

New Connections Combined Heat and Power



Case Study



The Clybaun Hotel, Salthill, Galway By Dunne Hotels Group

The Clybaun Hotel conference and leisure centre is a newly completed hotel located on the Old Clybaun Road, Knocknacarra, Salthill, Galway. The hotel includes 92 en-suite rooms, a 250 seat conference facility, full service restaurant and bar as well as a swimming pool, fully equipped gymnasium, leisure and spa facilities.

Energy costs in the commercial building sector have had a significant impact on the costs of businesses in recent years. With recent rises the cost of electricity and fossil fuels, the Clybaun hotel decided to assess the possibility of combining their energy requirements. With natural gas now available in the Galway area, the Clybaun hotel decided on using natural gas for both heating and on-site electricity generation to reduce their energy bills.

Combined Heat and Power (CHP) generation provides a proven alternative to standard sourcing of separate electricity and gas supplies by using lower costing natural gas to generate both electricity and heat. In addition, this low cost generation is environmentally friendly with lower emissions, and is exempt from carbon tax in many European countries today. In the Clybaun Hotel, the CHP unit contributes towards the electricity requirements of the hotel as well as providing heating for the hotel and leisure facilities.

Details of the Combined Heat and Power system and other appliances featured in the Clybaun Hotel follow.

Design Team:

CHP Consultants
F4energy Ltd

Consulting Engineers
Kyne & Clyne

Mechanical Services
**John Griffin &
Son Ltd**





The flue from the CHP plant, Clybaun Hotel.

In most cases, electricity is generated by burning a fossil fuel, which heats water and turns it into steam. This steam then drives turbines which converts the mechanical energy into electrical energy. Usually, the left over heat is then wasted to the atmosphere.

The Combined Heat and Power (CHP) process uses this left over heat to provide the heating requirements of a building. This means the CHP process has a greater efficiency than standard separate heating and electricity generation methods.

The Clybaun Hotel's CHP system was sourced and supplied by F4energy who also design, interphase and install CHP plants in Ireland.



The CHP unit partitioned in the naturally ventilated basement car park, Clybaun Hotel.

Since the CHP unit generates electricity in the event of a failure on the national power grid the hotel will still have electricity to maintain essential operations (e.g. computers, lifts, lighting etc)

The CHP unit Technical Details:

At the Clybaun Hotel, the CHP unit used is a Schmitt Enertec GmbH, model FMB-270-GSMK.

- Output Range: 0 – 220 kW electrical power
0 – 339 kW thermal heat
- Efficiency: 33% electrical efficiency
51% thermal efficiency
84% overall efficiency (combined)
- Max Natural Gas Consumption: 655kWh
- Dimensions of CHP unit: 2.35m High x 3.6m Long x 1.45m Wide
- Gas Pressure: 40mbar

The Costs:

The Irish CHP Association (ICHPA) in association with Sustainable Energy Ireland (SEI) have developed an online CHP Evaluation Tool to assess the viability of a CHP installation. The tool is simple to use and will give a reasonable indication of the feasibility and payback period of a CHP investment. The ICHPA whom are supported by SEI, aim to promote awareness and the benefits of CHP installations.

Note: For further information contact Sustainable Energy Ireland. For specific set-up costs with forecasts of payback period please contact F4energy directly.

The Environment:

In traditional electricity generation, most of the heat generated in the combustion of fuels is wasted to the atmosphere. This means that the majority of the energy (65% and higher) is wasted with only 35% or less of the energy being harnessed for electricity. This means that for every 1 kW of electricity produced, at least 3kW's worth of fuel needs to be burned.

With CHP, when the left over heat from electricity generation is used for heating, the efficiency can be 80% and greater. As natural gas produced less harmful emissions alternative fossil fuels, when complemented with CHP you also get more energy from your fuel and save greatly on fuel costs.

The Heating System

The Clybaun Hotel heating system is a centralised Low Pressure Hot Water (LPHW) system, which is serviced by the CHP unit and three Chappee Boilers with Riello burners. This heating system supplies several loads, as can be seen in the diagrams opposite.

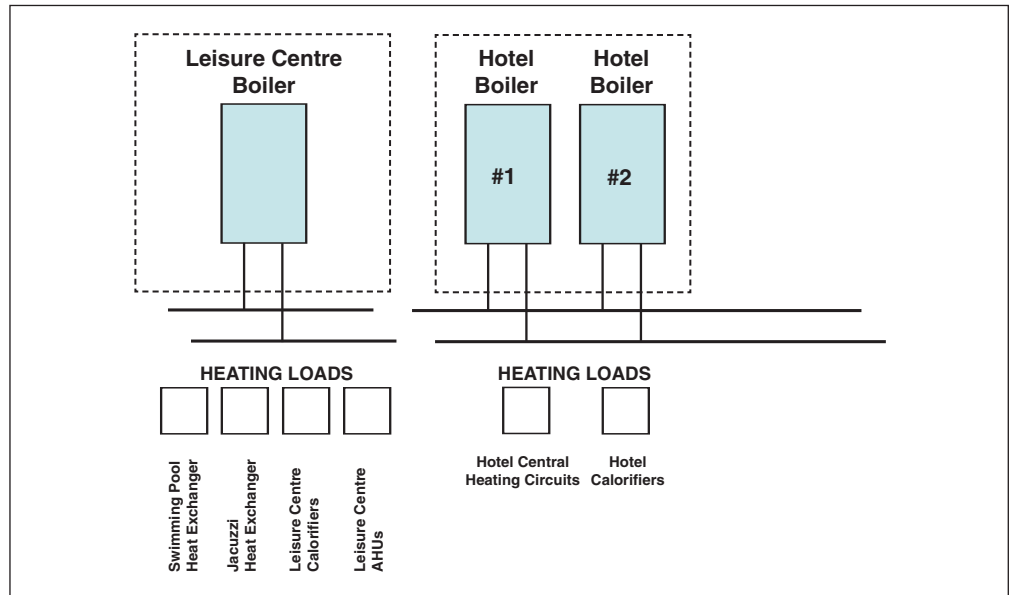
The system was originally designed with a separate LPHW system for the leisure centre and hotel. However it was important that the CHP unit could inject heat into both the leisure centre and the hotel LPHW system to reap maximum efficiency and payback from the investment. This was achieved by linking the two systems and pumping heat from one system to the other.

