



CNG/LNG fuelled vehicles

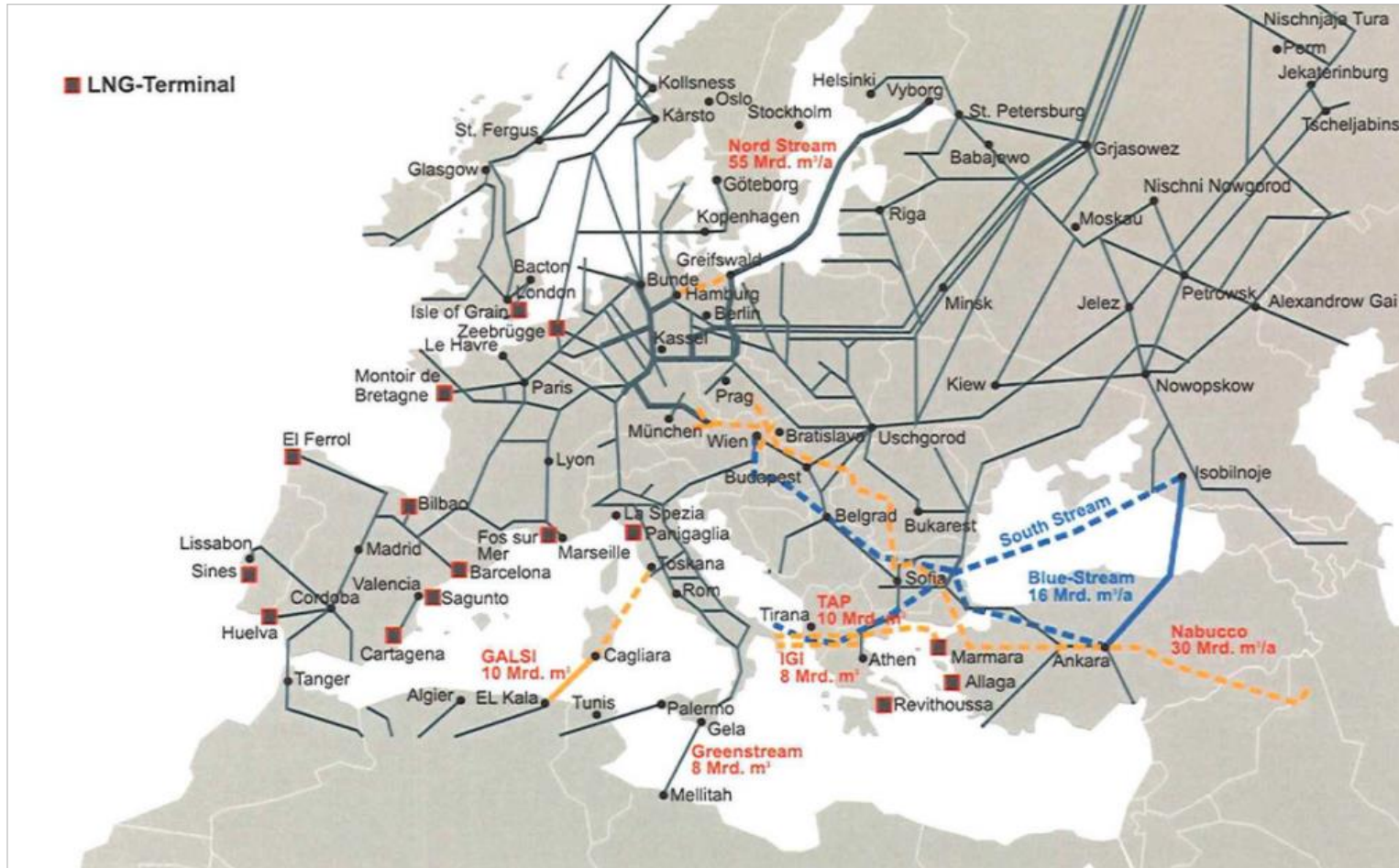
The European perspective

Riga, 22th March 2013

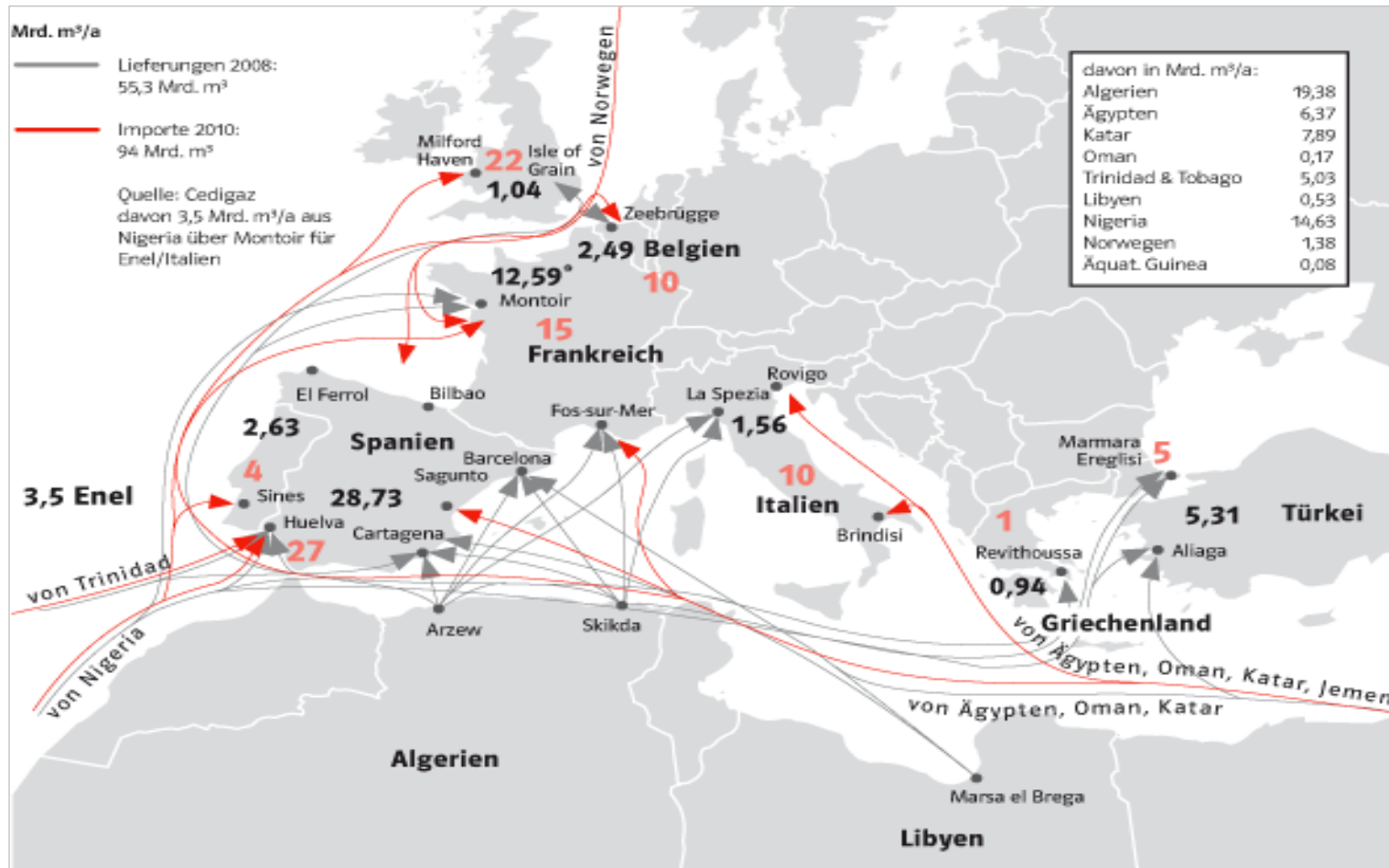
