Local Building Energy Standards in Ireland:

Report on the experience of Irish local communities in achieving higher energy performance and renewable energy requirements in their built environment.

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Executive Summary

Starting at the end of 2005, a number of progressive local authorities introduced building energy standards as part of planning requirements in their jurisdiction. These building energy standards require a substantial increase in the energy performance of new buildings (between 40% and 60% reduction in energy usage) as well as a mandatory contribution of renewable energy to their thermal energy requirement. This paper presents an inventory of these standards as well as a review of the process that led to their adoption. It discusses the lessons learned and makes recommendations as to the further deployment of such standards in other local communities as well as the pressure put on national government to follow suit. The paper also gives a snapshot of the current market for solar thermal systems in Ireland as well as estimates on the impact the local building energy standards are likely to have on their uptake in the areas where they are in application.

Introduction

The Irish political system is generally very centralised and local authorities have limited power and financial resources compared to many other European countries. Within the 'geographical' scale of political influence, County Councils are the most influential organ of public authority at a local level after national government. There are 26 counties in the Republic of Ireland. The remit of County Councils includes: planning, housing, waste management, water services, fire & emergency services, etc. Comparatively, town councils (village scale) have virtually no legislative power and a relatively small input in the day-to-day life of Irish citizens.

Figure 1 : Fingal County Hall, award-winning low-energy public building designed by Bucholz-McEvoy Architects

Until recently, national government had exclusivity in terms of defining energy standards for buildings in the framework of the national Building Regulations. This position was challenged in 2005 by a group of local councillors[1] from the Green Party who put a motion to Fingal County Council for the introduction of improved building energy standards in the Local Area Plan (LAP)[2] for the Cappagh Road (a 29 hectares area of this county rezoned for housing North of Dublin). After much debate, this proposal was adopted by the Council and Cappagh's LAP was published in October with a requirement that all new buildings must achieve the following energy standard as a prerequisite to receiving planning approval:

- annual heating requirement to be lower than 50 kWh/m2,year and;
- at least 30% of the buildings space and water heating requirements to be supplied by a renewable energy system.

[1] Councillors are locally elected representatives acting at C.ounty .Council level.
[2] Local Area Plan (LAP): A LAP is a land use plan which clearly establishes the parameters for the future development of the subject lands.

This development in Fingal was no short of a small sustainable energy revolution in Ireland for the following reasons:

- it set a very strong example for all local authorities in Ireland as to their capability to set energy standards that go above and beyond national standards;
- it put local authorities in the driving seat in the effort to improve energy efficiency in buildings, and forced the Irish government to rethink its own standards;
- it also encouraged the national energy agency (Sustainable Energy Ireland) to review its own targets for the House of Tomorrow programme, a funding initiative for energy efficient housing;
- for the first time ever, a target was set for the contribution of renewable energy to heating requirement in buildings;
- it forced building developers and other interested parties to address the issue of additional costs of implementing these higher standards, and to take a position on their ability and willingness to deliver houses that meet them.

An insight into how this was achieved

Figure 2: David Healy, Green Party Councillor at Fingal County Council

The process of introducing sustainable energy requirements for buildings in local planning regulations started in February 2005. At the time, three Green Party Councillors from Fingal County Council - David Healy, Joe Corr and Robbie Kelly - submitted proposals they had been developing for the County Development Plan[3]. "We wanted to get a standard into the County Development Plan that all developments would have to meet", explains David Healy. "We drafted it up with the double requirement of a heating demand and a percentage of renewable energy" [1].

Initially, the proposals were received with a certain degree of scepticism in the Council. Planning officials were of the opinion that this was a matter for national building regulations and not for local planning policies. At a time of strong demand for housing and frantic activity in the building sector, market response to bringing this kind of requirements was also a key concern for the Council and it was decided by a majority of councillors not to introduce them in the County Development Plan.

The first issue - the legality for a local authority to introduce building requirements that exceed the national regulations – will be examined in more details later in this paper. The issue of how much could be achieved in terms of building energy efficiency was the next one to be tackled. Cadogen Enright, energy consultant at Sustainable Development Ltd and advisor to the Fingal Councillors, contacted Sustainable Energy Ireland's Renewable Energy Information Office (REIO) for direction. The author of this paper, who was then working as an energy engineer at REIO, had done quite a bit of research on the Minergie standard in Switzerland[4] and saw this as a unique opportunity to promote them in Ireland. REIO's recommendation was to introduce a similar standard in terms of maximum heating requirement as well as an obligation to use renewable energy to meet at least 30% of the demand for space and water heating.

