

# Dutch National LNG Platform

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LNG, the clean way forward  
The Case of the Netherlands



# Index



1. Introduction, The Dutch National LNG Platform
2. LNG & Sustainability
3. Opportunities



# The Dutch National LNG Platform - 1

- **New territory, new markets, different players:** Platform connects private business and government agencies all working around the theme LNG;
- **Key Objective** is the introduction of LNG as a new, clean and quiet fuel for road and marine transport;
- **Collaboration** between the North Netherlands (Energy Valley), Rotterdam (Deltalinqs and Rotterdam Climate Initiative), companies and TNO (Netherlands Organization for Applied Scientific Research);
- Organize the chain



# LNG Chain from Bulk to Tank

## Source



Bulk LNG



Small liquefaction  
Bio LNG

## Transport



LNG Trailer



Tow boat - LNG barges

## Fuelling station



Fuelling station trucks



LNG bunker storage



LNG bunker vessel

## End user



LNG truck



Inland ship



Ferry



Short sea ship

# Members



ENN



SCANIA

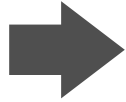


# Achievements 2012 - 2016

- 400 trucks (target is 5% growth of the replacement fleet)
- 19 fuel stations
- Inland shipping: 8 ships in operation, 40 under construction

# Index

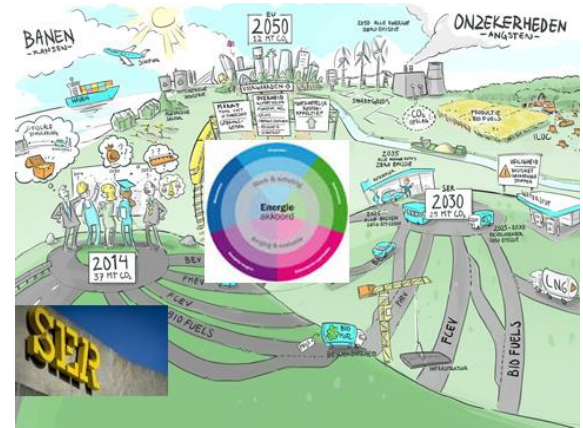
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# Dutch Energy Roadmap: SER Energy Agreement

## Objectives for Transport Sector:

- 2020: -17% CO2 Reduction vs 1990
- 2035: New passenger cars emission free
- 2050: -60% CO2 reduction



- LNG perfect transition fuel available NOW for heavy road transport, also allowing introduction of bio-LNG over time for further CO2 reduction.



# Need for sustainable transport

## **Global:**

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

## **Local living environment:**

- Air quality (= NOx, Sox and PM)
- Noise level reductions

# CO2 emission WtW – fossil LNG 15 %

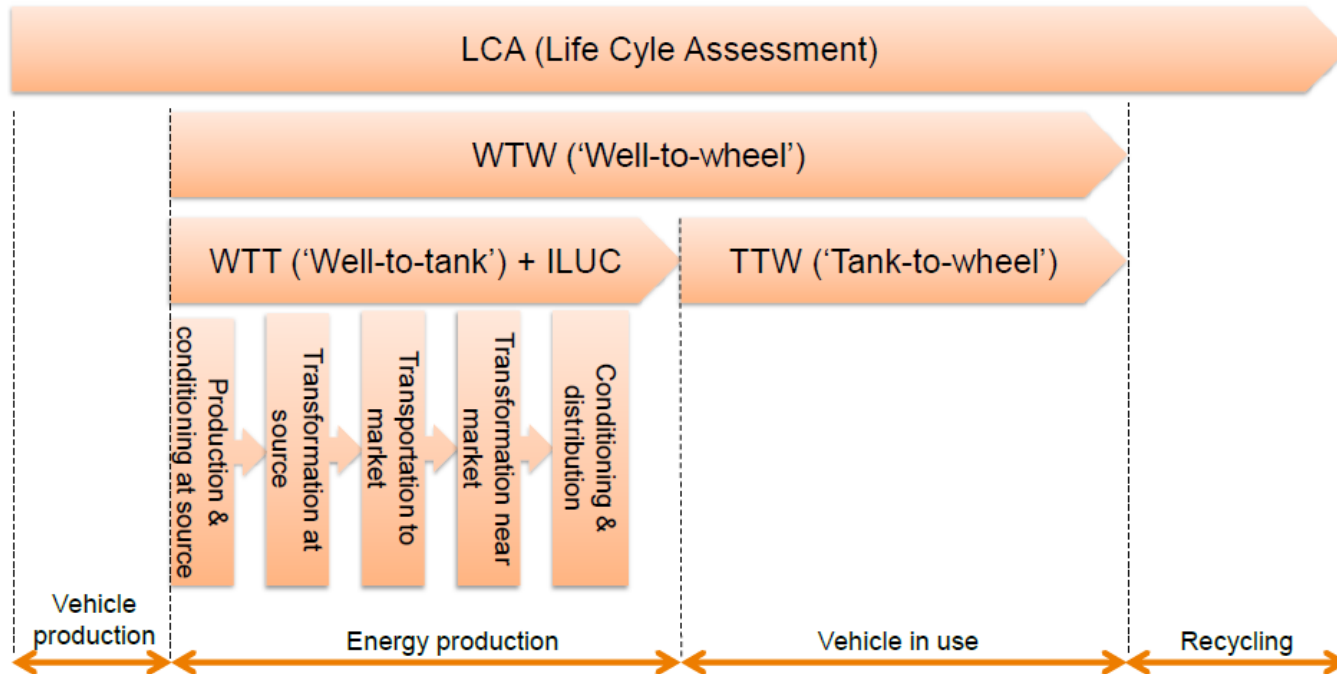
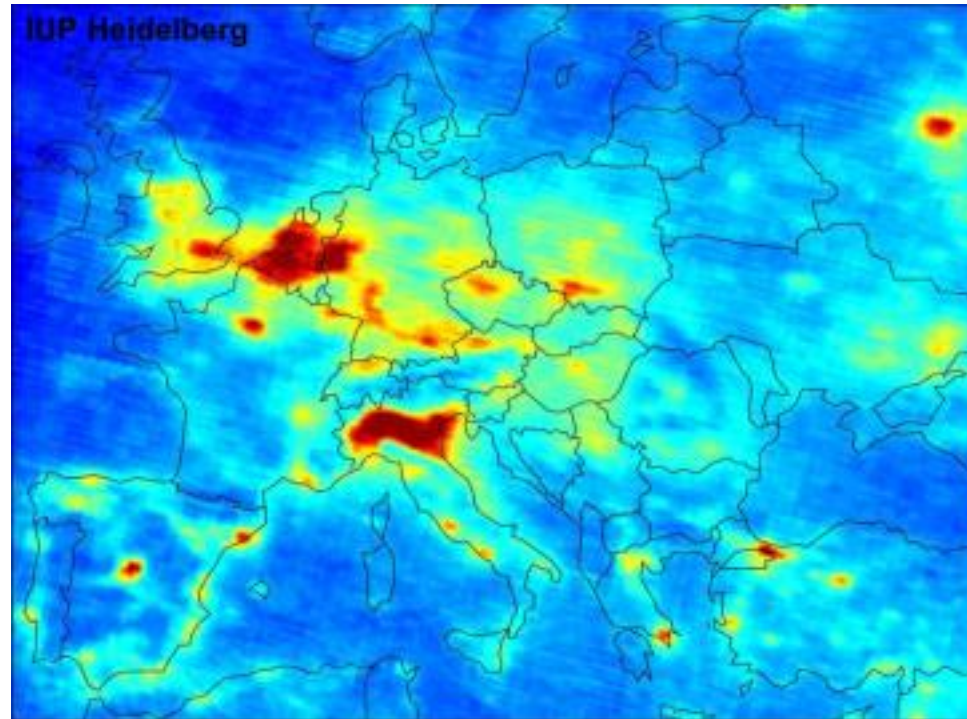


