

Clarke Energy

Engineer - Install - Maintain



Distributor & Service Provider
Gas Engines

Greenhouse Power & CO₂ Fertilisation



Greenhouse Cogeneration / Combined Heat and Power (CHP)

Clarke Energy is the authorised distributor and service partner for GE Energy's gas engine division in a growing number of countries across the world. In addition to providing high-efficiency, reliable gas engines we combine this with the expertise and resources to deliver unbeatable product support.

Whether your requirement is for the supply of a single gas engine generator or a complete turnkey power generation facility, we can meet that need. Our ability to add value by offering an end-to-end service, from initial proposal to reliable long-term maintenance, has led to us becoming a multi-national company with operations in ten countries across the globe. Our company prides itself on integrity, delivering only the highest quality products whilst providing a reliable accountable localised service.

Benefits of working with Clarke Energy

Clarke Energy provides flexible solutions for your gas generation projects. Our services range from the supply of a gas engine generator, through to the complete turnkey installation of a gas powered generation facility. Clarke Energy has a dedicated, top-quality team of sales, engineering, project management, commissioning and maintenance staff to meet your needs. We also offer long-term maintenance contracts backed up by a strong balance sheet, giving peace of mind with respect to the long-term performance of your GE gas generation equipment.

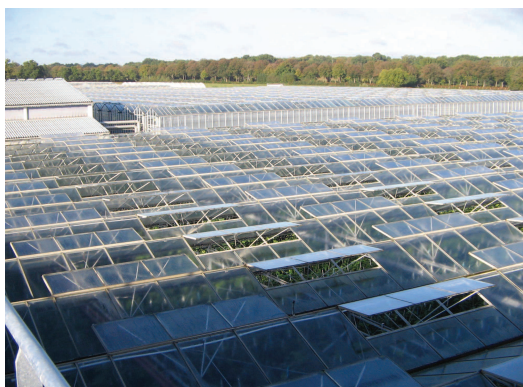
Greenhouse Cogeneration / CHP

Gas engines are highly efficient at providing the stimulus for the growth of plants, whilst in parallel providing a flexible supply of electrical power. Heat, light and carbon dioxide (CO₂) all promote plant growth. Gas engines provide electrical power at the alternator and when in a cogeneration configuration can also recover useful heat. Carbon dioxide is released in the exhaust gases of the engine as a by-product of the combustion of the fuel gas. Electrical power can be used to provide energy for lighting or can be exported to the grid, heat can be stored as hot water for use when needed and finally the CO₂ can be scrubbed and used to promote plant growth.

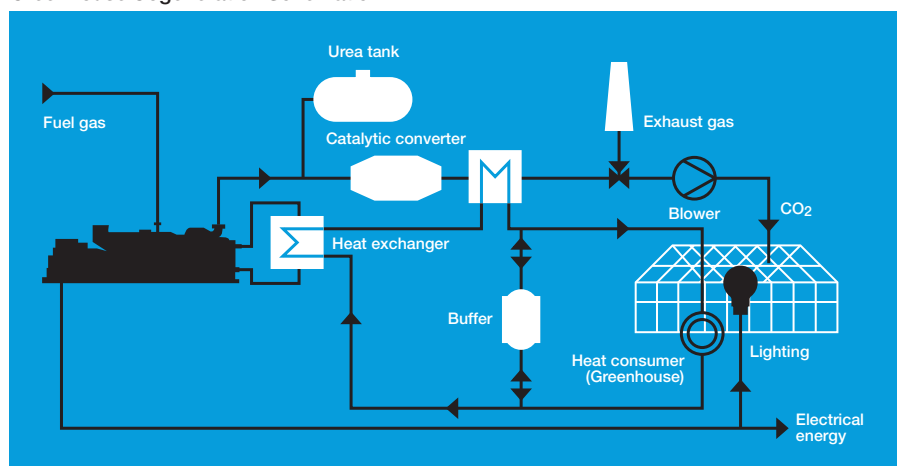
Benefits

- Efficiency levels up to 95%, therefore high contribution to resource conservation and maximisation of profits
- Provides power to grid at times of maximum demand hence receiving highest power sale prices
- Time-independent supply of CO₂ and heat through heat storage
- High quality CO₂

Serres le Château, France, 1 x JMS620



Greenhouse Cogeneration Schematic



Carbon Dioxide & Plant Growth

Plants grow by converting CO₂ to carbon through photosynthesis. Air generally contains approximately 350 ppm of CO₂. Optimal CO₂ levels depend on the type of plant and generally lie above 700 ppm. With increased artificial lighting, as present in greenhouses, plants absorb even more CO₂. If the greenhouse atmosphere is enriched with CO₂, the temperature kept on a constant level and sufficient lighting, provided plant growth and consequently the harvest yield can be increased significantly.

When burning natural gas in gas engines, approximately 0.2kg CO₂ is produced per kWh of energy input. This CO₂ is present in the exhaust of gas engines in a concentration approximately 5-6% by volume.

Energy Usage

The energy created by gas engine cogeneration / combined heat and power systems in greenhouses can be used in various ways. The electricity can provide the power for the artificial lighting and/or be fed into the electricity grid. The heat efficiently meets the greenhouse's requirements. In addition, the climate-relevant CO₂ of the engine exhaust gas serves as a fertiliser for the plants.

Exhaust Purification

After the purification of the exhaust gas with special catalytic converters (SCR and oxidation catalytic converters), the exhaust gas is cooled down by a heat exchanger to approximately 55°C and supplied to the greenhouse for CO₂ enrichment. A measurement device that constantly monitors the exhaust gas levels ensures maximum safety for vegetation.

Key Figures

Efficient operation is possible with approximately 1 hectare (ha = 2.47 acres) or larger greenhouse areas:

- CO₂ fertilisation is suitable for nearly all plant types
- CO₂ fertilisation with simultaneous heat supply: dimensioning for 0.5 MW_{el}/ha
- CO₂ fertilisation with simultaneous heat supply and illumination dimensioning for 0.35 MW_{el}/ha
- Illumination suitable for vegetables (e.g. tomatoes or peppers) and for flowers (e.g. chrysanthemums or roses)
- The decisive factors for economical plant operation are the high electrical efficiency, combined with the usage of heat and CO₂ fertilisation

Our Competence

Clarke Energy has installed a number of greenhouse power plants in the UK and France. This coupled with our comprehensive experience of natural gas generation means we are ideally placed to support your gas generation project.

JMS624 in Dutch greenhouse growing roses



If you would like to discuss your greenhouse cogeneration project with you in more depth, please contact your local Clarke Energy office.

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