

Dutch National LNG Platform

Piek - LNG / Bio-LNG - Low noise technology

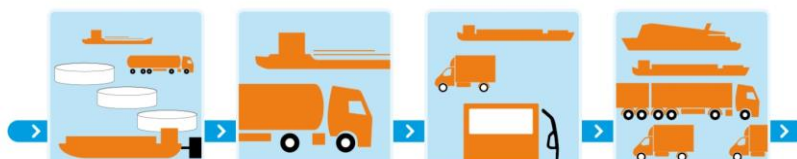
Robert Goevaers, 26-th of August 2014



Agenda



1. Dutch National LNG platform
2. Need for sustainable transport
3. Presentation PIEK project
4. Presentation European experience
5. LNG low noise technology



The Dutch National LNG Platform

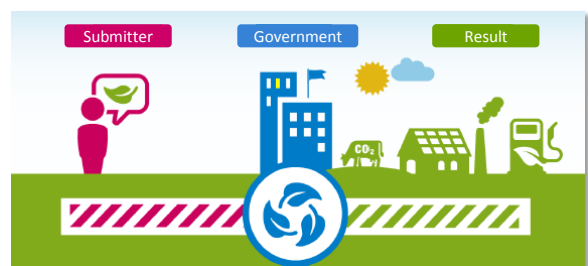


- Platform connects business firms and government agencies working on LNG.
- We work on the introduction of LNG as a new, cleaner and quieter fuel for road transport and marine navigation.
- Founded in July of 2012
- Focus: remove barriers, encourage innovations.

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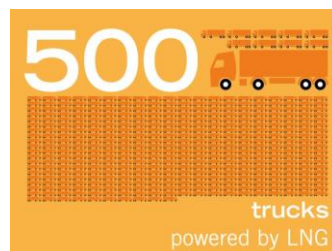
Green Deal Policy in the Netherlands

- Green Deals aim to stimulate a sustainable growth of the economy. By taking away bottlenecks (regulation, laws, permits), activating cooperation or helping to source funds, in order to support the realization of the plans.
- Companies take initiatives that meet the targets set by the government in the field of climate and environment.
- Topics are: Energy, water, climate, transport, mobility, food.
- LNG combines several items in the Green Deal Rhine and Wadden.
- Parties involved: government, NGO's, companies, knowledge institutions
- All working together in the National LNG Platform



Source: Website Ministry Economic Affairs

Objective for 2015: 50-50-500



Current state of affairs (May 2014):

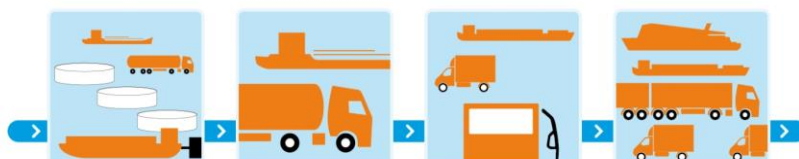
- 3 ocean-going vessels
- 3 river vessels (4th expected shortly)
- > 200 trucks (target is 5% growth of the replacement fleet)
- 7 filling stations

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Need for sustainable transport

Global:

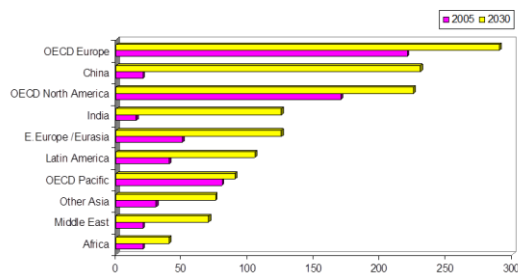
- Climate change → CO2 emission
Alternative fuels, drive-lines
- Shortage of oil → Alternative fuels

Local living environment:

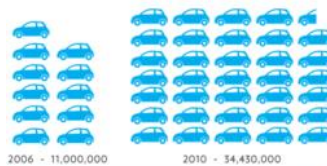
- Air quality
- Noise

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Need for energy

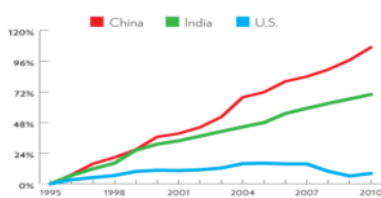


CHINA TRIPLED ITS NUMBER OF CARS—AND ITS GAS NEEDS—IN JUST 4 YEARS



The number of cars in the U.S. grew by 10 percent in that time

GLOBAL OIL CONSUMPTION IS SOARING
Cumulative growth in total oil consumption



Going Separate Ways

Performance of natural gas futures prices and diesel fuel spot prices.

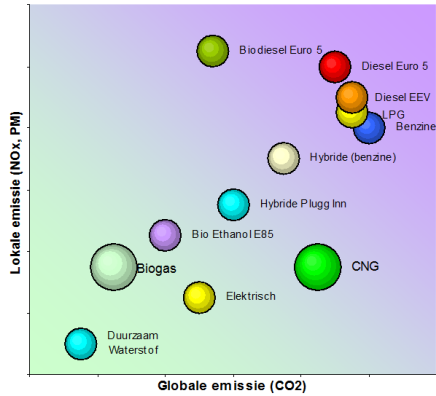
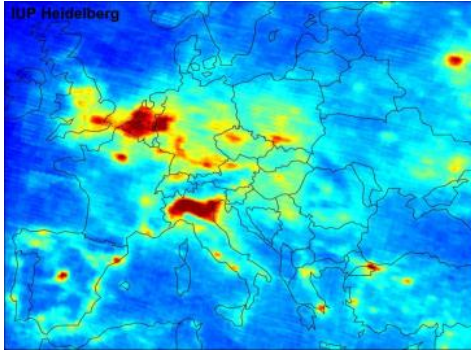


Sources: Energy Information Administration (diesel), WSJ Market Data Group (Nymex natural gas)

The Wall Street Journal

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Emissions

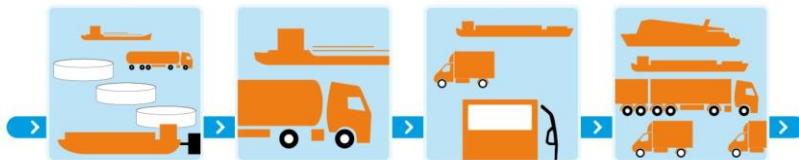


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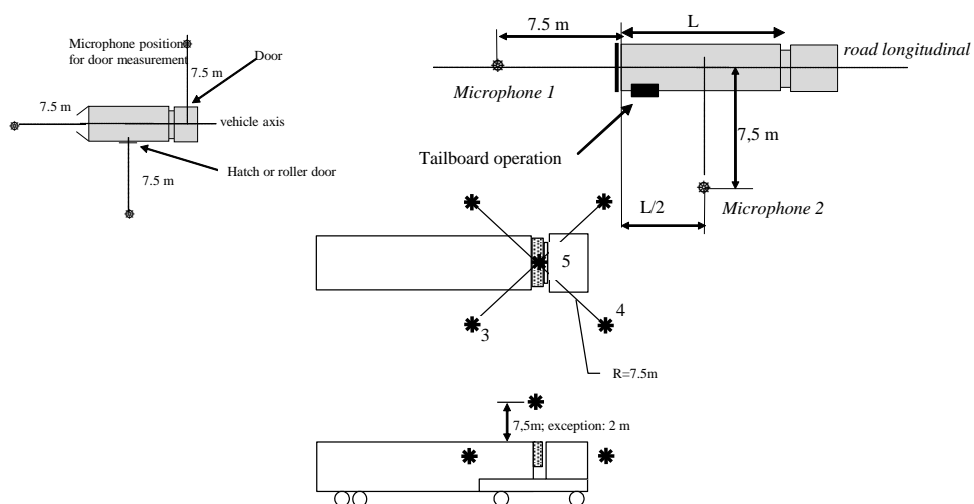
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The start of PIEK

