



Natural Gas Communal Heating System Case Study

Cairn Homes PLC achieve NZEB standard in new apartments using natural gas

Cairn one of Ireland's largest homebuilders, is powering and heating their development of 342 apartments through the installation of a natural gas communal heating system. This high-density development meets Part L (NZEB) 2019 of the Building Regulations using an innovative Combined Heat and Power (CHP) heating system solution in combination with solar photovoltaic (PV) panels.

Benefits of a communal heating and CHP system:

- No gas risers required within the building
- On-site electricity generation used for communal electrical loads
- Instantaneous hot water and heating available 24 hours a day
- Reduced need for mechanical equipment within each apartment
- Centralised plant provides easier maintenance



Griffith Wood, Dublin 9, achieve A2 BER rating with natural gas.

Committed to sustainable development

Cairn's Griffith Wood development is surrounded by the unique historical context of Marino with the tree lined street of Griffith Avenue, its historic architectural heritage and the educational buildings of the Marino Institute of Education (MIE) campus part of its charm.

The development is comprised of six apartment blocks ranging in height from four to seven stories, totalling 342 apartments, constructed over a common basement. The development has a gross floor area of 36,556m² and is served by a centralised communal heating system, led by CHP and supported by gas boilers and solar photovoltaic (PV) panels.

For years Cairn has been committed to building high quality, sustainable new homes. With Griffith Wood, Cairn's objective was to deliver a sustainable development that maximised the use of available space. By utilising otherwise redundant roof space, a solar PV array has been installed allowing large amounts of renewable electricity to be generated on the rooftop. This reduces the need for large plant room areas and maximises space for the apartments.

Decarbonising with a CHP communal heating system

With the increasing demand for homes and requirement for higher density developments in urban areas, apartment block developments are providing the most suitable solution for planners and homebuilders. With every new apartment development comes the requirement to provide a robust, energy efficient heating and power solution that meets all of today's building regulation requirements. Any solution must also offer security of supply and the flexibility for future decarbonisation.

A natural gas CHP system offers this flexibility. In addition to the system being compatible with renewable gases, such as biomethane and hydrogen, it can also be linked into a national district heating system, thereby providing adaptability for future decarbonisation.

Further potential benefits for this sustainable development will be the opportunity for the property management company to earn additional revenue from selling excess electricity generated onsite from the solar PV panels, back to the national grid, under the governments proposed micro-generation support scheme.

CHP unit



G-Box 20 Combined Heat and Power unit.

Genset

	50%	75%	100%	Load
Electrical power	10	15	20	kW
Recoverable thermal output	29	37	44	kW
Energy input	36	49	62	kW
Efficiencies electrical	28.1	30.6	32.0	%
Efficiencies thermal	81.5	75.3	70.4	%
Efficiencies total (el. + th.)	109.6	106.0	102.4	%
CHP coefficient	0.34	0.41	0.45	

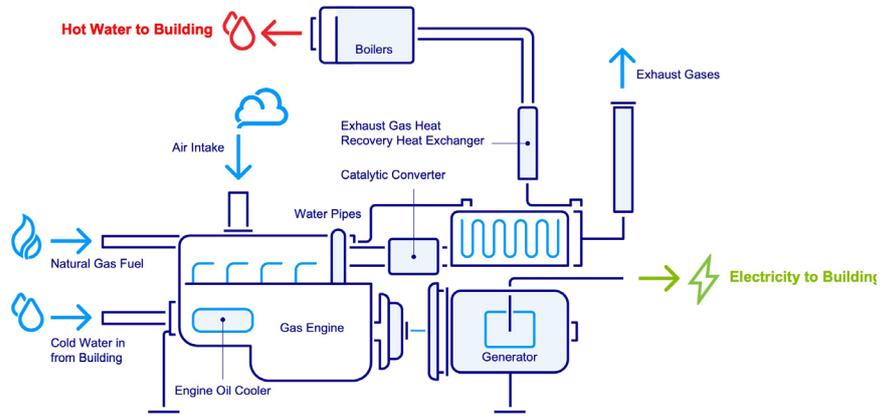


Combined heat and power (CHP)

Also known as co-generation, CHP 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. In Griffith Wood, electricity is generated on-site by using natural gas to drive an alternator connected to the heating system's engine.

The heat generated by the gas engine and exhaust is harnessed to provide heating and hot water to the building, while the electrical energy is used to power building systems such as lifts, pumps and car park lighting.

The CHP units used in this project are two G-Box 20s supplied by Glenegy. The combination of thermal and electrical energy supplied by a CHP unit can be accounted towards the Renewable Energy Ratio with the Dwelling Energy Assessment Procedure (DEAP).