Matthias Maedge
EU Affairs Manager & Head of Brussels Office
NGVA Europe



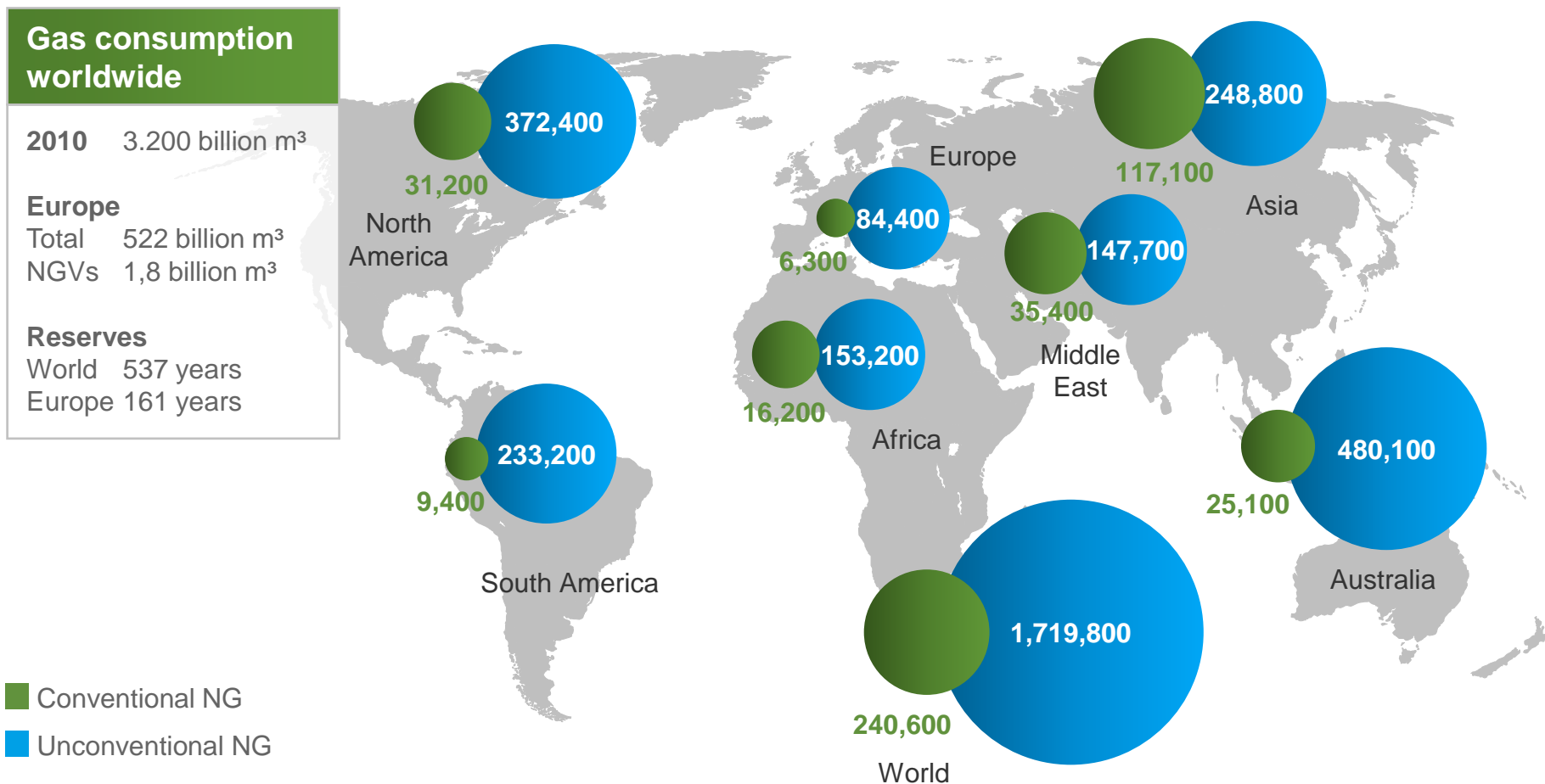
NG supply to Europe (Pipelines & LNG)