Figure 26 Overview of different ways to define vehicle emissions.

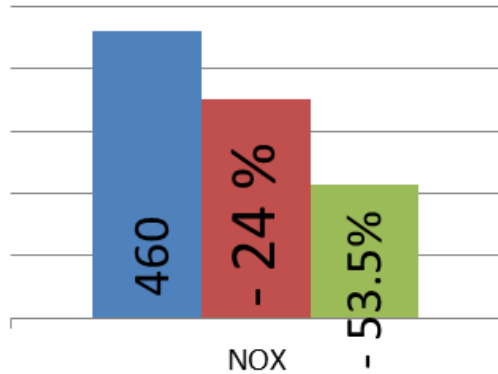
# Nox emissions



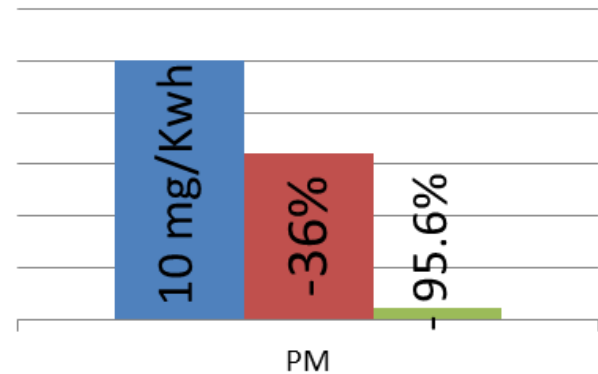
# LNG advantages

## Data checked and confirmed by NGO

### NOx Emissions



### PM Emissions



# Aanpak luchtkwaliteit 6 feb

- Niet te spreken is het rapport echter over de vervuilende files, met name tijdens de spits. Het gebied Rotterdam, Amsterdam en Den Haag behoort tot de twaalf slechtst presterende stedelijke regio's in de EU.

# Noise comparison diesel - LNG

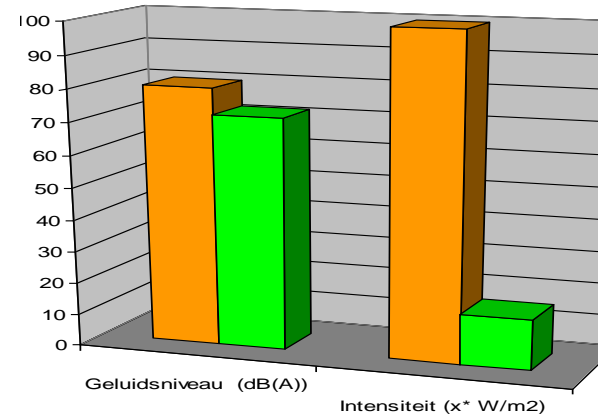
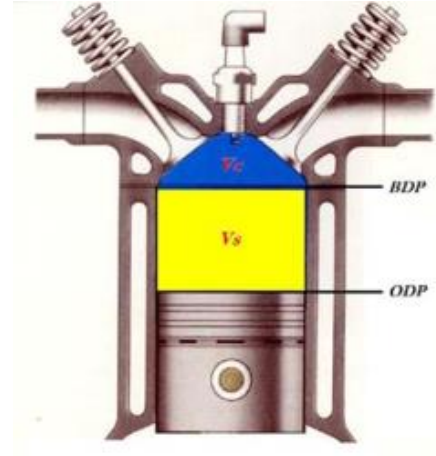
## Diesel engine

