CNG – Compressed Natural Gas&LNG for vehicles

Salon BEST 2011
13 October

FLUXYS

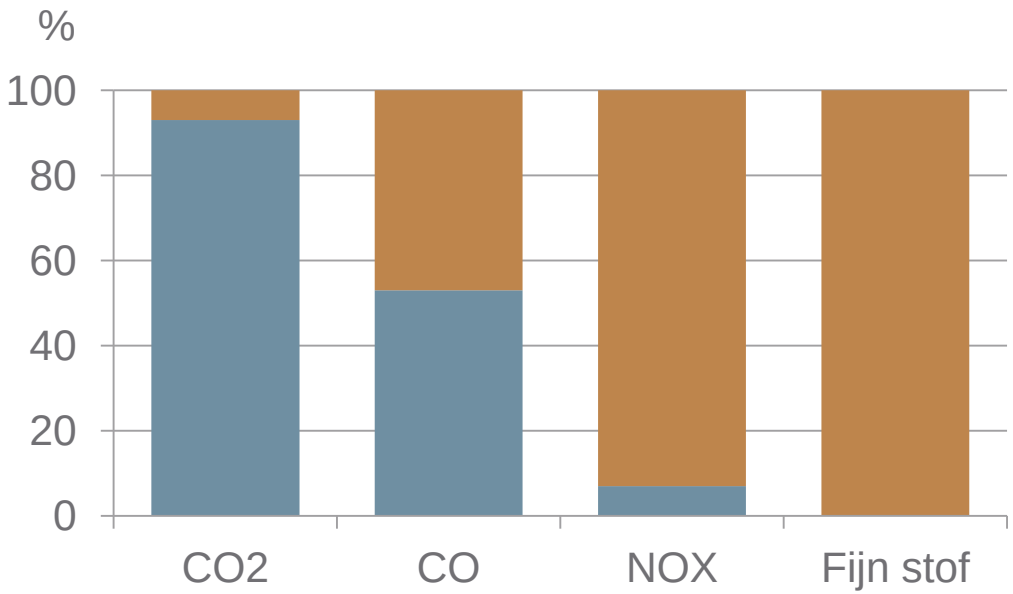
AGENDA

1. **CNG/LNG: characteristics and potential**
2. Current situation in Europe and Belgium
3. CNGDrive
4. Action Points
5. Conclusion

WHAT IS CNG?

Natural Gas/Biomethane used as fuel for cars, busses, trucks,…

- Compressed up to 200-250 bar, or as LNG (only for trucks)
- Clean fuel compared to diesel/gasoline:
  - Savings on CO_2 (10-20%), NOx (20-70%), SOx (40-80%), Particles (100%; below measurement limits)
  - Example: VW Caddy, CNG emissions compared to diesel



WHAT IS CNG?

