The Global Fuel Economy Initiative (GFEI): Promoting Cleaner and Efficient Vehicles

Jane Akumu – UN Environment
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
CO2 Emissions from Transport

THE TRANSPORTATION SECTOR
A major contributor to global energy-related CO2 emissions

GLOBAL ENERGY-RELATED EMISSIONS
≈ 30 Gt CO2

TRANSPORT EMISSIONS
≈ 7 Gt CO2

ROAD TRANSPORT EMISSIONS
≈ 5 Gt CO2

LEGEND
- RAIL
- AIR
- ROAD
- SEA
- HEAVY-DUTY VEHICLES
- LIGHT-DUTY VEHICLES

Sources:
THE GLOBAL GOALS: FUEL ECONOMY

DOUBLE AVERAGE FUEL ECONOMY

OF NEW CARS BY 2030 AND ALL CARS BY 2050

THE GFEI FUEL ECONOMY TARGETS
From 2005 baseline:

- 30% reduction in L/100km by 2020 in all new cars in OECD countries
- 50% by 2030 in all new cars globally
- 50% by 2050 in all cars globally
GFEI Benefits

- Reduced urban air pollution
- Fuel savings: estimated at over USD 300 billion in 2025 and 600 billion in 2050
- CO$_2$ reduction: estimated at over 1 gigatonne a year by 2025 and over 2 gigatonnes by 2050

Partners:

Donors:
Importance of GFEI for Africa

- 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,
  - efficiency goals
**CO₂ Emission Reduction in Japanese Transportation Sector**

- **Fuel Economy**
- **Traffic Flow**
- **Eco-Driving**
- **Alternative Fuels**
- **Travel Distance** (modal shifts, etc)
- **Others**

Source: JAMA
<table>
<thead>
<tr>
<th>countries with ongoing projects</th>
<th>new countries 2016</th>
<th>Countries expressed interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Chile</td>
<td>28 Malaysia</td>
<td>63 Panama</td>
</tr>
<tr>
<td>2 Ethiopia</td>
<td>29 Bangladesh</td>
<td>64 Iran</td>
</tr>
<tr>
<td>3 Indonesia</td>
<td>30 Kazakhstan</td>
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<td>5 Georgia</td>
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<tr>
<td>12 Vietnam</td>
<td>39 Ukraine</td>
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<td>15 Tunisia</td>
<td>42 Djibouti</td>
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<td>16 Thailand</td>
<td>43 Dominican Republic</td>
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<td>44 Guatemala</td>
<td>79 Lesotho</td>
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<td>18 Russia</td>
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<td>47 Barbados</td>
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<td>21 Uruguay</td>
<td>50 St. Lucia</td>
<td>83 Niger</td>
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<td>57 El Salvador</td>
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<td>72 D.R. Congo</td>
<td>73 Eritrea</td>
<td>99 Albania</td>
</tr>
</tbody>
</table>
GFEI at the global stage

- **2009**: GFEI Launched
- **2011**: Sustainable Energy for All – EE as one key focus
- **2013**: Doubling Energy Efficiency in the Transport Sector in the SDGs
- **2014**: G20 Energy Efficiency Action Plan includes Fuel Efficiency particularly HDVs
- **2015**: UN Sec General’s Climate Summit - GFEI was launched as one of the accelerators
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
GFEI Implementation Steps

• Data Collection
• Analysis of Vehicle fleet, Vehicle regulations, Fiscal incentives, Fuel standards
• Baseline Setting - 2005
• Policy options to support fuel efficient vehicles
• National and Regional Consultations
• Data to be collected is for all vehicles entering a country for the first time:
  • 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
## 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 second hand import
- Rated Fuel Economy per model and test cycle basis
- Number of sales by model

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>Body type</td>
</tr>
<tr>
<td>Simplified Body Type</td>
<td>Segment</td>
</tr>
<tr>
<td>Axle configuration</td>
<td>Driven wheels</td>
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<tr>
<td>Engine cylinders</td>
<td>Engine ccm</td>
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<tr>
<td>Engine kW</td>
<td>CC Category</td>
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<tr>
<td>KW class</td>
<td>Engine horse power</td>
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<tr>
<td>Engine valves</td>
<td>Fuel type</td>
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<tr>
<td>Model year</td>
<td>Number of gears</td>
</tr>
<tr>
<td>Transmission type</td>
<td>Turbo</td>
</tr>
<tr>
<td>Gross vehicle weight</td>
<td>Height</td>
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<tr>
<td>Length</td>
<td>Number of seats</td>
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## Final Data

