

# Cogeneration



Saving money, saving energy, cutting carbon



# Proven technology

The demand for energy is ever growing whilst it is becoming increasingly expensive. Businesses and individuals are seeking to reduce their costs and carbon footprint.

Due to its benefits, distributed generation such as cogeneration has become very popular in the UK and throughout the world in recent years. Cogeneration or Combined Heat and Power (CHP) technology converts gas into both electricity and heat in a single process at the point of use.

Cogeneration is highly energy efficient and as well as supplying an organisation with power and heat, it can deliver a number of positive financial and environmental benefits.

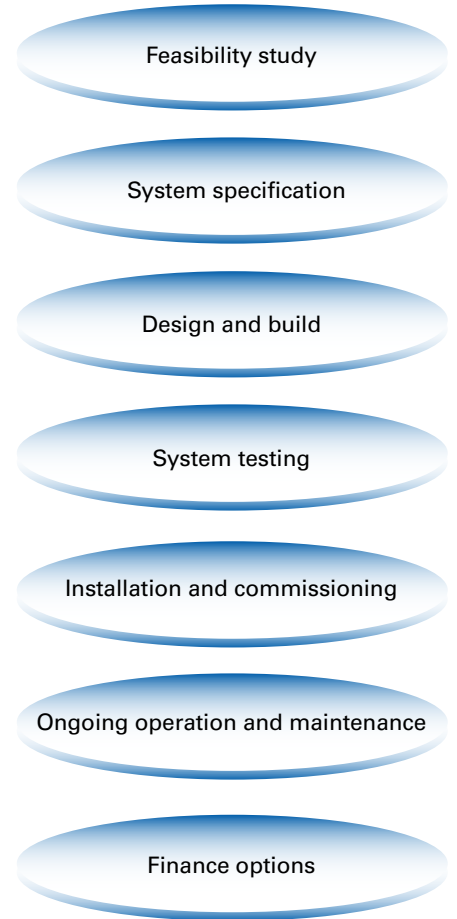
ENER-G's experience in the cogeneration market dates back to 1984 when we began designing, manufacturing, installing and maintaining cogeneration systems.

We are now firmly positioned as Europe's leading supplier of cogeneration systems from 4kWe up to 10MW and bring a wealth of knowledge and experience to all projects we undertake.



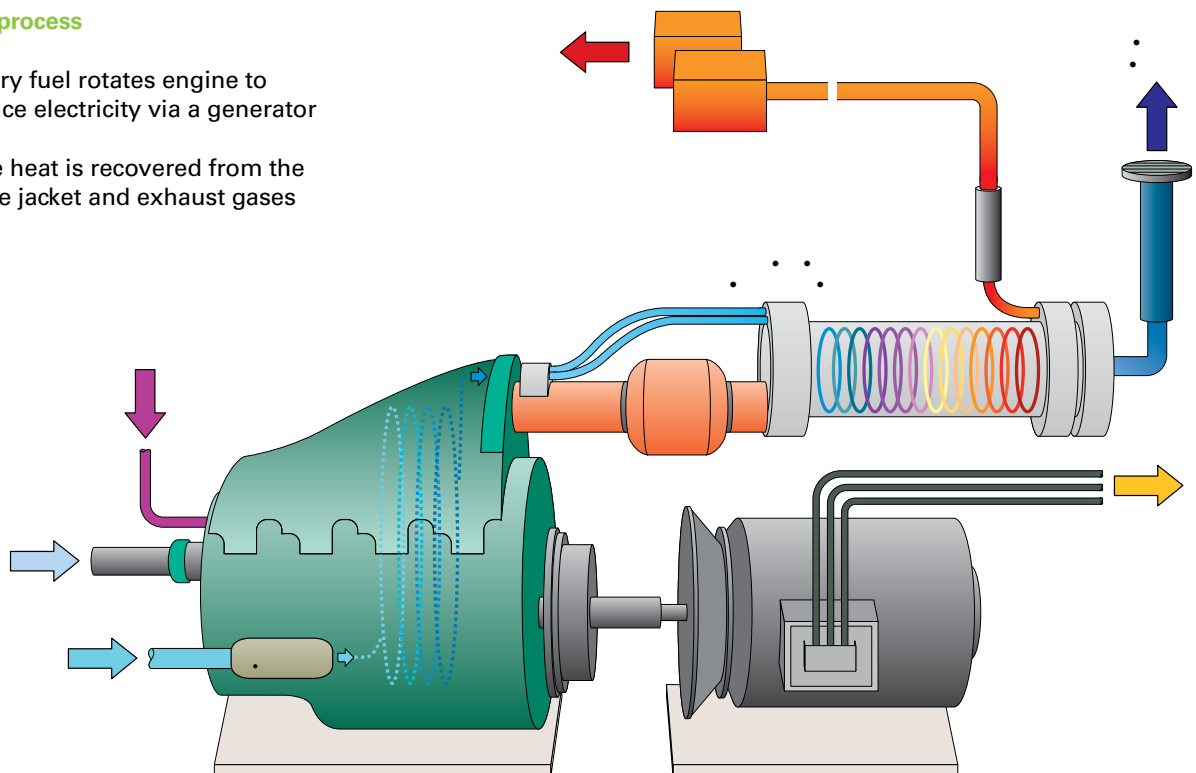
"The quality management system of ENER-G Combined Power has been approved by ISOQAR, to the standard of ISO9001:2008 including the design, manufacture and service of Combined Heat and Power units for hotels, hospitals, leisure centres and industrial applications."

