

Passive Design in Local Government Offices

Fingal County Council, Ireland

Summary

In 1996 Fingal County Council set out to procure a new headquarters building in Swords and initiated a competition for the building's design. The Council's clear commitment to the environment was demonstrated in the competition pre-condition that the building's design needed to demonstrate low energy usage and be responsive to the environment.

The completed building demonstrates that it is possible to produce an office building in Ireland that contains high internal heat gains but does not require any energy consuming air conditioning or mechanical ventilation to produce a comfortable internal environment.

This building uses passive technology such as natural ventilation, thermal mass absorption, intelligent controls, and night cooling to naturally moderate the buildings internal temperatures.



End-user area	Target Audience	Technical
<input checked="" type="checkbox"/> New buildings	<input type="checkbox"/> Citizens	<input checked="" type="checkbox"/> Energy efficiency
<input type="checkbox"/> Refurbishment of buildings	<input type="checkbox"/> Households	<input type="checkbox"/> Heating
<input type="checkbox"/> Transport and mobility	<input type="checkbox"/> Property owners	<input checked="" type="checkbox"/> Cooling
<input type="checkbox"/> Financial instruments	<input type="checkbox"/> Schools and universities	<input type="checkbox"/> Appliances
<input type="checkbox"/> Industry	<input type="checkbox"/> Decision makers	<input type="checkbox"/> Lighting
<input type="checkbox"/> Legal initiatives (municipal regulations, directives, etc)	<input checked="" type="checkbox"/> Local and regional authorities	<input type="checkbox"/> CHP
<input type="checkbox"/> Planning issues	<input type="checkbox"/> Transport companies	<input type="checkbox"/> District Heating
<input type="checkbox"/> Sustainable communities	<input type="checkbox"/> Utilities	<input type="checkbox"/> Solar energy
<input type="checkbox"/> User behaviour	<input type="checkbox"/> ESCOs	<input type="checkbox"/> Biomass
<input type="checkbox"/> Education	<input type="checkbox"/> Architects and engineers	<input type="checkbox"/> Wind
<input type="checkbox"/> Other	<input type="checkbox"/> Financial institutions	<input type="checkbox"/> Geothermal
	<input type="checkbox"/> Other	<input type="checkbox"/> Hydro power
		<input type="checkbox"/> Other

Context

Under the Kyoto protocol, Ireland is committed to limiting its greenhouse gas emissions to 13% over 1990 levels between 2008 and 2012.

Ireland has currently exceeded this limit and is making efforts in all sectors to increase energy efficiency and reduce emissions associated with energy production and distribution.

The energy used in Buildings is responsible for approximately 55% of the CO₂ released into the atmosphere and CO₂ is a major contributor to global warming.

A preconception exists that quality office buildings must offer air-conditioning to their occupants. Fingal County Hall stands as a live example of a quality naturally ventilated building, and demonstrates that the need for air conditioning can often be removed through intelligent design.

This building has already inspired other local authorities to seek low energy, naturally ventilated office buildings and is used as a case study for many building procurers who need live proof of a low energy alternative to air conditioned buildings.

Objectives

This office building was designed to consume considerably less energy than a typical Irish office building, particularly through the use of natural ventilation in place of energy consuming air conditioning or mechanical ventilation.

Process

Fingal County Council initiated a design competition for their new offices and specified that the building must demonstrate a clear commitment to reducing the buildings environmental impact.

BMA architects completed a successful competition entry and teamed up with Building Design Partnerships engineers and energy consultants who have a vast experience in the design of low energy and sustainable buildings.

During the early stages of the design the engineers and architects worked closely to develop the buildings facades and thermal storage strategies. Advanced thermal simulations were used to assist in the analysis of the buildings performance and the design was improved through a series of design iterations.

Daylight simulation was also carried out to optimise the design of internal and external light shelves, designed to project light evenly thought the buildings office areas.

Particular care was taken to produce an integrated solution with many of the build elements performing several tasks, such as the slab that has a structural purpose, is shaped to reflect light evenly into the building, provides a heat sink during warm weather and smoothes heating loads during the winter.

Financial resources and partners

The cost of procuring this building was considerably less than an equivalent air-conditioned office and some of the cost savings were then available to support the buildings architecture.

(Actual costs are a bit dated at this stage and would have no relation to the current market)

Results

The project was designed to use approximately quarter of the energy that an equivalent air-conditioned office would consume and costs less in capital terms than an equivalent air-conditioned office.

Total energy use was calculated at approximately 100kWh/m² per year.

In addition to producing energy and environmental savings, the building provides a natural working environment that many consider to be more healthy and productive than an artificial equivalent.

Lessons learned and repeatability

Fingal County Hall has demonstrated that it is possible to produce a naturally ventilated office building in Ireland that produces a quality internal environment while limiting the buildings environmental impact.

The building serves as an example that has been visited by many building procurers and designers and the technology demonstrated has already been replicated in another county council building in Ireland.

It is hoped that this building will help to reduce the preconception that office buildings must be air conditioned in order for a quality internal environment to be produced.

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