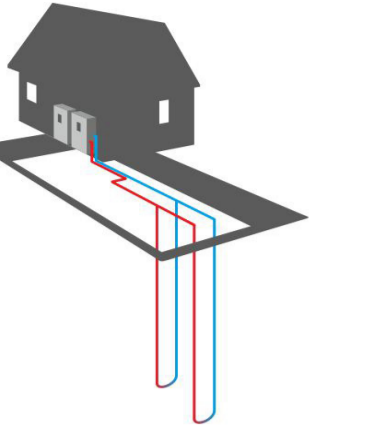


# The Breacan Mooney Award for Geothermal Installation of the Year 2011 for Domestic Dwellings

Kilsharvan, Co. Louth



The original house built in the 1970's was heated by an oil fired boiler. All of the existing system was removed. The existing house had floors removed on ground floor and underfloor heating fitted; the first floor had floor boards on joists which were also removed and underfloor heating fitted between the joists. Each room is now controlled separately by its own smart temperature sensor.

When a decision was made by Sean & Mary to review the possibility of using hydrothermal energy to heat the house, a drilling rig was organised and a test well drilled to 200 feet, to allow a decision on the best energy resource available on site to provide heat and hot water. The well driller established a water supply on site in excess of 3.23 litres/second.

Eurotech fitted a submersible, 3 phase pump and tested the flow quantity for 24 hours to establish consistence which was confirmed positive.

There are 2 borehole wells (one supply and one recharge, 10 meters away) with steel lining down to bedrock. The well has an internal PVC sleeve to hold the pump and perforated at intervals to allow water into the sleeve. The water level remains at 25ft below ground level consistently.

The open loop water flow rate is for:

heatpump 1: 2.4m<sup>3</sup>/hr, (0.67 l/s) and  
heatpump 2: 2.8m<sup>3</sup>/hr, (0.78 l/s)

Domestic cold water storage requirements can also be topped up from the wells and will lead to considerable savings when water charges for homes are implemented.

The system was commissioned on 15 Oct 2009 and checked on 15 Nov 2009. A service of the system was carried out on 12 Nov 2010. The house owner has cleaned the filters in winter every two months.

The ESB provided a three phase connection as it was close by. Eurotech fitted a variable speed drive to allow the well pump provide the exact flow rate to domestic water demand and also to each heat pump as required.

The system has been set up to allow the water pump provide the flow rate to deliver correct volume to both heat pumps together and for domestic hot water heating if necessary. The entire house, existing and new, has an underfloor heating system fitted to HT 2000 design by Eurotech, i.e. to give room temperature of 20°C at a relatively low

35°C flow temperature when outside weather was at -6°C.

