



# World Biogas Association

Gas Upgrading for Transport Fuel



Sustainable Efficient Technology





**T6** **METHANE POWER**

# POWERED BY NATURE

**Mark Howell**  
**Global Product Manager – Alternative Fuels**  
**New Holland Agriculture**



*Sustainable Efficient Technology*





# CNH Industrial - January 2022

## One of the world's largest capital goods company



T6 METHANE POWER  
**POWERED  
BY NATURE**



### AGRICULTURE

Second largest manufacturer  
of agricultural machinery

### CONSTRUCTION

A global player in construction  
equipment

### FINANCIAL SERVICES

Global financial services player  
supporting customers and dealers

**CASE IH**  
AGRICULTURE

**STEYR**  
TRACTORS

**NEW HOLLAND**  
AGRICULTURE

29  
plants

18  
R&D Centres

\$14.7B  
net sales in  
2021

**CASE**  
CONSTRUCTION

**NEW HOLLAND**  
CONSTRUCTION

8  
plants

8  
R&D Centres

\$3.1B  
net sales in  
2021

**CNH**  
INDUSTRIAL | CAPITAL

**NEW HOLLAND**  
AGRICULTURE





# The Farming Specialist



T6 methane power  
**POWERED  
BY NATURE**

## TRACTORS



## HARVESTERS



## CONSTRUCTION RANGE FOR AGRICULTURE



## SOIL MANAGEMENT



## CROP MANAGEMENT



let's get it done.





# Basildon Plant Fact Line



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**THEN**

**&**

**NOW**



**1964**



## THE SITE

- Area – 40 ha
- Personnel – 4000
- Building – 12.65 ha

## THE PLANT

- Monorail – 2 km
- Incoming tonnage – 800 per day
- Forklift trucks – 31

## THE PRODUCTION

- Models – 4
- Power range – 37 to 65 hp
- Components – Engines, front axles, hydraulic lift

## THE CONSUMABLES

- Paint – 1800 l per day
- Oil – 37,000 l per day
- Boiler fuel – 4000 l oil per day
- Electricity – 20,000 KVA (max)
- Water – 2.7m l per day

**2021**



## THE SITE

- Area – 40 ha
- Personnel – 585
- Building – 12.65 ha
- Iveco - 176

## THE PLANT

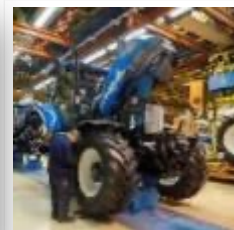
- Monorail – 2 km
- Incoming tonnage – 1,100 per day
- Forklift trucks – 25
- Auto Guided Vehicles – 21

## THE PRODUCTION

- Models – 21
- Power range – 100 to 300 hp
- Components – Sub assembly of armrests, hoods, roofs

## THE CONSUMABLES

- Paint – 450 l per day
- Air conditioning fluid – 200 kg per day
- Oil – 1000 l per day
- Boiler fuel – 9700 m3 gas per day
- Electricity – 46,500 kWh per day
- Water – 1.4 m l per day





# New Holland the Clean Energy Leader<sup>®</sup> since 2006



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## ALTERNATIVE FUELS HISTORY



**JULY 2006**  
**THE BIRTH OF A NEW ERA**  
CLEAN ENERGY LEADER<sup>®</sup>  
STRATEGY LAUNCHED



**NOVEMBER 2007**  
**100% BIODIESEL**  
ALL NEW HOLLAND ENGINES ARE  
100% BIODIESEL COMPATIBLE



**FEBRUARY 2009**  
**ZERO EMISSION FUTURE**  
NH<sup>2</sup>™ HYDROGEN TRACTOR AND  
ENERGY INDEPENDENT FARM™



**NOVEMBER 2011**  
**INTELLIGENT VITICULTURE**  
ECOBRAUD AND SUSTAINABLE VITICULTURE  
WIN A SILVER MEDAL AT AGRITECHNICA



**AUGUST 2016**  
**THE AGRICULTURE OF TOMORROW**  
NH<sup>DRIVE</sup>™ CONCEPT AUTONOMOUS TRACTOR,  
UNVEILED AT FARM PROGRESS, USA.



