Chickens & Eggs
Opportunities, Challenges & Strategies
Building the NGV Infrastructure

Integrating Petroleum & Alternative Fuel Infrastructures
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CEO

Clean Fuels Consulting

7 December 2011
Brussels
Integrating petroleum & alternative fuel infrastructures

- NGVisions
- Petroleum industry retailing system
- Challenges & trends in the petroleum retail markets
- Petroleum industry views toward alternative fuels
- Natural Gas industry retailing to the vehicle transportation sector
- Conclusions
NGVISIONS: BREAKING THE CHICKEN-EGG SYNDROME
Alternative Fuel Options

HVO = hydrotreated vegetable oil
*Added to original slide

NGVisions

• Natural gas to be considered a ‘fuel alternative’ and not just an ‘alternative fuel.’

• Petroleum retail stations will offer a full range of fuel alternatives alongside traditional petroleum fuels: CNG (bioCNG) ....and likely LPG; ethanol, etc.

Forepark, Netherlands (outside Den Haag, E19/A4)
Biogas has great potential but there will be competition for feedstock and competition among downstream applications.
Challenges to Alternative Fuels

- **Infrastructure**
  - Does the fuel require a new infrastructure?
  - Is it possible to blend alternative fuel with conventional fuel?

- **Powertrain**
  - Does the fuel require adapted or a new propulsion technology?
  - Is it possible to use the fuel in the existing car fleet?

- **Sustainability**
  - Economics - Ultimately must be competitive with hydrocarbons
  - Social - Cannot use food crops as a feedstock
  - Environmental – Lowest impact
If the NGVision is to be fulfilled:

• Need to understand the petroleum retail system: structure and processes
• Need to understand the petroleum retail sector’s propensities and preferences for alternative fuels
• See how the natural gas delivery structure and approach can be adapted to the vehicle transportation sector
PETROLEUM INDUSTRY RETAILING SYSTEM

International Oil Majors
Nationally-owned Oil Majors
Everyone else
About three quarters of refined oil is for the transport sector

Percentages of U.S. Refiner Retail Volumes (2009)

- Motor Gasoline: 42.2%
- No. 2 Distillate: 15.1%
- Kero-jet: 32.2%
- Propane: 3.1%
- Residual Fuel Oil: 8.0%
- Other: 0.3%

DOWNSTREAM SECTOR
REFINING, DISTRIBUTION, MARKETING

Refining
(Manufacturing and
Product Imports)

Distribution
(Transportation/Storage)

Marketing

- RETAIL OUTLETS
- FARMS
- Commercial Consumers
- Wholesale Distributor
- Licensed Importers

Source: Canadian Petroleum Products Institute
Who Owns Gasoline Retail?

The Association for Convenience & Petroleum Retailing
Types of Petrol Retail Ownership
(Generic to countries not controlled by a national oil company)

• Major oil owned & operated
  - Directly supplied
  - Profit/loss included in corporate earnings
  - First priority to fuel supplies

• Branded independents
  - Sell only brand of supplier
  - Pay premium, receive marketing assistance
  - May receive image assistance
  - Second priority to fuel supplies
Types of Petrol Retail Ownership (Generic to countries not controlled by a national oil company)

• Unbranded/private-branded independent
  - Buy product on open market: spot, long-term contract, futures market (hedge)
  - Establish own brand identity
  - Often pay less for fuel because no marketing premium
  - Last in line for fuel supply
Petroleum Retail Product Chain

- Major Oil Company
- National owned refinery
- Oil company owned refinery
- Nationally-Owned vertically integrated Oil Company
- Company owned & operated stations
  - Company owned, Dealer operated
  - Dealer owned company franchise
  - Branded independents
- Private branded independents
- Unbranded independents
- Truck Stop / Travel Centers (US Model)
- Controlled fuel distributors
- Company owned & operated station
  - Company owned, Dealer operated franchise
  - Dealer owned & operated
- Wholesale fuel distributors
- Fuel distributors
- Local
- Regional
- Convenient store / hyper markets
Type of ownership of retail sites in selected European countries

Survey of the Competitive Aspects of Oil and Oil Product Markets in the EU, A report to the Directorate General Transport and Energy, 2009, Econ Poyry, AB,
Ownership culture of fuelling stations varies greatly among European member states

% COMPANY OWNERSHIP vs % DEALERSHIP OWNED

- Italy = 76%
- Austria = 71%
- Ireland = 59%
- Spain = 60%
- EU-wide average (each) Company Owned sites have throughput of 2.6 mil liters/year; Dealer Owned sites are 1.8 mil liters/year.

