Water & Treatment Solutions



0

switching on the biogas resource

a new source of renewable energy



The evolution of the water industry is being

driven by a number of challenges including climate change, rapid population growth, increasing demand for natural resources, rising expenditures and heightened community expectations.

Wastewater is a proven source of potential energy which has been demonstrated to be financially and environmentally viable.

Energy can be generated from biogas produced from anaerobic digestion of wastewater sludge. Today, advanced technologies allow external sources of organic waste to be added to the anaerobic digestion to boost the production of biogas, resulting in more energy generation.

Through smart and reliable solutions, SUEZ collaborates with our clients to leverage wastewater resources to achieve their business objectives.

switching on the biogas resource

unlocking a

new source of

renewable energy

biogas facts

9.94kWh 1m³ of biomethane can

generate 9.94kWh of energy

Annual sewage sludge from 100.000 residents can recover biomethane to power 20 buses or 20 household waste collection trucks or 100 cars, saving **525,000** litres of diesel fuel

.1 litres 1m³ of biogas can offset more than 1.1 litres of petrol

Estimated only. Actual energy may differ sed on composition of biogas and

• Meeting increasing demand for energy while preserving natural resources through producing energy, biofuel and green gas for homes and businesses

Biogas is a powerful source of renewable energy

Biogas can be converted into electricity and heat to meet the energy needs of wastewater treatment plants, homes and businesses.

Refined biogas, known as biomethane, contains approximately 98% methane. It can serve as a supply of green gas for homes and businesses or as biofuel to power cars, buses and commercial vehicle fleets.

Biogas recovery contributes to:

• Combatting climate change through reducing emissions of greenhouse gas

• Obtaining cost savings through generating electricity to power onsite wastewater treatment facilities

• Moving toward a circular economy through recovering and regenerating energy from wastewater and organic waste

Understanding the biogas loop



Biogas is a powerful source of

5. BioLNG and bioCNG

- savings over diesel and gasoline

Biogas technologies

SUEZ is continually investigating **smart and innovative** technologies to assist our clients in making the best use of wastewater as a resource. Today, we offer a **full range** of proprietary anaerobic digestion technologies.

Anaerobic digestion

Anaerobic digestion is the biological process which converts organic matter from various feedstocks into biogas.

In collaboration with our clients, SUEZ helps to optimise the anaerobic digestion process to maximise biogas production.

Product	Digestion type	Description
Digelis™	Conventional digestion	Mesophilic digestion 37°C
Digelis™Smart	Conventional digestion	Mesophilic digestion 37°C + integrated biogas storage
Digelis™ Thermo	Enhanced digestion	Thermophilic digestion 55°C
Digelis™ Duo	Enhanced digestion	Mesophilic digestion 37°C + thermophilic digestion 55°C
Digelis™ Turbo	Boosted digestion	Thermal hydrolysis
Digelis [™] Simplex	Metallic tank solution for diges	stion

Co-digestion

Co-digestion is the practice of introducing additional organic waste streams to the traditional anaerobic digestion process to boost biogas production.

Our expertise in water treatment and waste management allows us to assist our clients in putting wastewater and organic waste to good use.

Identifying energy losses to operate on-site digesters

Drawing on our 40 years of experience in anaerobic digestion, SUEZ can identify and capture minor energy losses throughout the treatment process to heat on-site digesters.

This helps to maximise the quantity of biogas available for the production of electricity and biomethane.



SUEZ BIOMETHANE

SUEZ BIOMETHANE is a high-performance purification process for the production of biomethane.

Biomethane from SUEZ BIOMETHANE can be fed directly into the natural gas grid without additional compression, or treated further to produce biofuel. Advanced membranes allow the yield of biomethane with 99% purification with less than 1% loss of methane.

SUEZ CRYOGENIC

SUEZ CRYOGENIC technology combines the cryogenic cleaning of biogas and liquefaction of biomethane in an integrated system to produce liquid biofuel from biogas.

This technology treats biogas generated from sewage sludge and all kinds of waste including agricultural, industrial and household waste.

Biomethane can be fed directly into the natural gas grid without additional compression, or treated further to produce biofuel.

Cleargreen™

Cleargreen[™] is SUEZ's patented biological treatment of side-streams with high ammonia concentration, augmenting anaerobic digestion and co-digestion.

Wastewater streams generated by anaerobic digestion processes contain high concentrations of ammonia nitrogen.

Cleargreen[™] technology removes this ammonia nitrogen load from the effluent before it is returned to the main treatment line.

This treatment step helps limit the impact of digestion on the main water treatment line and allows plants to meet increasingly stringent effluent quality standards.

SUEZ provides professional stewardship for biogas projects.

From listening and understanding our clients' local needs, we collaborate with them to develop projects from beginning to end.

- Biogas consulting
- Project conception
- Engineering & construction
- Operation & maintenance

SUEZ has invested more than 10 M€ in the research and developm of biogas recovery strategies over the past eight years

Biogas Case studies

SUEZ continues to expand the boundaries of biogas via energy generation, gas production and biofuel refining through **partnerships** with municipalities and businesses around the world.



Energy self-sufficient wastewater treatment plants in South Australia

At Glenelg Wastewater Treatment Plant, operated by Allwater, a joint venture between SUEZ and Broadspectrum, a fully automated co-digestion plant was commissioned in July 2013. The on-site anaerobic digester is fed with liquid waste such as sugars, alcohols and other organic rich wastes to boost the biogas production. The co-digestion process has enabled the plant to produce an extra 1,790 MW of energy in the first 2.5 years of operation.

At Bolivar and Christies Beach Wastewater Treatment plants, anaerobic digesters and co-generation motors have been installed to generate biogas which is converted into electricity to power the plants.

Today, the electricity generated from biogas supplies 74% of the energy demand at Glenelg, 94% at Bolivar and 21% at Christies Beach plants.









Green gas added to network for 5,000 homes in Strasbourg, France

Strasbourg Urban Community is the first in France to inject biomethane produced from a local wastewater treatment plant into its natural gas network.

Since September 2015, through partnership with Strasbourg Urban Community and collaboration with our partner, a local distributor of natural gas, more than 1.6 million m³ of biomethane has been produced from wastewater at the Strasbourg-La Wantzenau Wastewater Treatment Plant.

This amount of biomethane supplies gas to approximately 5,000 low-energy homes in the region.

(\mathbf{B})

Bio-LNG to power longdistance transport vehicles in Valenton, France

Supported by ADEME*, the BioGNVAL project, operates through partnership with CRYO-PUR, a local company, aimed to develop innovative technologies for the production of liquid biofuel from biogas.

In 2014, SUEZ CRYOGENIC was developed under this partnership and tested at the Seine Amont Wastewater Treatment Plant in Valenton. The technology recovered 40% of biogas that couldn't be fed into the natural gas network. SUEZ CRYOGENIC reduced the volume of biogas by 1,000, which allowed the production of liquid biofuel.

The liquid biofuel is used to power longdistance transport vehicles. In 2015, the project won the Innovation Award at the Expobiogaz Exhibition in Paris.

*ADEME is the French Environment and Energy Management Agency

/\$UEZ/

Headquarter-Paris Tour CB21 16, Place de Ulris 92040 Paris La Défense Cédex France Tél. +33,1 58,81 50 00 www.suez.co.com