**JUNE 2015**  
**INNOVATION THAT WORKS**  
2<sup>ND</sup> GENERATION  
T6 METHANE POWER



**NOVEMBER 2013**  
**THE NEW FRONTIER**  
1<sup>ST</sup> GENERATION T6 METHANE  
POWER TRACTOR



**SEPTEMBER 2012**  
**A RENEWABLE ALLIANCE**  
STRATEGIC PARTNERSHIP WITH GROWTH  
ENERGY TO PROMOTE ETHANOL



**AUGUST 2017**  
**METHANE CONCEPT TRACTOR**  
REIMAGINES THE DESIGN AND REVEALS  
A CONNECTED AND SUSTAINABLE FUTURE



**NOVEMBER 2019**  
**SUSTAINABLE TRACTOR OF THE YEAR**  
T6.180 METHANE POWER CONCEPT



**FEBRUARY 2021**  
**INDUSTRY FIRST E-SOURCE**  
AN ELECTRICAL GENERATOR TO  
POWER ELECTRIFIED IMPLEMENTS



**MARCH 2021**  
**CNH INDUSTRIAL ACQUIRES A MINORITY STAKE IN BENNAMANN**



**Q4 2021**  
**DELIVERY OF FIRST T6.180 METHANE POWER UNITS**







# Market Drivers

## LEGISLATION

- COP 26
- Kyoto Protocol
- The Paris agreement
- EU Green Deal
- CAP Scheme

## CARBON EMISSIONS REDUCTION

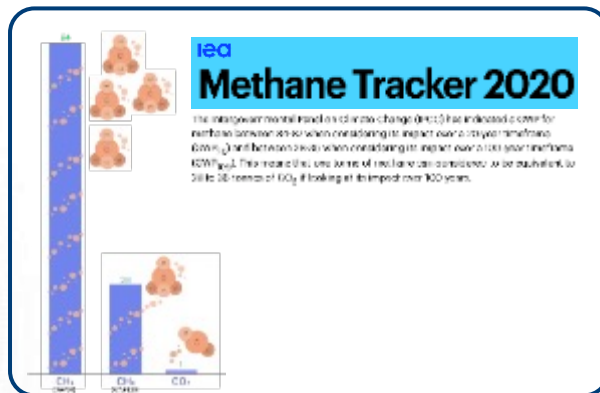
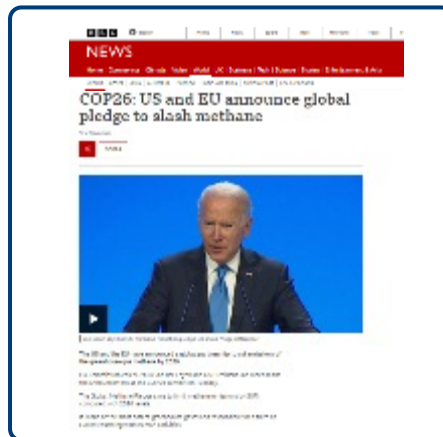
- Suppliers to supermarkets, wholesalers and other corporations
- Municipalities with social responsibility
- Contractors looking to win additional contracts
- Businesses looking to win funding for projects

## OPTIMISING PROFIT MARGINS

- Businesses looking for ways to reduce costs
- Running costs:
  - Day by day cash flow
  - Total cost of ownership



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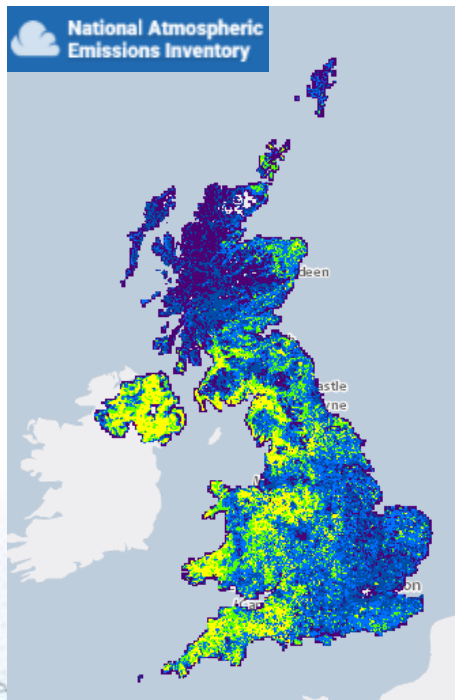