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

## Gas engine

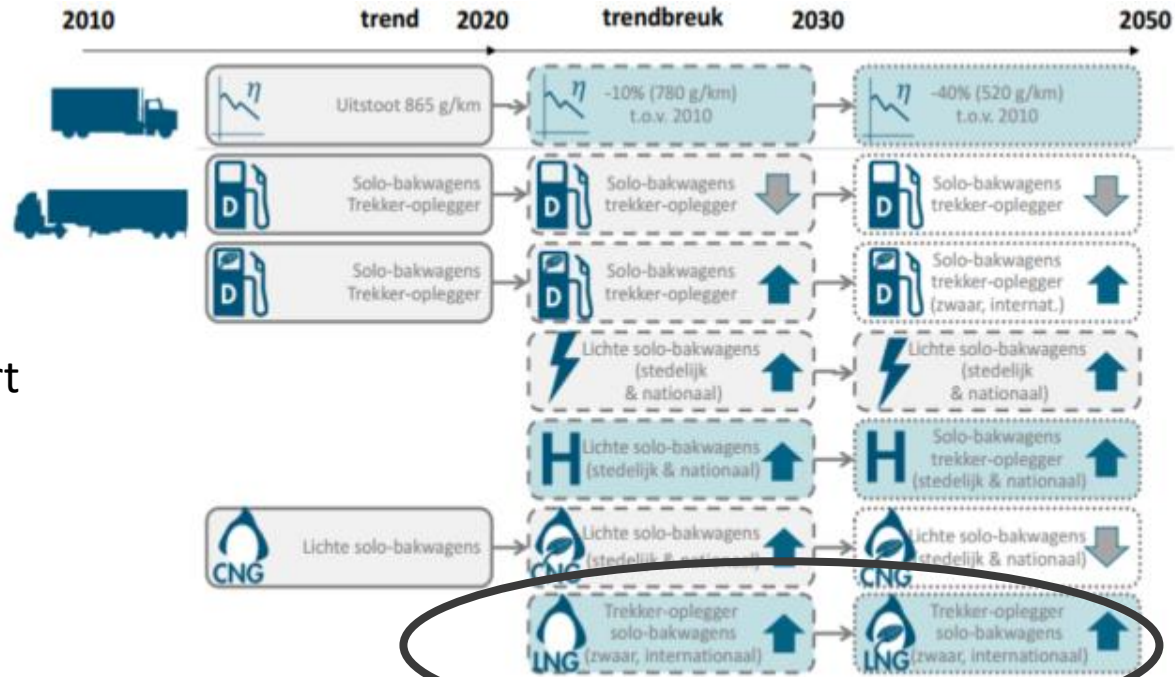
- Acceleration 70 dB(A)
- Gear box 68 dB(A)
- Brakes 70 dB(A)

Gas engine – 8 dB(A)



# Trucks (long-distance and heavy road transport)

(Bio-)LNG is considered to be among the most promising options (partly also due to expected favourable price development against conventional fuels) for transport sustainability improvement together with biofuels and electric city and light transport.



# Tank-infra LNG

## Waar kunnen trucks LNG tanken?

| 1  | Plaats     | Bedrijfsnaam   |
|----|------------|----------------|
| 1  | Duiven     | Engie          |
| 2  | Leeuwarden | Engie          |
| 3  | Zaandam    | ENN            |
| 4  | Oss        | ENN            |
| 5  | Zwolle     | LNG24          |
| 6  | Borculo    | Lng Achterhoek |
| 7  | Rotterdam  | Linde Gas      |
| 8  | Tilburg    | Rolande LNG    |
| 9  | Veghel     | Rolande LNG    |
| 10 | Utrecht    | Rolande LNG    |
| 11 | Rotterdam  | Shell          |
| 12 | Waalwijk   | Shell          |
| 13 | Pijnacker  | Shell          |
| 14 | Amsterdam  | Shell          |

## Waar kunnen trucks binnenkort LNG tanken?

| A | Plaats         | Bedrijfsnaam | Verwacht  |
|---|----------------|--------------|-----------|
| A | Harnaschpolder | Engie        | 2016      |
| B | Venlo          | Engie        | 2016      |
| C | Roosendaal     | Engie        | 2016      |
| D | Heerenveen     | Engie        | 2016      |
| E | Apeldoorn      | Engie        | 2016      |
| F | Uden           | ENN          | 2016      |
| G | Delfgauw       | LNG24        | 2016      |
| H | Roosendaal     | LNG24        | 2016      |
| I | Harnaschpolder | LNG24        | 2016      |
| J | Geldermaisen   | Rolande LNG  | Eind 2015 |
| K | Nieuwegein     | Rolande LNG  | Eind 2015 |
| L | Heteren        | Rolande LNG  | Eind 2015 |





# Ahold Transport: LNG ideal overall solution

**Safety**

**Emissions**

**Congestion**

**Fuel price**

**Government restrictions**

**Challenge in fuel price**

**Noise**

**Accessibility**

**CO<sub>2</sub>**

**Green footprint**

**Graph 1: Fuel price (this year compared with last year)**

| Year | Gas   | Diesel |
|------|-------|--------|
| 2007 | ~1000 | ~1000  |
| 2008 | ~1100 | ~1100  |
| 2009 | ~1200 | ~1200  |
| 2010 | ~1300 | ~1300  |
| 2011 | ~1400 | ~1400  |
| 2012 | ~1500 | ~1500  |
| 2013 | ~1600 | ~1600  |
| 2014 | ~1700 | ~1700  |
| 2015 | ~1800 | ~1800  |
| 2016 | ~1900 | ~1900  |
| 2017 | ~2000 | ~2000  |
| 2018 | ~2100 | ~2100  |
| 2019 | ~2200 | ~2200  |
| 2020 | ~2300 | ~2300  |
| 2021 | ~2400 | ~2400  |
| 2022 | ~2500 | ~2500  |

