



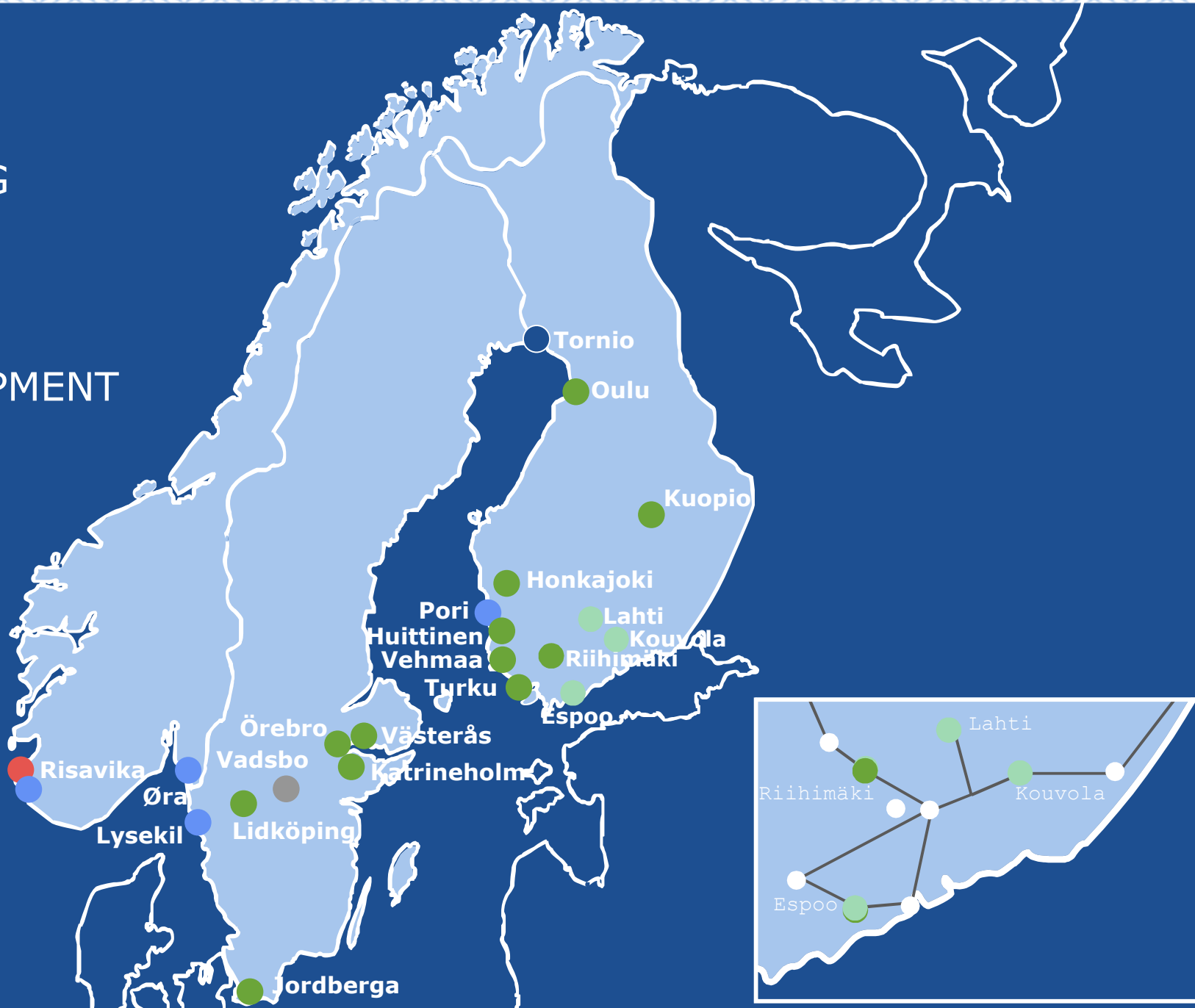
Developing a Nordic Gas Ecosystem – the role of Biogas

Jukka Metsälä, VP Traffic, Gasum Group | April 9th 2019



GASUM IS DEVELOPING THE NORDIC GAS ECOSYSTEM AND PROMOTING SUSTAINABLE DEVELOPMENT

- LNG production plant
- LNG terminal
- LNG terminal (joint project)
- Gasum, biogas
- Gasum, biowaste and biogas
- Biogas production plant (joint project)

