State-of-the-World Fuel Economy

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Dr. Lewis Fulton, STEPS3 Program,
Institute of Transportation Studies
University of California, Davis

www.steps.ucdavis.edu
# Fuel Economy State of the World 2014

The World is Shifting into Gear on Fuel Economy

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## New Cars

<table>
<thead>
<tr>
<th>Year</th>
<th>Target 2020</th>
<th>Target 2030</th>
<th>Target 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/100km compared to 2005</td>
<td>30% reduction*</td>
<td>50% average improvement globally</td>
<td>50% + globally</td>
</tr>
<tr>
<td></td>
<td>Engines, drive-trains, weight, aerodynamics.</td>
<td>Hybridisation of most models.</td>
<td>Significant contributions from Plug-in vehicles</td>
</tr>
</tbody>
</table>

## Total fleet

<table>
<thead>
<tr>
<th>Year</th>
<th>Target 2020</th>
<th>Target 2030</th>
<th>Target 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20% reduction</td>
<td>35% reduction</td>
<td>50by50</td>
</tr>
<tr>
<td></td>
<td>With lag time for stock turnover; includes eco-driving, maintenance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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*Note: Reduction rates are estimated and may vary based on various factors such as technology advancements and market penetration.**
Typical national objectives related to transportation/fuels policies

- Reduce oil dependence (diversify fuels)
- Improve balance of payments
- Reduce pollutant emissions
- Reduce greenhouse gases
- Promote domestic economies/jobs
IEA WEO 2012: heading toward 2 billion cars

OECD is fairly saturated, but rest of the world is not.

Figure 3.6  PLDV fleet in selected regions in the New Policies Scenario

- China
- European Union
- United States
- India
- Brazil
Deep Transport CO$_2$ Reductions in ETP-2012 2 Degree Scenario (2DS)

- Fuel economy improvement plays largest role, particularly through 2030
Fuel economy context

• Fuel economy improvement can be achieved through
  • Technical changes to vehicles
  • Changing the types of vehicles bought
  • Improving vehicle maintenance
  • Changing the way vehicles are driven (ecodriving)
  • Reducing traffic congestion

• Fuel economy improvement to vehicles should be part of a broader strategy:
  • Traffic management
  • City and regional planning
  • Promotion of public transit
  • Etc.
Meeting GFEI targets can stabilize global light-vehicle CO₂ emissions, despite more than a doubling of vehicle fleet.

Meeting GFEI global target can reduce a total of 33 Gt CO₂ emissions beyond already adopted policies between 2015-2050.

Adopted policies include vehicle efficiency standards adopted as of February 2014.

GFEI Target aims to reduce fuel consumption of all vehicles in half by 2050.

Source: ICCT Roadmap Model
Improving efficiency can save $billions

Countries could dramatically cut their fuel import bills in the future...

Figure 10.9 ▶ Fuel import bills in selected countries by fuel and scenario

a) Oil import bills

Source: IEA World Energy Outlook 2012
GFEI fuel economy report 2015

- 3rd edition since 2010
- Unique compilation of OECD and non-OECD new light duty vehicle fuel economy data
- Dataset currently comprises 26 countries covering more than 80% of the global LDV market
- Dataset covering eight years time series from 2008 to 2013
- Next update will come in 2016 and will include data of GFEI pilot countries
Regional fuel economy trends

- Countries with FE policies in place show encouraging improvement rates
- Size shift vs. technology evolution moderates non-OECD improvement
- Normalization to NEDC affects FTP based markets most – 15% increase of FE due to conversion compared to last edition
# FE improvement - Targets and reality

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2008</th>
<th>2011</th>
<th>2013</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OECD average</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average fuel economy (Lge/100km)</td>
<td>8.6</td>
<td>7.9</td>
<td>7.3</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>annual improvement rate (% per year)</td>
<td>-2.7%</td>
<td>-2.6%</td>
<td>-2.6%</td>
<td>-2.6%</td>
<td></td>
</tr>
<tr>
<td><strong>Non-OECD average</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average fuel economy (Lge/100km)</td>
<td>7.3</td>
<td>7.4</td>
<td>7.3</td>
<td>7.2</td>
<td></td>
</tr>
<tr>
<td>annual improvement rate (% per year)</td>
<td>0.5%</td>
<td>-0.4%</td>
<td>-0.9%</td>
<td>-0.2%</td>
<td></td>
</tr>
<tr>
<td><strong>Global average</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average fuel economy (Lge/100km)</td>
<td>8.3</td>
<td>7.7</td>
<td>7.3</td>
<td>7.1</td>
<td></td>
</tr>
<tr>
<td>annual improvement rate (% per year)</td>
<td>-2.3%</td>
<td>-1.9%</td>
<td>-1.8%</td>
<td>-2.0%</td>
<td></td>
</tr>
<tr>
<td><strong>GFEI target</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average fuel economy (Lge/100km)</td>
<td>8.3</td>
<td></td>
<td></td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>required annual improvement rate (% per year)</td>
<td>2005 base year</td>
<td>-2.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2014 base year</td>
<td>-3.1%</td>
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</tbody>
</table>

