WBA

WORLD BIOGAS ASSOCIATION

ANAEROBIC DIGESTION MARKET REPORT

THE NETHERLANDS

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Introduction

The Netherlands is one of the few countries in the world which has rolled out biogas-to-biomethane upgrading on a large scale and has clear short-, medium- and long-term visions and strategies set out by the Government in partnership with the private sector. Having been held back by regulatory uncertainty for some time, the Dutch biogas industry is now expected to grow rapidly thanks to the availability of new funding. Livestock manure and seaweed are expected to drive this growth in the short and long term respectively.

Current status

- There are currently over 250 functioning digesters in the Netherlands with 219 MW installed electrical capacity and 11,905 Nm^3/hr biomethane upgrading capacity (IEA Bioenergy, 2016). The Ministry of Economic Affairs (RVO) has published information on all of the installations online.

- There are 25 biogas upgrading plants either feeding biomethane into the gas grid or using it as vehicle fuel. The most common technology used for upgrading biogas to biomethane is membrane separation (European Commission, 2016).

- The percentage of biogas energy converted into heat is 56% and into electricity 33%. 8% of the energy is used as vehicle fuel, one of the highest levels in the world (IEA Bioenergy, 2015).

Potential

- By 2020, the biogas sector in the Netherlands has the potential to produce 1.2 billion m^3 of biogas or 0.75 billion m^3 of biomethane, increasing to 3.7 billion and 2.2 billion m^3 respectively by 2030 (Green Gas Forum, 2014). Significant growth is expected in biogas from manure, sewage sludge, grass and seaweed.

- There is potential in the Netherlands to produce 975 MW of energy using biogas solely from current waste streams: livestock manure (cows, pigs, and poultry), sewage, and food waste. 3 TWhe of electricity from these waste streams can meet the annual electricity requirement of over 440,000 people (based on World Bank, 2014).

- By 2030, the Dutch Green Gas Forum aims to be able to produce around 800 million nm^3 of biogas from the anaerobic digestion of seaweed (Green Gas Forum, 2014).

"WE EXPECT THE TOTAL AMOUNT OF NATURAL GAS STILL NEEDED IN 2050 TO BE REPLACED BY RENEWABLE GAS."

Marieke van der Werf, Director of Energy Transitions at Groen Gas Nederland

CURRENT DIGESTERS IN THE NETHERLANDS

Type	Digester count (2013)	Estimated installed capacity (MWe)	Upgrading capacity (Nm^3 biomethane/hr)
Agricultural	105	129	606
Wastewater	82	46	470
Landfill	41	15	1625
Bio-waste	11	11	3892
Industrial	13	18	5312
Total	**252**	**219**	**11,905**

Drivers

- **Green Gas Roadmap** – As a part of the Green Gas Green Deal, signed by the Dutch Ministry of Economic Affairs and the Green Gas Forum, the Green Gas Roadmap outlines the potential for renewable gas from digestion and gasification in the mid and long term. The Roadmap plays an important role in identifying feasible feedstocks for the production of biogas and its use in the Dutch economy.

- **Stimulering Duurzame Energie productie (SDE+) Scheme** – The SDE+ scheme provides the feed-in premium (FIP) that covers the difference between the cost of generating renewable electricity and the wholesale market price of electricity. For 2016, €9 billion was set aside to fund the scheme, a significant increase from €3.5 billion the year before. All renewable energy technologies compete for the same budget on a first-come-first-served basis, with priority given to low-cost technologies.

- **Green Gas Netherlands: Task Force Jumpstart** – Together with the Ministry of Economic Affairs, the Netherlands Agricultural and Horticultural Organisation (LTO), dairy cooperative Friesland Campina, the Sustainable Dairy Chain, and the Dutch Dairy Chain (DZO) have set up a cooperative with a budget of €150 million to incentivise the mono digestion of manure, which is not able to compete with other technologies for SDE+ but is environmentally beneficial (Groen Gas Nederland, 2016).

