ENER-G

Energy from biogas

OPTIMISED BIOGAS UTILIZATION

The complete solution

Our company

ENER-G designs, installs and operates biogas combined heat and power (CHP) systems for a variety of digestion plants.

Digestion plants produce a biogas which has high methane content, approximately 50-70%. This otherwise environmentally harmful gas is a rich fuel that can drive a CHP unit generating both heat and electricity. Turnkey delivery of individual biogas CHP projects hinges on our unique in-house resources that include a specialist design team, production facilities and dedicated team of service engineers. Thanks to our flexible engineering approach all our solutions include bespoke system design.

Our people have a vast experience and technical expertise which enables us to deliver our solutions to a wide range of clients. Our advanced technology utilises the biogas from the digestion plant and provides green energy.

The heat is used in the digestion plant and the related buildings and the renewable electricity is sold at a high price. As a result our solutions consistently surpass customers' expectations.

Our services include:

- Feasibility study
- Bespoke system design and specification
- Project management and assistance with Environmental Permitting
- Manufacturing of the CHP unit
- Build of the compound
- Electrical connection
- Installation and commissioning
- Supply of flare and auxiliary equipment
- Ongoing operation and maintenance
- Administration and sale of electrical power
- Finance options

The ENER-G concept

The problem

Disposal and treatment of biological waste represents a major challenge for the waste industry in the UK and Europe. For a wide range of organic substances from agriculture, food processing and manufacturing, anaerobic fermentation (with the lack of oxygen) is a superior alternative to composting.

Biogas – predominantly a mixture of methane and carbon dioxide (CO2) – is created from anaerobic fermentation of organic materials.

The gas produced in the digester consists of 50 - 70% methane and 30 - 50% CO2. This composition makes biogas well suited for combustion in gas engines. The biogas serves as a high-energy, renewable fuel that can be used as a substitute for fossil fuels. Biogas-fuelled gas engines improve waste management while help maximise the use of an economical energy supply.

Compared to fossil fuels utilising biogas in the engines avoids any additional greenhouse gas emissions. Due to the organic nature of the components of biogas, burning it in a gas engine for power generation emits the same amount of CO2 into the atmosphere as was originally absorbed during the process of photosynthesis in the natural CO_2 cycle.

The ENER-G concept

ENER-G works in partnership with the digestion plant developers and clients and connects to the system where the fermentation of the biomass has happened and the output, a methane-rich gas is generated. This will be then used in the ENER-G CHP unit, where it is burned in a reciprocating engine. The ENER-G cogeneration technology enables customers to realize the maximum economic and ecological benefits available from utilizing biogas for power generation.

The unit can be:

- Internal
- External, in a fully mobile, containerised unit

Energy generated:

- Electricity and
- Low temperature hot water (90°C) or
- Medium temperature hot water (120°C) or
- Steam up to 220°C

The heat can be utilised locally while ENER-G can sell the electricity to the local grid and administer the process for the recovery of Renewable Obligation Certificates (ROCs).

- Waste Water Treatment (WWT)

Anaerobic digestion can be applied at:

works (paper mills, industry)

- Sewage treatment works
- Farming consortiums
- Industrial manufacturers of organic products
- Breweries, distilleries
- Food processing and manufacturing
- Waste management facilities
- Chemical and pharmaceutical industry

Suitable organic materials:

- Sewage sludge and grease sludge
- Liquid manure, solid effluent
- Separately collected bio-waste from households
- Bio-waste from slaughter houses, breweries and distilleries, fruit and wine press houses, dairies, the cellulose industry or sugar production
- Secondary-growth raw materials, e.g. corn silage, non-food grains
- Vegetable oils and animal fats
- Vegetables, vegetation
- Organic municipal solid waste (MSW)

The process

The process of biogas generation is shown on the graph below.

The preparation of the bio-input take place in the digester plant, where the organic material is collected in a primary tank, and processed and prepared for the delivery to the digester tank.

1 Digester tank: the anaerobic fermentation of the prepared bio-input.

2 Gas bag: the biogas produced in the digester tank is collected in a flexible gas storage tank to ensure continuous supply of biogas, independent of fluctuations in the biogas production.