The CHP unit is supplemented by the three Chappee boilers. These natural gas powered boilers assist the CHP unit during times of peak load.

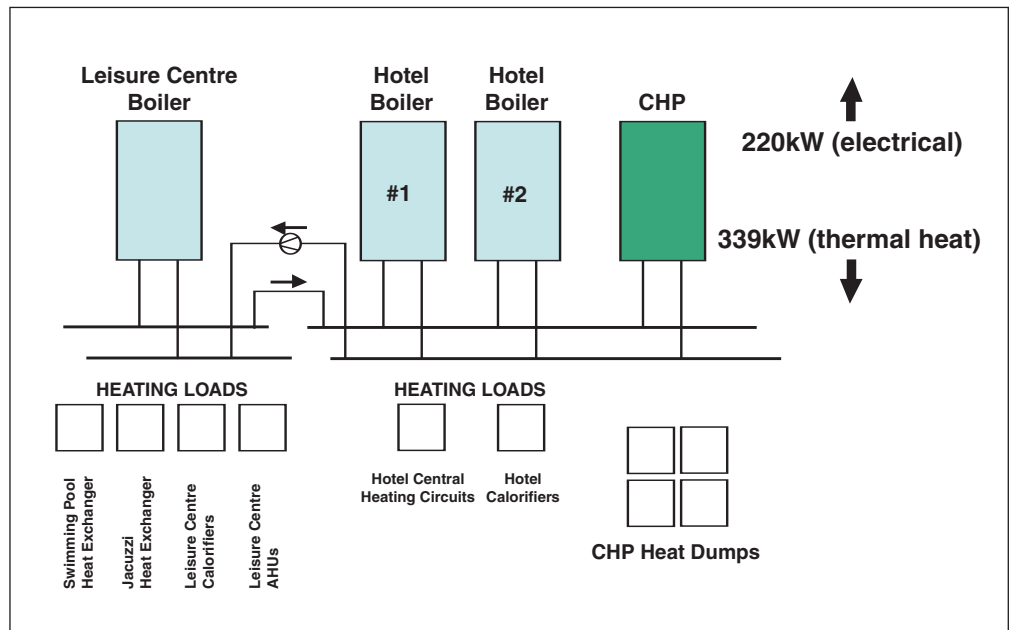
The CHP unit (provided with its own pump and temperature control) supplies LPHW heating in series with the boilers through two 2 inch flow and return pipes on the main Return Header. Heat is then supplied throughout the hotel, the swimming pool and other leisure facilities

Heat Dumps were required for the CHP unit. During the summer when the heat requirement is reduced, unused heat is dumped through fan cooled coils in the basement car park.

Original Heating System Design



F4Energy CHP Design



Integration with the Electrical System

The CHP unit in the Clybaun Hotel provides 220 kW of synchronised power to the hotel's main electricity distribution board, through a standard 600 Amp switch fuse. This reduces the hotel's demand for electricity from the national grid by 220 kW, which in turn results in lower electricity costs.

Boiler systems

The three boilers used by the Clybaun are used to assist the CHP unit during times of peak load. Two boilers are used for hot water & heating for the hotel. While the third boiler is assigned for heating the 18 meter Swimming Pool, Jacuzzi and with heating of the leisure centre. The LPHW is fed through the CHP unit and then to the boilers (for boost heat, if required). The hot water from the boilers is circulated throughout the hotel and leisure centre.



The Leisure Facilities at the Clybaun Hotel

The Clybaun Hotel has a fully equipped Health & Leisure centre. This comprises of an 18 metre swimming pool, a children's pool, steam room & sauna, Jacuzzi & plunge pool as well as a gymnasium and aerobics room.



The Outdoor Jacuzzi and Leisure Centre.

The Kitchen in the Clybaun Hotel

The full service restaurant in the Clybaun hotel requires a full service kitchen. Natural gas is the cheapest and cleanest fuel for cooking, which is reflected by the fact that where natural gas is available, it is by far the preferred fuel.

As natural gas is "instant", there is no waiting around for hobs to heat up or waiting for them to cool down, important in a commercial restaurant where many people have to be served as quickly as possible. In the majority of commercially run kitchens, gas is the preferred cooking fuel.



The full service kitchen at the Clybaun Hotel.

The restaurant in the Clybaun hotel requires a full service kitchen. The hotel's kitchen is fully equipped with a full range of gas appliances. The kitchen uses a heavy duty Dexion gas cooker with two high speed rings and a solid top boiling section. In addition to the cooker there is a six ring burner accompanied by deep fat fryers and grills. A free standing griddle unit is also in use.

Disclaimer

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.

Suppliers:

Combined Heat and Power System:

F4Energy Ltd.
Unit 14
Penrose Wharf
Cork City
Co. Cork

Phone: +353 21 486 1420
Fax: +353 21 455 2628

Boilers:

Hevac Limited
Muirfield Drive
Naas Road
Dublin 12

Phone: +353 1 419 1919
Fax: +353 1 458 4806

Kitchen:

Corcoran Food Equipment
Upper Rock Street,
Tralee,
Co. Kerry,

Phone: +353 66 712 5605
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