NG supply to Europe (Pipelines & LNG)



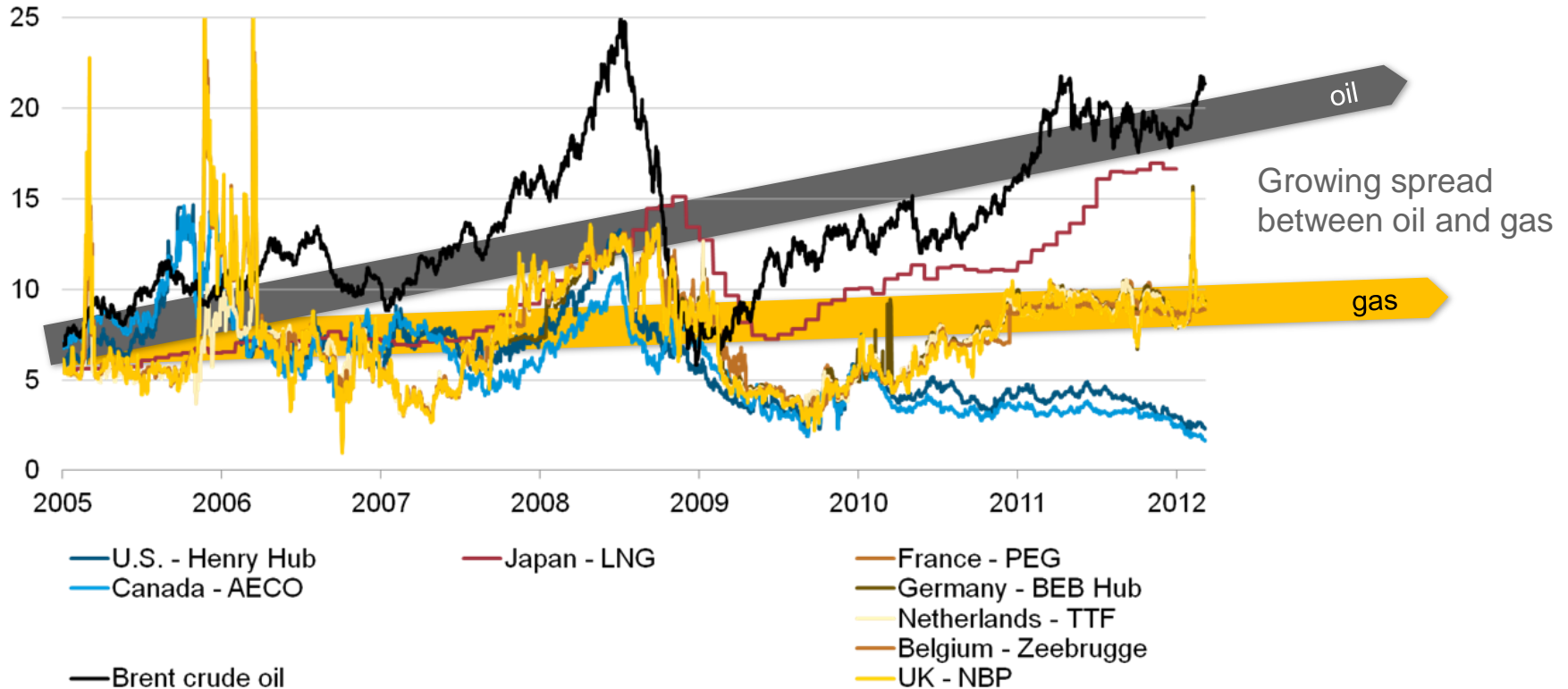
Worldwide gas reserves (Unit = 10^9 m^3)



