Case Study

Combined Heat & Power for Industry

Boston Scientific Limited established its first plant in Galway in 1994. The plant has undergone significant expansion over the intervening years and now extends to over 35,000 square metres.

CHP Project:
A feasibility study was completed in October 2008 to determine the suitability of CHP technology on the Boston Scientific site.

In August of 2009 a 1 MW CHP unit was commissioned, which was adequately sized on the sites base electrical and thermal loads, and fired on natural gas.

As part of the changeover Boston Scientific also converted their oil boilers from HFO to natural gas thus saving further on CO₂ emissions.

CES Energy have put in place a 10 year operating and maintenance agreement with Boston Scientific for this system.

5 years on - CHP unit still delivering savings
The CHP unit provides 9,125 MWh of electricity annually, equating to 33% of the total site electrical load.

The CHP unit satisfies 78% of the site heating load which equates to 8,100 MWh of thermal energy.

CO₂ emissions reduction of 2,760 tonnes per annum.

Annual energy savings of more than €300,000 for Boston Scientific.

Average uptime of the CHP of over 94% over the lifetime of the project, since commissioning in August 2009.

Uptime has increased in recent years with 8,523 operating hours, or 97.3% uptime, over the last 12 months.
CHP System Integration

Installation:

A reciprocating natural gas CHP unit was supplied by MTU GmbH in Germany through CES Energy. The unit was supplied within a containerised package acoustically treated to comply with site conditions of 65dBA at 10 metres. All necessary controllers, cooling fans, exhausts etc. were all housed within this package and delivered on-site. The unit operates 24 hour/day, 7 days/week all year round.

Description of Plant Energy Facilities:

There are two main boiler-houses on site with total boiler outputs of 9.25MWt. Boiler fuel is natural gas, with all burners having been changed over from HFO as part of this project.

Integration:

A connection to the Natural Gas Network was brought on site to a pre-determined skid location and a supply from there was made to the CHP Plant. A gas sample was analysed and forwarded to MTU prior to unit delivery.

The CHP was integrated with both main boiler-houses. Heat was supplied to the main boiler house flow headers by new heat exchangers. The flow on the primary side is controlled by a throttling valve and on the boiler side by a variable speed pump. The in-built heat exchange controller balances the flow through each heat exchanger with priority given to the heat exchanger with the lowest boiler return temperature. On the boiler side the pump is controlled so as maintain a supply temperature of 80°C.

Electricity generated by the CHP is integrated into the site network @ 20kV with a new G10 protection device installed.

A comprehensive power quality study on the CHP was also conducted showing real time. An ISDN line was also installed to facilitate remote monitoring of CHP operating parameters and fault conditions.

What is CHP?

CHP, also known as “Co-Generation” is the simultaneous production of electricity and heat usually in the form of hot water or steam from a primary fuel such as natural gas (see Figure 1 – Inside a Combined Heat and Power Unit). Electricity is generated on site by using natural gas to drive an alternator connected to the engine. The heat from exhaust fumes generated by the engine is harvested to provide heating and hot water for the building, while some of the energy within the hot water can also be used to provide cooling and air conditioning by using absorption chillers.

Why CHP?

Due to inefficiencies in electricity generation and the resulting cost of electricity from energy suppliers, significant savings can be made by generating electricity to meet requirements on your own site.

In general, the financial benefits of onsite electricity generation (using natural gas to power the electricity generator) are evident by comparing daytime electricity prices in Ireland of circa 14.9 cent/kWh with market natural gas prices of circa 5.2cent/kWh (SEAI Commercial / Industrial fuel figures, April 2015).

Benefits

- Significant reduction in energy costs
- CO2 emissions reduced
- Lower carbon tax
- Security and continuity of power supply
- Conservation of valuable fuel resources

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CHP Manufacturer:
MTU GmBH

CHP Supplier:
CES Energy

Business Description
CES Energy is an energy infrastructure developer delivering renewable and conventional electrical, cooling and heat energy solutions. We use the latest technologies providing substantial financial and CO₂ savings to our customers through EPC (Engineer Procure Construct) and/or BOO (Build, Own Operate) contracts.

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This information is only a guideline to the different products available for use with natural gas in new development construction. Users should ensure that products are suitable for the specific circumstances in which they seek to apply them. Contact the supplier or manufacturer directly for specific information on building requirements and materials needed for installation. Professional advice specific to the project should always be sought. The current Irish Gas Standards and Technical Guidance Documents (Building Regulations) override all contents. Users should ensure they always have the most up to date information.

The contact details for Gas Networks Ireland are:
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