Characteristics of the European motor fuel retail market

<table>
<thead>
<tr>
<th>Country</th>
<th>Annual consumption ('000 litres)</th>
<th>Number of sites</th>
<th>Average throughput ('000 litres)</th>
<th>Sites per 100 km²</th>
<th>Sites per 1,000 people</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>5,495,814</td>
<td>2,752</td>
<td>1,997</td>
<td>3.28</td>
<td>0.33</td>
</tr>
<tr>
<td>Belgium</td>
<td>6,498,479</td>
<td>3,192</td>
<td>2,036</td>
<td>10.47</td>
<td>0.30</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>n/a</td>
<td>1,484</td>
<td>n/a</td>
<td>1.88</td>
<td>0.14</td>
</tr>
<tr>
<td>Denmark</td>
<td>7,121,000</td>
<td>2,012</td>
<td>3,539</td>
<td>4.67</td>
<td>0.37</td>
</tr>
<tr>
<td>Finland</td>
<td>5,006,923</td>
<td>2,029</td>
<td>2,468</td>
<td>0.60</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>France</strong></td>
<td>52,227,460</td>
<td>14,578</td>
<td>3,583</td>
<td>2.68</td>
<td>0.23</td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td>61,664,000</td>
<td>14,447</td>
<td>4,268</td>
<td>4.05</td>
<td>0.18</td>
</tr>
<tr>
<td>Greece</td>
<td>n/a</td>
<td>8,000</td>
<td>n/a</td>
<td>6.06</td>
<td>0.71</td>
</tr>
<tr>
<td>Hungary</td>
<td>n/a</td>
<td>1,447</td>
<td>n/a</td>
<td>1.56</td>
<td>0.14</td>
</tr>
<tr>
<td>Ireland</td>
<td>3,088,284</td>
<td>1,911</td>
<td>1,616</td>
<td>2.72</td>
<td>0.43</td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td>39,800,225</td>
<td>21,919</td>
<td>1,816</td>
<td>7.27</td>
<td>0.37</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>1,689,028</td>
<td>237</td>
<td>7,127</td>
<td>9.12</td>
<td>0.49</td>
</tr>
<tr>
<td>Netherlands</td>
<td>8,513,445</td>
<td>4,243</td>
<td>2,006</td>
<td>10.22</td>
<td>0.26</td>
</tr>
<tr>
<td>Poland</td>
<td>n/a</td>
<td>2,658</td>
<td>n/a</td>
<td>0.85</td>
<td>0.07</td>
</tr>
<tr>
<td>Portugal</td>
<td>6,997,659</td>
<td>2,674</td>
<td>2,617</td>
<td>2.91</td>
<td>0.25</td>
</tr>
<tr>
<td>Spain</td>
<td>25,289,656</td>
<td>8,577</td>
<td>2,949</td>
<td>1.70</td>
<td>0.19</td>
</tr>
<tr>
<td>Sweden</td>
<td>9,785,000</td>
<td>3,245</td>
<td>3,015</td>
<td>0.72</td>
<td>0.35</td>
</tr>
<tr>
<td>UK</td>
<td>38,062,844</td>
<td>9,176</td>
<td>4,148</td>
<td>3.76</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Source: Experian Catalist 2008 & 2009, and UPEI and Energie Informationsdienst Feb 2009 for Germany

Survey of the Competitive Aspects of Oil and Oil Product Markets in the EU, A report to the Directorate General Transport and Energy, 2009, Econ Poyry, AB,
## Top Petrol Stations in Europe by Brand

