

WASTEWATER SUCCESS STORY

Vehicle Fuel from Wastewater at Suomenoja WWTP

Espoo, Finland

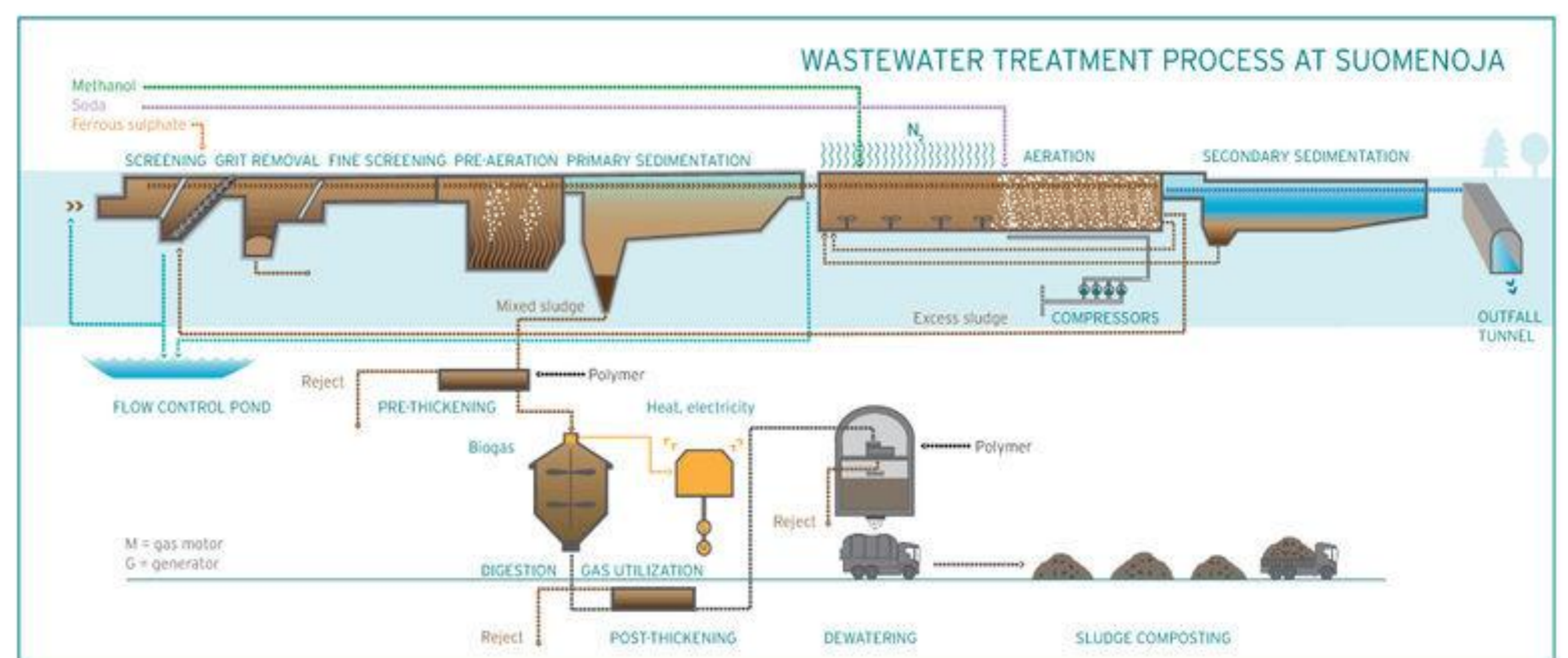
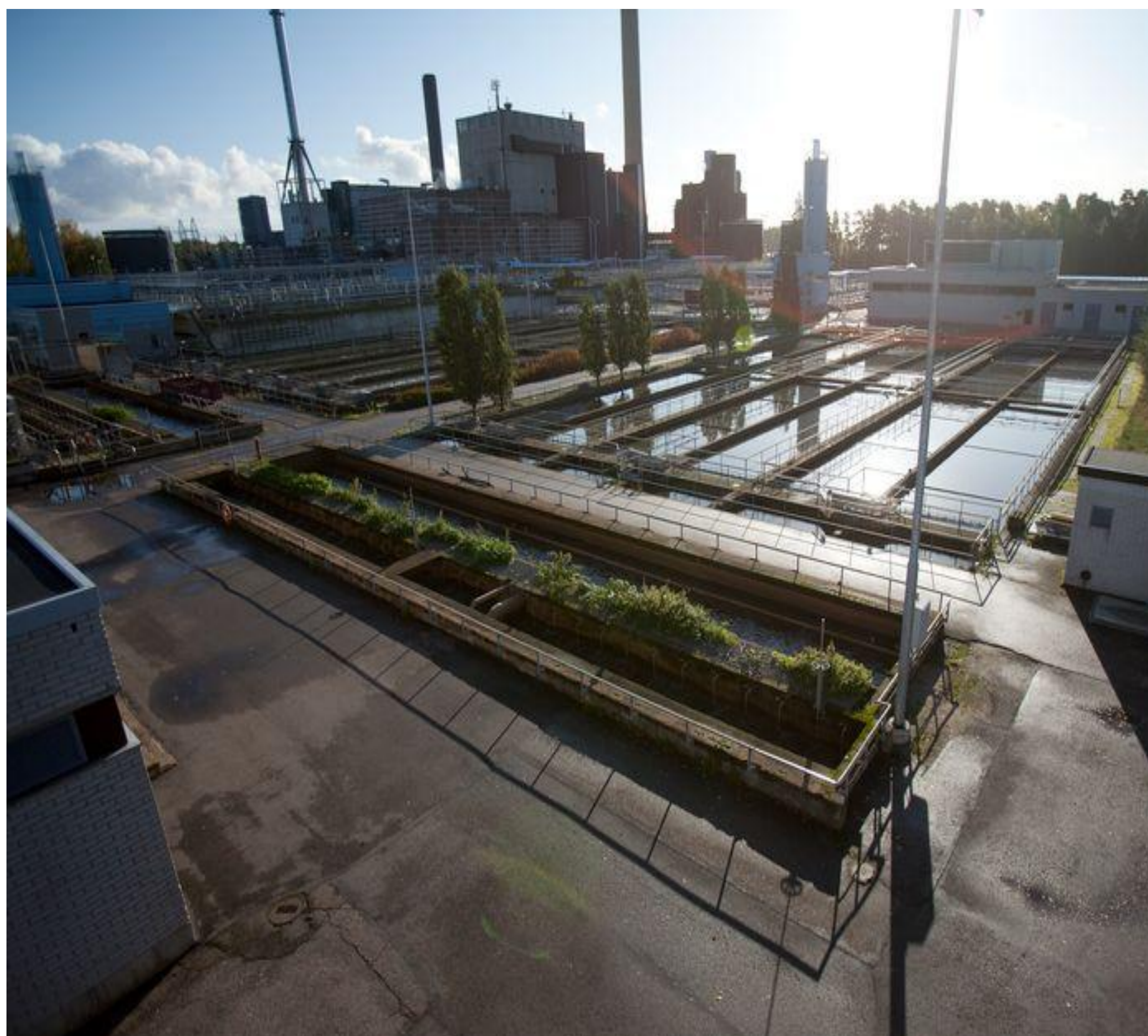
Helsinki Regions Environmental Services HSY