# Atmospheric Methane

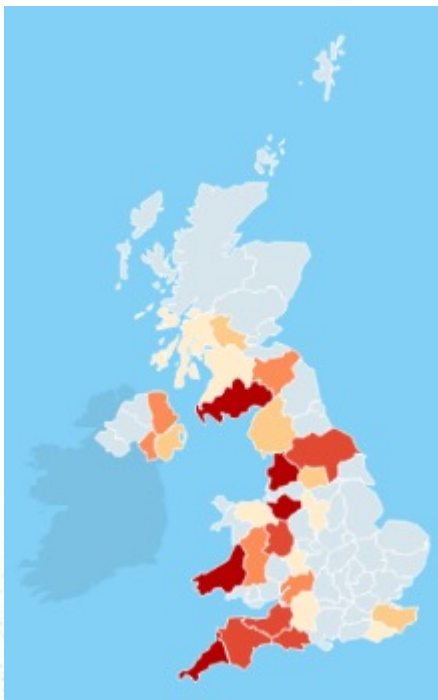
SITUATION

## UK Methane Hotspots



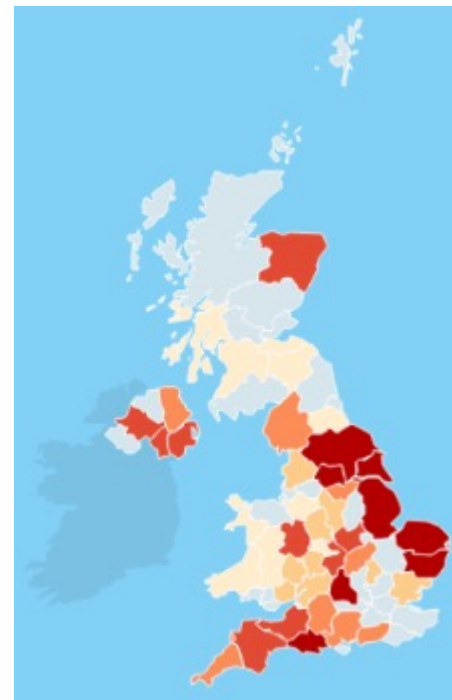
- Low concentration of Methane in atmosphere
- High concentration of Methane in atmosphere

## UK Dairy Hotspots



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## UK Pig Hotspots







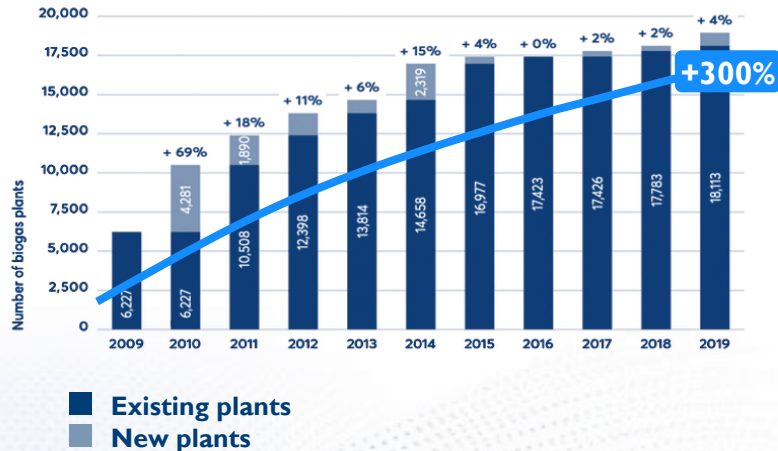
# Potential Customers: EU focus



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## MARKET

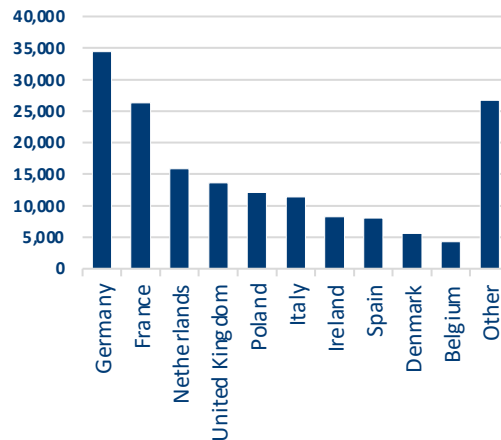
### EU Biogas Plants



EBA Statistical Report 2020

Development of the number of biogas plants in Europe, 2009-2019

### EU Dairy Farms



Eurostat survey 2018

Total number of holdings – Number of cattle +50





# Environmental Impact View



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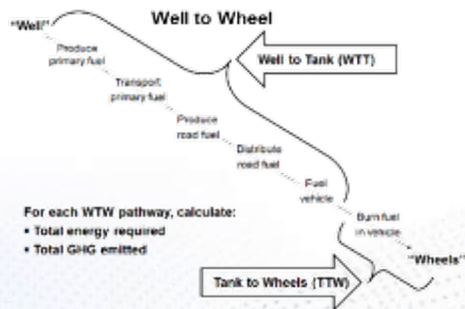
## Natural Gas vs Diesel