**Our services include:**



**The CHP process**

1. Primary fuel rotates engine to produce electricity via a generator
2. Waste heat is recovered from the engine jacket and exhaust gases



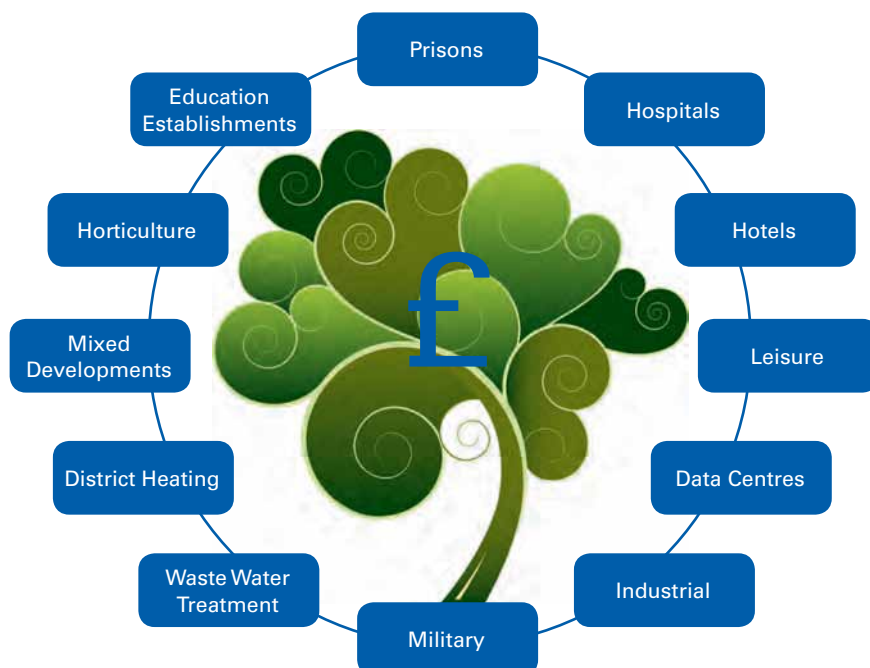
# Benefits and applications

## Ideal cogeneration applications

The technology is ideal for applications with consistent demands for thermal energy and electricity.