**Graph 2: Challenge in fuel price**

| Year | Gas    | Diesel |
|------|--------|--------|
| 2007 | ~41000 | ~41000 |
| 2008 | ~42000 | ~42000 |
| 2009 | ~43000 | ~43000 |
| 2010 | ~44000 | ~44000 |
| 2011 | ~45000 | ~45000 |
| 2012 | ~46000 | ~46000 |
| 2013 | ~47000 | ~47000 |
| 2014 | ~48000 | ~48000 |
| 2015 | ~49000 | ~49000 |
| 2016 | ~50000 | ~50000 |
| 2017 | ~51000 | ~51000 |
| 2018 | ~52000 | ~52000 |
| 2019 | ~53000 | ~53000 |
| 2020 | ~54000 | ~54000 |
| 2021 | ~55000 | ~55000 |
| 2022 | ~56000 | ~56000 |

# Gebruikers van LNG in wegvervoer



POST KOG EKO

Vos Logistics



WIM BOSMAN  
MAKING YOUR LOGISTICS WORK

Van Vliet Transport

SPEKSNIJDER LOGISTIEK



A.G.v.Geffen  
TRANSPORTBEDRIJF B.V.



XPO



KUEHNE+NAGEL



# LNG road transport



POST KOGEKO

Vos Logistics



WIM BOSMAN  
MAKING YOUR LOGISTICS WORK



Van Vliet Transport

SPEKSNIJDER LOGISTIEK

SNEL LOGISTIC SOLUTIONS  
turning goods into better

VAN DEN HEUVEL  
Transport-Koeriers-Distributie

BOS  
LOGISTICS

DASKO  
KOOL- EN VRIJSTRAANSPORTEN

NAGEL-GROUP

A.G.v.Geffen  
TRANSPORTBEDRIJF B.V.

nabuurs  
SUPPLY CHAIN SOLUTIONS

XPO

St vd Brink  
Nat.- Internationaal Transport

By  
Wezenberg Groep

BAKKER GROEP

MIDDELKOOP  
innovatief in logistiek

rötra

tielbeke  
toptechniek in logistiek

DE ROOY  
transport - logistiek

vanUden  
LOGISTICS

Simon Loos

oegematransport

ZANDBERGEN'S  
TRANSPORT B.V.