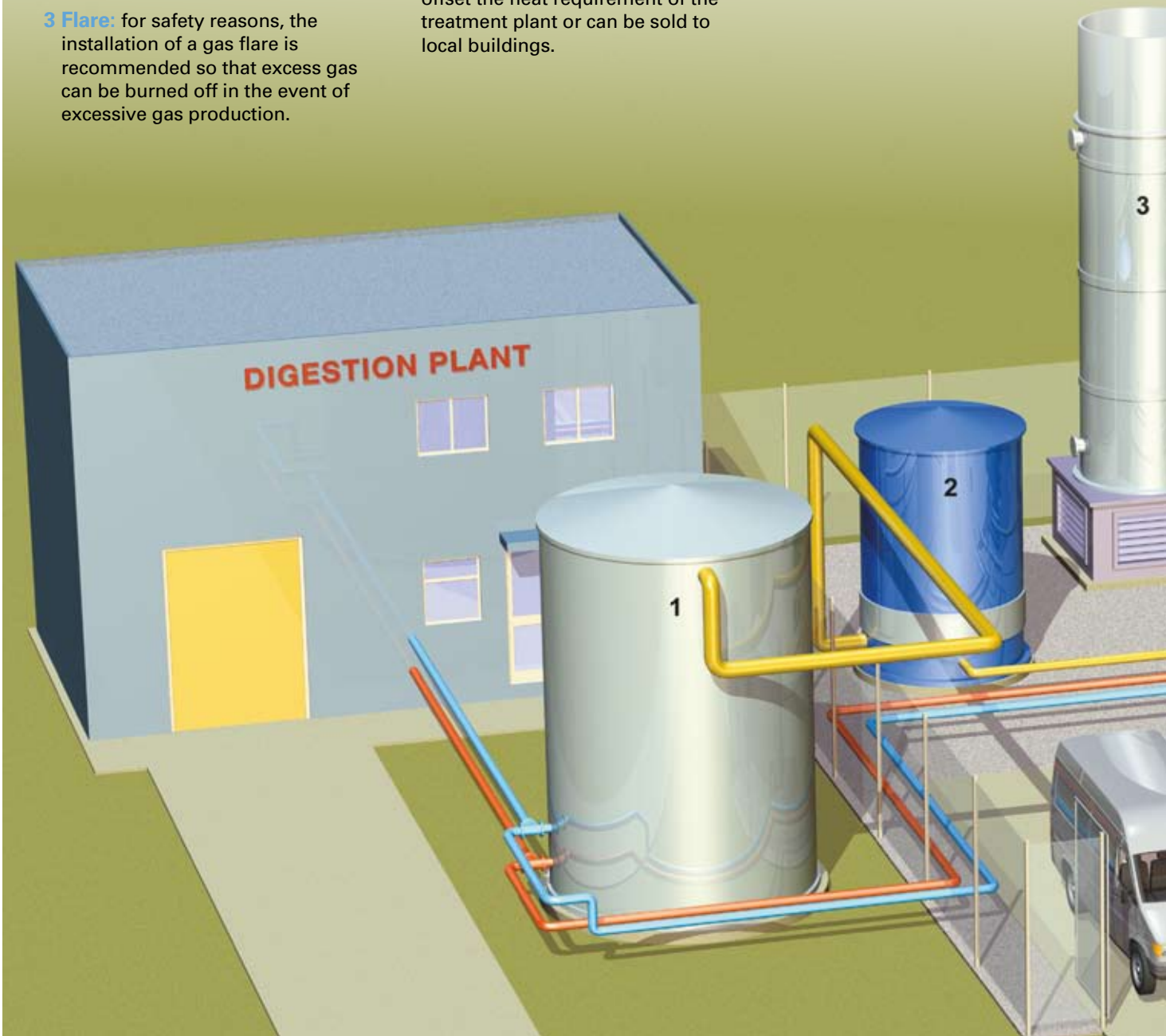
3 Flare: for safety reasons, the installation of a gas flare is recommended so that excess gas can be burned off in the event of excessive gas production.

4 Auxiliary equipment: switches the flare on/off in case the biogas quantity increases or drops, or when the CHP unit is switched off for example for annual maintenance or repair.

5 Heating water: cold water is transferred from the digestion plant and other buildings into the CHP unit. Here the Heat Recovery System takes the "waste heat" from the engine jacket and/or from the exhaust gas to heat up the water. This thermal energy can be used to heat the digester or to offset the heat requirement of the treatment plant or can be sold to local buildings.

6 Biogas connection: the biogas is transferred from the gas bag into the CHP unit.

7 Natural gas: as an option natural gas can be connected to the system to provide additional electrical energy or heat if required (separate power unit).



8 Engine: a range of 6 to 20-cylinder turbo charged reciprocating engines, in sizes from 165kW to 2MW are available for biogas applications.

The engine is fully integrated with the digestion plant and can be controlled from anywhere on the plant. It also has the ENER-G Gkontrol system for remote monitoring and fault diagnosis.

9 Alternator: electric generator, powered by the engine that produces alternating current.

10 Silencer: reduces the engine's exhaust gas noise. The engine is housed in a fully noiseproofed container therefore the system can be applied in noise-sensitive locations.