Cogeneration should be considered when:

- Increasing energy efficiency
- Reducing energy costs
- Designing a new building
- Installing new boiler plant
- Redeveloping an existing site
- Supporting your company's green image
- Managing existing power demands
- Improving Corporate Social Responsibility



## Cogeneration benefits

### Operational

- Reduced base load electrical supply
- Additional security of supply
- Increased diversity on heating and hot water
- Steam raising capabilities on larger units
- Choice of multiple fuels
- Cooling provision using absorption chillers

### Environmental

- Reduced primary energy use
- Reduced CO<sub>2</sub> emissions
- Help with carbon legislation compliance
- Reduced transmission losses from the grid
- Lower SO<sub>x</sub> emissions with the use of natural gas as a fuel

### Financial

- Reduced primary energy costs
- Zero capital outlay option
- Stabilised electricity costs over a fixed period
- Reduced investment surrounding plant e.g. boilers
- Eligible for Enhanced Capital Allowances
- Potential ROCs eligibility (Biogas, Liquid Biofuel)
- Potential benefits from Renewable Heat Incentive
- Sufficient savings to fund energy efficient measures

### Legislative

- Helps with Part L compliance
- Helps meet the CRC Energy Efficiency Scheme (CRCEES) targets
- Helps reduce carbon footprint
- Avoids Climate Change levy

## Financial options

The long-term future of Combined Heat and Power is secured in the global energy markets, by its ability to provide a multitude of operational, environmental and financial benefits.

Now more than ever, the certainty of fixed price low cost energy gives businesses the stability they need. ENER-G can provide this key service, often at no capital cost.

Our flexible finance options can be specifically tailored to the individual requirements of each of our customers, regardless of the project size, cost or complexity.

We have an outstanding reputation of being the market leader in offering real added value financial solutions.

### Capital purchase

Capital purchase allows businesses to claim 100% first year capital allowances on investments in energy saving technologies. The scheme can be either the sole purchase of the unit or the full scope of the project including feasibility studies, project design, supply, installation and commissioning.

The fixed cost can be for a complete turnkey package or just the supply of equipment. We can also offer a service package that will operate and maintain the system throughout its life cycle.

### Discount Energy Purchase (DEP)

With DEP the client signs a contract to purchase the electricity generated by a CHP unit over a number of years. ENER-G will fund all the costs associated with the implementation of a CHP project. This means there is no capital outlay or risk for the client. It is also a faster route to scheme implementation and immediate savings with no continual maintenance/aftercare costs. ENER-G take on the full investment risk for the project. DEP customers receive the Premier Plus service package free of charge as part of the contract agreement.

### Public Private Partnership (PPP)

Public Private Partnerships guarantee savings to our public sector clients. In general these projects are for 15 years and often used for full energy centres ranging from £2-10 million in value. ENER-G have had numerous successful PPPs whereby savings are guaranteed through multiple technologies including heating, chilling, efficient lighting, building energy management systems and renewable biofuel technologies.



## Operation and maintenance

### ENER-G Service Centre

After investing in CHP looking after the unit and its performance is a very important part of the equation. The operation of a cogeneration engine can be compared to a car engine running at 17 hours a day, the engine runs 217,000 miles per annum.

Our Service Department at head office coordinates the deployment of our nationwide engineering team 7 days a week 365 days a year. We offer a rapid response to all incidents to ensure optimum operation, benefits, and to maximise the life span of the CHP unit.

CHP systems require regular, periodic maintenance and inspection. The unit will require a service after a predetermined amount of hours.

Units typically require between 6 and 10 services per annum dependent upon operation. The service procedures vary throughout the year from replacing and recalibrating components to oil and filter changes.

The CHP unit often uses gas as its fuel and is therefore subject to the Gas Safe Regulations.



Support and manufacturing.  
Manchester, UK.