- **Guarantees of Origin for Renewable Gas** – On behalf of the Ministry of Economic Affairs, Vertogas certifies that upgraded biogas meets the energy value and quality of natural gas and that the biomass used to produce it has been sustainably sourced, as per the Dutch Technical Agreement (Vertogas, 2017). This allows for smooth integration into the gas grid, fair compensation, and access to subsidies for the generators of biomethane, all of which are barriers for biogas in many other countries.

Barriers

- **Reliability of financial incentives** – Schemes supporting the anaerobic digestion industry have been modified, stopped, or new ones initiated by different governments, making evaluations of long-term feasibility or profitability difficult (European Commission, 2016).

- **Excessive focus on cost** – Current incentive schemes are designed to encourage maximum energy generation at minimum cost but do not take into account the greenhouse gas emission abatement benefits of technologies such as AD.

- **Inconsistent gas specification** – The calorific value of upgraded gas required to be fed into the grid varies by region, putting developers in regions where higher standards are required at a disadvantage and leading to inconsistent development of biogas across the country.

CASE STUDIES

Wjister Green Gas Hub – Centralised upgrading (IEA Bioenergy, 2017)

- **Inputs:** The hub combines biogas from a landfill site, an onsite plant digesting residual household organic waste, and biogas from local farms digesting crop residues.

- **Outputs:** The combined biogas is upgraded to natural gas quality and supplied to the gas grid. Liquefied CO_2 is extracted for use in horticulture.

- **What is unique:** Biogas from various sources is dried, desulphurised, and supplied to the upgrading facility via a biogas pipeline, where is it upgraded to natural gas quality for further use. A pilot plant refining the biogas to bio-LNG for use in lorries is also in development.

Energy and nutrient recovery factory, Amersfoort WWTP (Ostara, 2016)

- **Inputs:** Thickened sludge from Soest and Nijkerk Wastewater Treatment Plants (WWTPs) are sent to the Amersfoort WWTP for digestion.

- **Outputs:** In addition to generating 2 GWh of electricity, which is used on site with excess exported to the grid, 900 tonnes of Crystal Green, a granular, phosphorus fertiliser, is produced every year.

- **What is unique:** Monetisation of nutrients, especially phosphorus (essential for plant growth), is generally limited and occurs in just a handful of countries around the world.

"THE UTILISATION OF BIOGAS IN A FUTURE ENERGY SYSTEM IS A MUST BECAUSE OF ITS CONTRIBUTION TO THE CIRCULAR ECONOMY AND THE VERSATILITY OF APPLICATIONS IT OFFERS."

Michel Dumont, Senior Advisor on Bioenergy and Specialist in Biomethane at the Netherlands Enterprise Agency

"TODAY GREEN GAS (BIOMETHANE) IS USED AS A HEAT OR POWER SOURCE OR IS INJECTED INTO THE GAS GRID. BOTH ARE EFFECTIVE USES FOR BIOGAS. AFTER 2020, USE OF BIOGAS IN TRANSPORT AS BIO-LNG IS EXPECTED TO TAKE OFF. MANURE, SEWAGE SLUDGE AND GRASS WILL BE THE RAW MATERIALS FOR DIGESTION IN THE COMING 15 YEARS, ALLOWING BIOGAS TO MEET 5-7% OF THE DUTCH RENEWABLE ENERGY TARGET (15-20 PJ)."

Freek van Eijk, MD Acceleratio, WBA Advisory Board Member

"PRODUCTION OF BIOGAS IN COMBINATION WITH HARVESTING VALUABLE COMPOUNDS IS THE IDEAL SOLUTION FOR WET ORGANIC RESIDUES. METHANISATION OF BIOGAS ENABLES GROWTH OF MARKETS SUCH AS VEHICLE FUEL WHERE WASTE HEAT FROM CHP CANNOT BE UTILISED."

Kees Kwant, Senior Expert on Bioenergy and the Biobased Economy at the Netherlands Enterprise Agency

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