NGVA Board of Directors (140 members)
Why natural gas in transport?

CNG

- Cost-effective: low CO2 abatement costs (€/t CO2)
- Immediate: solution to air quality problems, less noise
- Sustainable: Natural Gas, Biomethane & Power-to-Gas, no blend limitations
- Intermodality: investments in waterborne and road complement each other
- Gas is the available, economical and clean alternative to oil

LNG
NGV distribution across Europe

Source: GRTgaz
Directive on deployment of alternative fuels infrastructure (2014/94/EU)

Member States have to develop National Policy Frameworks until 18 November 2016

Detailed provisions for CNG and LNG:

- CNG in cities and densely populated areas by 2020.
- CNG & LNG at least on TEN-T core network by 2025. (150 km + 400 km indic. distances).
- LNG in sufficient TEN-T seaports by 2025.
- LNG in sufficient TEN-T inland ports by 2030.
- Common technical standards by 2016.
- Consumer information: "1 petrol litre equivalent" for better comparability of fuel prices shall be used.
6.3.2 Natural Gas Refuelling Station

Table 6.8: Planned Number of Natural Gas Refuelling Points in the TEN-T Comprehensive Network

<table>
<thead>
<tr>
<th>ROAD NAME</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road name</td>
<td>CNG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road name</td>
<td>LNG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

http://ec.europa.eu/transport/themes/urban/studies/urban_en.htm
How important is biomethane in the gas mix?

Source: NGVA Europe
Natural Gas emissions – CO2 & air quality

Average CO2 reduction of NG vs oil

30%

… carbon neutral mobility

NGV pollutant values vs EU limits

Source: OEMs
The Council asked for a comprehensive and technology neutral approach for the promotion of emissions reduction and energy efficiency, for electric transportation and for renewable energy sources also after 2020, (…)

Liquefied Natural Gas (LNG) is an option for heavy duty vehicles and ships, due to its high energy density and low pollutant emissions. In addition, electricity, hydrogen, Compressed Natural Gas (CNG) blended with biomethane, and advanced biofuels are the main options for passenger cars and light duty vehicles for medium distances.

NGV applications, low emissions champions

CNG buses – success story

Garbage collection – quiet truck

Delivery vehicles – no limits

Cleanest combustion on e-gas

CNG distribution and LNG long-haul trucks – a solution for all
## Top TEN green cars (Swiss automobile club)

