BioCNG, BioLNG, Electric and H$_2$ trucks
Towards a zero emissions transport

Vilnius, Lithuania
April 2021
CNH industrial and IVECO
A global capital goods player
The European leader in alternative-energy trucks
Note: all figures provided in this presentation are on a US GAAP $ basis and updated at December 31, 2019, unless otherwise indicated.
INNOVATION AND TECHNOLOGY: KEY NUMBERS

$1.0 BILLION
INVESTED IN R&D IN 2019

56
R&D CENTERS

9%
OF ALL EMPLOYEES DEDICATED TO R&D

13
R&D CENTERS IN EMERGING MARKETS

~ 5,700
INDIVIDUALS DEDICATED TO INNOVATION

11,984
ACTIVE PATENTS OWNED

Note: all figures at 31 December, 2019, unless otherwise noted.
(1) Emerging Markets are defined as low, lower-middle or upper-middle income countries as per the World Bank list of economies as at June 2019.
IVECO designs, manufactures and markets a wide range of light, medium and heavy commercial vehicles for road and off-road use.

Committed to safe, efficient and sustainable mobility, IVECO has been investing in the development of alternative drive systems for over 20 years. It offers engines running on diesel, HVO, Natural Gas and Biomethane on its entire range.
ELECTROMOBILITY IN COMMERCIAL VEHICLES

A wide range of vehicles with innovative hybrid and full electric propulsion systems offer fuel consumption savings and emission reductions for sustainable mobility:

- Fuel Cell powertrain for heavy commercial vehicles
- e-Axle for Battery Electric Vehicles and fuel cell heavy duty applications
- Advanced and integrated propulsion control system with dedicated software
- Battery packs for light commercial vehicles, buses, hybrid and full electric applications
- A complete electric bus offering with Overnight Charge, Opportunity Charge and In-Motion-Charge
ALTERNATIVE PROPULSION IN AGRICULTURE

The STEYR Konzept

- A future vision for agricultural machinery
- A modular hybrid electric drive with a high-efficiency diesel engine, a generator, and five electric motors
- Fewer moving parts to deliver optimal energy flow
- In pure electric mode, it enables zero-emissions— in terms of both exhaust gas and noise

The Energy Independent Farm Concept

- Reduction of NO\textsubscript{2} emissions by up to 90%, and particulate matter weight by 95%
- 50% drive-by noise reduction
- Up to 95% reduction in CO\textsubscript{2} with biomethane *
- Biomethane can be generated from waste products at farms, enabling energy independence through a circular economy

* Note: Well-to-Wheel measure

The New Holland T6 Methane tractor

- The World’s first 100% methane powered production tractor
- Max power of 180HP and max torque of 740Nm
- Available at farms from the second half of 2020
- Identical performance to the equivalent diesel engine
PRESERVE AIR QUALITY
REDUCE GHG EMISSIONS
REDUCE NOISE

PRESERVE TRANSPORTER’S PROFITABILITY
Future challenge of on-road transportation
Sustainability

Global warming

**EU Legislation:**

- Light Duty and Heavy Duty CO2 reduction
  - 2025: -15% CO2
  - 2030: -30% CO2

- Carbon footprint to become a tool for corporate sustainability index and for food producers.

Urban Air Quality Improvement

**Local Authorities enforcing:**

- PM city limits
- Diesel ban in some areas or highways
- Incentives for Hybrid and ZEV
CO₂ Footprint
Transport sector Focus

TREND BY SECTOR

TRANSPORT MIX

Source: https://ec.europa.eu/clima/policies/transport_en
Making vehicles more efficient has always been a top priority for the truck industry, as this is a key competitive factor. But cutting emissions by a few percentages per year is not enough. Carbon-neutrality by 2050 at the latest implies that by 2040 all new commercial vehicles sold must be fossil free. And this is a pledge that the commercial vehicle industry is making now for the first time.
## Sustainability calculation

### Well to Wheel CO₂ emissions

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>CO₂ Impact</th>
<th>% Fossil</th>
<th>% Renewable</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO</td>
<td>CO₂ ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEV</td>
<td>CO₂ ↑</td>
<td>% fossil</td>
<td>% renewable</td>
</tr>
<tr>
<td>H2</td>
<td>CO₂ ↑</td>
<td>% fossil</td>
<td>% renewable</td>
</tr>
</tbody>
</table>

- **Well-to-Wheel (WtW)**
  - Δ ~ 0 (-95%) depending on % mix

- **Well-to-Tank (WtT)**
  - CO₂ = 0

- **Tank-to-Wheel (TtW)**
  - CO₂ = 0
  - Δ > 0 depending on % mix

Production & Distribution of the fuel (power included)

Use (combustion) of the fuel

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**IVECO**
Sustainability calculation
Life Cycle Assessment : Cradle to Cave + Well to Wheel

Life Cycle Assessment (LCA)
- Well-to-Wheel (WtW)
- Well-to-Tank (WtT)
- Tank-to-Wheel (TtW)