<table>
<thead>
<tr>
<th>Make</th>
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<th>Condition</th>
<th>Body Type</th>
<th>Engine CC</th>
<th>Fuel Type</th>
<th>Model Year</th>
<th>Registration Date</th>
<th>L/100km</th>
<th>CO2</th>
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<td>Used</td>
<td>S.WAGON</td>
<td>1596</td>
<td>Petrol</td>
<td>1989</td>
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<td>Petrol</td>
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<td>2005</td>
<td>2005</td>
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<td>145</td>
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<td>Used</td>
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<td>Diesel</td>
<td>2004</td>
<td>2005</td>
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<td>SKODA</td>
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<td>2005</td>
<td>2005</td>
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<td>S.WAGON</td>
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<td>Diesel</td>
<td>1998</td>
<td>2005</td>
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<td>Diesel</td>
<td>1998</td>
<td>2005</td>
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<td>New</td>
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<td>2005</td>
<td>2005</td>
<td>8.1</td>
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</table>
**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:

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

In a similar way, average CO₂ intensity can be obtained through weighted average with the sales of each model:

\[
\text{Average annual emission} = \frac{\sum_1^n \text{sales model } i \times \text{emission model } i}{\text{Total sales in the year}}
\]
GFEI Activities

- Information Campaigns
- Data Collection & Analysis
- Outreach to Stakeholders
- Support Policy Making Efforts

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
## Fuel Economy Levels

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2008</th>
<th>2011</th>
<th>2013</th>
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<tr>
<td><strong>Global</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Average (l/100km)</td>
<td>8.07</td>
<td>7.67</td>
<td>7.2</td>
<td>7.1</td>
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<td>OECD Average</td>
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<td>7.6</td>
<td>7.0</td>
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<tr>
<td>Non-OECD Average</td>
<td>7.5</td>
<td>7.6</td>
<td>7.5</td>
<td>7.2</td>
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<tr>
<td><strong>Uganda</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average (l/100km)</td>
<td>10.94</td>
<td>11.14</td>
<td>11.34</td>
<td>12.15</td>
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<tr>
<td><strong>Kenya</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average (l/100km)</td>
<td>7.4</td>
<td>7.6</td>
<td>7.7</td>
<td></td>
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<tr>
<td><strong>Ethiopia</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average (l/100km)</td>
<td>8.4</td>
<td>7.9</td>
<td></td>
<td></td>
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<tr>
<td><strong>Mauritius</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Average (l/100km)</td>
<td>7.0</td>
<td>6.6</td>
<td>5.8</td>
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<td><strong>Algeria</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Average (l/100km)</td>
<td>7.5</td>
<td>7.4</td>
<td>7.0</td>
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</tbody>
</table>
# Kenya Fuel Economy Levels

<table>
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<tr>
<th>Year</th>
<th>Average fuel consumption metric combined (L/100km)</th>
<th>Average CO₂ emission (g/km)</th>
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</thead>
<tbody>
<tr>
<td>2010</td>
<td>7.4</td>
<td>178.2</td>
</tr>
<tr>
<td>2011</td>
<td>7.6</td>
<td>182.0</td>
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<tr>
<td>2012</td>
<td>7.7</td>
<td>185.4</td>
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<tr>
<td>Grand Average</td>
<td>7.5</td>
<td>181.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year of vehicle registration</th>
<th>Fuel Type</th>
<th>Grand Average</th>
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<tr>
<td></td>
<td>Diesel</td>
<td>Petrol</td>
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<tr>
<td>2010</td>
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<td>7.2</td>
</tr>
<tr>
<td>2011</td>
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<td>7.5</td>
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<tr>
<td>2012</td>
<td>8.0</td>
<td>7.6</td>
</tr>
<tr>
<td>Grand Average</td>
<td>8.0</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Kenya Fuel Economy Levels
GFEI baseline setting – little progress in fuel economy improvement in countries without policies

Baseline Light-Duty Vehicle Fuel Economy and Trends

- Algeria
- Bahrain
- Chile
- China
- Cote d'Ivoire
- Egypt
- Ethiopia
- EU
- Georgia
- Indonesia
- Japan
- Kenya
- Mauritius
- Montenegro
- Peru
- Philippines
- Sri Lanka
- Uganda
- Uruguay
- Uruguay
- US
- Vietnam
## Policy Options