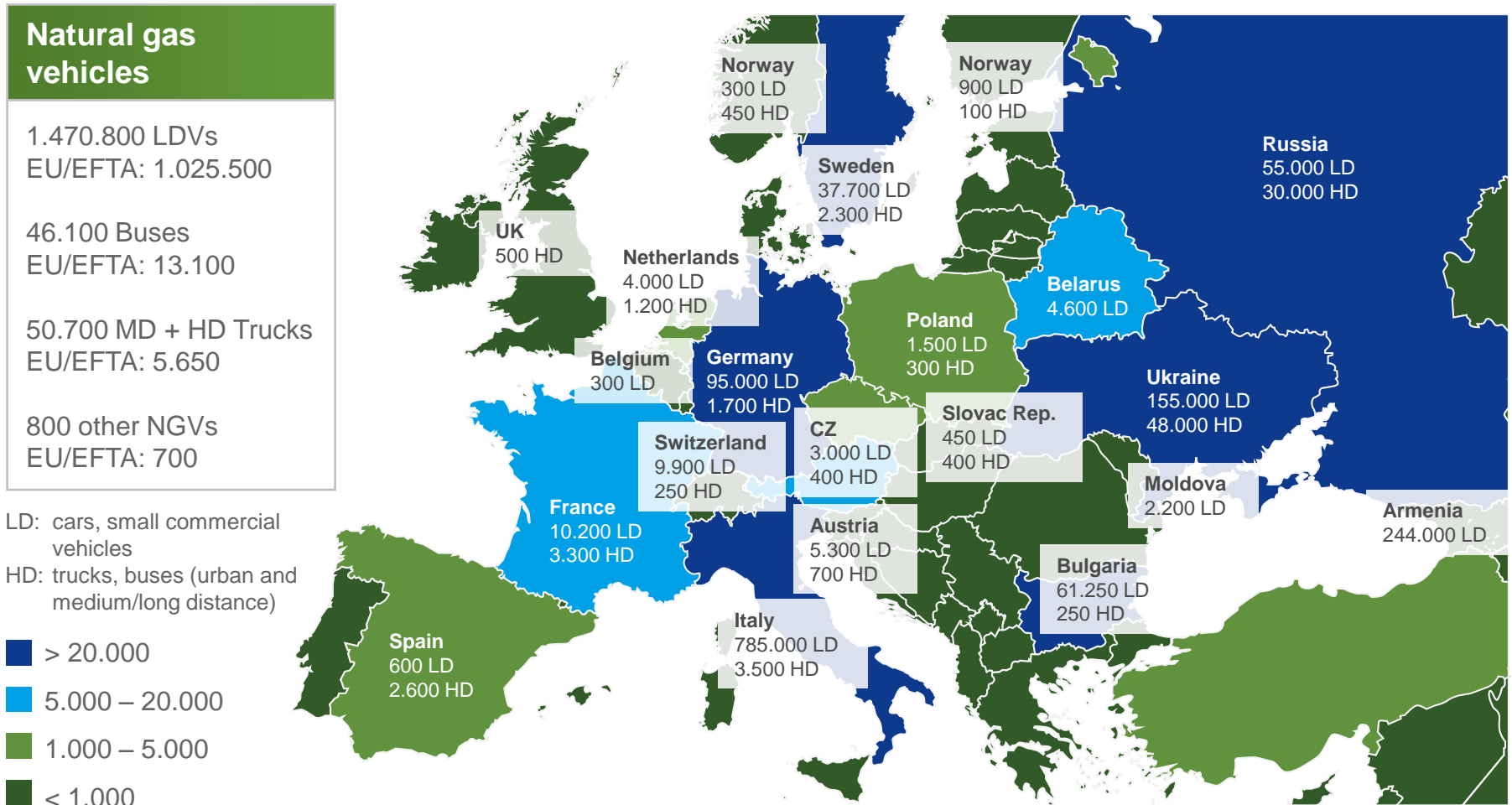
Source: Data BGR, graph works NGVA Europe

Decoupling of Oil and Gas prices

U.S. dollars per million British thermal unit



1.5 Mio NGVs in Europe vs 500,000 end of 2003 market share 0,5%, some ~500 LNG units only



Source: NGVA Europe, 01.01.2012

Natural gas has major environmental benefits compared to other fuels



CNG

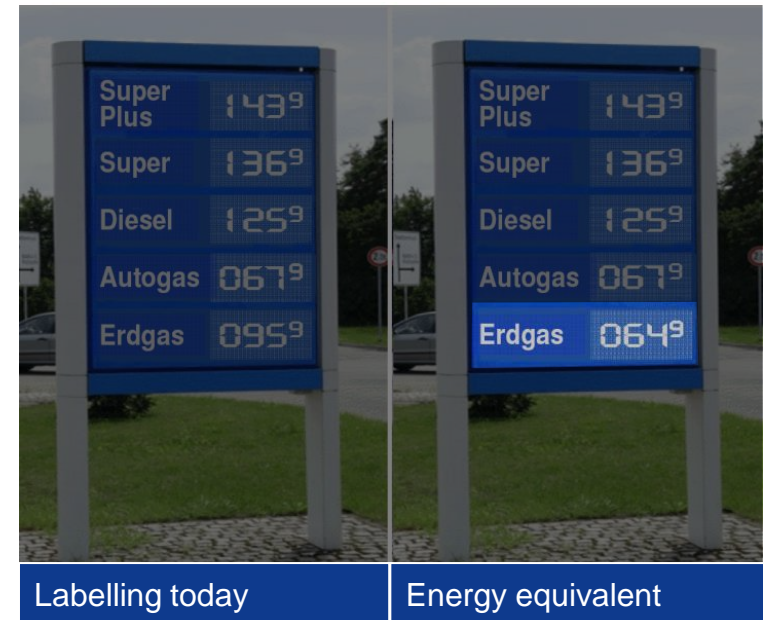
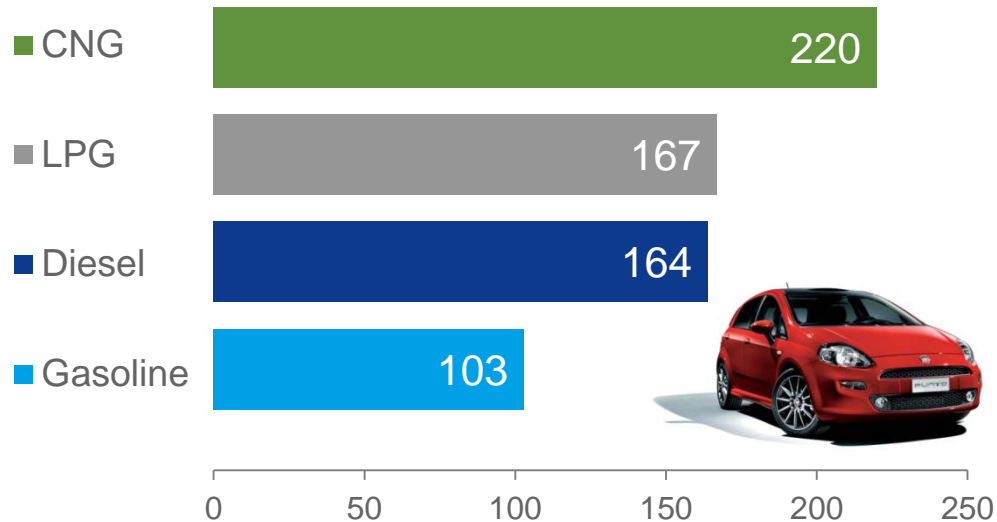
Used in passenger cars, light duty vehicles, busses up to heavy duty in medium range applications