The market response to such standards was first tested during discussions with a local developer, Menolly Homes, who wanted to develop land in the county. It has to be noted at this stage that a very large proportion of housing construction in Ireland is undertaken by developers i.e. companies who acquire sites and build multiple houses (sometimes by the hundreds) for sale or rent to householders. Developers and associated construction companies have such a weight in the supply of housing, and generally in the national economy, that their response to the proposed standards was fundamental.

The Council put forward a condition for rezoning the land that Menolly Homes sought to develop that the energy standards originally proposed for the County Development Plan should be achieved, and

[3] The County Development Plan states the local authority's policies for land use and for development control and promotion in its area. The authority, in exercising control, must consider the provisions of the Plan, and try to secure its objectives.
[4] See www.minergie.ch

managed to receive a public commitment from the developer to comply. This gave sufficient confidence for the councillors to submit the following proposals into the Local Area Plan for Cappagh which were successfully voted through in October 2005:

> *"All new buildings will meet the minimum low energy performance standards (as defined below) as a prerequisite to receiving planning approval (calculation report to be submitted with the planning application). Each building's energy performance calculation must be demonstrated on the basis of a simple approved method (e.g. EN 832) carried out by qualified or accredited experts. Low energy buildings are defined as buildings with an annual heating requirement (space and water heating) not exceeding 50 kWh/m2 of useful floor area. The development will utilise renewable energy supply systems to meet at least 30% of the buildings space and water heating requirements as calculated on the basis of an approved method carried out by qualified or accredited experts." [3]*

On December of the same year, Fingal County Council demonstrated that their intentions went beyond a one-off trial by voting the same building energy requirements into two other Local Area Plans (North Ballymun and Northwest Balbriggan).

Energy performance is also about social justice

Beyond the immediate sustainability concerns, Fingal County Council's initiative was a direct response to the issue of their citizens' well-being and fuel poverty in a context of rising energy prices. "A central aspect of the arguments within the Council was the financial benefits to the people who would be living in the houses", declares Fingal Councillor David Healy. "In so far as these buildings require an extra cost, if they do, the cost will be borne by the developer or the landowner. Even if the houses sell for what a house built to the current low standards would sell for and it costs more to build, that's really quite a small dent in what will be quite spectacular profits being made. The householder will receive the benefit; there's no doubt about that. Even at current energy prices it will have a significant financial benefit". [1]

Jeff Colley of Construct Ireland also comments that 'by taking a proactive approach to shifting market conditions, Fingal County Council have revealed a commitment to the long-term wellbeing of their local community, who will stand to benefit in terms of buildings that are both less likely to devalue as energy becomes a key factor influencing property value and less likely to prove a liability in terms of spiralling running costs, with the added social benefit of helping to alleviate the risk of exposing people to fuel poverty.

You are not alone…

Fingal County Council took a bold step by introducing such standards in 2005. Up until this point, the Irish building industry had resisted any attempt to improve energy standards in buildings. The consultation phase leading to the publication of the current building regulations in 2002 saw frenzied lobby work by builders and developers who only perceived higher energy performance as higher construction costs and reduced profit margins. When prompted by supporters of the Fingal initiative, the positive response by progressive members of the building industry was key in reinforcing the Council's confidence.

Gerry McCaughey, CEO of Century Homes (now Kingspan Century), the largest timber-frame house manufacturer in Ireland, has always been very vocal about the building industry and the Irish government's failure to deliver better energy performance in buildings. Gerry comments on the Fingal initiative: "The decision by Fingal County Council to specify the highest standards of energy efficiency for building in three local area plans is one of the most significant developments in building for decades. For the first time a local authority sees the wisdom of ensuring that buildings are designed to the highest standards in energy efficiency. This will result in warmer, more comfortable buildings that are healthier to live in and much cheaper to run. I hope this ground-breaking initiative by Fingal County Council will set the standard for developments in Ireland. We don't really need pilot schemes or one-offs, the technology has been proven to work, so these standards can be met, we know that. It will work". [1]

Similarly, Seamus Ross Junior of Menolly Homes, one of the biggest home builder in Ireland, states in the Construct Ireland magazine: "Menolly Homes view the attention to sustainable building expressed by Fingal County Council as a positive development for Ireland , and are pleased to take up the challenge. As a company, Menolly recognise the value of the type of innovation this encourages, and have taken this onboard as a key growth area in the market." [1][

Michael O'Driscoll, CEO of Manor Park Homebuilders Ltd, is also supportive: "Fingal County Council have to be congratulated on taking the first step in the right direction. It's better late than never and I'm delighted that the local authorities are finally becoming proactive in this regard. We have the technology and the capability in Ireland to comply with these requirements, for which both supervision and enforcement will be essential. This is a positive challenge for developers, and is very encouraging because finally it is coming from the local authorities rather than builders trying to innovate without legislative support."