Natural Gas/Biomethane used as fuel for cars, busses, trucks,…

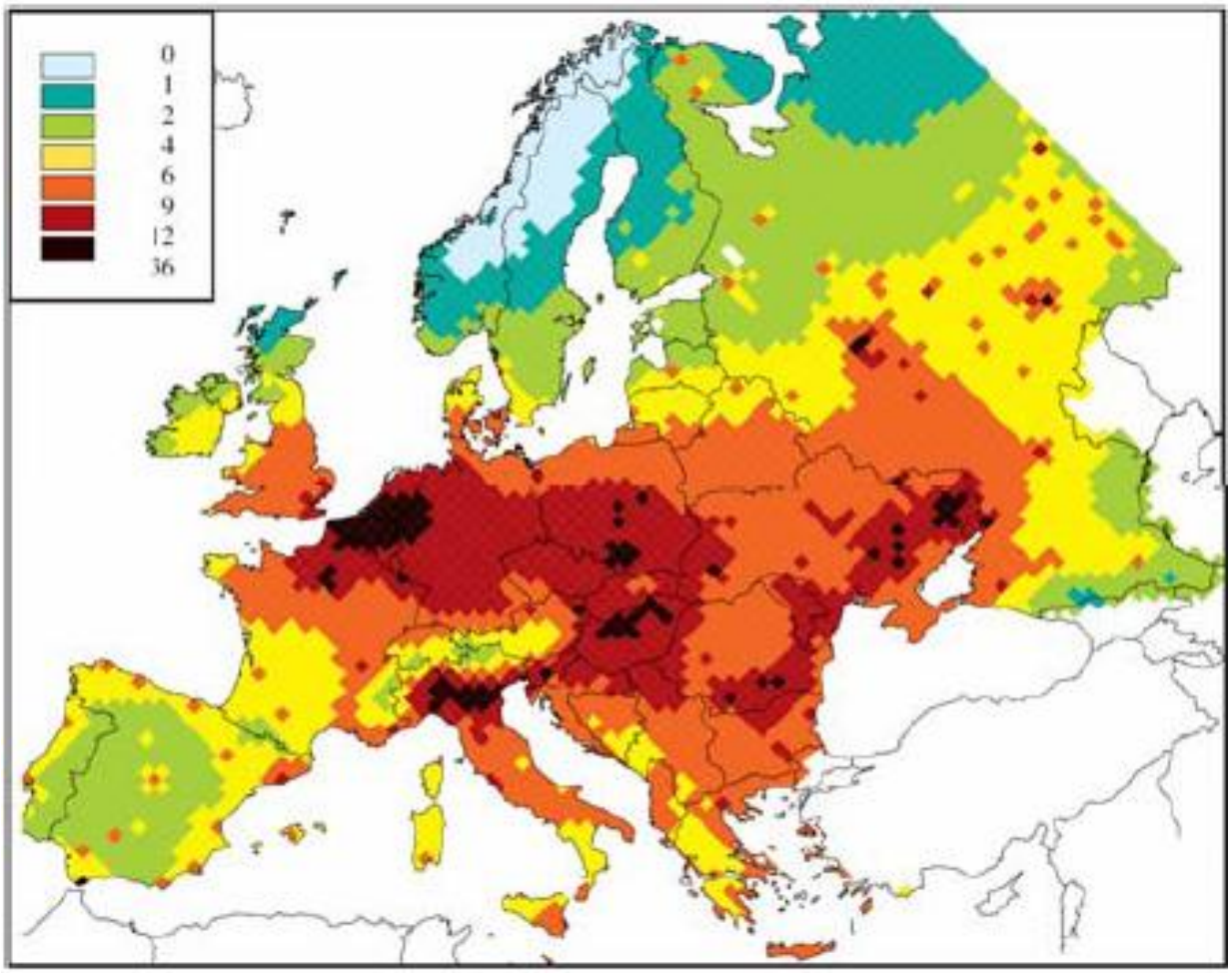
- Silent vehicles
  - Noise reduction up to 50-70%, mainly of importance for vehicles in urban environments
- No concession to autonomy:
  - Vehicles are typically bi-fuel with a range of 300-450km (CNG) + 300-450km (petrol)
  - LNG trucks range up to more than 1000 km: either full LNG (a.o. Mercedes, Iveco) or dual fuel diesel and LNG (Volvo)
- Storable & flexible energy : e.g.Zeebrugge terminal
  - Capacity = 30 X TGV Drogenbos/Seraing
  - 4 buffers: cylinders in vehicles, buffer CNG station, line-pack, tanks
- Potential for renewable

CNG – COMPRESSED NATURAL GAS

- Technology exists over 30 years, whilst no incidents are reported
  - CNG cars already available:
    - > In Belgium: VW Passat, Caddy, Touran, Mercedes B & E, Sprinter, Fiat Doblo, Opel Zafira, Combo, Volvo and Iveco trucks,…
    - > Other countries: Honda, Ford, Peugeot…
  - Also other vehicles are already (commercially) available:
    - > Garbage trucks: Iveco, Mercedes,
    - > Public buses: Volvo, VanHool
    - > Trucks: Volvo (dual fuel), Mercedes, Iveco