LNG

Heavy duty vehicles, vessels and maritime applications

- Significant reduction/avoidance of CO₂ emissions when using NG/biomethane
- Almost total reduction of NO_x
- Particle emissions are avoided
- Reduction in noise levels by 50%, especially in inner-city applications

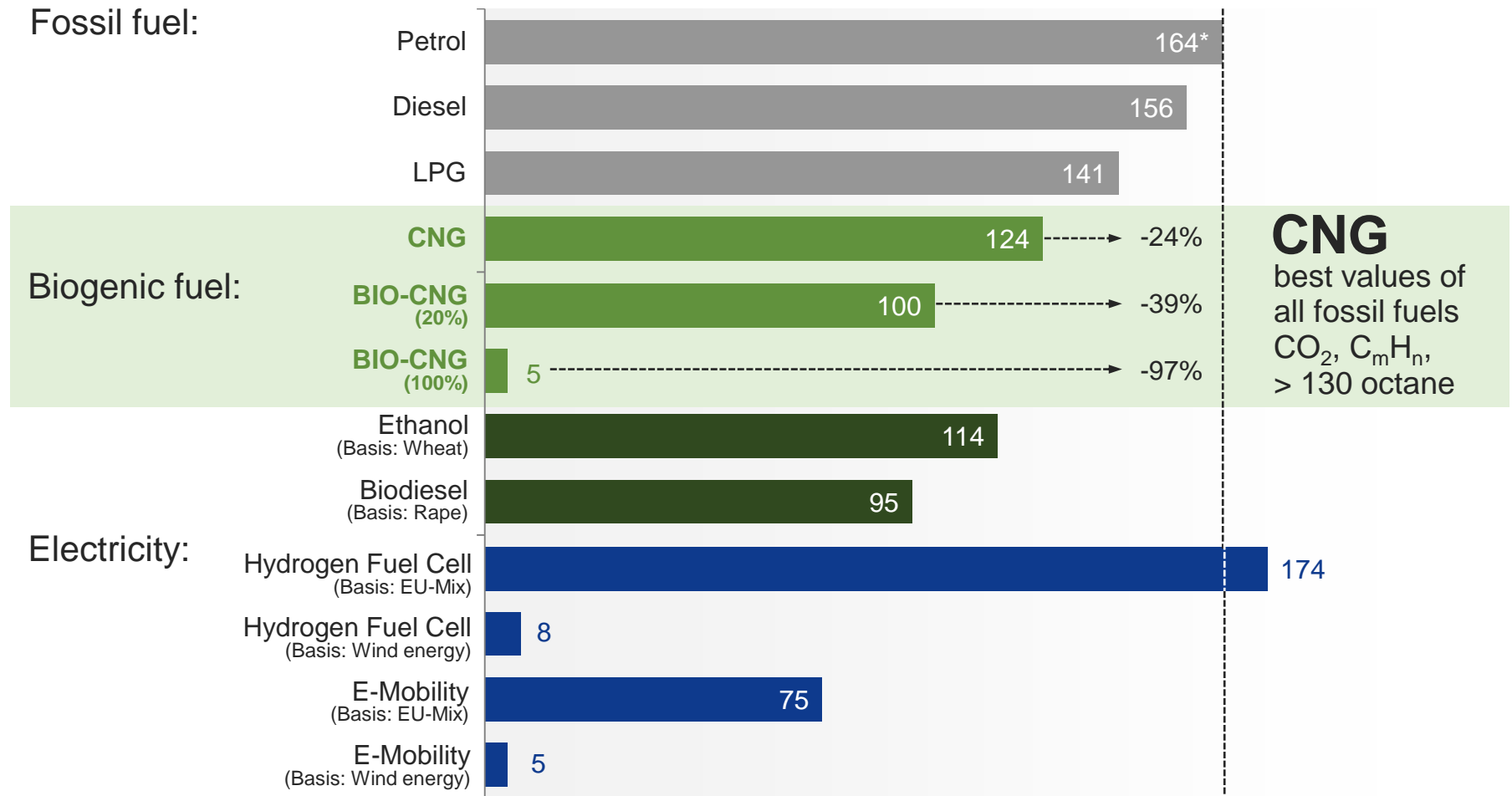
Range in kilometres for 10 € fuel costs



Cost advantage of natural gas today not transparent, due to wrong labelling

Methane & CO₂ – The cleanest fuel on a WTW basis

THG-Emission WTW in gCO₂ äq/km



*Basis: (Petrol, naturally aspirated engine), Fuel-consumption: 7l/100km
Source: DENA; EUCAR-CONCAWE