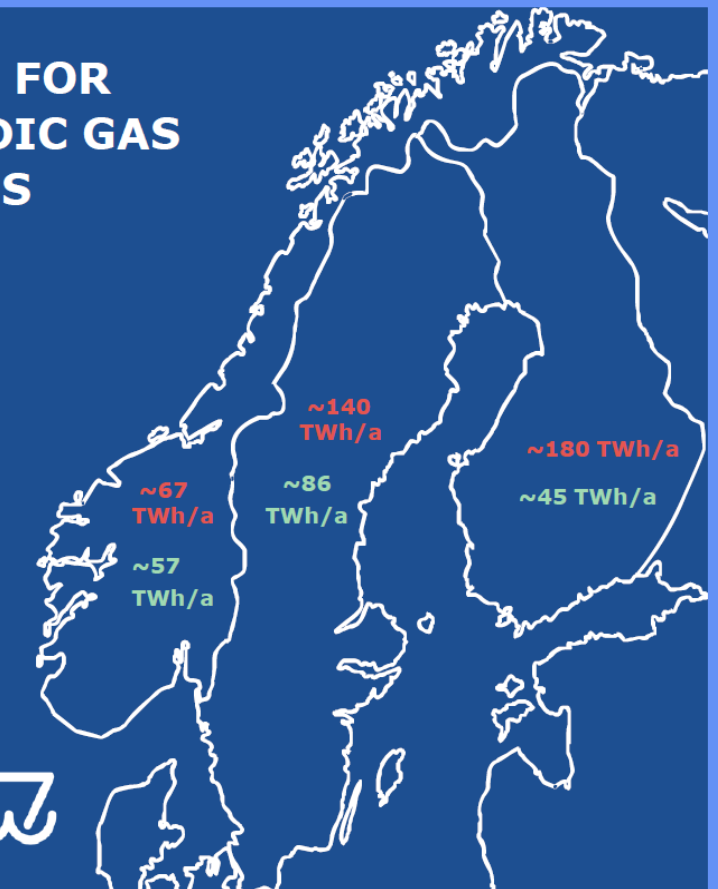


THE NORDIC OPERATING ENVIRONMENT

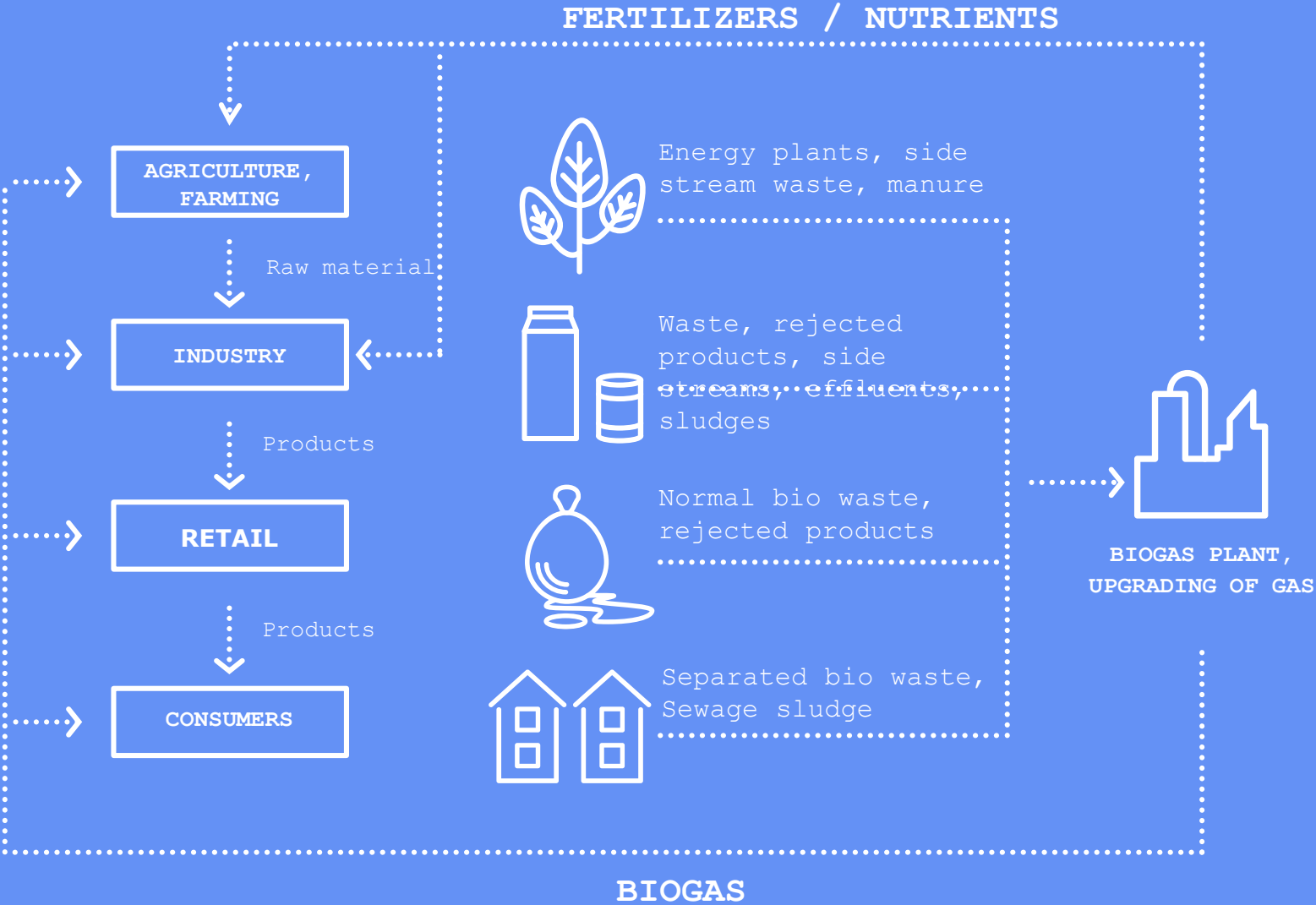
- Significant emission reductions and increased sustainability are required
- EU and national climate goals steer the transport sector towards a cleaner solutions in the Nordics
- Customer demand for environmentally friendly products and services is increasing rapidly across the Nordics
- Real demand for cost-efficient solutions, high security of supply and right business partnerships
- Major local and sustainable feedstock potential for biogas in the Nordics