11 Radiator: cools the engine by transferring heat from the engine.

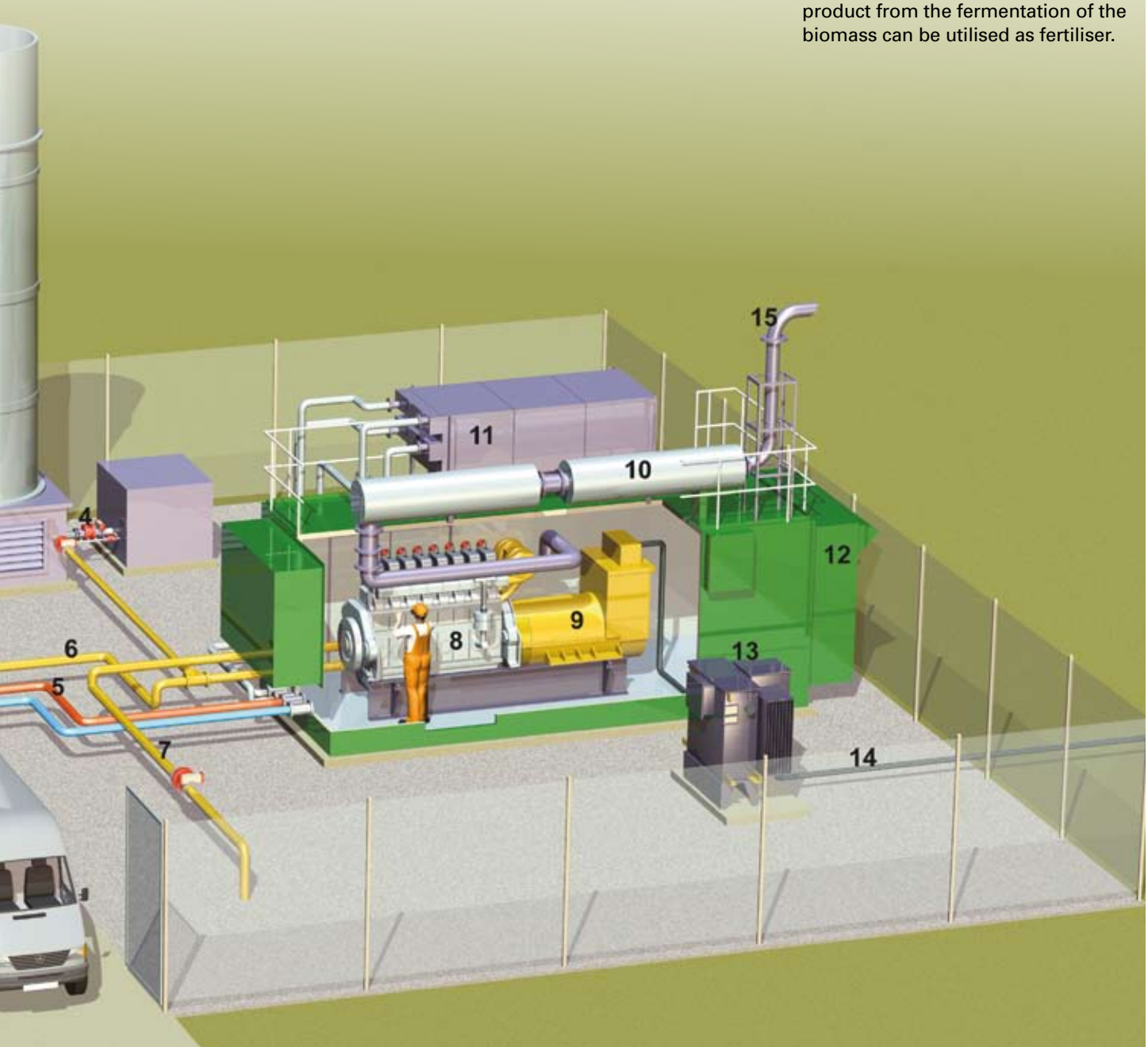
12 Ventilator: helps avoid overheating of the engine by providing reduction in short-circuit air flow from the pressure side to the suction side of the ventilation radial fan.

13 Transformer: transfers electrical energy from the alternator to the high voltage (HV) cable.

14 Electricity HV cable: the electrical energy generated by the CHP unit can be utilized for the treatment plant as well as to supply the public power grid and sold as renewable electricity.

15 Exhaust: the engine exhaust emissions are fully compliant with EU standards.

Post-treatment of the residual digest material takes place and the end product from the fermentation of the biomass can be utilised as fertiliser.