ENER-G offer a variety of flexible maintenance packages:

#### Premier

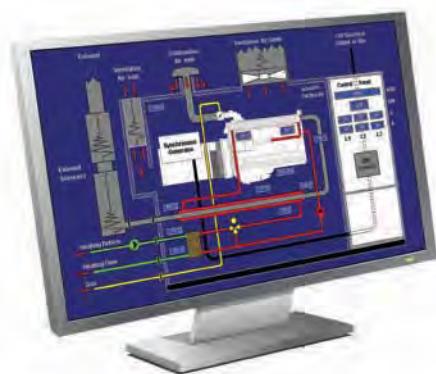
The Premier service package includes:

- 24 hour remote monitoring
- Automated SOS alerts
- Communication with central servers
- Remote SOS alert via SMS
- Part identification
- Remote fault diagnosis and rectification
- Safe oil disposal
- Oil Analysis programme
- Dedicated site engineer
- Routing scheduled servicing.

#### Premier Plus

The Premier Plus service package includes all of the benefits associated with the Premier package, but is also inclusive of all parts and labour required to rectify faults or repairs for the contract term, within the acoustic enclosure.

The service is a fixed price paid annually for the term of the contract. To offer flexibility and the opportunity to take advantage of early savings, the price can also be profiled against the age of the system across the contract term (subject to contract). Premier Plus is the number one CHP maintenance package in the industry, covering both service and repairs, without the need to raise purchase orders and minimising operational downtime. Premier Plus is the best way to achieve the biggest savings.



### Remote monitoring and customer reports

An integral part of the CHP unit is the on-board computer. The computer's function is to provide optimised safe and efficient operation of the CHP.

The computer also provides a two-way communication channel between the CHP unit and ENER-G's Service Centre, this allows for live system operational monitoring and full historic data retrieval.

In the event of system faults ENER-G's Service Centre can receive an SOS signal from the unit, run remote diagnosis, rectify problems and schedule an engineer if necessary.

The system in place reduces operational downtime and maintains client savings, whilst generating monthly customer performance reports and offering customers the opportunity to log on and monitor operation and savings.

## Product and fuel types

### UK natural gas range

Product reference	Electrical output kWe	Output jacket coolant kWth	Output exhaust kWth	Total heat output kWth	Fuel input (LHV) kW	Fuel input (HHV) kW
ENER-G 4	4	-	-	8	15	16
ENER-G 10	10	-	-	17	32	36
ENER-G 25	25	-	-	38	75	82
ENER-G 35	35	38	23	61	111	123
ENER-G 50	50	46	33	79	148	164
ENER-G 70	70	63	46	109	204	226
ENER-G 90	90	110	51	161	278	308
ENER-G 100	100	116	56	172	303	335
ENER-G 110	110	122	62	184	327	362
ENER-G 125	124	131	69	200	361	399
ENER-G 135	135	146	71	217	392	434
ENER-G 150	152	156	80	236	432	478
ENER-G 165	165	197	88	286	497	550
ENER-G 185	185	210	99	309	545	603
ENER-G 210	210	226	111	337	604	669
ENER-G 230	229	237	121	358	649	718
ENER-G 310	310	152	205	357	820	907
ENER-G 375	378	162	239	401	978	1082
ENER-G 425	430	189	279	468	1119	1238
ENER-G 500	505	211	316	527	1298	1436
ENER-G 770	770	434	438	872	1883	2083
ENER-G 850	847	483	465	948	2054	2272
ENER-G 1150	1150	586	842	1428	2966	3280
ENER-G 1160	1163	660	643	1303	2822	3121
ENER-G 1560	1557	872	847	1719	3765	4164
ENER-G 1600	1600	TBC	TBC	TBC	TBC	TBC
ENER-G 1710	1707	979	900	1879	4121	4558
ENER-G 1950	1942	1078	1078	2156	4685	5182
ENER-G 2000C	2000	1017	TBC	TBC	4761	5266
ENER-G 2150	2138	1210	1150	2360	5139	5684