New CNG models 2012: Low emission champions

**Eco up! wins Germany's
"Green car of the Year"**



**Downsized & turbo charged
engines + CNG is ideal (Fiat Panda)**



**New Audi A3 TCNG. Cleanest
combustion engine with e-gas**

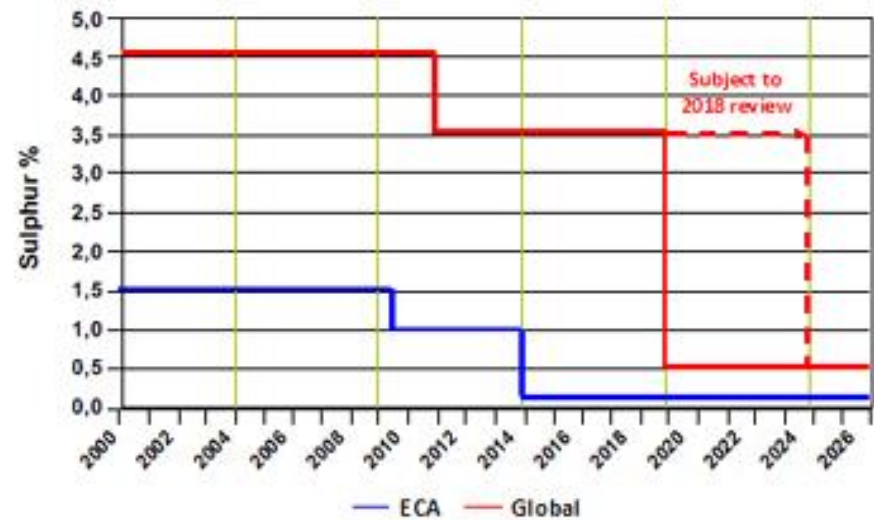
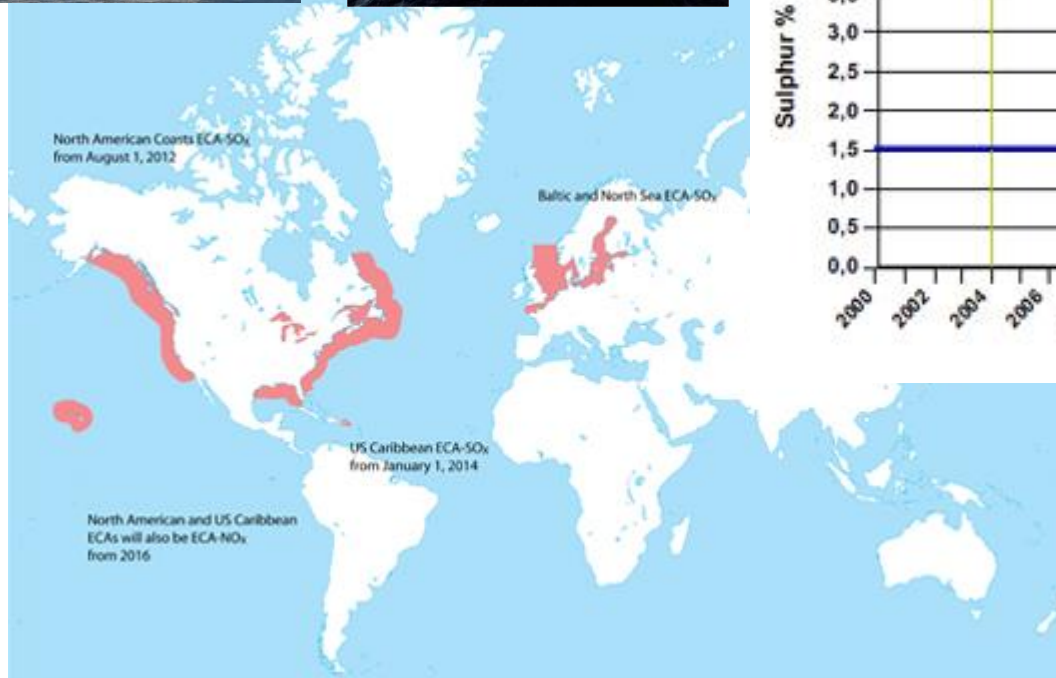


**More attractive OEM models. Range 500 km +
(Opel Zafira Tourer & Mercedes-BENZ B-Class)**



LNG in shipping

Marine fuel sulphur limit of 0,1% in ECA's



LNG trucks for long distance transport



Diesel vs. CNG / LNG

1 Liter



Diesel

CNG
5 litre



200 bar

LNG/LBG
1,8 litre



-162°C at 1 bar
-125°C at 10 bar

Two technologies are available for heavy engines:

- Dedicated, using 100% natural gas
- Dual fuel, using diesel injection for ignition and natural gas as the main fuel