PONAT

CORNELISSEN  
Transport  
A Cornelissen Company

PETER APPEL  
Transport

KUEHNE+NAGEL

CvHEEZIK  
YOUR WARE - OUR CARE

# Shippers embracing LNG

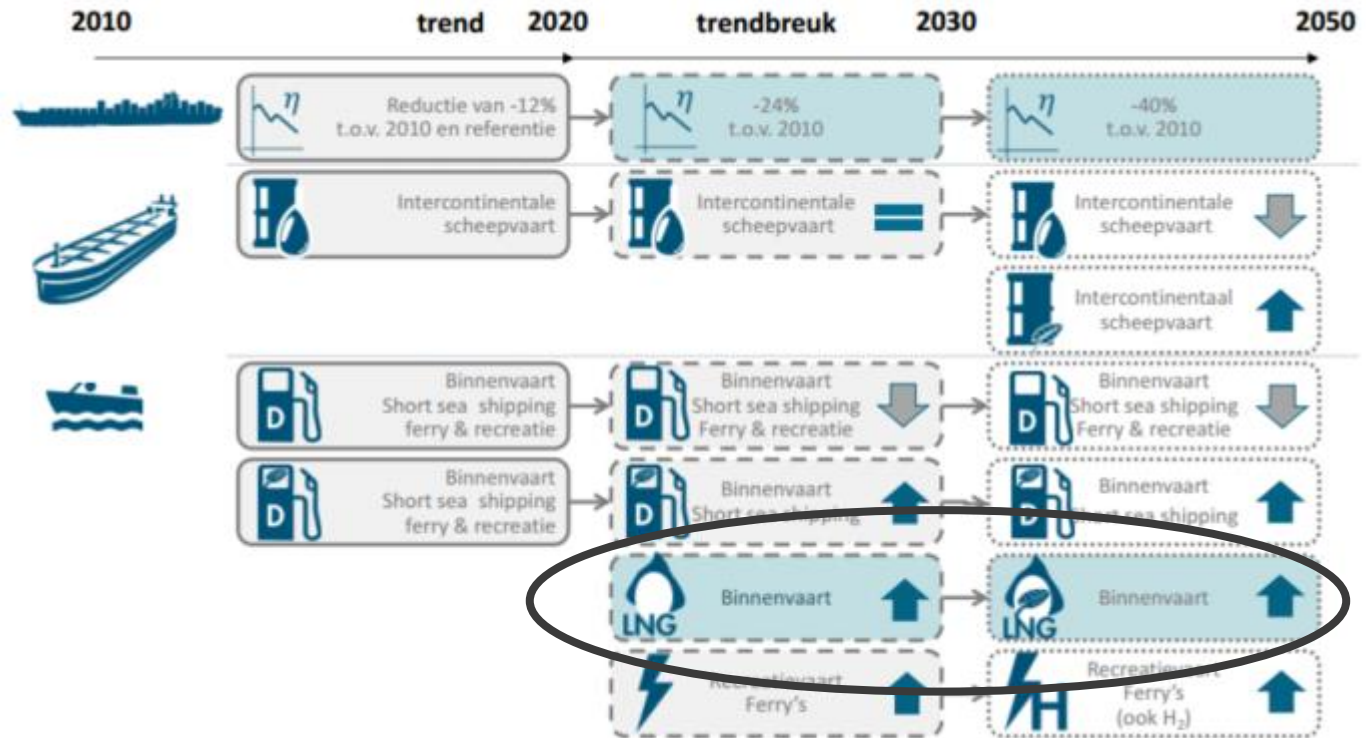


# Energy Agreement: Targets for LNG trucking

| <b>Year</b> | <b>Trucks</b> | <b>Service stat.</b> | <b>Trucks/station</b> |
|-------------|---------------|----------------------|-----------------------|
| 2020        | 6.500         | 36                   | 181                   |
| 2025        | 12.500        | 60                   | 208                   |
| 2030        | 22.000        | 100                  | 220                   |
| 2050        | 50.000        | 200                  | 250                   |

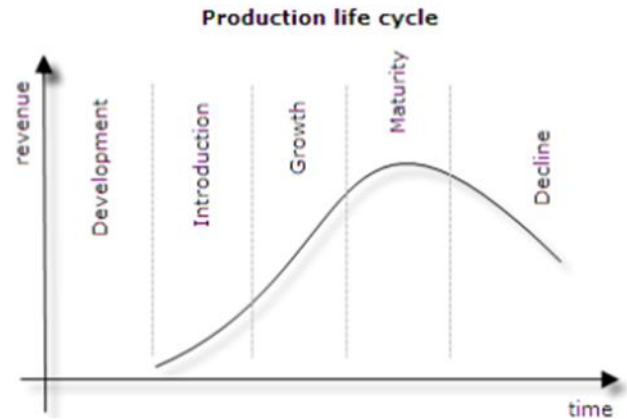


# (Bio-)LNG is the most promising option to improve sustainability in shipping

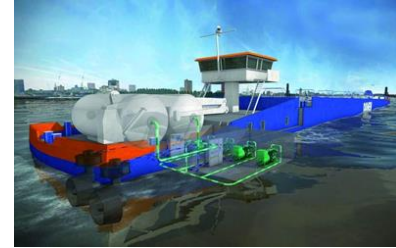


# Shipping

- R&D still some work to be done (methane)
- Focus on implementation
- Without end-user no infra
- Financing (EIB option?)

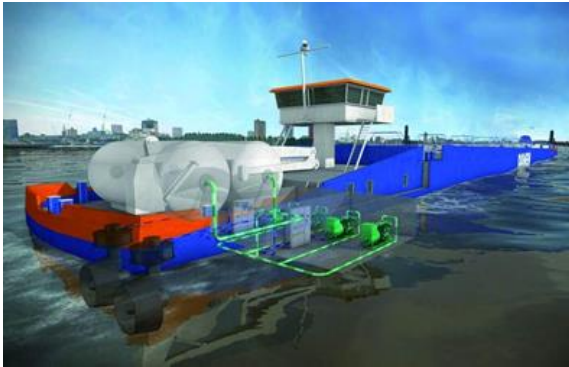


# Ships & LNG



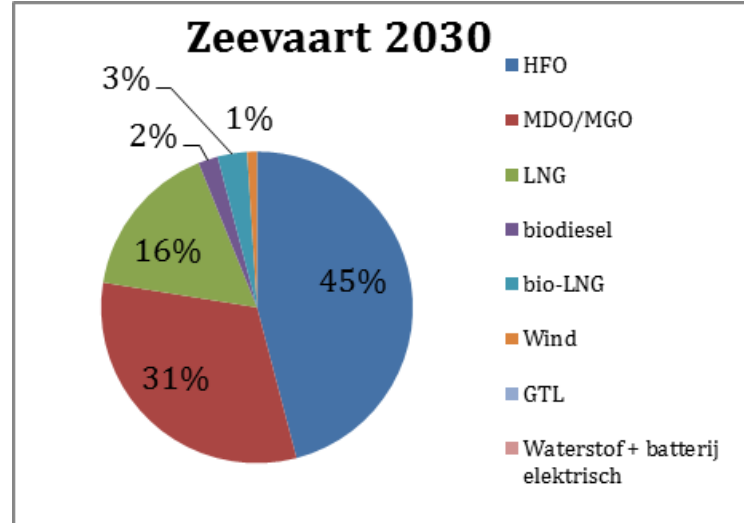
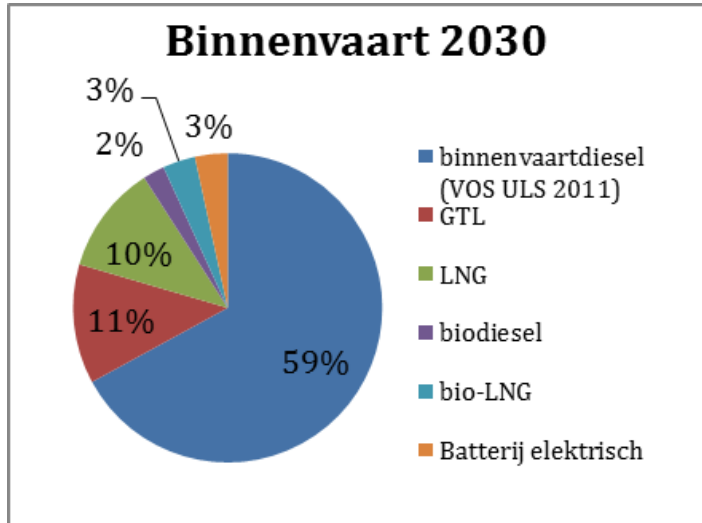


