

Saving opportunities

Although only 5 years old, Wales Millennium Centre in Cardiff has undertaken energy saving initiatives leading to a saving of 15% in 2009 compared to the benchmark year of 2006. A projected £65,000 plus of further savings will be realised from energy initiatives commenced within 2010

"The electrical energy consumption of existing air-handling unit fans can easily be reduced from a level of between 5 and 10kW/m³ to a modern recommended level of between 2 and 2.5kW/m³"

Photograph courtesy of John Evans

The Wales Millennium Centre is the hub of cultural life in Wales, and it has this year the Centre achieved ISO 14001 and is recognised as an exemplar by the Carbon Trust and is on track to reach or exceed the 2010 target of 21% energy use reduction compared to the 2006 benchmark year. Now thorough an air conditioning inspection, culminating in an improvement project carried out by HVAC energy saving specialist Efficient Air the Centre can again demonstrate best practice.

The project was managed by David Bonney, technical manager, maintenance at the Centre, and Efficient Air's energy assessor Eric Agbozo, a CIBSE fully accredited complex Air-conditioning Energy Assessor. It was undertaken as an 'Article 9' Air Conditioning Inspection Survey of the HVAC systems and controls in line with the EPBD (Energy Performance of Buildings Directive) using the TM44 methodology.

From the quick win and low cost energy saving initiatives that were identified, Efficient Air calculated an energy reduction of 80,350kW/hrs. This equates to a cost saving in the

region of £7254 per annum and a CO₂ reduction of around 44.6T.

The second part of the Survey looked at capital investment opportunities, of which when implemented would yield an energy reduction of 644,800kWh, equating to a cost saving in the region of £58,032 per annum, and a CO₂ reduction in the order of 354.6T.

Implementing all of the opportunities outlined has the potential to improve the HVAC energy performance of the Centre by 28.3%. This equates to energy saving of 725,150kWh, a cost saving of £62,286 and a CO₂ reduction of 400T. With a payback period of between 3.3 and 6.5 months, David Bonney had little difficulty in receiving authorisation to commence the work.

Investigations

The first step in the process, was a thorough investigation of every aspect of the building's structure, its operational characteristics and the HVAC services. The building has a total floor area of 32,3750m², with a conditioned floor area of 21,222m². The areas are conditioned by 37 AHUs, air delivery is provided via 72 off 4-pipe fan coil units.

Primary heating medium for the building is via a Low Temperature Hot Water (LTHW) system. Chilled Water is provided through 2 chiller units with a combined capacity of 2236kW. In addition to the central equipment, there are dedicated LTHW and cooling systems serving AHUs and Fan Coil Units (FCU) located in the Dance House and the Urd's 150 bed accommodation centre. These are centrally controlled with localised override.

Humidification provision is via electric steam humidifiers to the

main auditorium and orchestral practice room. In the case of the main auditorium, humidification is required to maintain optimum condition for performers, musical equipments and the internal building fabric (which is mostly treated wood for acoustic purposes). All units are centrally controlled via the BMS with appropriate set points to ensure optimum efficiency.

Easy wins

Within a short space of time, Efficient Air's Energy Assessor was able to make some general observations. For instance, the majority of units on this site are providing greater levels of airflow than recommended CIBSE guidelines. Significant savings were achievable by airflow reduction down to the required level. This can be done either by reducing the motor speed on the variable speed drives (VSD) to the systems.

The electrical energy required for ventilation fans and air-handling units plays an increasing role in the energy demand on buildings. The Specific Fan Power (SFP) value (expressed in kW/m³) indicates the power efficiency of supply and extract air fans in a building. Recent studies have shown that the electrical energy consumption of existing air-handling unit fans can easily be reduced from a level of between 5 and 10kW/m³ to a modern recommended level of between 2 and 2.5kW/m³ through better design and more efficient components.

Key recommendations listed in the action plan include: Reducing airflow to the Foyer area; Overdoor heater review; Energy efficient humidification installation; Valve replacement; Inverter installation; and Critical Areas DX Unit Installation.

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