- **OECD: rates close to target**
- **Non-OECD: little improvement**
- **Global: Right trend at slow pace**
- **2030: Improve global FE by 50%**
Progress towards 2030 GFEI target
(We’re about half way there; next several years are critical)

Sales-weighted averages include projected sales of passenger cars and light commercial vehicles through 2030.
FE in OECD is very heterogeneous

- Both, least and most efficient markets are in OECD
Vehicle market dynamics

- The non-OECD market accounts for almost 60% of global PLDV sales, leading to a decreasing share of markets with fuel economy regulation.
- Shifts towards least efficient markets lead to moderate average OECD FE improvement rates although more than half of the OECD markets have improvement rates >3%.
Potential Fuel Economy Improvements to 2030

From the U.S. NRC 2013 report:

- Light-weighting of up to 25% in 2030, 50% in 2050 relative to 2010
- High efficiency accessories (e.g. air conditioning, lighting, tires)
- High efficiency engines (including but not limited to hybridization)
  - E.g. 25% improvement from turbocharged, downsized direct injection gasoline engines
- Overall Impacts:
  - By 2030, potential for 50% reduction in fuel consumption/CO2 per km at $2000-3500 per vehicle (through hybridization)
  - 66% reduction by 2050 at somewhat higher cost
Fuel Economy Improvements are Cost-effective

*Fuel savings more than pays for fuel economy improvements in light-duty vehicles*

Source: IEA Fuel Economy Roadmap, July 2012
Passenger Car Fuel Economy Standards Globally

- US 2025: 97
- Canada 2025: 97
- Mexico 2016: 145
- EU 2021: 95
- Japan 2020: 122
- China 2020: 117
- S. Korea 2020: 97
- India 2021: 113
- Brazil 2017: 138
- KSA 2020: 142
- S. Korea 2020: 97
- EU 2021: 95
- Canada 2025: 97

Liters per 100 kilometers (gasoline equivalent)

Grams CO₂ per kilometer, normalized to NEDC

- historical performance
- enacted targets
- proposed targets or targets under study
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
The IEA’s fuel economy readiness index

Countries are at various points in developing fuel economy policies

Source: IEA Fuel Economy Roadmap, July 2012
Baseline Light-Duty Vehicle Fuel Economy and Trends

- Liters per 100 kilometers (L/100km) normalized to NEDC Test Cycle

- Countries: Bahrain, Chile, China, Egypt, Ethiopia, EU, Georgia, Indonesia, India, Japan, Kenya, Mauritius, Montenegro, Morocco, Peru, Tunisia, Uruguay, US, Vietnam

- Year: 2005 to 2025
UNEPs Mapping of Fuel Economy Policy Progress

Global Progress on Fuel Economy Policy (2015)

* GFEI partners are involved in supporting all these countries except in Brasil.
June 2015 - For more information visit www.globalfueleconomy.org
The next 2-decades will likely be ICE-driven, even with rapid Plug-in Vehicle (PEV) growth

Note: this aligns with the IEA ETP 2012 2DS Scenario except with only 5 million PEV sales by 2020 instead of 20 million.
Electric vehicles v. gasoline/diesel, with declining power plant CO2 emissions

Battery electric vehicles will probably be needed to get below 50 g/km, but we will also need deeply decarbonized electricity generation (Based on NRC, 2013 assumptions for fuel economy)
Conclusions

Reaching the GFEI target to cut by half specific light-duty vehicle fuel consumption by 2030 requires:

- to keep scaling up the market coverage of fuel economy regulations;
- to set strengthened fuel economy improvement targets for the 2015-2030 period (especially in the non-OECD);
- to monitor the stringency of fuel economy improvement targets already in place;
- to keep monitoring the developments of fuel economy worldwide.
Thank You!

Lew Fulton
lmfulton@ucdavis.edu