### Tank to Wheel (TTW)

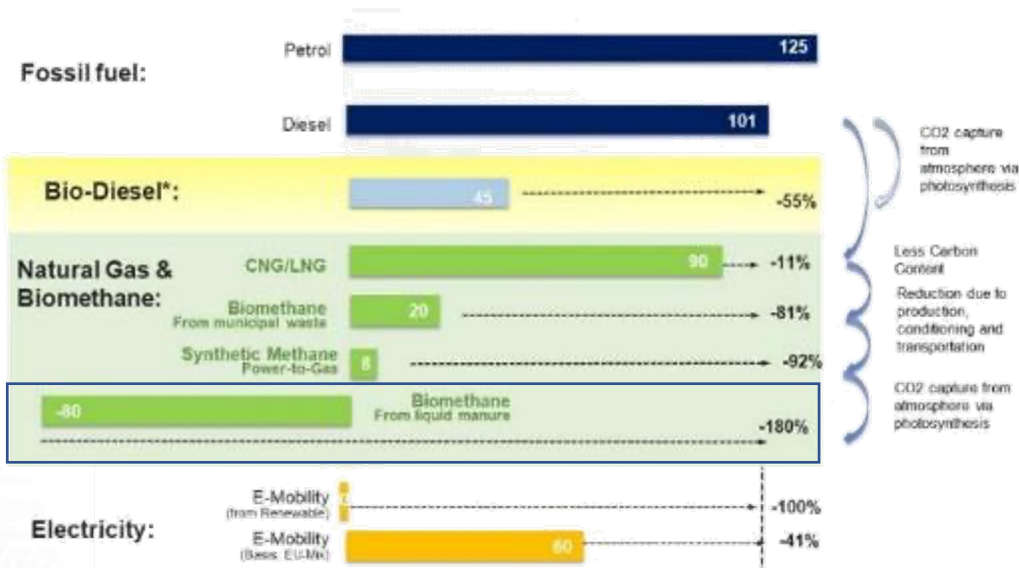
- **Non-Renewable** Natural Gas has a significant reduction in CO<sub>2</sub> emissions vs Diesel (~11%)

### Well to Tank (WTT)

- **Renewable sources of Gas** reduce CO<sub>2</sub> emissions even further vs Diesel
- Between ~ 80% - 180% reduction depending on the source



### Well-To-Wheel (WTW) - GHG emissions in CO<sub>2</sub> g/km



Source: Elob, Thinkstep Study 2017 and JEC WW study v4 201  
\*HVO Hydrotreated Vegetable Oils