THE GROWTH POTENTIAL FOR THE EXPANSION OF NORDIC GAS ECOSYSTEM IS ENORMOUS

Total market size
in the Nordics:
~750 TWh



BIOGAS – THE CLOSED CYCLE OF CIRCULAR ECONOMY



9/4/2019

DEVELOPING BIOGAS VOLUMES IN THE NORDICS

- Biogas production technology is a preferable solution in bio waste and side streams management fostering achievement of circular economy targets.
- Commission's Circular Economy Package (12/2015) and Waste-to-Energy communication (1/2017) highlight the role of biogas production compared to other solutions
- Strong support for development of recycling nutrient market. When feedstock limits production of ecological fertilizers, digestate has to be further processed for industrial recycled nutrient market

Feedstock potential enables over 70 TWh* biogas production in Sweden, Norway and Finland



*Biogas market ramp up
in Sweden, Norway and Finland:*

*Today ~ 4 TWh/a total
Step 2 ~ 15 TWh/a total
Step 3 ~ 35 TWh/a total
Step 4 ~ 70 TWh/a total*

* Gaia Consulting 2017

Gasum's greenfield projects together with partners

(some examples)



NYMÖLLA



Further development of the Gasum's biogas plants

(some examples)



Further Development of Biogas Market Model in the Nordics

A wide-angle photograph of a multi-lane highway during sunset. The sky is a mix of orange, yellow, and grey clouds. In the foreground, a tall street lamp stands on the left side of the road. In the middle ground, a white truck is driving on the highway. To the left, several high-voltage power lines and towers are visible against the sky. The overall scene is a mix of infrastructure and nature.

Demand for Cleaner Road Transport

Maximize the value of biogas

Commission published emission limits for new vehicles by 2030, 30-37,5% CO2 reduction for different vehicle segments

In addition, focus on a full life cycle emission and social impact on low-carbon transition as well as promotion on clean fuels

High national ambition level for carbon neutral road transport in the Nordics – Biogas has a key role !!

GAS FUEL IN ROAD TRANSPORT IS A SOLUTION FOR FAST EMISSION REDUCTION - *THIS SOLUTION IS AVAILABLE TODAY*

- **Natural gas infrastructure exists already and molecule is used widely in industry and energy production.** Biogas potential around 40% of energy consumption in road transport segment in the Nordics – Biogas is a part solution to cut road transport emission
- **Gas vehicle models are available today for bus, light duty distribution and passenger car segments and refueling infrastructure is developing in Europe.** Gas solutions are based on proven technology and enable significant emission reduction in combustion engines.
- **Major share of road transport emission comes from HDV segment, long haul segment has the highest fuel consumption.** Based on recent studies, there is a significant market potential for LNG/LBG driven HDV transport.

