrid and electric cars in 2014 was 56% of the total number of cars
- Hybrid-petrol, petrol and diesel vehicles attract 58%, 253% and 345%, respectively, in excise tax
- Fully electric vehicles are levied at 25%.



Labeling and CO_2-based Tax in Thailand

- Vehicle excise tax rates in Thailand combines CO2 ratings and engine capacity
- Mandatory eco-sticker

Types of Vehicles		Fuel type / Tax rates		
	CO2/ engine capacity	E10/ E20	E85/ NGV	Hybrid
Passenger vehicles – cars and vans with less than 10 seats	≤ 100 g/km	30	25	10
	101-150 g/km	30	25	20
	151-200 g/km	35	30	25
	>200 g/km	40	35	30
	>3,000 cc	50	50	50
~~				
Electric vehicle/ fuel cell	≤ 3,000 cc (180 Kw)	10		
	> 3,000 cc (180 Kw)	50		

Source: Energy Policy and Planning Office and Department of Alternative Energy Development, 2015

Summary

- High growth rate of passenger car sales (and other vehicles) with relatively high fuel economy will persist without fuel economy policies
- Implementing fuel economy policies can substantially reduce CO2 emissions – supporting the Paris Agreement
- Also reduces fossil fuel consumption and national expenditures on fossil fuels
- Improves air quality through adoption of more advanced vehicles and technologies

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