- CNG already a large success in different European countries:
  - Over 1.3 M NGVs in Europe today (Natural Gas Vehicles)
    - > Italy (730.000 vehicles + 725 stations), Germany (92.500 vehicles + 900 stations)

ESTIMATED LOSS OF LIFE EXPECTANCY (MONTHS) ATTRIBUTABLE TO PM2.5 (2000)



Source: http://europa.eu.int/comm/environment/air/cafe/activities/pdf/cafe_scenario_report_2.pdf

VEHICLE TYPES AND FUEL ALTERNATIVES

Vehicle type	Present fuel	LPG	Liquid bio fuels	Full electric	Hybrids (energy recuperation)	Bio-natural gas (CNG & LNG)
Cars	Petrol & diesel	Yes (conv.)	Yes (%)	Yes (city cars)	Yes	**Yes (CNG)**
Vans	Diesel	Yes (conv.)	Yes (%)	No	Yes	**Yes (CNG)**
Delivery trucks	Diesel	No	Yes (%)	No	Yes	**Yes (CNG)**
Urban buses	Diesel	No	Yes (%)	Yes (wired)	Yes	**Yes (CNG)**
Coaches	Diesel	No	Yes (%)	No	No	**Yes (LNG)**
Heavy on road trucks	Diesel	No	Yes (%)	No	No	**Yes (LNG)**
Heavy off road trucks	Diesel	No	Yes (%)	No	No	**Yes (LNG)**
Railway locomotives	Diesel & electric	?	Yes (%)	Yes (wired)	No	**Yes (LNG)**
Ships	Diesel	?	Yes (%)	No	No	**Yes (LNG)**

Example of a CNG-car performance

- CO_2 119 g/km
- 1.4 liter compressor/turbo
- 150 hp/5500 rpm
- 220 Nm/1500-4300 rpm
- 450 – 500 km range on gas
- 0-100 km/h 9.8 s
- Top speed 213 km/h

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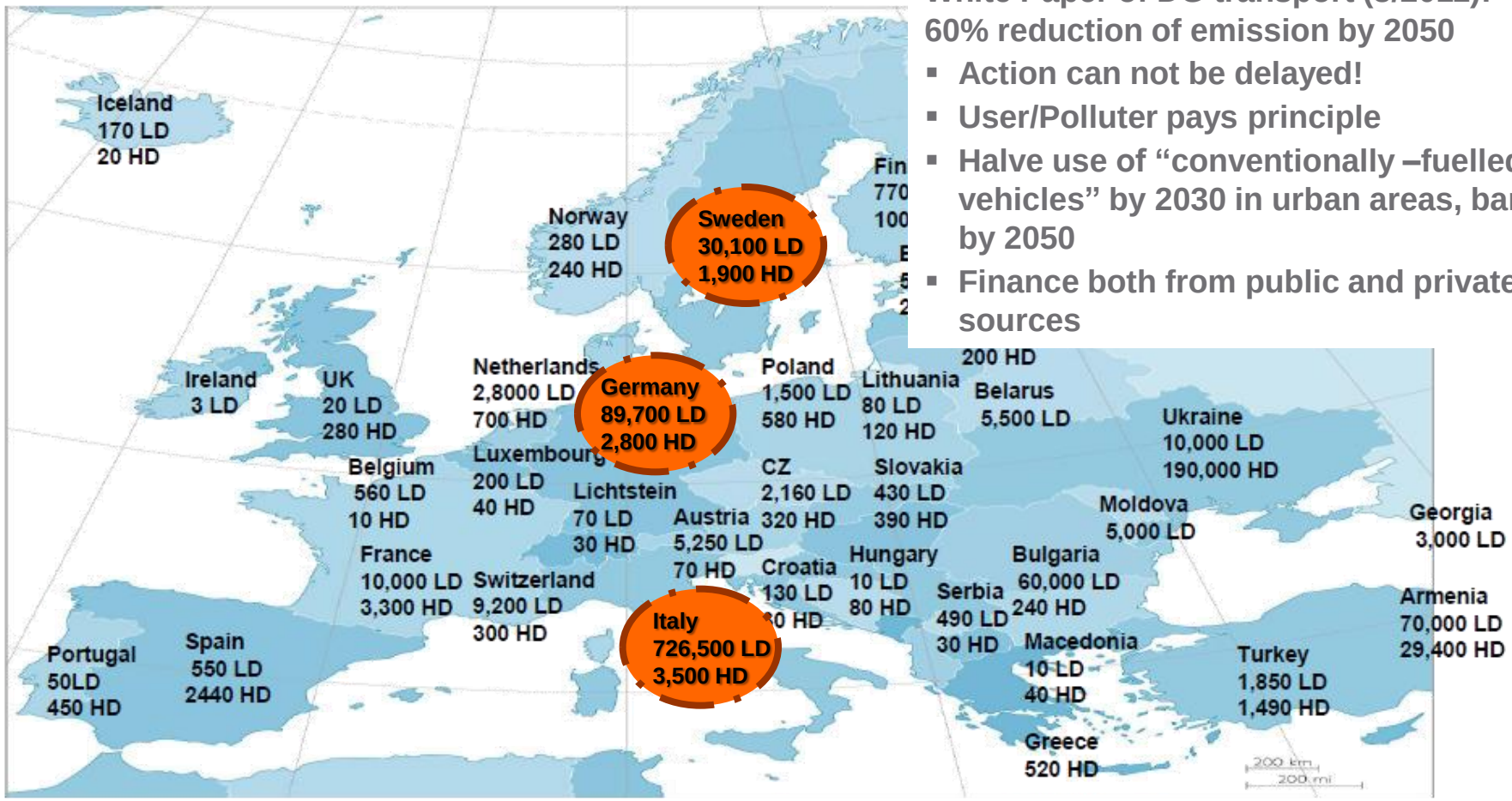
WHAT IS GOING ON IN EUROPE?