# LNG is reality!



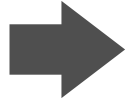
# Shipping

| Doelen    | Infra                               | SSS         | Binnenvaart |
|-----------|-------------------------------------|-------------|-------------|
| 2015-2020 | 10 bunkerpunten zee- en binnenvaart | 50 schepen  | 40 schepen  |
| 2020-2030 | ??                                  | 100 schepen | 300 schepen |



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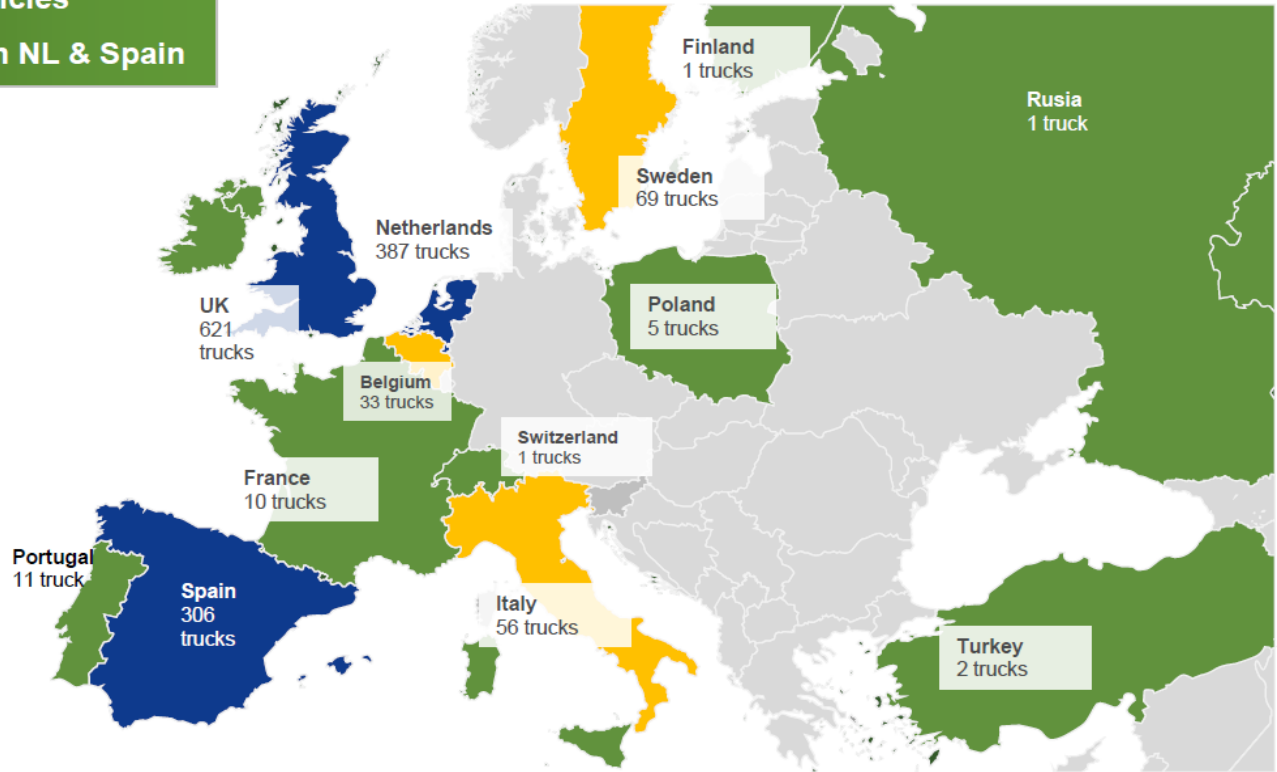
## European Committee Initiatives



- **Trucking:**  
LNG stations every 400 km (250 miles) along the Trans European Core Network (2020)
- **Shipping:**  
LNG bunkering for in all 139 ports on the Trans European Core Network (2020-2025)

# Trucks

1.500 LNG Vehicles  
UK leader, then NL & Spain



- > 200
- > 25
- < 10
- None

# Opportunities

- Extension of public-private cooperation nearly completed
- Trucks more OEM's, more KW's
- NRMM: LNG needs less complex technology
- National LNG fuel infrastructure is there
- International cooperation
  - Countries
  - Companies

AIM



# Cooperation

- Intensify co-operation; learn from the expertise and experience how to speed up the market introduction of LNG in Lithuania
- increase efforts to support the exchange between international LNG experts and political decision-makers
- co-ordination of activities at European level, in particular with regard to joint applications for EU funding



# New legislation

|  | <i>CO</i><br>[g/kWh] | <i>HC</i><br>[g/kWh] | <i>NOx</i><br>[g/kWh] | <i>HC+NO<sub>x</sub></i><br>[g/kWh] | <i>PM</i><br>[g/kWh] | <i>PN</i><br>[n/kWh] | <i>EU type-approval<br/>of engines</i> | <i>Placing on<br/>the market of<br/>engines</i> |
|--|----------------------|----------------------|-----------------------|-------------------------------------|----------------------|----------------------|--|---|
| CCR1   | 5,0                  | 1,30                 | 9,745                 | NVT                                 | 0,540                | NVT                  |  |   |
| CCR2   | 3,5                  | 1,00                 | 6,745                 | NVT                                 | 0,200                | NVT                  |  |   |
| NRMM-Stage IIIA (IWV)  | 5,0                  | NVT                  | NVT                   | 7,8                                 | 0,270                | NVT                  |  |   |
| NRMM-Stage V (IWP)<br>Op basis van voorstel EC   | 3,5                  | 0,19                 | 0,40                  | NVT                                 | 0,010                | 1x10 <sup>12</sup>   | 1-1-2019                               | 1-1-2020  |
| NRMM-Stage V (IWP)<br>Op basis van de laatste versie Raad v/d<br>EU, van 30 juni 2015. | 3,5                  | 0,19                 | 1,800                 | NVT                                 | 0,015                | 1x10 <sup>12</sup>   | 1-1-2019                               | 1-1-2020  |



