

iSERVcmb Case Study

**Electricity savings of 26 - 40% per year of total building use by replacement of old VRF system with new VRF system.
2.5 to 5.0 year return on investment**

Service House MacWhirter Ltd, UK

Introduction

This report summarizes the results of MacWhirter Ltd's participation in the iSERVcmb project with regard to its HVAC system energy consumption. The report refers to the period from Feb 2006 to 2013.

Building and Services Profile

Service House is an office block, arranged over 2 stories, of 303 m² internal floor area of which 210 m² is conditioned in Cardiff, UK.

Both floors are served by a single multi-split VRF system with heating and cooling functions. The VRF has one external unit and 10 indoor units. Ventilation in the building is Natural.

The VRF has a Nominal Cooling Capacity of 45kW and a Nominal Heating Capacity of 40kW. The nominal electrical power demand in both modes is 13.67 kW (including 1.2kW for the indoor units).



	Key Figures
Location	Cardiff, United Kingdom
Sector	Office
Construction Date	?
Project Size	210 m ²
EPC	N/A
Sub-metering Level	Party Metered
Data Frequency	15'
Data Collection Protocol	Stand Alone system
Data Sending Protocol	Automatically extract & send to an email address
Nature of Savings achieved	Improved HVAC Control HVAC Equipment Replacement Choose an item.
No. HVAC Systems	1
HVAC Components	<input type="checkbox"/> Heat Generators <input type="checkbox"/> Cold Generators <input checked="" type="checkbox"/> All-in-One Systems <input type="checkbox"/> Heat Pumps <input type="checkbox"/> Air Handling Units <input type="checkbox"/> Humidifiers <input type="checkbox"/> Dehumidifiers <input type="checkbox"/> Pumps <input type="checkbox"/> Storage Systems <input type="checkbox"/> Terminal Units <input type="checkbox"/> Heat Recovery <input type="checkbox"/> Heat Rejection

iSERV Achievements

Energy Savings

Electricity: 67 - 124 kWh/m²

26 - 40%

Cost Savings

Electricity: 10 - 18.6 €/m²

Total building electrical consumption reduction since participation

Emissions Reductions

Electricity: 0.030 - 0.056 tCO₂/m²

Investment to achieve savings

~1 €/m²





VRF Operation

The VRF is controlled by a timeclock and thermostats. The system operates on a time schedule set depending on time of year. Manual daily readings were used for the majority of the data used in this case study though aMR meters are now installed. The building is occupied 08:00 to 17:00, Monday to Friday. Outside of these hours the system is off except in extreme weather conditions.

Savings of 14 - 26 MWh/a due to replacement VRF system

The data provided starts at February 2006 and is intermittent until September 2012. Only electricity consumption is provided as there is no gas installed in the building.

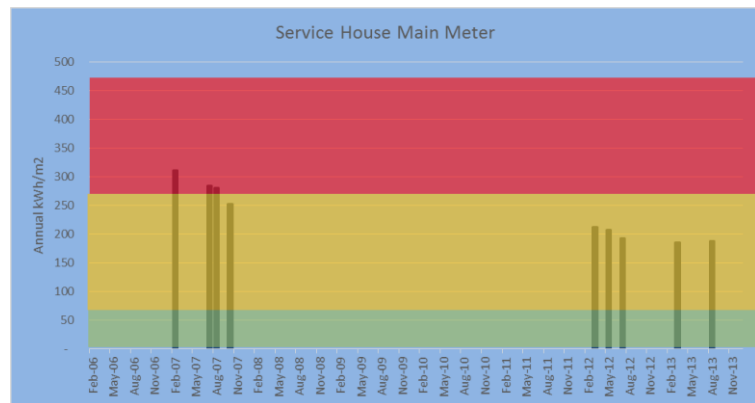
The VRF system was replaced in 2010.

The reduction is from a peak of between 252 - 311kWh/m²a between February and October 2007 to 187 kWh/m²a in August 2013.

This is equivalent to a 26 – 40% reduction in the total energy use of the building. Discussions over the usage of the building during this period indicates this is primarily due to the replacement of the VRF in 2010.

The VRF system was replaced following the predecessor project to iSERV, HARMONAC (2007 to 2010), helping to identify the potential impact to be had from replacing the existing older VRF system with a modern inverter driven unit.

The annual electrical savings achieved in the building are estimated to be between 13,600 to 26,000 kWh/a. From the graphic it can be seen that the building has also now moved into the average consumption band for this building. It is anticipated that this performance could improve further once additional data is available for heat pump operation all year round.



“The HARMONAC and iSERVcmb projects provided us with the confidence to replace our Head Office VRF system based on the energy savings we expected to make compared to the existing system. We are delighted to see the savings we are making.”

Dave Wright – MacWhirter Ltd

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how energy efficient are you really?



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