<table>
<thead>
<tr>
<th>Rank</th>
<th>Brand</th>
<th>Nr. of stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shell</td>
<td>14,000</td>
</tr>
<tr>
<td>2</td>
<td>Total</td>
<td>11,500</td>
</tr>
<tr>
<td>3</td>
<td>BP</td>
<td>8,900</td>
</tr>
<tr>
<td>4</td>
<td>Esso</td>
<td>7,100</td>
</tr>
<tr>
<td>5</td>
<td>ENI</td>
<td>6,400</td>
</tr>
<tr>
<td>6</td>
<td>Orlen</td>
<td>2,800</td>
</tr>
<tr>
<td>7</td>
<td>Aral*</td>
<td>2,700</td>
</tr>
<tr>
<td>8</td>
<td>AVIA</td>
<td>2,600</td>
</tr>
<tr>
<td>9</td>
<td>OMV</td>
<td>2,500</td>
</tr>
<tr>
<td>10</td>
<td>Lukoil</td>
<td>2,500</td>
</tr>
<tr>
<td>11</td>
<td>Statoil</td>
<td>2,000</td>
</tr>
</tbody>
</table>

*Aral is part of BP

© 2009 www.retail-index.com
## European fuels, fuelling stations & vehicles per station

<table>
<thead>
<tr>
<th>FUEL</th>
<th>VEHICLES</th>
<th>STATIONS</th>
<th>VEHICLES PER STATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PETROLEUM¹</td>
<td>234 million</td>
<td>134,282 (+)</td>
<td>1,743</td>
</tr>
<tr>
<td>NATURAL GAS²</td>
<td>1.42 million</td>
<td>Total = 3,964 (2,706 public &amp; 1,258 private)</td>
<td>358</td>
</tr>
<tr>
<td>LPG³</td>
<td>7 million</td>
<td>25,519</td>
<td>279</td>
</tr>
</tbody>
</table>

1. Europia Annual Report 2011, from the National Oil Industry Associations (NOIA)
2. Gas Vehicles Report October 2011
3. European LPG Association (AEGPL) as of 2007
In the U.S. the *convenience industry* dominates gasoline sales.

*Independent, Unbranded: 45%
Major Oil Companies: 2%
Independent, Branded: 53%*

*BP, ConocoPhillips, ExxonMobil exiting retail
*Consumers think major oil owns 63% of stores*

The Association for Convenience & Petroleum Retailing
The convenience industry sells 80% of the gasoline in the US

• **114,673 C-stores (79.1%)** sell motor fuel
  – 64,463 (56.2%) owned by companies with 1 store
  – 6,773 (14.6%) owned by companies with 500+ stores

• **Major oil pulling out of retail**
  – Fewer than 2% owned/operated by major oil companies
  – Consumers think they own 63% percent of stores
  – BP, ConocoPhillips, ExxonMobil have announced intent to sell all retail holdings; Shell is almost completely out

The Association for Convenience & Petroleum Retailing
CHALLENGES & TRENDS IN THE PETROLEUM RETAIL MARKETS
OMV’s Assessment Criteria for Alternative Fuels

- **Product Quality**
  - Same or better than conventional fuels,

- **Business Volume**
  - Use in existing infrastructure/powertrain, fit to existing standards, use in other segments,

- **Contribution to existing quotas**

- **Energy Security**
  - Diversification of Supply (Feedstock, Region, etc.),
  - Efficiency

- **Sustainability**
  - Economic (mid and long term)
  - Social aspects
  - Environmental aspects
Can money be made selling fuel to motorists?
Prices & Margins
Automotive
Gasoline Prices
December 2011

- Unleaded gasoline (95 RON) price excluding tax: ~ €0.50
- Excise tax ~ €0.60
- Value Added Tax (VAT) ~ 20%

- Total = ~ €1.35

Source: Modified from Eurostat 2011
In the U.S. the number of retail gasoline stations has declined 17% between 1995 & 2008.
The population of Canadian retail petrol stations declined 38% since 1988.
PETROLEUM INDUSTRY VIEWS OF ALTERNATIVE FUELS

LIQUID BIOFUELS
GASEOUS FUELS
Which alternative fuels are the oil companies talking about (or not) on their websites?

