“Greening the Automobile”

Presentation to the Vancouver Board of Trade

April 2, 2007.
Theme is Green
Technology Pathways

Advanced Diesel

- Oxydizing Catalytic Converter to minimize Carbon Monoxide (CO) and unburned Hydrocarbons (HC)
- An Advanced DeNOx Catalytic Converter to reduce harmful NOx emissions
- A Particulate Filter which helps reduce particulate emissions (soot) by as much as 98%
- A Storage Catalytic Converter (SCR) to further treat harmful NOx emissions
Technology Pathways

**Hybrid**

![Diagram of a hybrid vehicle with labels for Battery, Power Split Device, Generator, Electric Motor, and Internal Combustion Engine.]
**Who likes hybrids?**

**Ontario continues to have highest hybrid share; Quebec shows largest growth since 2001**

- **Ontario**
- **British Columbia**
- **Quebec**
- **Alberta**
- **Manitoba**
- **Nova Scotia**
- **Saskatchewan**
- **New Brunswick**
- **Prince Edward Island**
- **Newfoundland**
- **Northwest Territories**

**SOURCE:** R.L. Polk
Canadian Hybrid Volumes

Total Registrations are 17,898 from 2001 – 2006

AIAMC members sold 90% of all hybrids from 2001 - 2006

SOURCE: R.L. Polk
Environmental Goals for the Auto Sector

• Reduce transport-related conventional emissions (carbon monoxide, nitrogen oxides, volatile organic compounds, particulates and lead) to levels such that they cannot be considered a serious public health concern anywhere in the world

• Limit transport-related greenhouse gas (GHG) emissions to sustainable levels
Environmental Goals for the Auto Sector

- **Reduce transport-related conventional emissions** (carbon monoxide, nitrogen oxides, volatile organic compounds, particulates and lead) to levels such that they cannot be considered a serious public health concern anywhere in the world.

- **Limit transport-related greenhouse gas (GHG) emissions** to sustainable levels.

Two of the seven goals identified under the “Mobility 2030: Meeting the Challenges to Sustainability” Report as part of the Sustainable Mobility Project whose participants were:

BP, DaimlerChrysler, Ford, General Motors, Honda, Michelin, Nissan, Renault, Shell, Toyota and Volkswagen

*Enlightened Self Interest!*
In 2000 there were about 700 million LDV in the world, by 2030 that number is expected to be 1.3 billion and by 2050 there are expected to be about 2 billion vehicles on the road = VEHICLE PARC INCREASING = INCREASED EMISSIONS

Oil discoveries have been decreasing since 1962 and some estimates suggest that peak oil production will occur in the first 20 years of the 21st century with half of the readily accessible oil already been used. At the same time oil consumption between 2000 and 2020 is expected to increase about 55% = OIL SUPPLY DECREASING/CONSUMPTION INCREASING

Greater Consumer awareness of and demand for environmentally friendly vehicles = CONSUMER IS DEMANDING
Example: California Standard “30% Improvement in Fuel Economy” -- For all Automakers, based on 2007 FE Ratings, significant number of models would no longer be available starting in 2009:

<table>
<thead>
<tr>
<th>Year</th>
<th>% Cars Not Available</th>
<th>% Trucks Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>62%</td>
<td>49%</td>
</tr>
<tr>
<td>2010</td>
<td>79%</td>
<td>59%</td>
</tr>
<tr>
<td>2011</td>
<td>92%</td>
<td>73%</td>
</tr>
<tr>
<td>2012</td>
<td>99%</td>
<td>89%</td>
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<tr>
<td>2013</td>
<td>99%</td>
<td>89%</td>
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<tr>
<td>2014</td>
<td>99%</td>
<td>91%</td>
</tr>
<tr>
<td>2015</td>
<td>99.5%</td>
<td>94%</td>
</tr>
<tr>
<td>2016</td>
<td>99.5%</td>
<td>95%</td>
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</table>
• Unlike other sectors, the auto industry must reduce GHG emissions from its products which depend on consumer purchasing, consumer driving behaviour, the total on-road fleet and the available fuels in Canada
  – 2005 GHG MOU committed industry to interim targets

• Accelerating GHG reduction through an integrated plan that includes:
  – Clean fuels
  – Public and private fleets
  – Retirement of older vehicles (smog reduction and GHG reductions/safety improvement)
  – Consumer supports for advanced technology vehicles
  – Research and Development

• Canada has enjoyed the economies of scale benefits arising from integration that has been in place since 1965 Auto Pact – which has afforded Canadians:
  – a wider variety of vehicles
  – The lowest possible cost
  – The most advanced technology
Possible Transportation Fuel Pathways

![Diagram showing possible transportation fuel pathways](image)

Source: Sustainable Mobility Project
# Well to Wheels CO₂

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Well-To-Tank Emissions</th>
<th>Tank-To-Wheels Emissions</th>
<th>Propulsion System</th>
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<tr>
<td>Gasoline</td>
<td></td>
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<td>2010 ICE</td>
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<td>Gasoline</td>
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<td>DI ICE</td>
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<tr>
<td>Gasoline</td>
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<td>Advanced ICE</td>
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<tr>
<td>Ethanol Sugar beet</td>
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<td>ICE</td>
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<tr>
<td>Ethanol (Straw)</td>
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<tr>
<td>Diesel</td>
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<tr>
<td>RME Biodiesel</td>
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<td>Advanced DI ICE</td>
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<tr>
<td>FT-Diesel (remote-NG)</td>
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<td></td>
<td>DI ICE</td>
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<tr>
<td>FT-Diesel (Residual Wood)</td>
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<td>DI ICE</td>
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<tr>
<td>CNG (EU-NG-Mix)</td>
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<td>LH₂ (EU-NG-Mix)</td>
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<td>Gasoline</td>
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<td>Diesel</td>
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<tr>
<td>FT-Diesel (Residual Wood)</td>
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<td>HEV</td>
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<tr>
<td>CGI₂ (EU - NG - Mix onsite)</td>
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<td></td>
<td>ICE HEV</td>
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<td>Methanol (remote-NG)</td>
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<td>CGI₂ (EU-NG-Mix onsite)</td>
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<tr>
<td>CGI₂ (EU-NG-Mix + CO₂ seq)</td>
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<td>CGI₂ (EU-EL-Mix onsite)</td>
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<td>FC</td>
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<tr>
<td>CGI₂ (9%m-B onsite)</td>
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<tr>
<td>LH₂ (EU-NG-Mix)</td>
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<td>FC</td>
</tr>
</tbody>
</table>

Notes: 
(1) Estimated by VHA  
(2) Estimated by BP, from CM data  
(3) Net output from energy use in conversion process  
(4) Based on Hydro figures  
Source: Sustainable Mobility Project calculations.
Thank You!
David C. Adams
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- Porsche Cars Canada, Ltd.
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- Suzuki Canada Inc.
- Toyota Canada Inc.
- Volkswagen Canada Inc.
The Canadian Auto Industry has committed to reduce annual GHG emissions by 5.3 Mt in 2010 (more than the previous Government’s Climate Change Plan imposed, and earlier than required)

- Has also committed to achieving interim goals:
  - 2007 - 2.4Mt
  - 2008 - 3.0Mt
  - 2009 - 3.9Mt

- Will drive GHG reductions in the new vehicle fleet through new technologies, encouraging the use of alternative fuels and complementary activities

- Will continue the introduction of Tier 2 level emissions control systems

- Will bring forward technologies that promote on-road fuel savings such as on-board diagnostics and tire pressure monitoring systems