1,108,600 cars, 145,000 buses, 107,800 trucks and 16,300 other NGVs 3740 filling stations 8.7 billion Nm3 (7.4 Mtoe)

White Paper of DG transport (3/2011): 60% reduction of emission by 2050

- Action can not be delayed!
- User/Polluter pays principle
- Halve use of "conventionally –fuelled vehicles" by 2030 in urban areas, ban by 2050
- Finance both from public and private sources

Source: NGVA Europe, status end 2010

CURRENTLY KNOWN CNG FILLING STATIONS/PROJECTS

Electrabel:
Operational since 2009

DATS 24:
Operational since 2011 – Ambitious growth plan for 25 stations in 3 years

EcofillCo/GreenPointSupplies:
First station opened in Brasschaat, plans for future stations in Oostende, Ghent, St-Katelijne-Waver, Limburg,..

Other active/interested parties :

- Methadev
- Q8 (as a part of European strategy)

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CNGDRIVE WAS LAUNCHED BY FLUXYS

Current president: KVBG/ARGB, Vice-president: Federauto

CURRENT ACTIONS FOCUSED ON 3 TOPICS

- Communication & Lobby
  - Background file being prepared
  - Lobby starting
  - Website launched: www.cngdrive.be

- Taxation
  - Current Belgian tax regime is unclear (e.g. no “accijns” on CNG today, not clear for the future)
  - Proposal for new government being prepared

- Technical specifications for filling stations ready, submited to regional authorities / +new “Vlarem trein”

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WHAT IS NEEDED TODAY

- Raise public awareness for this clean and available technology, and possibilities for transition to renewable biomethane.
- Further development of stations
  - Large clients are needed to guarantee minimal off-takes
    > Transport companies with local ‘hub’
    > E.g. bpost, taxi companies, garbage trucks, busses, municipal fleet,..
- Visibility on future tax regime &support of the authorities
  - How will CNG vehicles be taxed compared to diesel/gasoline?

ENERGY TAXATION. LOOKING BEYOND 2020

NGVA Europe issued Position Paper and met with DG TAXUD to strongly oppose the COMM proposal for the revision of the Energy Taxation Directive with regard to the NG treatment.