- In the city we have to:
 - Live
 - Work
 - Shop
 - Recreate
 - Sleep
- Noise reduction in urban environment
- Legislation in the Netherlands (based on WHO)
 - 19.00 -23.00 : 65 dB(A)
 - 23.00 - 07.00 : 60 dB(A)
- A challenge, a threat, an opportunity

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PIEK – TNO test procedure



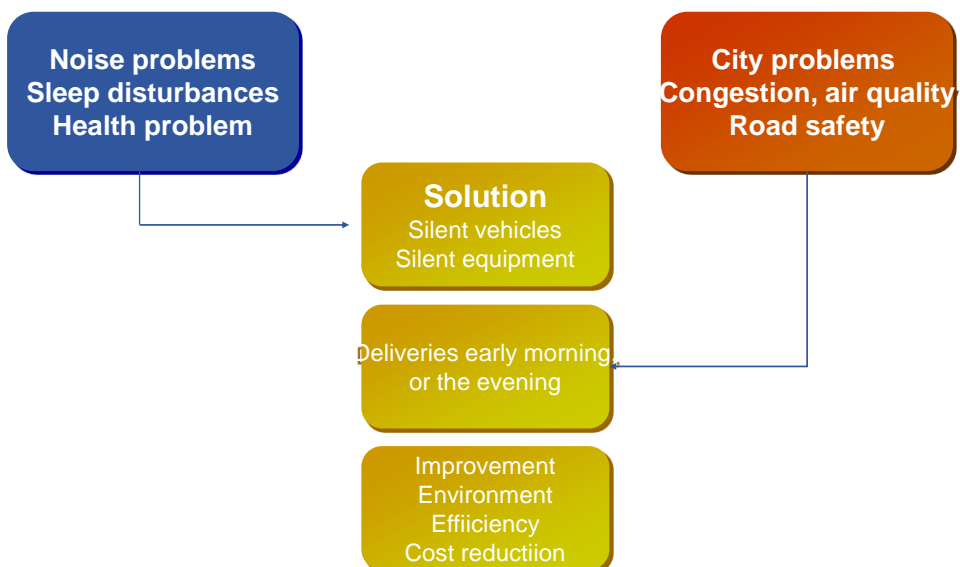
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Peak noise without 'quiet' development

	7,5 m DB(A)
Slamming door	74
Driving up/away	67 - 83
Load hatch	65 - 92
Containers over load floor	74 - 85
Refrigeration kicking in	70 - 78
Removing onboard forklift	77- 82
Truck engine	65 - 82

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Aim of the PIEK project



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Key development 1: low noise body



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Key development 2: low noise engine



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Logistic implementation > 2004

- Traffic congestion problem
- Deliveries < 7.00 O'clock not allowed unless
Peak, quiet vehicle
- Noise reduction accomplished →
Evening-night distribution option
- Investment quiet equipment + 15 %
- Cost reduction > 20 %?
- Trials Albert Heijn