### UK biogas range

Product reference	Electrical output kWe	Output jacket coolant kWth	Output exhaust kWth	Total heat output kWth	Fuel input (net) kW	Fuel input (gross) kW
ENER-G 100B	100	94	57	151	310	343
ENER-G 150B	151	131	83	214	450	498
ENER-G 190MB	191	115	110	225	493	545
ENER-G 250B	254	173	127	300	657	727
ENER-G 310B	308	149	181	330	831	919
ENER-G 360B	364	245	190	435	946	1046
ENER-G 375B	377	162	261	423	988	1093
ENER-G 425B	430	192	250	442	1131	1251
ENER-G 500B	505	211	348	559	1312	1451
ENER-G 600B	598	305	272	577	1413	1563
ENER-G 600BL	598	305	0	305	1413	1563
ENER-G 800B	798	408	362	770	1882	2081
ENER-G 800BL	798	408	0	408	1882	2081
ENER-G 1150B	1138	489	726	1215	3154	3488
ENER-G 1150BL	1138	489	0	489	3154	3488
ENER-G 1950B	1945	716	1298	2014	4931	5454
ENER-G 1950BL	1945	716	0	716	4931	5454

\*All figures are indicative, please refer to our technical department for specific project performance data.

## Case studies

### Sunderland Aquatics Centre

Sunderland Aquatics Centre is one of Sunderland's most ambitious regeneration projects; it houses the region's first 10 lane 50m swimming pool.

The centre was designed to be the greenest 50m swimming pool in the country and incorporates a number of green energy initiatives. At the heart of the centre's green credentials is the installation of an ENER-G CHP unit.

The system has been operational since May 2008. It was designed, built, operated and financed by ENER-G on a Discount Energy Purchase (DEP) scheme over 10 years. This gives the aquatics centre instant payback.

The 185kWe ENER-G CHP unit was assembled on site, because of logistical difficulties in accessing the installation area on the first floor with a fully assembled unit.

It was mounted on an anti-vibration frame as it was essential for vibration to be kept to a minimum.

The ENER-G CHP unit saves around 500 tonnes of CO<sub>2</sub> annually whilst offering huge financial savings through reduced primary energy costs. The DEP savings scheme has produced savings of £31,548 per annum, assuming the site is using all the heat and operating 17 hours per day.

### Museum of Liverpool

The prestigious new £72 million Museum of Liverpool has installed an advanced Combined Heat and Power (CHP) system, guaranteeing annual energy savings of more than £500,000.

The 'trigeneration' technology, which creates highly efficient heat, electricity and cooling, will also reduce carbon emissions by 884 tonnes each year.