→ COMM proposal from 13th April 2011: highest tax increase of ~ 400 % for NG vs oil derived fuels (petrol, diesel, LPG)

	CO_2 Related Tax			Energy Related Tax			Total (CO_2+Energy Related Taxes)		
	Proposed Tax from 2013 (€/tonCO2)	Fuel emission factor (tCO2/TJ)	Impact €/GJ	Proposed Tax 2013-2015 (€/GJ)	Proposed Tax 2015-2018 (€/GJ)	Proposed Tax from 2018 (€/GJ)	€/GJ 2013-2015	€/GJ 2015-2018	€/GJ from 2018
Petrol	20	77,6	**1,552**	9,6	9,6	**9,6**	11,152	11,152	**11,152**
Gas Oil	20	74,3	**1,486**	8,2	8,8	**9,6**	9,686	10,286	**11,086**
Kerosene	20	71,8	**1,436**	8,6	9,2	**9,6**	10,036	10,636	**11,036**
LPG	20	65,8	**1,316**	1,5	5,5	**9,6**	2,816	6,816	**10,916**
NG	20	55	**1,1**	1,5	5,5	**9,6**	2,6	6,6	**10,7**

*now possible to keep current minimum tax levels until 2023 (short term!). Market share aspect is not reflected. Also infrastructure investments not considered. This approach of punishing NG, the cleanest available alternative fuel, is not sustainable, nor in line with the 2011 WP on transport .

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CONCLUSION : CNG AND/OR LNG FOR VEHICLES

- Clean
- Safe and available technology
- Security of supply
  - Large and multiple sources (geographically spread)
  - Large interconnected grid in Belgium and in Europe
- Reduce oil dependancy (delay/avoid peak and economical consequences…)
- Sustainable: can be mixed to biodiesel, to H2, to biomethan
- Transition to renewable biomethan: biofuel with highest efficiency/ha (Sweden)
- Storable& flexible :