<table>
<thead>
<tr>
<th>Policy Category</th>
<th>Measures</th>
</tr>
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</table>
| **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
Sri Lanka: Demand response for technologies

Cars added to the fleet per year

- Car (Petrol)
- Car (Diesel)
- Car (Hybrid)
- Car (Electric)
European Union

- 12% of total CO\(_2\) emissions from transport
- mandatory emission reduction targets for new cars
- average for all new cars is 130 grams of CO\(_2\) 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
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
Mauritius

• Vehicle CO2-based 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
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
Global Progress on Fuel Economy Policy (2016)

* GFEI is involved in supporting all these countries except in Brasil
January 2016 - For more information visit www.globalfueeeconomy.org
Next steps

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

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

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

**Global View**

http://www.unep.org/transport/gfei/autotool/
Transport Unit
Economy Division
United Nations Environment
Nairobi, Kenya

E-mail: Jane.Akumu@unep.org
Web: http://unep.org/transport/
www.globalfueleconomy.org
SADC Low Sulphur Diesel Roadmap

- 15 countries
- Regional workshop held on **7-8 July 2015** with **13 countries** participating to develop a low sulphur strategy
- Angola, Botswana, Democratic Republic of Congo, Lesotho, **Malawi**, Mauritius, **Mozambique**, Seychelles, South Africa, Tanzania, **Zambia**, **Zimbabwe**, and Swaziland
- Sub-regional workshop already held in Botswana in August 2016 and this one in Mozambique in Nov 2016
- National Activities: Mozambique, South Africa, Zimbabwe, Malawi and Botswana, Mauritius
SADC Recommendations

1. Governments in **refining countries** to facilitate decision on **capital investment** for refinery upgrade;

2. Governments to engage stakeholders to review **storage and handling infrastructure** at receiving ports to avoid negative impacts of fuel comingling;

3. Governments to **secure the quality of low sulphur fuels** by:
   a. Reviewing logistics to segregate fuels; and
   b. **Implement fuel quality enforcement and monitoring regime**;

4. There are on-going national initiatives such as formation of **task teams** to address low sulphur fuels and these should be supported to facilitate quick action towards low sulphur fuels;

5. Countries to carry out inventory of light and heavy duty vehicles to ascertain number, age, technology to support cleaner fuels and vehicles policy development;

6. Governments to support **research studies on cost-benefit analysis** especially on health benefits in the sub-region to help decision making towards lower sulphur fuels;

7. There is need for **enhanced sensitisation** of stakeholders including government and the public on the benefits of low sulphur fuels with support from continental bodies such as UNEP, AMCEN etc., to implement this a communication strategy is needed;

8. Countries to **review pricing of cleaner low sulphur fuels** to promote their use, particularly in countries that have both 500 ppm and 50 ppm diesel fuel;
SADC Recommendations cont.

9. Countries support the harmonisation of low sulphur fuel standards within the sub-region particularly among countries that have joint import/supply facilities;
10. Countries support sub-regional harmonisation of minimum vehicle standards;
11. There is need to form multi-sectoral committees bringing together the health, energy, transport, environment and finance sectors to promote low sulphur fuels and cleaner vehicles at national and regional levels;
12. The proposed timeframe for low sulphur diesel fuels by importing countries is:
   a. 50 ppm by January 2016; and
   b. 10-15 ppm by 2020;
13. The proposed timeframe for low sulphur diesel fuels for refining countries is 50 ppm by 2020;
14. Governments to support cleaner transport solutions including cleaner vehicles, cleaner alternative fuels, efficient public transport and non-motorised transport including through Public Private Partnership; and
15. There is need for capacity building support on transport emissions strategies and while also benchmarking with other countries.
SACU sub-regional meeting

- A sub-regional workshop held on 4-5 August 2016 in Gaborone, Botswana to discuss fuel standards harmonization in the Southern African Customs Union (SACU) region.
- Botswana, Mozambique and South Africa and the SADC Secretariat.
- The sub-regional workshop aimed at bringing together the SACU countries that get their petroleum product supplies from South Africa.
- It was noted that there already existed a collaborative effort between the SACU Member States and that an Interstate Oil Committee (IOC) had been formed.
- Participants further proposed a move to 50 ppm diesel fuels by 2020 and 10 ppm by 2025.
- SADC countries time frame to low sulphur will vary eg, importers of oil products, like Mozambique and Zimbabwe will have shorter periods to low sulphur than those with refineries like South Africa, Zambia and Angola.