<table>
<thead>
<tr>
<th>Company (#) Euro retailer</th>
<th>Ethanol</th>
<th>Other bio-liquids</th>
<th>Hydrogen</th>
<th>Natural gas for vehicles</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP (3)</td>
<td>✓</td>
<td>Biodiesel; 2nd Gen</td>
<td>✓</td>
<td>NO</td>
<td>LPG, wind, solar, CCS</td>
</tr>
<tr>
<td>ENI (5)</td>
<td>✓</td>
<td>Biofuels, Green Diesel, ETBE</td>
<td>✓</td>
<td>CNG</td>
<td>LPG, CCS, Methanol</td>
</tr>
<tr>
<td>EXXON MOBIL (4)</td>
<td>✓</td>
<td>Algae biofuels</td>
<td>✓</td>
<td>NO</td>
<td>LPG, CCS</td>
</tr>
<tr>
<td>OMV (9)</td>
<td>✓</td>
<td>FAME; ETBE; Veg oil;</td>
<td>✓</td>
<td>CNG, bio-CNG, SNG</td>
<td>LPG</td>
</tr>
<tr>
<td>SHELL (1)</td>
<td>✓</td>
<td>Biofuels</td>
<td>✓</td>
<td>CNG, LNG</td>
<td>LPG, CCS</td>
</tr>
<tr>
<td>STATOIL (11)</td>
<td>✓</td>
<td>Biodiesel, Bioethanol</td>
<td>✓</td>
<td>CNG, GTL, LNG</td>
<td>CCS, Methanol, Wind, Geothermal</td>
</tr>
<tr>
<td>TOTAL (2)</td>
<td>✓</td>
<td>DME</td>
<td>✓</td>
<td>NO</td>
<td>Methanol; ETBE; FAME; Solar</td>
</tr>
</tbody>
</table>
OMV Status Alternative Fuels: “Nice Products”

Share of biofuels in European transport fuels 2007

Survey of the Competitive Aspects of Oil and Oil Product Markets in the EU, A report to the Directorate General Transport and Energy, 2009, Econ Poyry, AB,
BP ALTERNATIVE FUELS ACTIVITIES

- Biofuels (liquids)
- Wind
- Solar
- Carbon Capture & Storage
- Ventures (strategic corporate venture capital arm of BP Alternative Energy.)
  - Investing in highly innovative cleantech companies and funds;
  - Investing in next generation carbon offsets;
  - Incubating proprietary cleantech R&D.
Katrina Landis, CEO  
BP Alternative Energy

• We are developing the next-generation biofuels based on cellulosic materials grown on lower-quality agricultural land not best suited for growing food crops economically.  
• No other biofuel has the potential to deliver the necessary volume at the low cost of cellulosic biofuels.  
• Our product will be made from dedicated energy grasses, converted into fuel using proprietary technology that extracts sugars from the cellulose in the plant and converts it into liquid fuels.

Source: Building Sustainable Energy Businesses, Katrina Landis, CEO, BP Alternative Energy (Renewable Energy Technology Conference, 21 September 2011)
Katrina Landis, CEO
BP Alternative Energy

• At BP, we believe we are seeing the coming of age of a new energy sector that, over the next 100 years, will supplement traditional fossil fuels to create a more diversified energy mix.

• Note I said ‘supplement,’ not ‘replace.’ The world has had more than a century to build its energy portfolio around fossil fuels. A fundamental shift can’t be anything other than the work of decades.