Our capabilities

- We are specialists in CHP manufacturing and operation with 25 years of experience
- We are engine-independent therefore can personalise the CHP unit for each client's needs
- Over 15 years of experience in biogas utilisation from landfill sites and mines at in excess of 80 sites
- Experience in dealing with a variable energy gas that can contain contaminates that effect generation performance
- Operation and maintenance with network of over 140 service engineers in the UK and across Europe
- Our state-of-the-art remote monitoring system ensures immediate problem identification, which reduces downtime and increases engine availability (95%)

Operation and maintenance

For all our systems we offer personalised long-term operational and maintenance contract to ensure smooth operation and long engine lifetime.

Finance options

- Capital purchase
- Medium to long term rental of generation plant
- Discount energy purchase (electricity only)
- Shared ROC/FIT (Feed in Tariff) scheme
- Fully financed option

Benefits of working with ENER-G

- ENER-G can carry projects that are conceptual, through feasibility to construction and completion
- Main contractor capability for full turnkey operations
- Reduced number of professional bodies involved
- Reduced cost of project development
- Flexible approach to the utilisation of heat and power
- All building works and civils can be accounted for
- Live online system monitoring and operational maintenance
- Maximised operational output from the CHP system due to our nationwide network of service staff
- Full client support and assistance to maximise financial revenue of the electricity sale and ROCs

Case study

Stornoway Scotland

The Comhairle nan Eilean Siar waste treatment facility, situated near to Stornoway, was opened in October 2006. It was the first in the UK to incorporate anaerobic digestion (AD) of source-separated biowaste (food, paper and garden waste).

The facility is a major part of the Council's municipal waste management service delivery, allowing it to meet the challenging targets for landfill diversion of biodegradable municipal waste that have been set by European Union and the Scottish Government.

The AD plant processes household separated kitchen waste, paper and household green waste that is collected from all around the islands, to produce a methane rich biogas (50-55%) that can be used to fuel a combined heat and power (CHP) unit.

ENER-G designed, built and delivered a 305kWe biogas CHP unit for this site, which enables the biogas produced from the AD process to be used to generate enough electrical power to power the site with the surplus being exported to the local network.

The AD plant can treat up to 7000 tonnes of biowaste each year. All of the waste heat is captured and utilized to maintain the AD plant at the correct temperature and heat the office accommodation at the site.

ENER-G's biogas CHP unit has been successfully generating power producing on average 637560kW of heat and 589260kW of electricity per annum.

About ENER-G

ENER-G provides customers with a variety of technologies ranging from the generation of energy to the management of energy use, delivering sustainable energy solutions and technologies on a business-to-business basis worldwide.

Established in Salford, Greater Manchester in the 1980s, the company offers a 'one-stop-shop' for all commercial and industrial energy requirements, from the efficient generation of energy to the equally efficient control of consumption. The company has partners across the globe.

Our solutions include combined heat and power (CHP), biogas utilisation, heat pump technologies, efficient lighting, controls, metering and data solutions and energy from waste. This is accompanied by our wide range of energy and water consultancy and procurement services.

ENER-G is 100% dedicated to the development of its products and markets, and over the years has seen rapid growth, both organically and through acquisition to achieve a strong global presence within the energy industry. Currently ENER-G operates in the UK, the Netherlands, Norway, Poland, Hungary, Lithuania, Spain, Italy, Romania, Mexico and South Africa.

ENER-G Natural Power Limited
ENER-G House
Daniel Adamson Road
Salford
Manchester
M50 1DT
UK
Tel: +44 (0) 161 745 7450
Fax: +44 (0) 161 745 7457
E-mail: re@energ.co.uk

www.energ.co.uk

Australian Partner and Distributor

SIMONS GREEN ENERGY

Simons Green Energy, as part of the Simons Engineering Group, is a leading provider of sustainable energy, heating and cooling solutions in Australia. With over 80 years operating in the field of thermal engineering, we provide solutions to meet our clients' needs with reliable products, technology and service quality. This tailored approach assures the highest system performance, greatest return on investment and complete customer satisfaction.

Simons Green Energy offers a turnkey solution. We design, supply, install and maintain Cogeneration and Trigeneration systems, waste heat generators and high efficiency steam and how water boilers for a wide range of industries throughout Australia

AUSTRALIA OFFICE LOCATIONS

SIMONS GREEN ENERGY

Sydney Head Office
Unit 1, 33 Maddox Street
Alexandria NSW 2015
T + 61 2 8338 8660
F + 61 2 8338 8661

Melbourne
34 Strong Avenue
Thomastown VIC 3074
T + 61 3 9462 6700
F + 61 3 9462 6711

E info@simonsgreenenergy.com.au
www.simonsgreenenergy.com