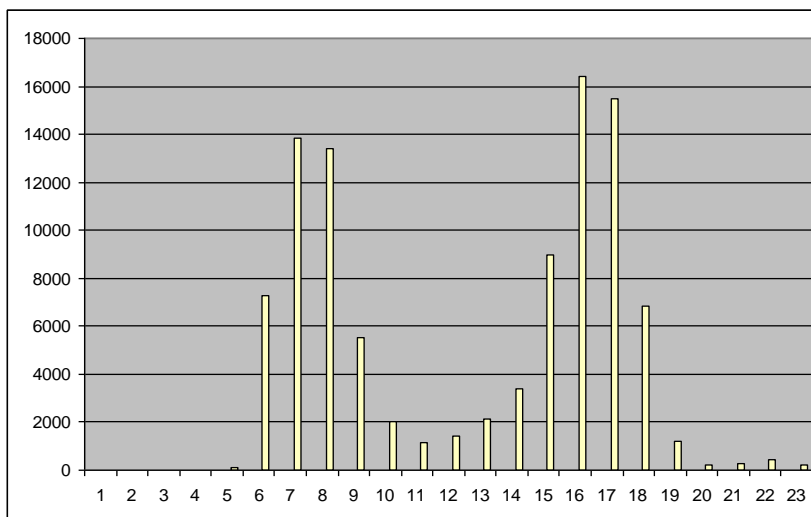
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Challenge: congestion and deliveries



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Congestion: 87% morning evening



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Trials 2007

- Distribution night without noise complaints?
- 10 shops, 9 cities
- 1000 Deliveries morning and evening
- Trials 3 months
- Monitor:
 - Noise complaints
 - Local environment
 - Greenhouse impact (emission)
 - Logistic improvement
 - Costs

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Trials

Albert Heijn 5 trials in 2007

Deliveries between 05:00 and 07:00

Deliveries between 19:00 and 02.00

> 1000 Deliveries, 1 complaint

Results

Emission reduction 30%

Cost-savings :

Better usage of capacity

Less delays / waiting hours / km's → **ROI < 3 years**

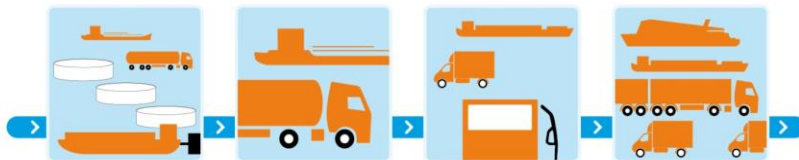
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- Replace 1000 vehicles in 2010
- PIEK implemented in 50 cities
- 1400 PIEK deliveries per week



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Why international development is crucial

- Source approach
- Truck industry is international
- Level playing field
- Same rule, bigger market
- Congestion is an international problem
→ solution everyone's concern

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Partners in Europe

- Netherlands: **Stichting PIEK-keur (RAI, FOCWA)**
- United Kingdom: **Noise Abatement Society**
- France: **Cemafroid**
- Belgium: **Universite d'Anvers**
- Germany: **TUV**
- Ireland: **Dublin Institute of Technology**



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CNG - LNG

Diesel vs CNG & LNG
Autonomy equivalence

Diesel oil

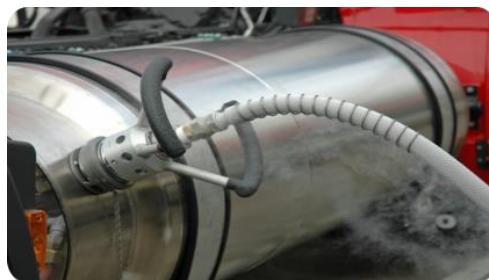
1 litre



CNG
5 litre



LNG
1,8 litre



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Noise comparison diesel - LNG

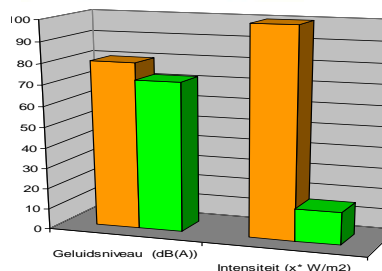
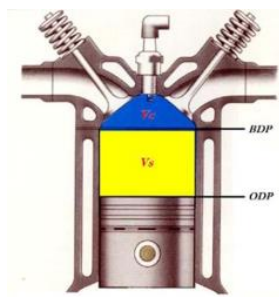
Diesel engine

- Acceleration 79 dB(A)
- Gear box 68 dB(A)
- Brakes 72 dB(A)