OVERVIEW OF WASTEWATER PROJECT:

Suomenoja WWTP facility serves a population equivalent of 250,000 inhabitants in the Helsinki metropolitan area of Finland and the average wastewater flow rate is 90,000 m³/d, when the wet weather peak flow can be as high as 300,000 m³/d. Suomenoja WWTP is specialised for nutrient removal and operational level of nitrogen removal is 75% and phosphorus removal rate is 97%. The water treatment track has traditional mechanical-chemical-biological treatment process.

The sludge treatment process is based on mesophilic digestion process which retention time is 14 days followed by dewatering procedure with three centrifuges. The facility of Suomenoja produces annually about 23,000 tons of dewatered sludge in average of DS 32% and the sludge is further processed by composting for green building and agricultural purposes. Total energy consumption is 13 GWh/a.

ACTUAL ANNUAL EMISSION REDUCTIONS: 900 MTCO₂E



BIOGAS INFORMATION

- Two (2) mesophilic complete mix digesters, operated in series and capacity 2*6,000 m³
- Biogas production 3.5 Mm³/a
- Average methane content in biogas 63%
- Biogas end use as a vehicle fuel since 1st November 2012
- Combined heat and power unit as a deputy operational line, operated as a main operational line in the end of October 2012
- Capacity of generation (0.7 MW), 1 MWM GmbH (2000), at the moment in secondary use
- Own electricity production 4.6 GWh (2011) which was 35% of total consumption
- Own heat production (2011) by CHP 9.5 GWh and by heat recovery 4.1 GWh, which was 97% of total heat consumption

COST & REVENUE INFORMATION

Investment Cost of biogas upgrading plant: US\$ 4,000,000
Sales value for HSY (US\$/year): 1,000,000

Other revenue streams: Investment subsidiary system for recyclable energy investments (15-40%)
Actual payback period: 5 years

GASUM PROJECT HIGHLIGHTS

- HSY transfer raw bio gas to Gasum Ltd. upgrading plant, which locates at Suomenoja WWTP area
- Gasum Ltd. upgrades raw bio methane, average methane content higher than 95%
- Total energy content in bio methane 20 GWh/a, energy consumption of upgrading 1.5 GWh/a
- Potential as a vehicle fuel 3.39 Mkm/a

ENVIRONMENTAL ASPECTS

- Bio gas upgrading is based on water scrubbing process (manufactured by Malmberg Water Ab)
- Odor control system is based on activated carbon filter
- Noise level less than 50 dB
- Suomenoja WWTP internal energy source decreased due to co-operation (0%)
 - Thus there has to be great focus on energy saving issues
- Great environmental total impact when bio gas is used vehicle fuel and WWTP use natural gas and electricity; -900 MTCO₂E/a and -25TNO_x/a
 - SO₂ emissions increases +1.3 T/a due to energy consumption increase at Suomenoja WWTP due to fossil fuels origin



Gasum

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BIOGAS

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MAAKAASU
NATURGAS

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SYSTEM PHOTOGRAPHS

GASUM PLANT IN ESPOO



VEHICLE FUEL USE



SPECIAL WWTP-RELATED ENERGY IN ESPOO

- Utilization of excess heat of treated wastewater in Espoo city's district heating system is under final negotiations
- Plant will be combined heating and cooling plant
- Heating energy potential PE 20,000

FOR MORE INFORMATION

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