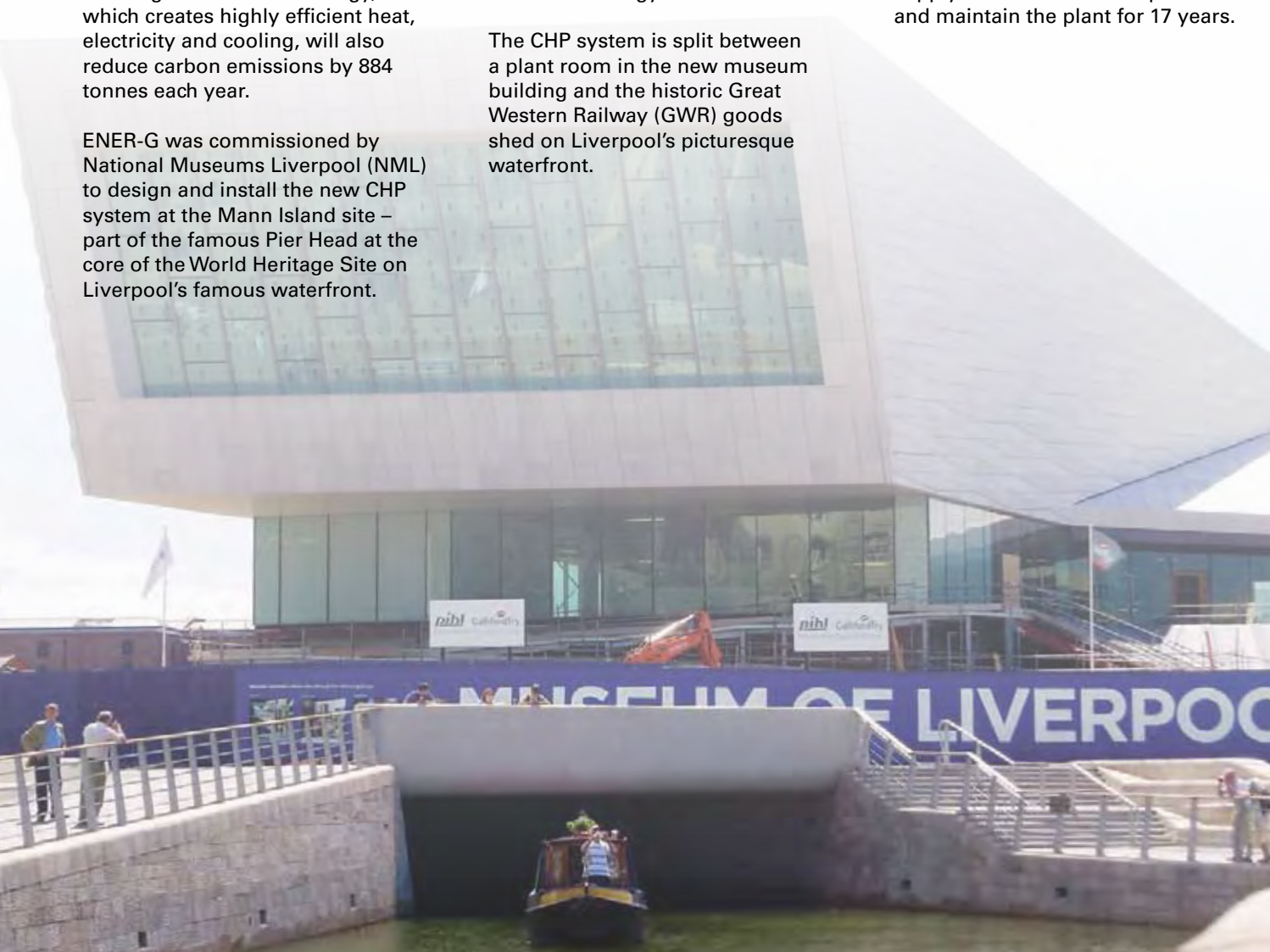
ENER-G was commissioned by National Museums Liverpool (NML) to design and install the new CHP system at the Mann Island site – part of the famous Pier Head at the core of the World Heritage Site on Liverpool's famous waterfront.

ENER-G designed and manufactured two 385kWe bio-diesel CHP units, two 768kWe natural gas CHP systems, two 850kWe boilers, an 1000kWe absorption chiller and a 998kWe conventional compression chiller which will serve all the new museum's energy needs.

The CHP system is split between a plant room in the new museum building and the historic Great Western Railway (GWR) goods shed on Liverpool's picturesque waterfront.

ENER-G has converted the goods shed into a state-of-the-art energy centre with sophisticated remote monitoring and diagnostic facilities.

The energy centre can operate independently of the utility electrical supply. ENER-G will also operate and maintain the plant for 17 years.



## The ENER-G group

ENER-G delivers sustainable energy solutions and technologies on a business-to-business basis worldwide. Established in Salford, Greater Manchester in the 1980s, the company offers complete solutions for all commercial and industrial energy requirements, ranging from the efficient generation of energy, to the management and control of consumption.

ENER-G Combined Power, as part of the ENER-G group offers a range of efficient cogeneration and trigeneration systems. ENER-G designs, manufactures, operates, maintains and finances cogeneration systems from 4kWe up to 10MW fuelled by natural gas, biogas, propane, biodiesel or pure plant oil (PPO).

Across the ENER-G group our services include sustainable technologies such as heat pumps, energy from biogas and energy from waste. We can provide holistic energy management solutions such as energy purchasing, consultancy, metering and bureau services and energy savings solutions including efficient lighting and building energy management systems. We can also offer flexible finance models, offering access to our energy solutions without the upfront capital expenditure normally required.

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, with partners across the globe.



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## Australian Partner and Distributor



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 hot water boilers for a wide range of industries throughout Australia.



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