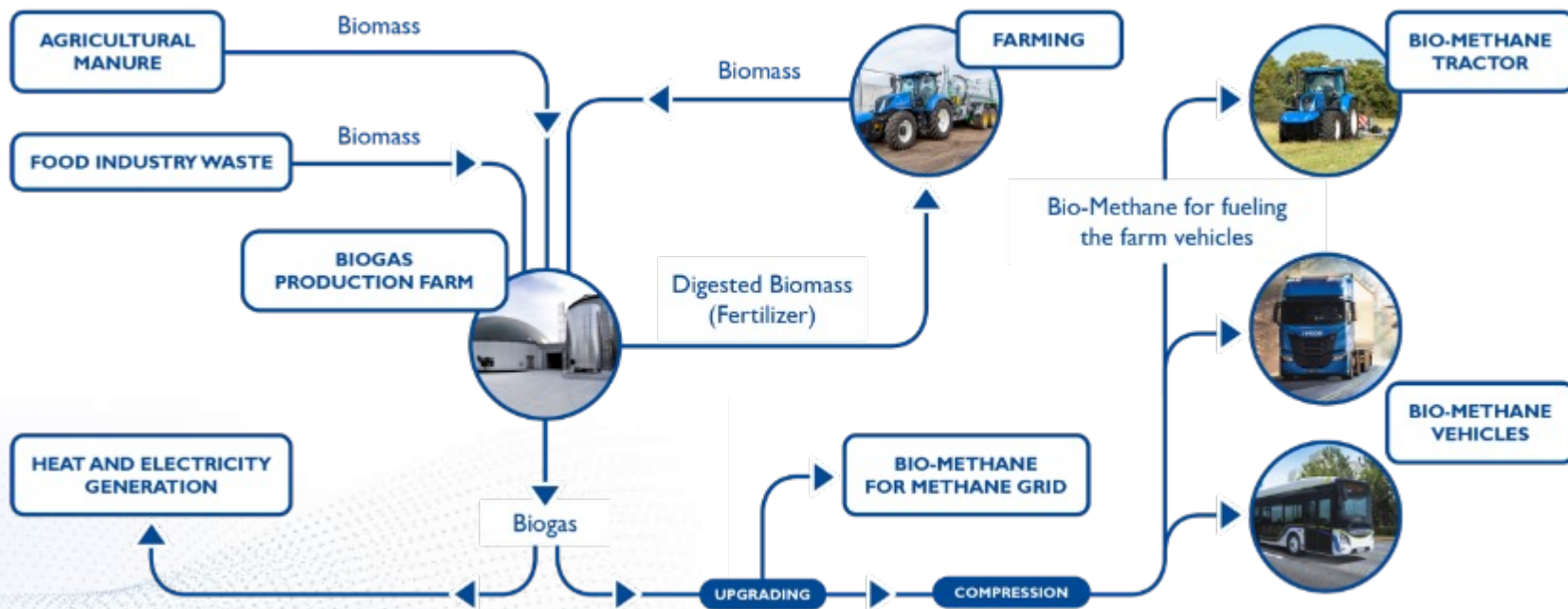


# Energy Independent Farm™ Biogas Plant



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How the system works







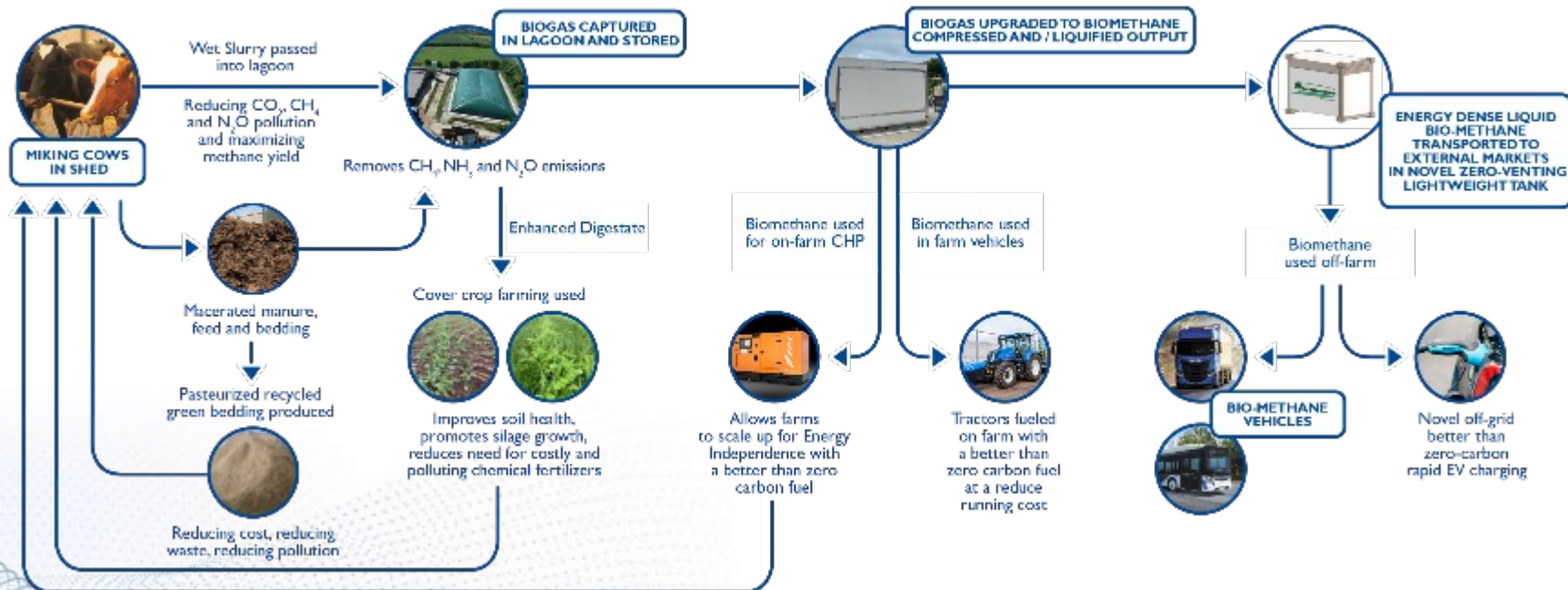
# Energy Independent Farm<sup>SM</sup> Dairy Farm