# CCR en NRMM emissielimiten

## CCNR I emission limit values

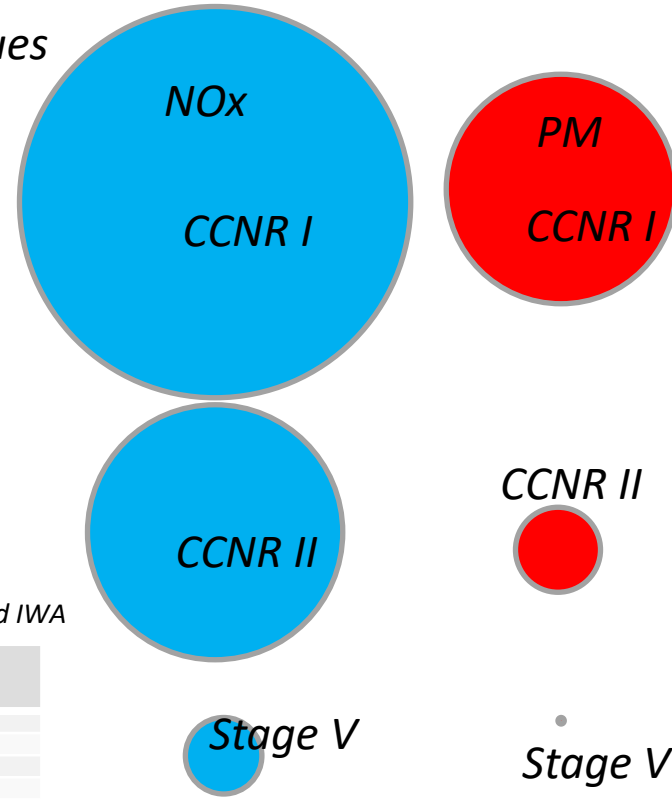
| Power range | CO      | HC      | NO <sub>x</sub>  | PM      |
|-------------|---------|---------|--|---------|
| (kW)        | (g/kWh) | (g/kWh) | (g/kWh)  | (g/kWh) |
| 37≤P<75     | 6.5     | 1.3     | 9.2  | 0.85    |
| 75≤P<130    | 5.0     | 1.3     | 9.2  | 0.70    |
| P≥300       | 5.0     | 1.3     | n ≥ 2800 min-1 = 9,2<br>500 ≤ n < 2800 min-1 = 45 * n -0.2 | 0.54    |

## CCNR II emission limit values

| Power range | CO      | HC      | NO <sub>x</sub>  | PM      |
|-------------|---------|---------|--|---------|
| (kW)        | (g/kWh) | (g/kWh) | (g/kWh)  | (g/kWh) |
| 19≤P<37     | 5.5     | 1.5     | 8.0  | 0.8     |
| 37≤P<75     | 5.0     | 1.3     | 7.0  | 0.4     |
| 75≤P<130    | 5.0     | 1.0     | 6.0  | 0.2     |
| 130≤P<560   | 3.5     | 1.0     | 6.0  | 0.2     |
| P≥560       | 3.5     | 1.0     | n ≥ 3150 min-1 = 6,0<br>343 ≤ n < 3150 min-1 = 45 n -0.2 - 3 n<br>< 343 min-1 = 11,0 | 0.2     |

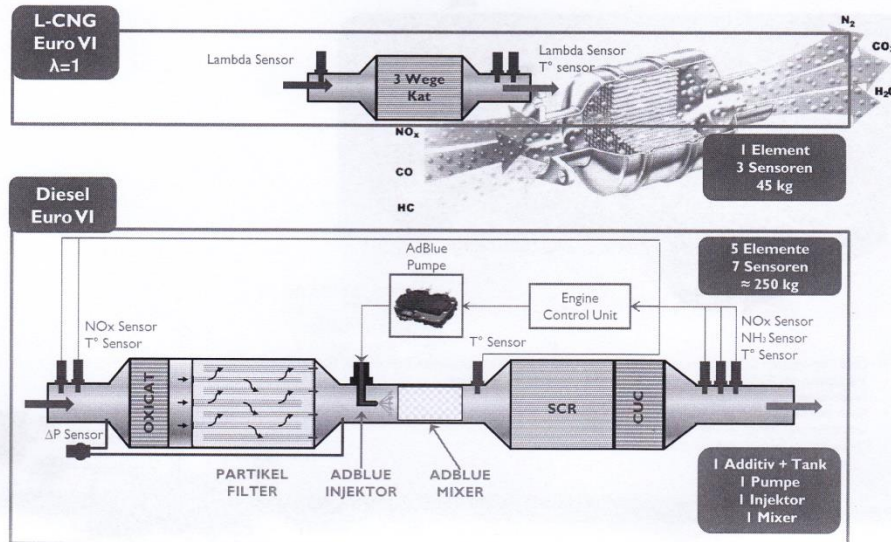
## EU NRMM Stage V emission standards engine types IWP and IWA

| Power range | Engine ignition type | CO      | HC                            | NO <sub>x</sub> | PM mass | PN                 | A   |
|-------------|----------------------|---------|-------------------------------|-----------------|---------|--------------------|-----|
| (kW)        | (-)                  | (g/kWh) | (g/kWh)                       | (g/kWh)         | (g/kWh) | (1/kWh)            | (-) |
| 19≤P<75     | all                  | 5       | (HC + NO <sub>x</sub> ≤ 4.70) | 0.3             | -       | 6                  |     |
| 75≤P<130    | all                  | 5       | (HC + NO <sub>x</sub> ≤ 5.40) | 0.14            | -       | 6                  |     |
| 130≤P<300   | all                  | 3.5     | 1                             | 2.1             | 0.1     | -                  | 6   |
| P≥300       | all                  | 3.5     | 0.19                          | 1.8             | 0.015   | 1x10 <sup>12</sup> | 6   |