Production of the vehicle
Production & Distribution of the fuel (power included)
Use (combustion) of the fuel
Recycling
2 families of low-carbon energies for road transport
G-Mobility and E-Mobility

G-Mobility
- Fossil
  - Biomethane – agriculture / waste water...
  - CNG
  - LNG
  - BioCNG
  - BioLNG

Power to Gas
- H2
- +
- CO2

E-Mobility
- Solar / wind / hydraulic / biomass
- FCEV
- BEV

E-Mobility
- Fossil
  - H2
  - FCEV
  - BEV
### MISSION’S COMPATIBILITY

#### 2020 – 2025 period

<table>
<thead>
<tr>
<th>MISSIONS</th>
<th>HYBRID</th>
<th>BEV renewable electricity</th>
<th>PLUG-IN HYBRID</th>
<th>GREEN H₂</th>
<th>BIO-GNC</th>
<th>BIO-LNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>URBAN LOGISTICS</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>REGIONAL</td>
<td>No benefit</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>NATIONAL</td>
<td>No benefit</td>
<td>impossible</td>
<td>No benefit</td>
<td>+++</td>
<td>+++ (rigids only)</td>
<td>+++</td>
</tr>
<tr>
<td>LONG-HAUL</td>
<td>No benefit</td>
<td>impossible</td>
<td>No benefit</td>
<td>Borderline (rigids only)</td>
<td>+++</td>
<td></td>
</tr>
</tbody>
</table>

- **+++ environmental Benefits**: Most mature, versatile & profitable solutions
- **Many alternative solutions**:
BioMethane
Understanding the ecosystem
BioMethane
A Strategic step for a Circular Economy
Biomethane in Europe

Number of BioMethane Plants in EU

Number of plants per country

Source: EBA biomethane map 2020
ITALY CASE STUDY: biomethane & sustainable logistics
Winning partnership among farmers, transporters, biogas association

160T/DAY
~ 2000 RUNNING HDT

Link to the case

Link to the case

Link to the case
The total budget for CEF Transport is €24.05 billion for the period 2014-2020. INEA is responsible for implementing €22.4 of the CEF Transport budget in the forms of grants during the same period.

BioLNG EuroNet has three specific deliverables that will be co-funded by the European Commission:

1. 39 Shell LNG fueling stations in Europe, for Europe
   Shell will build a pan-European network of sites in Poland, Germany, Netherlands, Belgium, France and Spain (with DSG).

2. 2,000 heavy duty European LNG trucks
   Scania and IVECO will be offering competitive financing and tracking solutions to help facilitate the transition from diesel to LNG.

3. 1 Bio-LNG production facility
   Nordol will build a new plant that will process waste to produce biomethane.

BioLNG EuroNet is a project bringing together major industry players in the market:
Shell, Scania, Scania Financial Services, IVECO, IVECO Capital, DISA and Nordol. BioLNG EuroNet is designed to facilitate the mass scale adoption of LNG as a road fuel in Europe and help the EU meet its 2050 goal of a 60% reduction in CO₂ emissions.
BioMethane development potential in France and Germany

BioMethane: the natural way to decarbonize road transport

France 2019
- 0.15 Mt BioMethane
- Enough for 6,500 HDT
- 150% of current NGV HDT

France 2030
- 2.70 Mt BioMethane
- Enough for 120,000 HDT
- 37% of running Heavy Duty Trucks

Germany 2018
- 0.7 Mt BioMethane
- Enough for 30,000 HDT
- 10% of running Heavy Duty Trucks

Germany 2030
- 8.3 Mt Biogas + Bio-Meth.
- Enough for 335,000 HDT
- 110% of running Heavy Duty Trucks
-90% NO₂
-95% Fine particles
-95% CO₂
-3 to -5 dB

Zero Petrol, AdBlue, DPF, EGR

100% Renewable energy, 100% Made in Europe
Feedback
BioMethane & FCEV – the «Green» alternative for long haul transport

Long term prospective - EU potential by 2050

Light road transport will be primarily electric in 2050. Long-distance heavy transport requires fuels with a high energy density, meaning that direct use of electricity (from batteries) is less suitable. In heavy road transport and international shipping, hydrogen and bio-LNG dominate in the “optimised gas” scenario.
CNG and LNG stations

...exponential growth in all EU
LNG Gas Stations Coverage
Last 6 years Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>LNG Stations</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>73 (+46%)</td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>95 (+30%)</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>155 (+63%)</td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>249 (+60%)</td>
<td></td>
</tr>
</tbody>
</table>

APRIL 2021: 4000 LNG stations (+47%)

IVECO
TCO
Total Cost of Ownership
Stralis NP vs. Diesel Fuel & CO₂ comparison

Tuttotrasporti CO₂ saving calculation

**FUEL SAVING:** -12% vs diesel
**CO₂ SAVING:** -11% with fossil fuel
E-Mobility

NIKOLA TRE (to be continue…)

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