Outline

- Global Trends in Vehicle FE Standards
- Why Mexico Needs to Improve Vehicle Fuel Efficiency
- Fuel Economy Characterization of Light-Duty Vehicles In Mexico
- Modeling of Mexico Vehicle Stock and Transportation Oil Use
- Scenario of Oil Production vs. Demand
- Conclusions
Global trends for fuel economy and GHG emission standards

At least nine countries and regions have established or proposed motor vehicle fuel efficiency or GHG emission policies. Of the 30 OECD countries, only Mexico and Iceland do not currently have some form of fuel economy or GHG emission program for vehicles.

Source: Comparison of Passenger Vehicle Fuel Economy and GHG Emission Standards around the World, by Feng An and Amanda Sauer, Report for the Pew Center on Global Climate Change
Benefits of Improving Vehicle Fuel Economy

Currently relevant to Mexico:
- Reducing Energy Consumption
- Reducing GHG Emissions
- Improving Air Quality
- Improving Trade Balance
- Promoting Energy Efficient Technologies
- Increasing Competitiveness of Auto Industry
- Synchronizing with International Standards

Future relevance to Mexico?
- Reducing Dependence of Imported Oil
- Improving Energy Security
Carbon Emissions of the 20 Highest Emitting Nations

– Mexico ranks 13th

The 302 MMTc emitted annually by U.S. automobiles exceeds the total emissions of every other nation except China, Russia and Japan.
Relationship of Vehicles Sales to Per Capita Income

– Large growth potential for Mexico

Per Capita Income ($)

Vehicles per 1,000 Persons

USA
Japan
France
Canada
Finland
Australia
Italy
UK
Spain
Portugal
Greece
Taiwan
Israel
S. Korea
Czech
Hungary
Maylaysia
Russia
Brazil
Thailand
China
India
Mexico

35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
Light-Duty Vehicle Sales in Mexico surged since 1995

LDV sales have grown rapidly since 1995, following a major market contraction in 1994.

Since 1995, the annual growth rates averaged
~ 23% for cars
~ 18% for trucks
~ 22% for cars & trucks combined.

The combined annual growth rate is still
~14% with the market contraction of 1994 included.
Mexico is basically a “net” light truck exporter

Mexico auto market is very dynamic in the sense that it produces, sells, exports, and imports large volumes of vehicles at the same time. About half of the new-sale vehicles are made domestically, half are imported. Three quarters of produced vehicles in Mexico are exported. But in general, Mexico is a “net” auto exporter – it exports more vehicles than it imports and sells domestically.

Accounting of Mexico LDVs in 2002
Mexico Driving Pattern is very different from the US ones

- Mexico Cycle vs. US City, Highway and CAFE Cycles

The average speed of MEX-IMP cycle is only about 14 mph. In comparison, the US-City average speed is about 20 mph, HWY cycle about 48 mph, and combine City/HWY CAFE cycle about 32 mph. MPG rating declines with the cycle-average speed.
New Vehicle “Certified” FE vs. Stock-wide Average “Real-world” FE Estimation

<table>
<thead>
<tr>
<th>2002</th>
<th>Cars</th>
<th>LDTs</th>
<th>LDVs</th>
<th>&quot;Gap&quot;</th>
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<tr>
<td>MPG</td>
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<tr>
<td>New sale CAFE</td>
<td>33.2</td>
<td>22.3</td>
<td>29.9</td>
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<td>New sale US-City</td>
<td>28.1</td>
<td>18.9</td>
<td>25.3</td>
<td>18%</td>
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<td>New sale Mex-IMP</td>
<td>22.8</td>
<td>15.3</td>
<td>20.5</td>
<td>46%</td>
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<tr>
<td>Stock average</td>
<td>17.5</td>
<td>11.5</td>
<td>15.3</td>
<td>96%</td>
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Fuel economy of motor vehicles in Mexico

Stock average “real-world” fuel economy figures are much lower than the certified fuel economy ratings for new vehicles measured based on standardized US-City cycle.
Modeling of New Vehicle Sales and Vehicle Population in Mexico

- to reach 4 million units for new sales, and 55 million population by 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Cars ('000)</th>
<th>LDTs</th>
<th>LDVs</th>
<th>HDTs</th>
<th>Total ('000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>593</td>
<td>225</td>
<td>818</td>
<td>35</td>
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<td>2005</td>
<td>843</td>
<td>286</td>
<td>1,129</td>
<td>59</td>
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<td>1,296</td>
<td>436</td>
<td>1,732</td>
<td>86</td>
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<td>2015</td>
<td>1,817</td>
<td>607</td>
<td>2,424</td>
<td>114</td>
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<td>2020</td>
<td>2,318</td>
<td>770</td>
<td>3,088</td>
<td>141</td>
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<tr>
<td>2025</td>
<td>2,887</td>
<td>890</td>
<td>3,577</td>
<td>159</td>
<td>3,736</td>
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<tr>
<td>2030</td>
<td>2,823</td>
<td>935</td>
<td>3,758</td>
<td>167</td>
<td>3,924</td>
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<table>
<thead>
<tr>
<th>Year</th>
<th>Pop (millions)</th>
<th>Cars</th>
<th>LDTs</th>
<th>LDVs</th>
<th>HDTs</th>
<th>Total (millions)</th>
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<td>2000</td>
<td>5.5</td>
<td>2.2</td>
<td>7.6</td>
<td>0.6</td>
<td>8.2</td>
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<td>2005</td>
<td>7.8</td>
<td>2.9</td>
<td>10.6</td>
<td>0.7</td>
<td>11.3</td>
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<td>23.3</td>
<td>1.2</td>
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<tr>
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<td>24.5</td>
<td>8.2</td>
<td>32.8</td>
<td>1.6</td>
<td>34.3</td>
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<td>2.0</td>
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<td>52.2</td>
<td>2.4</td>
<td>54.5</td>
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New Vehicle Sales ('000)

Vehicle Population (millions)
PEMEX oil production will begin to decline

Reserves are around 50% depletion now, PEMEX predicts that decline will begin after 2006 unless significant new reserves are discovered.
Under BAU, oil demand will outstrip crude supply between 2015 and 2035

Demand for road transport alone will outstrip total crude supply between 2024 and 2039

Historical Production
Conservative Estimate
Middle Estimate
EIA Estimate
Total Oil Demand
Model Transport Fuel Demand (Gas & Diesel)
EIA projected Transport Fuel Demand

Oil demand/supply (t/bpd)

Gaps between Gasoline Demand and Refinery Capability are large

~30% of Gasoline in 2001 was imported
However, Mexico has over-supply of Diesel fuel

Intermediate distillates balance trend
(Thousand barrels per day)

Source: Martha Hernandez, PEMEX
Import costs for road fuels could be higher than crude export income by 2016.
Conclusions

• There is tremendous growth potential for vehicle ownership and fuel demand.
• Unless large reserves are found in the near future and/or demand growth is curbed, Mexico could become a net oil importer in 10 years.
• There are multiple benefits to improved vehicle fuel economy:
  – Reducing CO2 emissions and improving air quality
  – Improving trade balance and putting off dependence on foreign oil
  – Increasing competitiveness of the auto industry