<table>
<thead>
<tr>
<th>rank</th>
<th>brand</th>
<th>modell</th>
<th>capacity in cm³</th>
<th>output in kW / hp</th>
<th>gearbox</th>
<th>fuel type</th>
<th>consumption in l/100 km</th>
<th>CO2 in g/km</th>
<th>emission class</th>
<th>total points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VW</td>
<td>eco up! 1.0 BMT Erdgas CH</td>
<td>999</td>
<td>50 / 68</td>
<td>m5</td>
<td>CNG</td>
<td>2.9</td>
<td>63</td>
<td>Euro6</td>
<td>88.2</td>
</tr>
<tr>
<td>1</td>
<td>Skoda</td>
<td>Citigo 1.0 Green tec CNG Erdgas CH</td>
<td>999</td>
<td>50 / 68</td>
<td>m5</td>
<td>CNG</td>
<td>2.9</td>
<td>63</td>
<td>Euro6</td>
<td>88.2</td>
</tr>
<tr>
<td>1</td>
<td>Seat</td>
<td>Mii 1.0 MPI Ecofuel CNG Erdgas CH</td>
<td>999</td>
<td>50 / 68</td>
<td>m5</td>
<td>CNG</td>
<td>2.9</td>
<td>63</td>
<td>Euro6</td>
<td>88.2</td>
</tr>
<tr>
<td>2</td>
<td>Audi</td>
<td>A3 Sportback 1.4 TFSI g-tron S-tronic Erdgas CH</td>
<td>1395</td>
<td>81 / 110</td>
<td>a7</td>
<td>CNG</td>
<td>3.3</td>
<td>71</td>
<td>Euro6</td>
<td>84.2</td>
</tr>
<tr>
<td>3</td>
<td>VW</td>
<td>Golf 1.4 TGI BlueMotion DSG Erdgas CH</td>
<td>1395</td>
<td>81 / 110</td>
<td>a7</td>
<td>CNG</td>
<td>3.4</td>
<td>74</td>
<td>Euro6</td>
<td>83.0</td>
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<tr>
<td>4</td>
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<td>CT 200h Hybrid</td>
<td>1798</td>
<td>100 / 136</td>
<td>as</td>
<td>petrol</td>
<td>3.6</td>
<td>82</td>
<td>Euro6</td>
<td>81.4</td>
</tr>
<tr>
<td>5</td>
<td>Seat</td>
<td>Leon 1.4 TGI CNG Erdgas CH</td>
<td>1395</td>
<td>81 / 110</td>
<td>m6</td>
<td>CNG</td>
<td>3.5</td>
<td>76</td>
<td>Euro6</td>
<td>79.8</td>
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<tr>
<td>6</td>
<td>Suzuki</td>
<td>Celerio 1.0 Unico</td>
<td>998</td>
<td>50 / 68</td>
<td>m5</td>
<td>petrol</td>
<td>3.6</td>
<td>84</td>
<td>Euro6</td>
<td>78.8</td>
</tr>
<tr>
<td>7</td>
<td>Lancia</td>
<td>Ypsilon 0.9 TwinAir NP Erdgas CH</td>
<td>875</td>
<td>59 / 80</td>
<td>m5</td>
<td>CNG</td>
<td>3.1</td>
<td>69</td>
<td>Euro6</td>
<td>78.4</td>
</tr>
<tr>
<td>8</td>
<td>Fiat</td>
<td>Panda 0.9 TwinAir NP Erdgas CH</td>
<td>875</td>
<td>59 / 80</td>
<td>m5</td>
<td>CNG</td>
<td>3.1</td>
<td>68</td>
<td>Euro6</td>
<td>76.8</td>
</tr>
<tr>
<td>9</td>
<td>Toyota</td>
<td>Auris 1.8 VVT-i Hybrid</td>
<td>1798</td>
<td>100 / 136</td>
<td>as</td>
<td>petrol</td>
<td>3.5</td>
<td>79</td>
<td>Euro6</td>
<td>76.3</td>
</tr>
<tr>
<td>10</td>
<td>Citroen</td>
<td>C1 VTi 68 S&amp;S 5T</td>
<td>998</td>
<td>51 / 69</td>
<td>m5</td>
<td>petrol</td>
<td>3.8</td>
<td>88</td>
<td>Euro6</td>
<td>75.8</td>
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<tr>
<td>10</td>
<td>Peugeot</td>
<td>108 PureTech 68 S&amp;S</td>
<td>998</td>
<td>51 / 69</td>
<td>m5</td>
<td>petrol</td>
<td>3.8</td>
<td>88</td>
<td>Euro6</td>
<td>75.8</td>
</tr>
</tbody>
</table>
Renewable electricity stored in the gas grid with p-t-g technology

Audi A3 TCNG

Wind Energy
The starting point for the Audi e-gas project is renewable electricity.

Power grid
The wind energy is fed into the public power grid.

Electrolysis
The electrolysis plant, which is operated by wind power, splits water into oxygen and hydrogen.

Methanation
The hydrogen reacts with carbon dioxide in a methanation plant. The result: e-gas (synthetic natural gas).

CNG filling station
The increasing proportion of e-gas promotes climate-friendly long-distance mobility.

Brussels, 28 April 2016
Reducing CO2 emissions from HDVs

Commission Communication on reducing CO2 emissions from Heavy-Duty Vehicles:

Principal sources of biomethane

Source: European Commission, IPCC, CNH
LNG Blue Corridor – mid-term results

- Diesel
  - 29.6 liter
  - 735 g CO₂/km

- LNG
  - 22.9 kg
  - 623 g CO₂/km
  - 16% less CO₂

Source: LNG Blue Corridor

Brussels, 28 April 2016
NGV roadmap 2030

► 20% of the total new LDV and HDV sales NGV
► 50% of new bus sales NGV
► 20 Mio CNG cars
► 300.000 CNG buses
► 400,000 NGV trucks (300,000 LNG, 100,000 CNG)
► 4,000 L-CNG refuelling points (1,000 stations à 4 dispensers)
► 10.000-15.000 CNG stations
► gas sales around 40 bcm (50:50 CNG and LNG)
► The share of bio-methane has the potential to increase to 10-20%
### Gaps – possibilities to influence

#### EU
- Maintain level playing field for alternatives fuels.
- Implement policies to create confidence for consumer and investors.
- Implementation project “NGV Blue Corridor II” (trucks, buses, vans).
- WTW acknowledgement for natural gas/biomethane blends.

#### Member State
- Long term alternative fuel targets, NGVs, others.
- Involve key industry in national planning (round tables).
- Sustained tax regime as prerequisite for further NGV growth.
- Soft adoption measures: road toll, polluters-pay-principle, public procurement, etc.
- Communication campaign: media / workshops.

#### Industry
- Technical standards CNG & LNG refuelling stations, gas quality.
- Deploy full potential of NGV engines (efficiency, horse power).
- Improve NGV product portfolio, additional manufacturers needed.
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