CLEAN & LOW CARBON HEAVY DUTY TRANSPORT
THE HERE AND NOW SOLUTIONS AND THE INNOVATIONS
FOR SUSTAINABLE HEAVY DUTY TRANSPORT

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BIOFUELS & WASTE TO FUEL
SMART & ATTRACTIVE PUBLIC TRANSPORT
PLATOONING, CONNECTED & AUTONOMOUS VEHICLES
ELECTRIFICATION
THERE ARE NO SILVER BULLETS FOR COMMERCIAL SUSTAINABLE TRANSPORT

A BROAD GREEN TOOLBOX

Energy efficiency
Smarter transport
Alternative fuels and electrification

CLEAN LOW CARBON COMMERCIAL OUTCOMPETE DIESEL
DIFFERENT SOLUTIONS FOR DIFFERENT TRANSPORT MISSIONS – THERE IS NO SILVER BULLET

**Inner city bus/Distribution/RCV**
- Electrification

**Long Haulage**
- Liquid biofuels, Liquid Biogas (LBG), Platoons, E-roads

**Suburban bus/Distribution trucks**
- Biofuel Hybrids, Biogas

**Regional bus/Coach**
- Liquid biofuels/biogas (LBG)

**Autonomous**
- Dedicated bus systems, mines, harbours, airports
HERE AND NOW - COMMERCIAL CLEAN AND LOW CARBON HEAVY DUTY SOLUTIONS

**BIODIESEL & HVO**
Low blends to B100 Diesel engine

*Up to 90% CO₂ reduction*

*All types of applications, including long-haulage and coaches.*

**ETHANOL ED95**
World’s No. 1 biofuel Diesel engine

*Up to 90% CO₂ reduction*

*Buses, coaches waste collectors, distribution and haulage trucks.*

**BIOGAS & NATURAL GAS**
Compressed or liquid Otto engine

*Up to 90% CO₂ reduction*

*Buses, coaches waste collectors, distribution and haulage trucks.*

**HYBRIDS & ELECTRIFICATION**
Diesel hybrids Biofuel hybrids BEV Demo tests

*Up to 98% CO₂ reduction*

*City buses, waste collectors, distribution trucks.*

**BUS SYSTEMS**
Bus System packages

*Buses
Service and R&M Workshops Finishing ITS and FMS systems Ticketing systems*

*Alternative Fuels*
HERE AND NOW - SMART PUBLIC TRANSPORT

BUS SYSTEMS (BRT) + BIOFUELS + INTELLIGENT TRANSPORT SYSTEMS (ITS) = TRULY SUSTAINABLE TRANSPORT

Smart and safe transport

- Dedicated bus lanes
- High frequency
- Attractive and efficient stations
- Bus priority
- High quality customer info
- Modal integration at stations
- Flexible traffic management
- Greatly improved road safety
- High capacity at low cost - quick implementation

(10% of rail cost, 2 years implementation)
INNOVATION - FROM WASTE TO CLEAN LOW CARBON FUEL

BIOGAS HAS SUPERIOR GHG REDUCTION PERFORMANCE

- 95% of all global organic waste goes to landfill
- Biogas has a GHG reduction of 73% – 270%!
- Sweden 2018:
  - Less than 1% landfill
  - 91% of grid gas is biogas
  - 83% of public transport decarbonised
  - 28% of total fuel pool decarbonised
- Biogas potential:
  - 20% of fuel pool
- Particulate emissions 80% below Euro 6 level
Autonomous HD Full Electric Fuel Cell
HD Hybrid
HD Liquid Biofuels
Waste to Fuel
Gas

Gartner Hype Cycle

Peak of Inflated Expectations
Plateau of Productivity
Slope of Enlightenment
Trough of Disillusionment

Time
A DECARBONIZED TRANSPORT SECTOR IN 2030? YES!

- Driver training/ITS (3 TWh)
- Fleet renewal (1 TWh)
- Aerodynamics, optimized service, rolling resistance, tyres (4 TWh)
- Driveline, hybridization (1-2 TWh)
- Platooning, autonomy, logistics (2 TWh)
- 8-10 TWh biofuels 2030
- Electrification

Energy use in HD sector (TWh)

- Savings from more efficient transport
- Savings from more efficient drivelines
- Savings from more efficient vehicles
- Electrification
- Biofuels
- Remaining fossil fuel
WE KNOW IT IS POSSIBLE!

CLEAN AND LOW CARBON COMMERCIALY IN OPERATION ON ALL CONTINENTS

- 65% CO₂ AND -15% COST IN OUR OWN TRANSPORTS

- 65%
100% FOSSIL FREE CITY & REGIONAL TRANSPORT – IT IS EASY!

2 400 BIOGAS, ETHANOL, BIODIESEL, HVO & BIOFUEL HYBRID BUSES & TRUCKS
OVER 90% GHG REDUCTIONS – COMMERCIALLY

THE ROAD TO PARIS GOES VIA STOCKHOLM
GO AND SEE!
TO HALVE EMISSIONS EVERY DECAD...
REFERENCE SLIDES
SUSTAINABLE TRANSPORT IS NOT DIFFICULT

IT IS HERE AND NOW!
A SHIFT IS URGENT
GREEN TRANSPORT OFTEN DRIVEN BY THE BUS INDUSTRY

CONGESTION & URBANIZATION

POLLUTION

ENERGY SECURITY

CLIMATE CHANGE

MOBILITY x3

THE NO 1 KILLER

CURE THE OIL ADDICTION

HALVING OF CO₂ EVERY DÉCADE
WASTE TO FUEL – A WIN-WIN-WIN!

95% of organic waste to landfill

Organic waste → Biogas!

Biomethane fuel
- Best business case
- Biogas - the most sustainable diesel replacement.
- Many positive socio-economic values

Electricity
- Expensive and energy inefficient
- Sun & wind better
- Global biogas shift from electricity to fuel production

Heat
- Low value,
- Energy inefficient

Minimized landfill!

Bio-fertilizer
There is a lot of idle land also in Europe. Fallow and abandoned land alone could make Europe fossil fuel free and oil independent.

Need for reaching 10% biofuel goal

Available

- Proposed compulsory fallow
- Abandoned cropland in Bulgaria & Romania
- Abandoned cropland in EU-23

25 MHa = 8 Belgiums

Eurostat, Svebio
URBANIZATION AND POPULATION GROWTH

No sustainability without solutions for Asia, India and Africa

Source: United Nations, Department of Economic and Social Affairs The 2010 Revision. (Updated: 15 April 2011)