FLEXIBILITY = KEY concept for renewable energy in the 21th century

Flexibility is a reality with Natural gas (/bio) or (B)LNG

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BACKGROUND

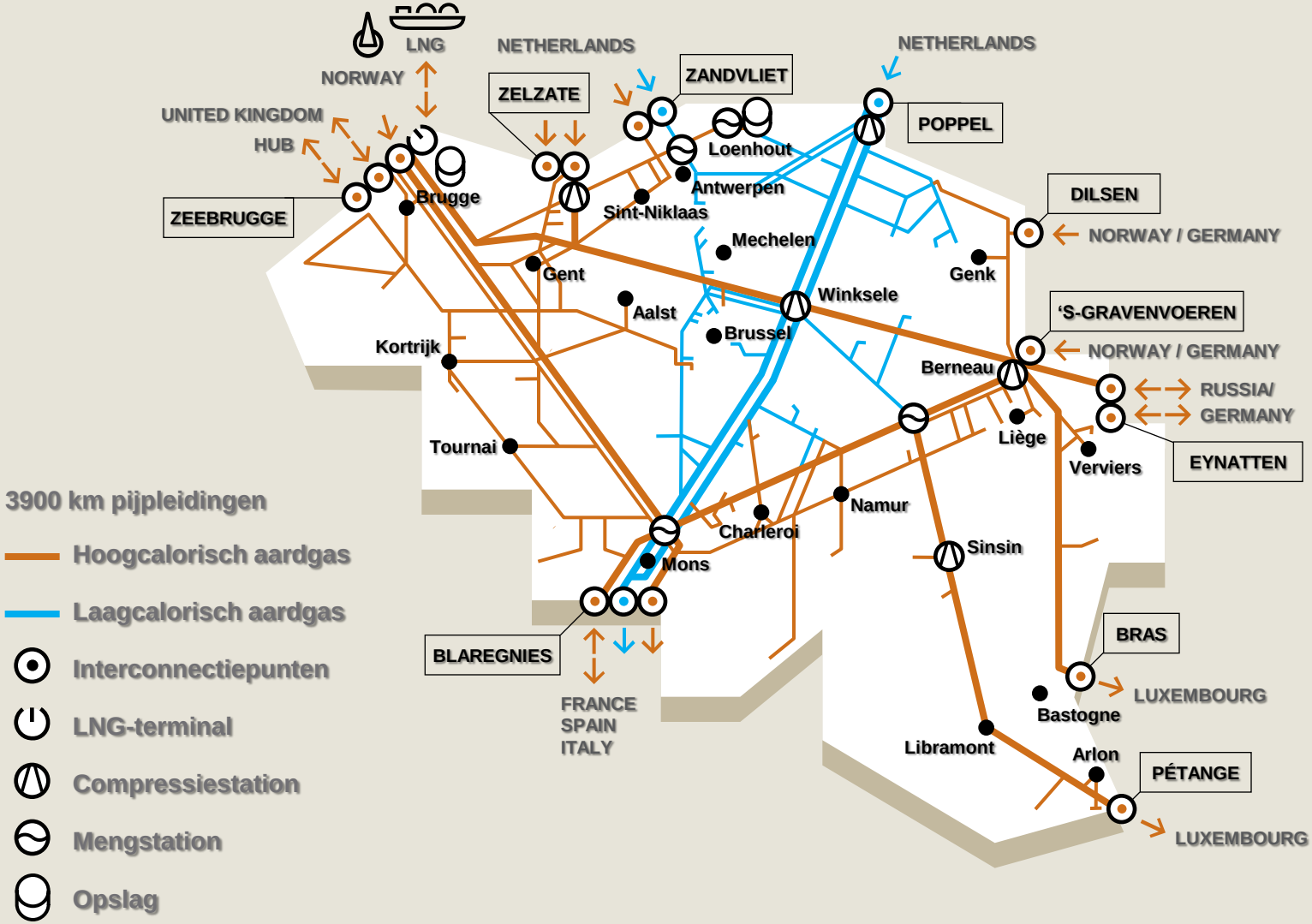
BACKGROUND – 2 options for refuelling

Both slow-filling and fast-filling options are readily available

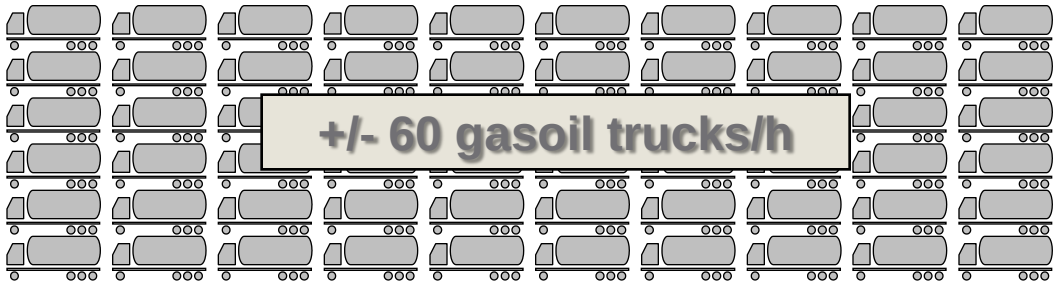
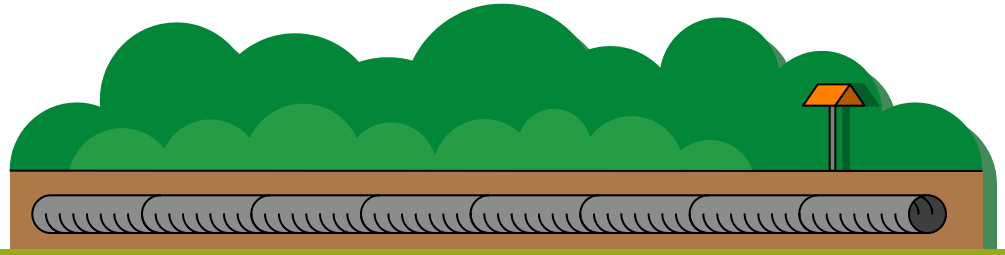
~ 6-8 hours