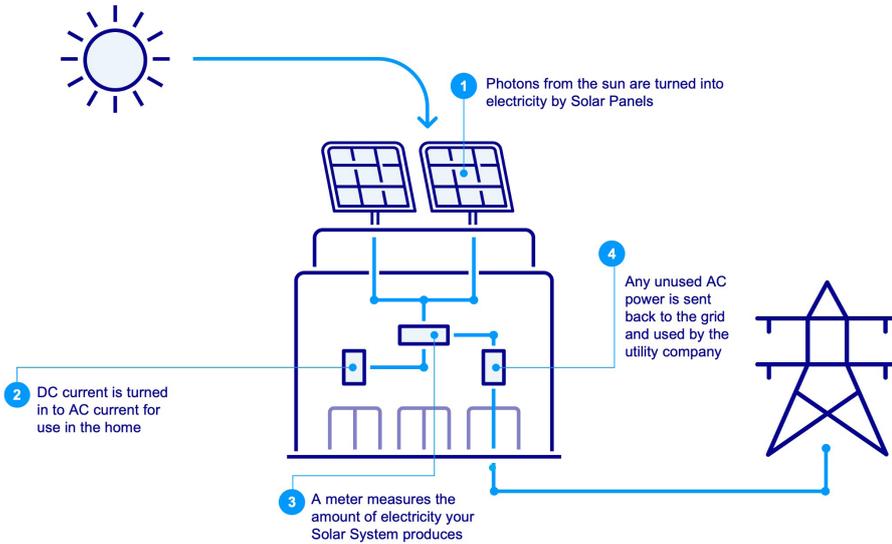
CHP and DEAP

The proportions of heat from the CHP and conventional boilers, and the heat and electrical efficiencies of the CHP for the calculation of CO₂ emissions, are based on its design specification. Heat efficiency is defined, as the annual useful heat supplied from a CHP scheme divided by the total annual fuel input (based on gross calorific value) and the electrical power efficiency is the total annual power output divided by the total annual fuel input.

Appendix C and N of the DEAP manual detail how the DEAP software caters for CHP installations in a communal heating system.

An area weighted calculation can be performed across the entire apartment development to assess how much renewable energy is to be assigned to each apartment within the DEAP software. Any shortfall in renewable energy is compensated by the electrical power generated by the solar PV panels.

Solar photovoltaic (PV) panels



Solar PV panels contribute to the building's overall renewable energy contribution by generating electrical energy that can be used to help power building systems, such as pumps and communal lighting, alongside the electrical power generated from the CHP.

There are 103 high efficiency 300wp PV panels, situated on roof mounted installations and spread across the six apartment blocks.

Natural gas system boilers

At times of peak demand, standard gas boilers can step in to help meet the additional load. The Griffith Wood development has three such gas boilers each with an efficiency of over 96%.

Features

Stainless steel heat exchanger

Very compact design

Two burner combustion system

0-10 V connections as standard

The controls can be programmed to work with solar thermal, biomass and buffer tank

Benefits

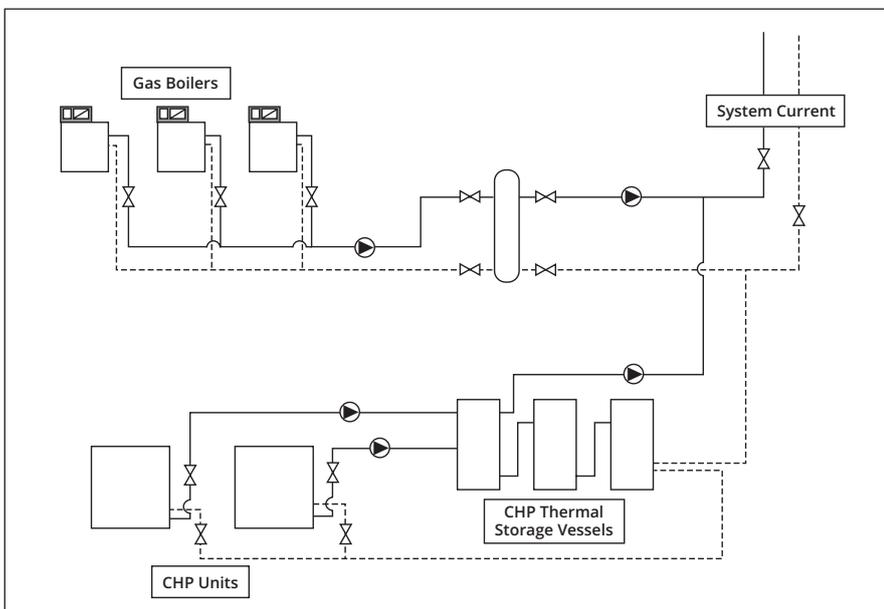
Designed for maximum combustion performance and safety

Easy to fit in combined spaces

Spreads the heat demand across the two burners, reducing wear and tear on components

For easy BMS interface

Sustainable, energy efficient solution for a wide range of applications



Photovoltaic panels



- LONGi high efficiency 300wp panels
- Low maintenance renewable technology
- Potential future income generation through the introduction of the government Micro-generation Support Scheme

Floor standing condensing boilers



The sirius floor standing condensing boiler provides an energy efficient, cost effective heating solution for large residential apartment developments and commercial buildings such as schools, hotels, nursing homes and leisure facilities. It benefits from the latest dual burner technology, which delivers an industry-leading modulation ratio of 10:1.

“Several options were considered for the mechanical system but a CHP led communal system was by far the best choice”

Design Team, O'Connor Sutton Cronin



Apartments in Part L

Technical Guidance Document Part L of the Building Regulations provides guidance on how apartment blocks can demonstrate that reasonable provision has been made for the required amount of renewable energy. Where there are both common areas and individual dwellings in a building, reasonable provision would be to show that the average contribution of renewable technologies to all areas meets the minimum level of renewable provision to the individual dwellings and common areas combined. In this case, a portion of the renewables should be provided to each area and individual dwelling in the building.

Builder

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CHP suppliers

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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.