LNG opened the way for the medium and long distance road transport

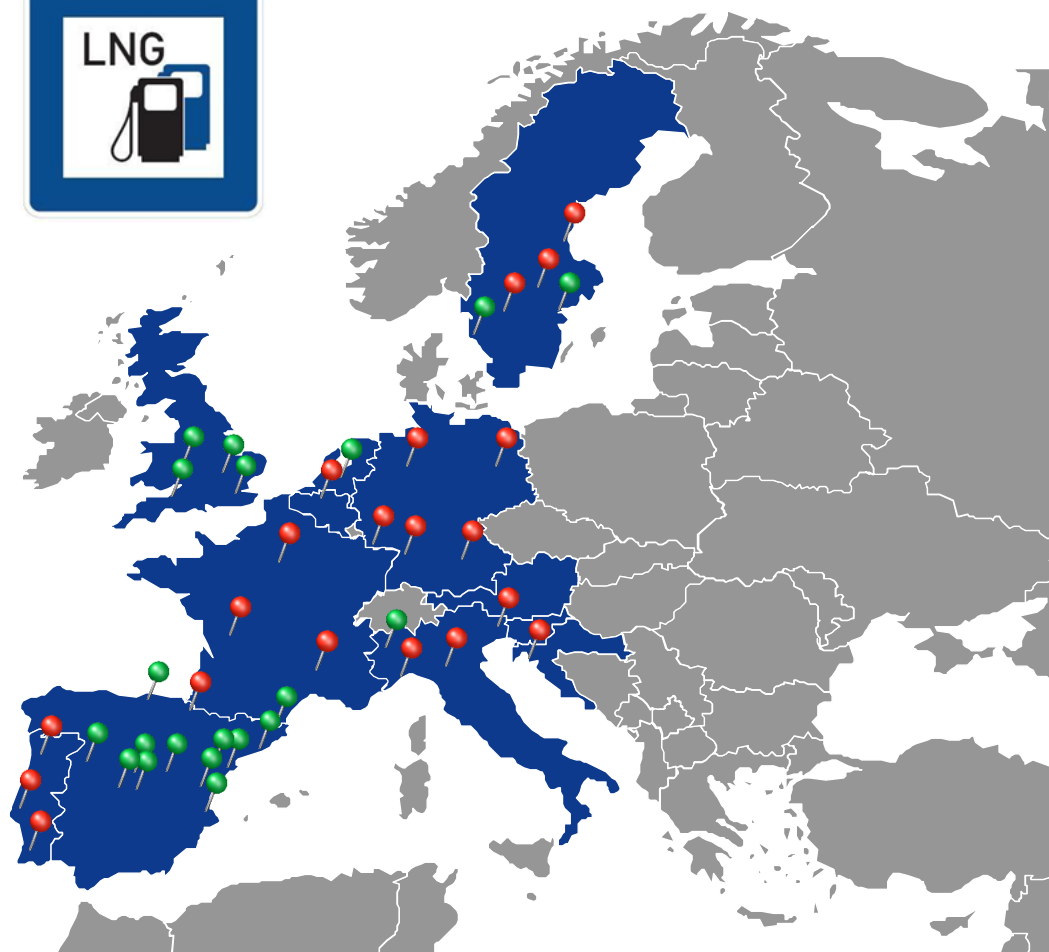
The LNG Blue Corridors Project

- Existing LNG stations
- Approx. 16 additional LNG fuel stations

FP7 project on European LNG Blue Corridors

The intention is to define at least three initial pan European routes with strategically placed LNG filling stations that would allow the heavy, long distance truck transport throughout Europe:

- **Portugal-Spain to France, Netherlands, UK**
- **Portugal-Spain to France, Germany, Denmark, Sweden**
- **Mediterranean arch to Italy and Slovenia**



Source: LNG Blue Corridor project

TEN-T funding available for CNG & LCNG filling stations & LNG shipping infrastructure

CNG station. Dats 24,
Brussels, Belgium



L-CNG station. Indox,
Lleida, Spain



LNG bunkering & refuelling
(Bit Viking converted to LNG)



- 3 winning LNG-projects (road & maritime) 2012 call
- Deadline for new annual call 28th February 2013 and multi-annual call 26th March 2013.
- New TEN-T guidelines & corridors to be adopted by European Parliament soon.

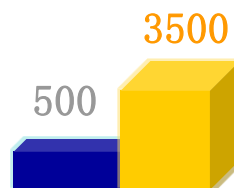
More info: http://tentea.ec.europa.eu/en/apply_for_funding/follow_the_funding_process/calls_for_proposals_2012.htm