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ENERGY INDEPENDENT FARM

## How the Bennamann system works





# Why use a Methane Powered tractor?



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**86kg CO<sub>2</sub>e / kg CH<sub>4</sub> - 97% 2.75kg CO<sub>2</sub>e / kg CH<sub>4</sub>**

Path 1  
Today



Path 2  
Tomorrow





# FPT Industrial natural gas engines

## Main features and benefits



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- 100% natural gas engines with diesel-like performance
- CNG, LNG and bio-methane compatible
- Stoichiometric combustion strategy pioneered from 1995 for clean combustion and low emission
- Multipoint injection and proprietary model-based engine control (patent pending)
- High performance materials for maximum reliability
- High resistance structural block and oil sump specifically designed for installation on tractors
- Reduced operating costs and low CO<sub>2</sub> emissions (nearly zero when operating with bio-methane)
- Simple 3-way catalyst for stage V emission compliance
- Lower noise and vibration compared to Diesel (5 db)







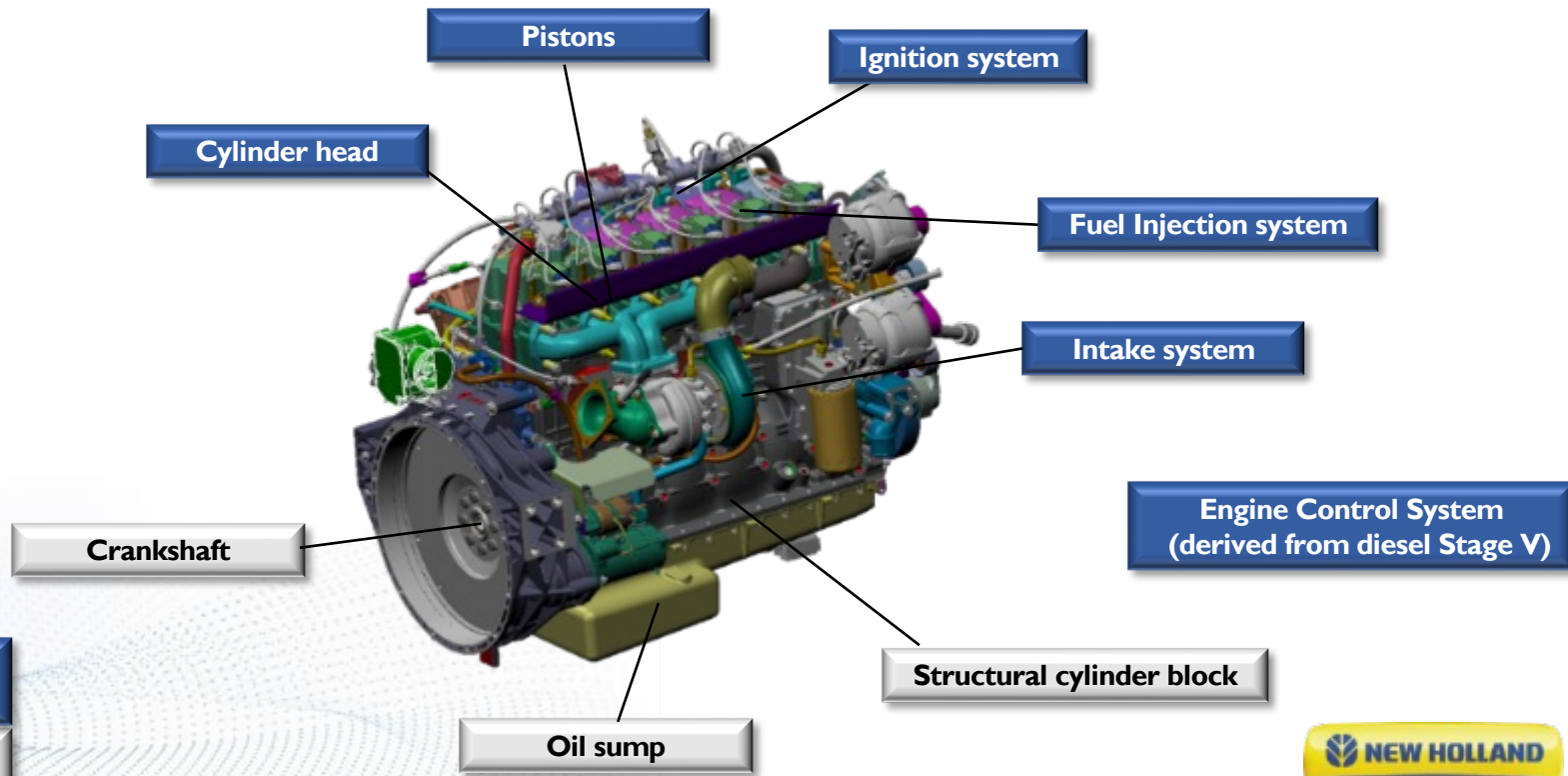
# CNG 6.7L NEF



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Maximize commonality with 6.7L NEF stage V Diesel development

ENGINE CONFIGURATION



**New NEF NG  
Content**

**Carry over from  
NEF diesel**



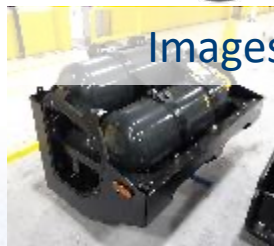


# Fuel Tank Development

455 litre CNG compressed to 200bar  
185 litres on vehicle, 270 litres range extender



Images from the production line



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Refuelling via a standard NGV1





# Emissions legislation

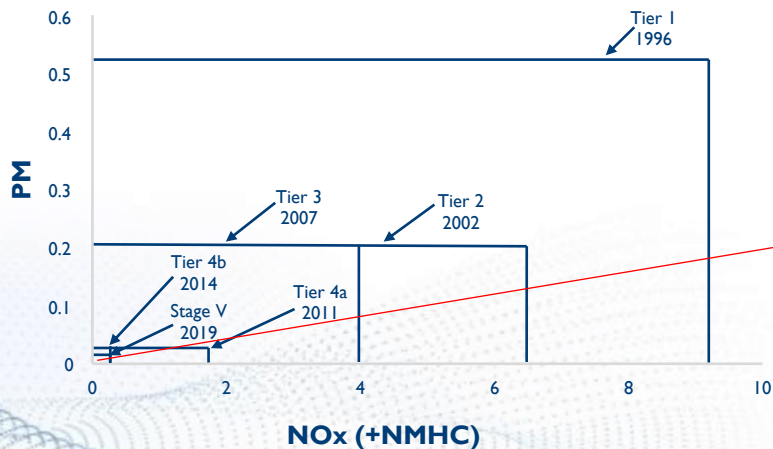
## The impact of Methane technology vs Emission legislation



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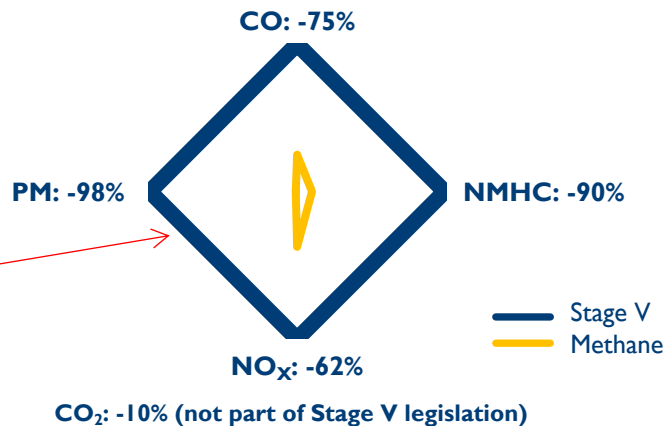