Gas engine

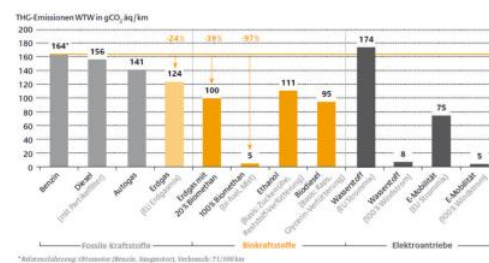
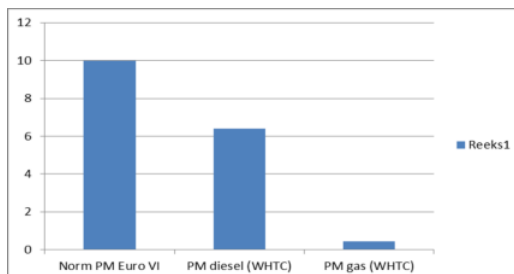
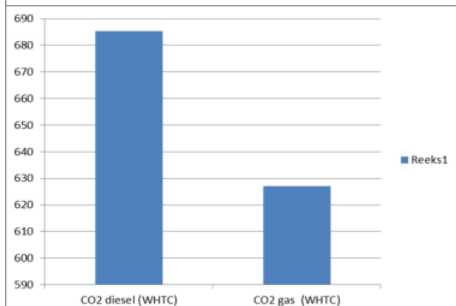
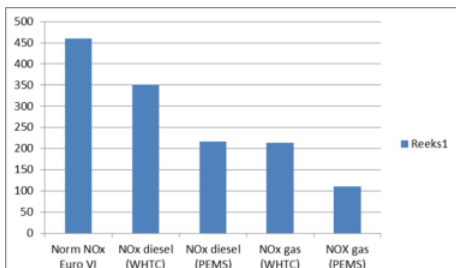
- Acceleration 71 dB(A)
- Gear box 68 dB(A)
- Brakes 72 dB(A)

Gas engine – 8 dB(A)



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Emission data



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Opportunities: trucking advantages

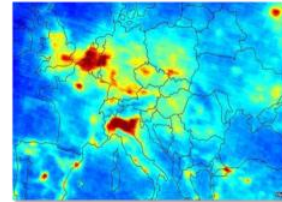
Noise: PIEK level, evening & night distribution

Less congestion, less fuel, less costs



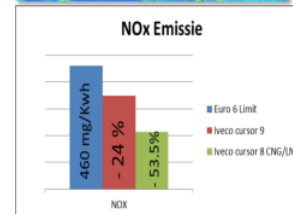
Air quality: - 50% Euro VI

14 cities with Low Emission Zone (Nox)



CO₂: - 10, - 20 % compared with diesel

Green Deal Cities: Technology 2020



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Trucking

- About 200 trucks on LNG (total fleet of tractors >10 metric ton is 80,000)
- 7 LNG fuelling stations (4 public, 3 dedicated)
- Great variety of users (more than 10 different transport companies, 4 LNG station operators)
- **Intensive excise duty lobby in progress: Tax, Europe, Maut**
- **Develop lng infra structure to Germany / in Germany**
- **Safety program fuel stations**



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Fuel mix study Holland: LNG best way to reduce CO₂ for heavy trucks

- 2030 : 25 % tractor-trailer is LNG = 20.000 Trucks in Holland
- Fuel stations 2030 : 100
- Currently: 7 fuel stations (3 years)
- 2050: 50 % tractor-trailer is LNG = 50.000 Trucks in Holland
- Main players:



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International cooperation offers WIN WIN solutions

Cooperation, knowledge transfer and harmonization:

- Safety standards
- Permitting standard
- LNG quality issues
- Emissions
- Technical standards (equipment) and innovations
- Cost effective LNG Chain / infrastructure:
 - Development of bunker system infrastructure
 - Development of LNG distribution centers

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Contact information

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