

IGEN-OCHSNER GMLW 19 - Air Source Heat Pump

One Year Monitoring Case Study

*Julianstown, Co Louth, Ireland
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Introduction

Air Source heat pumps extract heat energy from the outdoor ambient air and can raise it to a level suitable for domestic and commercial uses. They do not have the need for ground loops as required by ground source heat pumps; however they must be designed and specified correctly for a given installation. A 16kW Ochsner GMLW 19 air source heat pump was specified and installed by IGEN at a crèche on the east coast of Ireland in December 2008. The performance of the system in the production of space heat and hot water was monitored over one year by the Centre for Renewable Energy at Dundalk Institute of Technology (CREDIT). The monitoring period was from the 16th February 2009 to 16th February 2010 and included one of coldest winters in Ireland on record. A summary of the results is presented here.

The Building

The building is shown in Figure 1. It is well insulated and has under floor heating. The floor area of the building is ~ 400m².



Figure 1

The heat pump was installed to provide all the hot water and space heat for the building.

The Heat Pump System

The heat pump system consists of an Ochsner Millennium outdoor evaporator as shown in Figure 2. This is the part of the system that extracts energy from the ambient outdoor air.



Figure 2

The Ochsner GMLW 19 heat pump unit along with an Ochsner Unifresh 800 litre cylinder is shown in Figure 3. Both hot water and space heat for the building is drawn from the cylinder.



Figure 3

Heat Pump Performance

The heat production by the heat pump and the electricity consumption along with the system's flow and return temperatures, outdoor temperature and outdoor relative humidity were monitored and logged in five minute intervals for one year.

The total heat production and electricity over the one year monitoring period is shown in Figure 4.

Heat production vs Electricity consumption

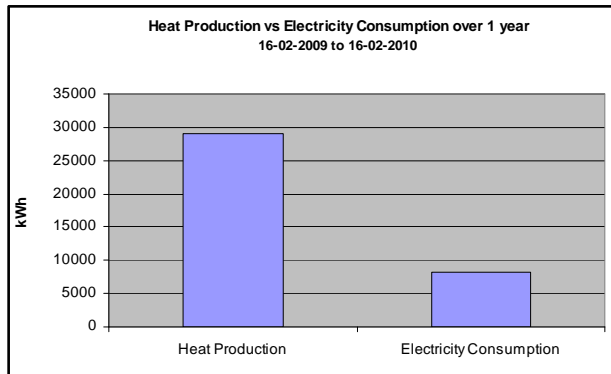


Figure 4

The annual Seasonal Performance Factor (SPF) for the system was 3.55. This consisted of an SPF of approximately 4.0 for space heat and approximately 2.9 for domestic hot water.

Running cost comparison

A cost comparison with the use of other heating system based on 2010 fuel costs is shown in Figure 5.

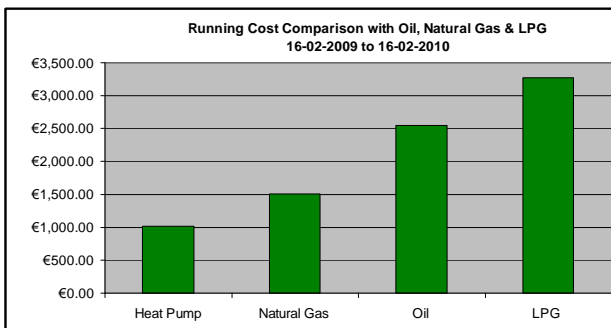


Figure 5

The results show how the heat pump running cost would compare with using other forms of heating as follows,

The running cost of the heat pump is –

- ~ 33% less than the cost of using natural gas
- ~ 60% less than the cost of using home heating oil
- ~ 69% less the cost of using LPG

CO₂ Emissions Comparison

Heat pumps do not emit carbon dioxide (CO₂) at the point of use like fossil fuel systems; however since they consume electricity there will be CO₂ emissions at the electricity generation stations depending on the electricity generation plant mix of the national grid. A comparison of CO₂ emissions with other fossil fuel systems is shown in Figure 6.

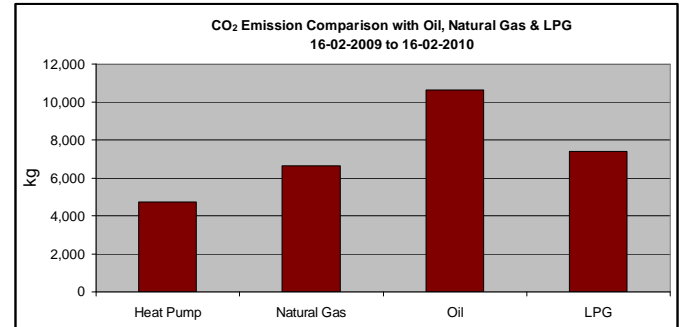


Figure 6

Conclusion

The study has shown that an Ochsner GMLW19 air source heat pump is well suited to an Irish maritime climate in the provision of hot water and space heat to the building and that the annual running cost is less than using conventional fossil fuel systems.

The installation met the building regulation with regard to renewable energy requirement for new buildings well in excess of the requirements 2007 Technical Guidance Document L Conservation of Fuel and Energy – Dwellings

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A detailed report on the study is available on request.