Before  
emissions  
legislation



By developing a tractor running on methane, we have changed the game

Emissions  $56 \leq P < 130$  kW





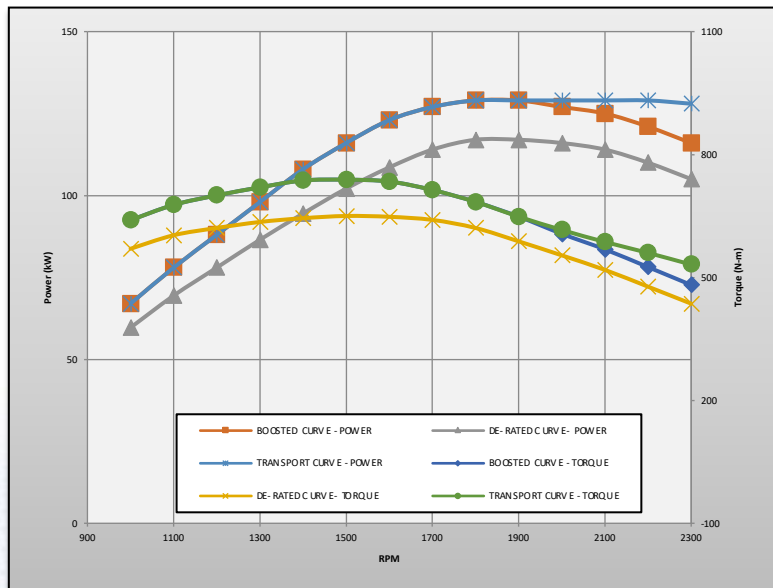


# Methane Power tractor



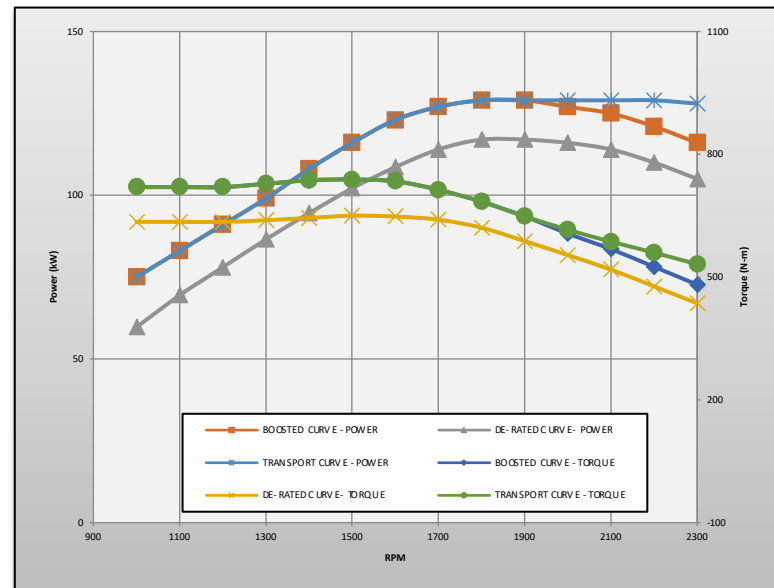
T6.180  
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## T6.180 DIESEL



VS

## T6.180 METHANE POWER





# Usage

T6.180 METHANE POWER



T6.180 METHANE POWER  
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Municipal

Livestock

Tillage

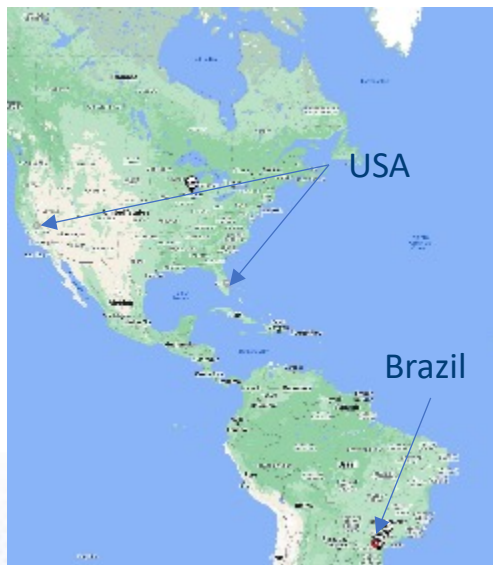
Cereals



# Units around the world



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T6.180 METHANE POWER



**T6**   
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BY NATURE**

**THANK YOU**







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## **QUESTION & ANSWERS**