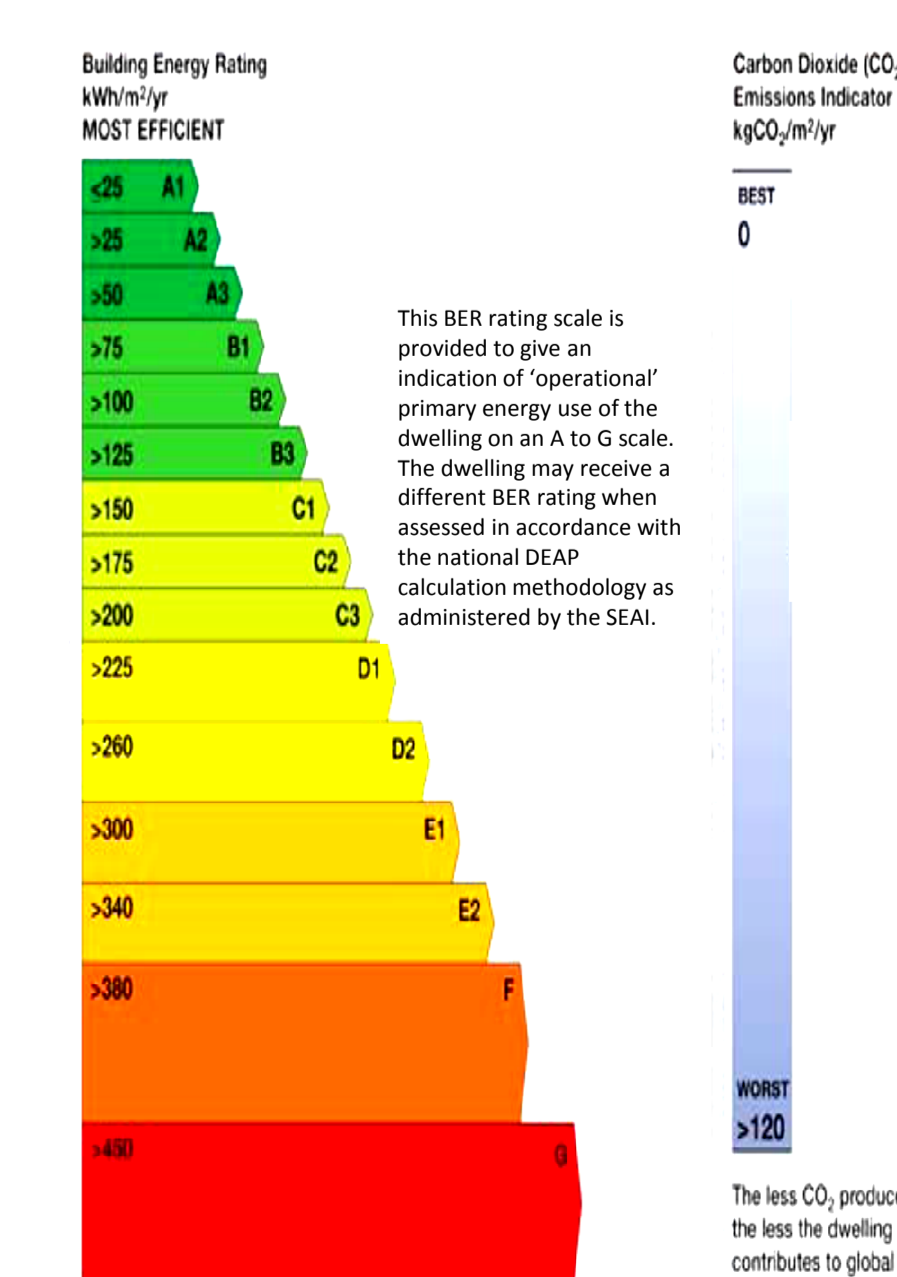
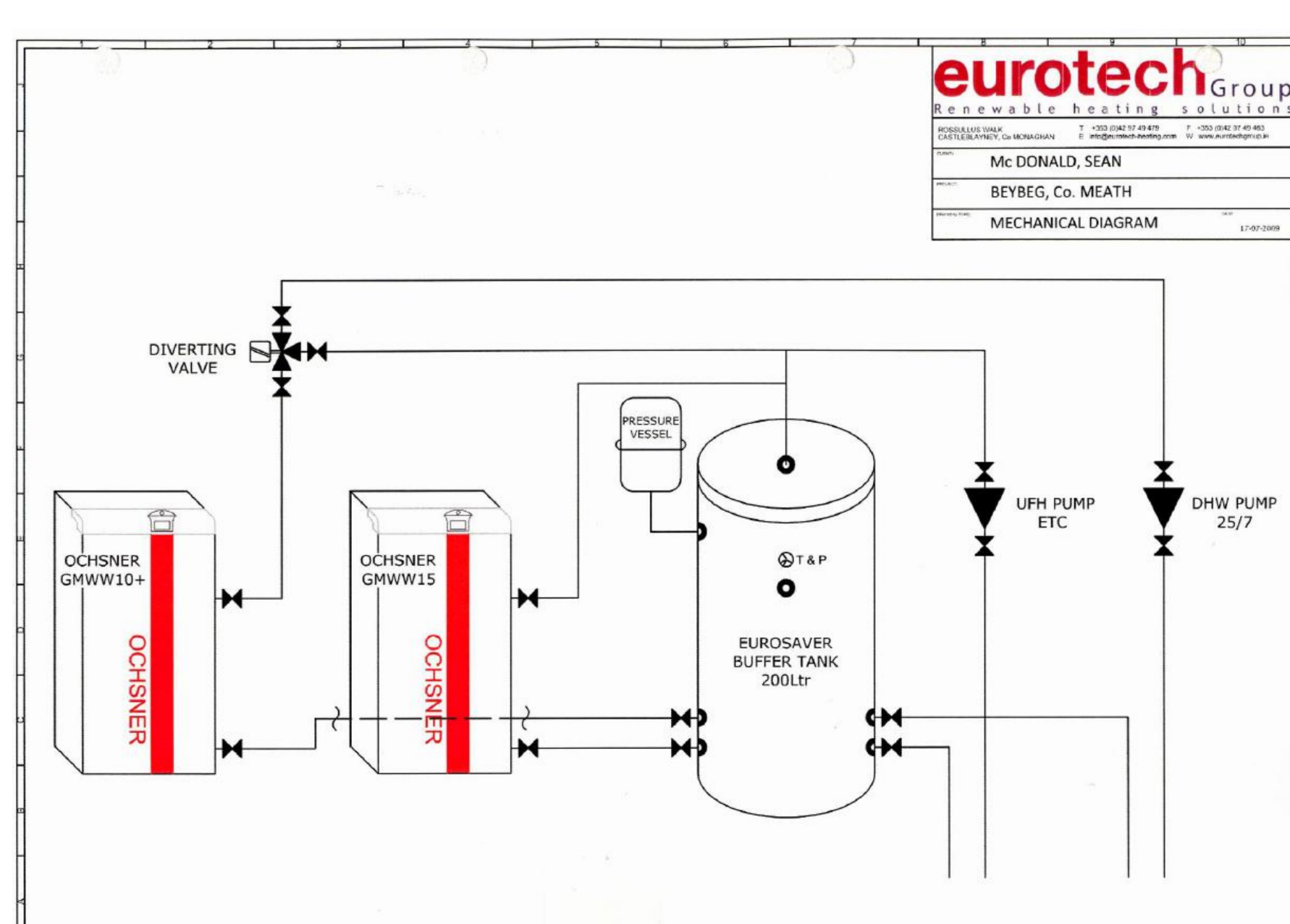
The hot water was designed to heat using:

1. A heat pump to extract heat from the toilet extract duct from the bathroom and ensuites, and
2. During times of high demand, from the Ochsner water to water heat pumps.

The system has run trouble free. There is no requirement for a flame or flue and as a result reduces local pollution from flue gas emissions.

The boiler house has no odours and does not require additional ventilation like louver doors, etc., there is no exposure to freezing. This area had external temperatures of -17°C in December 2010.

The following table and BER chart provides an indication of how the house performs based on data retrieved from the utility bills. The cost of heating the house is substantially lower than that which would have arisen if using oil fired heating.



Key Data and Assumptions used in calculations:	
Year of analysis	2010
Floor Area	473 m <sup>2</sup>
Annual Electricity Consumption	18666 kWh
Base annual elect demand excluding heating	8566 kWh
Delivered energy intensity by floor area	39.5 kWh/m <sup>2</sup> /yr
Primary energy intensity by floor area	87.7 kWh/m <sup>2</sup> /yr
CO <sub>2</sub> emissions per floor area	46.7 kg/m <sup>2</sup> /yr
Geothermal Renewable Energy usage	38.0 kWh/m <sup>2</sup> /yr
Min. Bldg. Reg. Part L renewable energy	10.0 kWh/m <sup>2</sup> /yr
CO <sub>2</sub> emissions saved against oil heating	8053 kg/yr
Night % of Total Electricity demand	54%
Period of review	14/9/10 - 13/9/11
Electricity CO <sub>2</sub> intensity factor	0.533 kg/kWh
Kerosene CO <sub>2</sub> intensity factor	0.257 kg/kWh
Seasonal CoP heatpump	4.0
Primary Energy Factor grid electricity	2.22
Primary Energy Factor Oil	1.1
Seasonal efficiency oil boiler	0.85