Current status

Market Entry

Critical Mass

Target Market



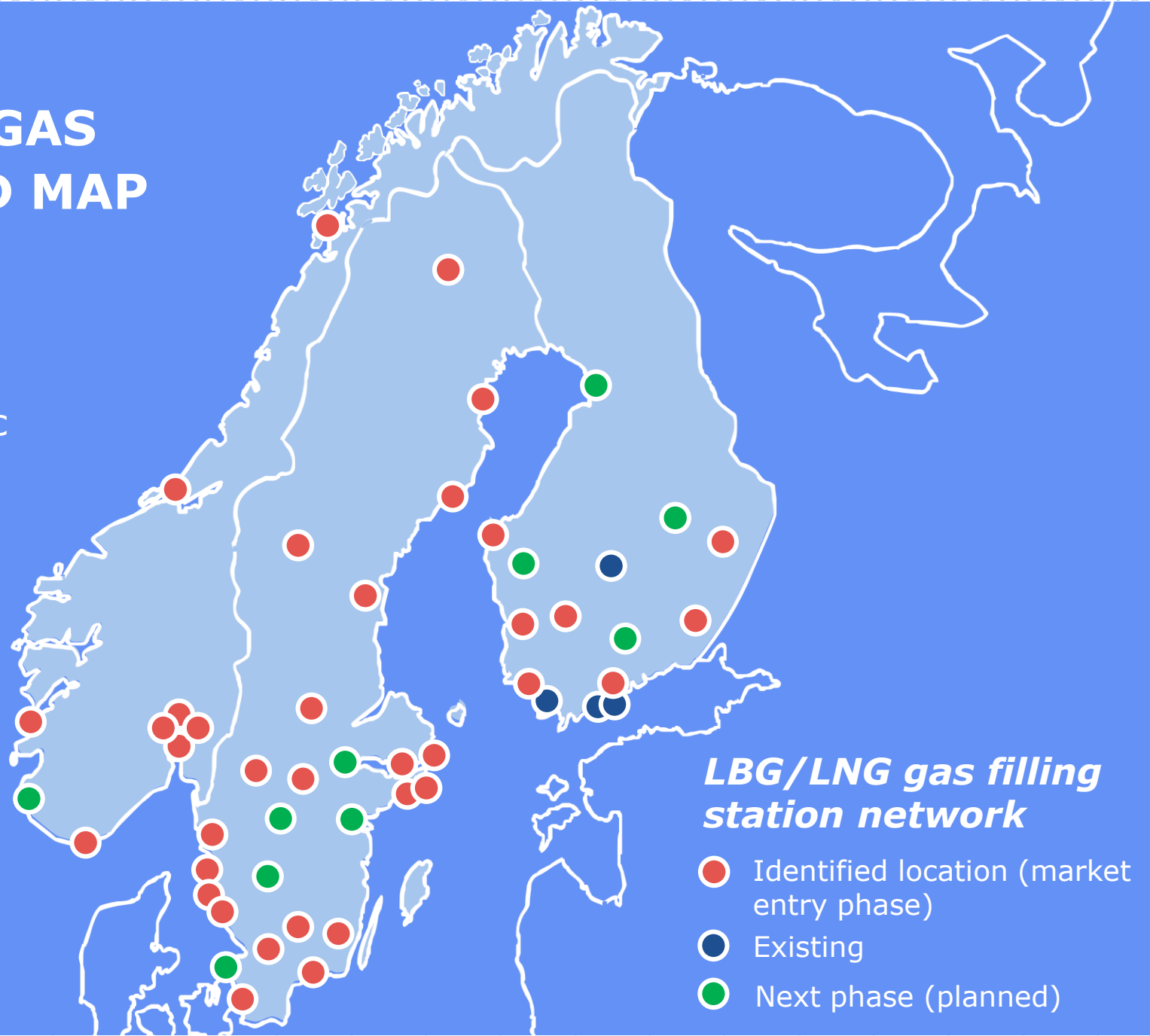


Strong Growth in All Gas Vehicle Segments in Finland



GASUM'S HEAVY-DUTY GAS FILLING STATION ROAD MAP

- Our road map reflects the ambition to sharply increase the role of LNG as a fuel in the Nordic HDV segment and accelerate this development.
- Gasum's Market Entry phase includes around 50 new LNG/LBG filling stations in Finland, Sweden and Norway by early 2020s





Elgiganten, Gasum and Volvo Lastvagnar are now entering a testing period in which Elgiganten's transport partners will run the outgoing transport from Elgiganten's Nordic distribution centre in Jönköping on liquified biogas.



Gasum and Lidl Finland are cooperating to produce environmentally friendly and local biogas from biowaste generated at Lidl grocery stores.



Posti will be using the LNG vehicles for demanding transport operations. Posti's target is to reduce carbon dioxide emissions in proportion to net sales by 30% by 2020.



More than 100% growth in Finland in CNG/CBG sales. Gasum launched a fixed monthly fee fuel campaign - 65 €/month fuel fee for consumer segment



Gasum and IKEA Finland launch cooperation – Biogas from restaurant food waste and gas filling stations in conjunction with stores



Organic waste K-food stores and the Kesko logistics central warehouse is currently recycled to produce biogas. Biogas is used to power/heat the making of Pirikka ice cream at Turenki Ice Cream Factory.

WE ♥ GAS