LNG figures China. 2015 forecast

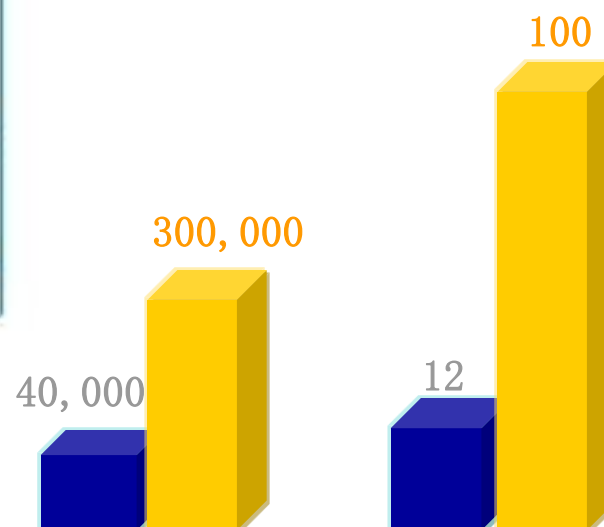


2015 Projection

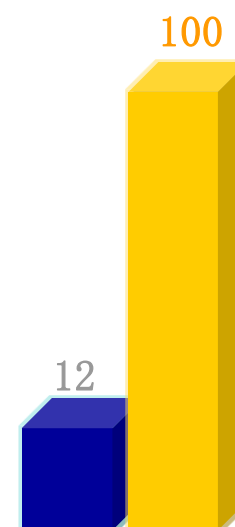
■ 新奥 ENN
■ 行业 Industry



LNG 运营站 (座)
LNG stations



LNG 车辆 (辆)
LNG vehicles

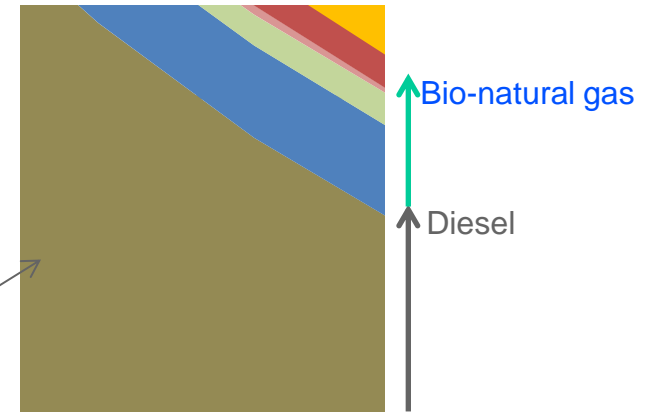
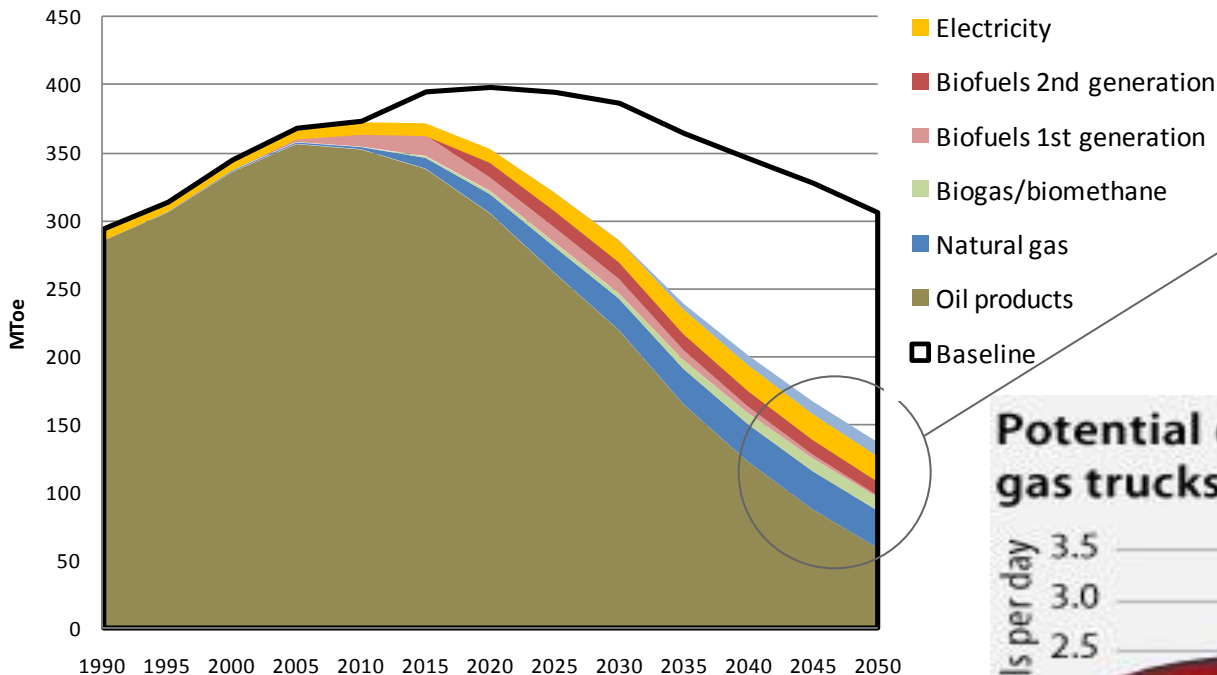


LNG 销量 (亿方)
LNG sales (bcm)

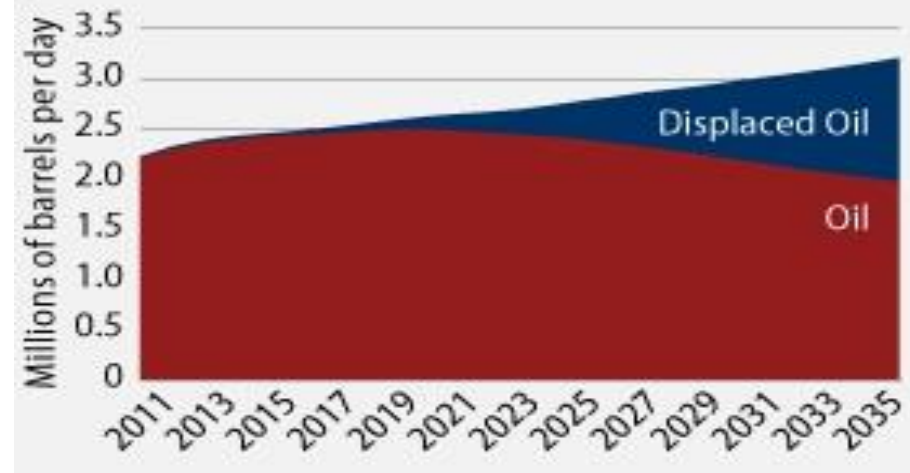
Source: ENN

Europe & North America forecast

Final energy consumption - Transport



Potential oil displacement from natural gas trucks and buses



- **Market share in 2050 EU/EFTA:**
13% passenger, 33% freight
- **North American forecast**
37% oil replacement vs NGV

Source: Eurogas, EIA

Clean Power for Transport package

European Commission, 24 Jan 2013



- Communication on an alternative fuels strategy
 - Proposal for a Directive on the deployment of alternative fuels infrastructure (harmonised standards & targets for rollout of consolidated alternative fuels)
- **150 km max. distance between CNG and 400 km max. distance between LNG stations** at national level Europe-wide to be implemented by 2020.
 - Action plan for the development of LNG in shipping, proposing to install **LNG refuelling stations in all 139 maritime and inland ports.**

Source: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0018:FIN:EN:PDF>



Conclusions



- Constantly rising fuel costs for oil based fuels
- Significant macro-economic savings when using NG as a fuel
- Infrastructure support (TEN-T) for CNG and L-CNG filling stations is key
- Tax support for NG main driver during infrastructure build-up phase
- Pricing based on energy content will push the NGV market
- NG in transport is the quickest and most cost-effective way to reduce emissions from transport

Thank you for your attention

NGVA Europe

Secretariat Address:
Avenida de Aragón 402
28022 Madrid, Spain

Brussels Liaison Office:
Avenue de Cortenbergh 172
1000 Brussels, Belgium

matthias.maedge@ngvaeurope
www.ngvaeurope.eu