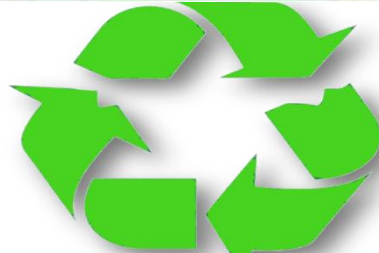


# Shipping

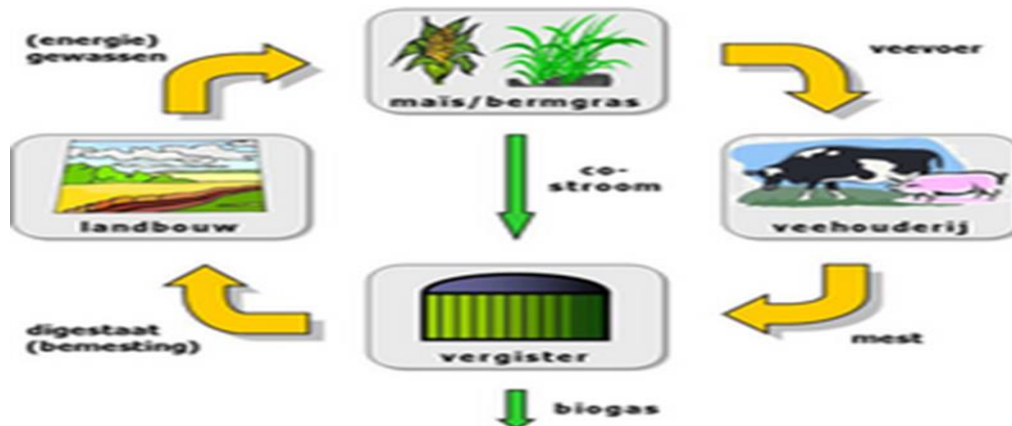
## Komplexität



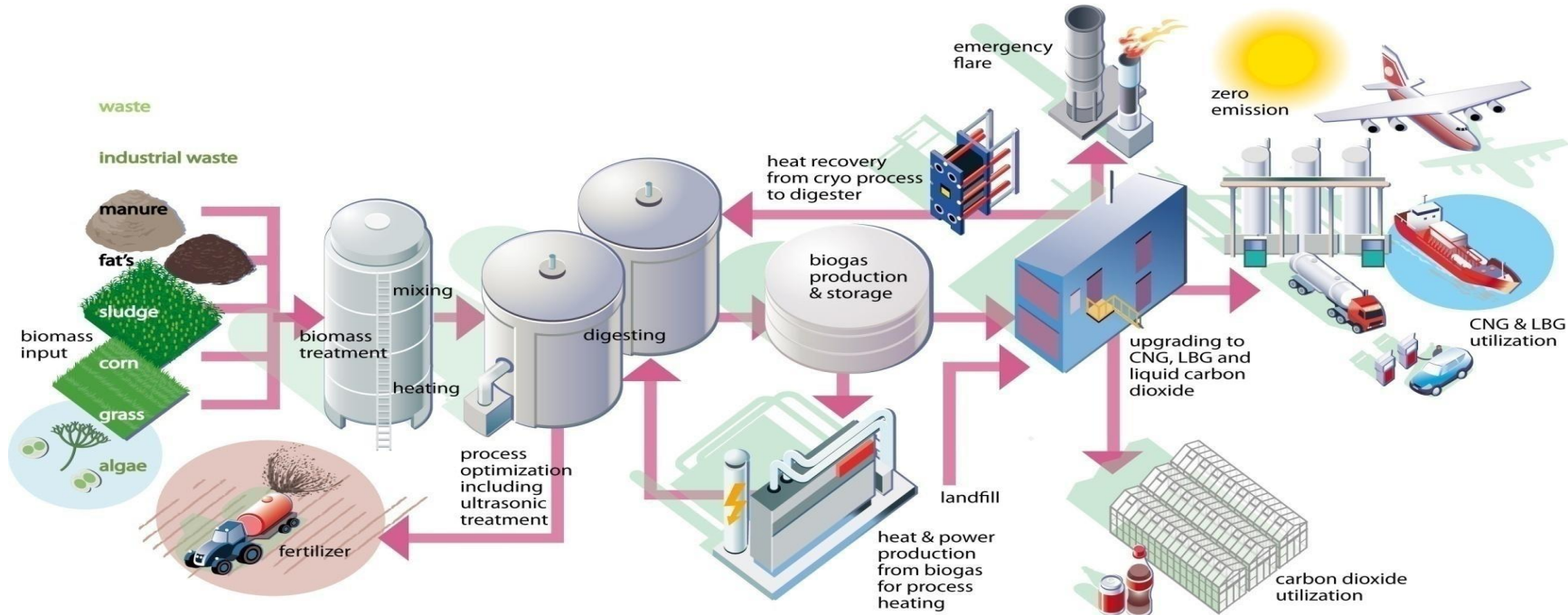
# Marketing approach



# Win Win situation



# Production of bio-Lng bio-Lng





# The new challenge

Ing → Bio-Ing

- Goals:
  - In 2021 10 %  
blending of bio-Ing  
10%
- How to speed up  
development?



# Contact information

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