Source: Building Sustainable Energy Businesses, Katrina Landis, CEO, BP Alternative Energy (Renewable Energy Technology Conference, 21 September 2011)
NATURAL GAS INDUSTRY RETAILING TO THE VEHICLE TRANSPORTATION SECTOR

COMMERCIAL CUSTOMERS (FLEETS)
PRIVATE CARS/COMMUTERS
NGV Pathways to 2020

Fuel Supply
- Biogas (Renewable Resource)
  - Agricultural waste
  - Municipal waste
  - Urban waste

Processing
- Fossil Resource
  - Refining
  - LNG Processor

Transmission
- LNG (99% CH₄)
- LNG Storage
- European 1.3 m/km pipeline

Fuelling Technology and Infrastructure
- Compressor
- Storage
- Dispensing
- Liquid-to-compressed natural gas (LCNG)
- CH₄ reformed to H₂

Vehicle & Engine Systems / Technology
- Engine
- Storage
- Emissions

The Customers
- FLEET
  - Government Municipal
  - Commercial
  - Commuter
- FLEET
  - Government Municipal
  - Commercial
  - Urban fleet
  - Commercial fleet
- Passenger
  - Off road applications
  - Marine
  - Rail
What is the target market?
THE NGV MARKETING PYRAMID
Gas industry fuelling station strategies
(Some Basic Concepts/Options)

• Central fuelling station for private fleet
• Selected access to private, central fuelling station
  – Access issues time of day
  – Security a concern
  – Liability an issue

• Selling through the fence
  – Compressor on the ‘inside’ for private fleet
  – Dispenser on public access part of the property for commuters
  – Locations can be ‘inconvenient’ but…it’s a start!
FUELLING STATION STRATEGIES
(Some Basic Concepts)

• *Dedicated (CNG only)* Fuelling Station Model
  – Has Been *Part* of the Italian Approach to Develop the Initial Market
  – Unless throughput is assured, probably not an economic alternative
  – More appropriate for truck stops & long haul
FUELLING STATION STRATEGIES
(Some Basic Concepts)

• PUBLIC FUELLING STATION MODELS
  – Can be owned by the ‘branded’ multinational companies
  – Can be with owner of a franchised multinational company
  – Sometimes easier with independent, private brand fuelling stations who have more flexibility
VARIOUS BUSINESS ARRANGEMENTS WITH PUBLIC FUELLERS

• Station owner buys CNG equipment & takes € margin on gas sales directly
• Station owner leases equipment. Operation/maintenance still responsibility of equipment ‘owner’
• Gas Co. (or other) leases space from station owner; maintains ownership & profit of the gas; sells gas to station; splits € margin with station owner; or
• Other creative approaches
The gas industry has to get used to marketing a ‘new’ type of customer

• Traditional sectors
  - Commercial
  - Industrial
  - Residential

• The 4th Sector: Natural Gas Vehicles
  - Looks a bit like residential sector: more customers, less individual gas sales
  - More difficult to market
  - More time to complete sales
  - €s/$s invested per customer higher (?) (compare to investment in residential sector)
CONCLUSIONS
NGV Challenges

- Oil companies like liquids: petrol & diesel
- Bio-liquids are becoming acceptable
  - Liquefied Petroleum Gas (LPG) acceptable (market for residual refining products butane & propane)
  - Bio-liquids for blending are easier to integrate into existing liquid retailing operations (ethanol & biodiesel) (% mix an issue!)
- Oil companies don’t make much money retailing fuels
- “What is known is liked. What is unknown is disliked.”
Financial Support for Fuelling Station Investments Required

• From gas companies
  - Longer times for return on investment
  - Possible subsidies (favorable fuel pricing, reduced costs of pipeline connection to stations)
  - Leadership by example: converting own fleets

• From Government
  - Focus on customer support
  - Various financial incentives (tax credits, tax deductions, etc.)
Strategy to Get Methane to the Markets

• Understand the structure & process of the system that gets oil products to motorists

• Look at past and current *successful* pathways to get natural gas to the transportation sector (motorists)

• Identify the ‘best’ opportunities and strategies for each form of methane, given the wide range of customers and pathways to reach them

• Don’t put all your eggs in one basket
METHANE IS A DIVERSE & FLEXIBLE FUEL FOR THE TRANSPORT SECTOR

- FOSSIL GAS
- CNG
- LNG
- BIOGAS
Chickens & Eggs
Opportunities, Challenges & Strategies
Building the NGV Infrastructure

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