~ 2-4 minutes

Availability of Natural Gas: 17 Entry Points in Belgium

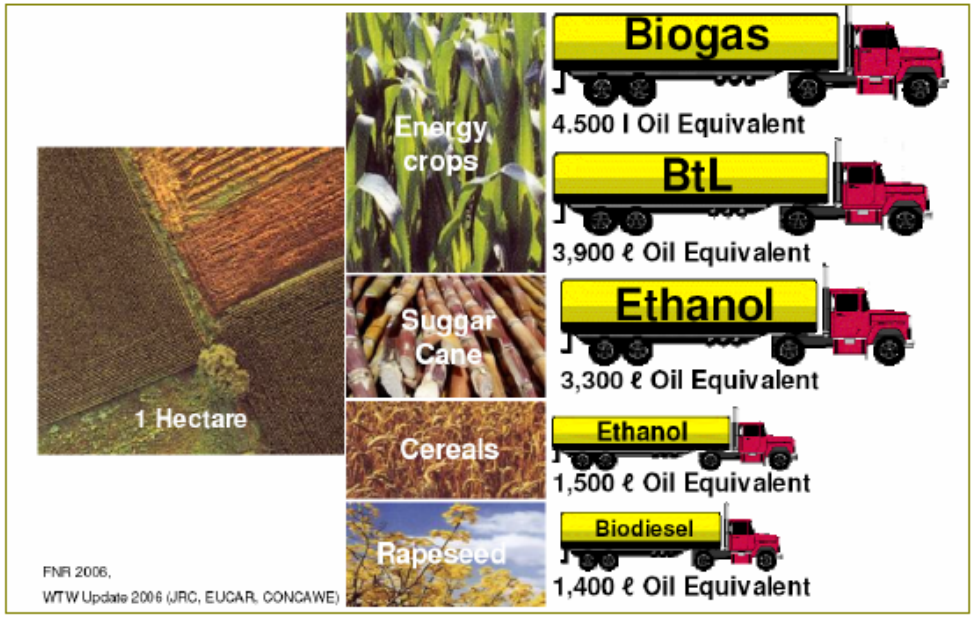


UNDERGROUND PIPELINE: MOST SUSTAINABLE TRANSPORT MODE

COAL	1518 Wagons/d (69 trains)	
GASOIL	1465 gasoil trucks/d	
NATURAL GAS	1 underground pipeline	

- Less air emissions and noise
- Optimum energy use: no empty return kilometers
- Less space needed
- No visual impact
- Less incidents

Biogas production potential



EU is still missing a European legislation for the injection of biomethane in the NG grid. NGVA Europe is working also in the next legislation about the gas quality.

Among different options of biofuels, biomethane presents the highest efficiency per hectare of land. A global European estimation shows a potential of 2.750 TWh (9,9EJ=238Mtoe), made out of 1.500 TWh (5,4 EJ=130Mtoe) coming from crops, plus another 1.250TWh (4,5EJ=1.108Mtoe) coming from other sources: sewage, manure, landfills, etc.

If we choose bioethanol instead of biogas we would loose the potential of the waste, sewages, etc (1.250TWh, 4,5EJ=108Mtoe) and we would also reduce the efficiency of the land by 47%.

In other words we would obtain 800TWh (2,9EJ=70Mtoe) instead of 2.750TWh (9,9EJ=238Mtoe).

BACKGROUND – Incentives in other NEW countries

- Germany
  - Fixed taxation until 2018 (900 stations today)
- Italy
  - Incentive for new CNG cars up to 3500 €
  - No new filling station without CNG and/or LPG
- Sweden
  - Low fuel tax on CNG
  - Free parking for CNG cars
  - 40% less yearly tax (personal income) on company CNG cars
  - Financial support on CNG filling stations (up to 30%)
- Spain:
  - In Madrid new diesel busses prohibited, more than 1000 CNG busses and garbage trucks…