The move has also received strong support from politicians and government officials. Dick Roche, at the time Irish Minister for the Environment, Heritage and Local Government, praised the Local Area Plan for increasing awareness among potential purchasers and tenants in the Dublin area on the importance of energy performance in buildings. Eamon Gilmore, Labour Party Spokesperson on the Environment, also commented that "Incorporating energy efficiency measures into the Irish building sector is the logical way forward…our carbon saving targets could be our saving grace by providing a great opportunity for this country to not just build innovative energy-saving houses, but to become self-sufficient in energy production…[and] to move to the top in terms of energy conservation and to have an environment of which all of us can be proud". [1]

By June 06, Fingal County Council had also introduced energy standards in Portmarnock, Kinsealy and Donabate LAPs. While they are in keeping with the standards introduced in Cappagh, North-West Balbriggan and Castlelands, these LAPs include a performance based CO_2 Emissions Target (CET) which requires a reduction of at least 60% in CO_2 emissions deriving from energy usage for space and water heating within the housing development, relative to a baseline of prevailing regulatory and design practice. The 30% contribution of renewable energy systems to meet the collective space and water heating requirements within the housing development was maintained as a requirement in the standards. This time the revised standards also included the following requirements for non-residential building developments:

- A collective reduction of at least 60% in CO_2 emissions deriving from total energy usage (space heating, water heating, lighting, other) arising from all services within the development, relative to a baseline of existing regulatory and design practice.
- A contribution of 30% by renewable energy supply systems to meet the collective energy requirements within the development.

Dun Laoghaire-Rathdown joins the top league

Dun Laoghaire-Rathdown County Council was the first Council to replicate what had been done in Fingal. The county is located between the outer suburbs of Dublin City and the Dublin/Wicklow Mountains on the East Coast of Ireland. Its total population is approximately 190,000. In March 2006, another Green Councillor, Ciaran Fallon, put forward a motion to the Council to introduce similar standards as in Fingal in their LAPs. In October of the same year, he reiterated his attempt by putting forward a motion for their adoption at County Development Plan level and the Council agreed to engage formally in the process for the variation (Variation number 5 "Energy Policy ET7") of the Dún Laoghaire Rathdown County Development Plan, 2004-2010.

The proposed variation originally included very similar targets to those adopted in Fingal i.e. 60% CO_2 reduction and 30% renewable energy contribution. However, these targets were revised downwards following submissions by prominent groups during the consultation process. Among those, the advice provided by CODEMA (Dublin Energy Agency) and the concerns expressed by the Royal Institute of Architects of Ireland (RIAI) and the Irish Home Builders Association (IHBA) managed to undermine the ambitions of the Council. The IHBA warned that the measures could lead to a slump in new house starts and place extra pressure on house prices due to considerable extra costs. Some of the measures, such as ventilation controls, also conflicted with national building regulations and builders and architects would be left uncertain as to which to follow, a spokesperson for the association said [3].

More controversially, CODEMA and Sustainable Energy Ireland, the national energy agency, advocated a less stringent target in CO_2 reduction (-40% compared to the baseline). The argument put forward was that the technology required to achieve the 60% reduction is unproven, relatively high risk requiring a very significant degree of innovation at a significantly higher cost [4]. It has also been reported that the RIAI wrote to the Council to express the view that "such matters are properly dealt with through the building regulations regulatory systems and not by variation to [county] development plans" and that although the institute "fully supports the concept of improved standards in energy efficiency and sustainability generally", this "should be dealt with on a national basis by the Minister for the Environment . . . and the Building Regulations Advisory Board" [5]. The same source revealed that the RIAI shared the view of the IHBA that the 60% improvement on current building regulations could not be achieved.

These submissions generated considerable debate among Dun Laoghaire-Rathdown County Council which adopted on 12 February 07 a 40% reduction in CO_2 emissions from heating, cooling and lighting, as well as a 20% contribution to heating from renewable energy sources in all new house and apartment developments with more than 10 dwellings, and to commercial properties greater than 1,000 square metres. The Council also delayed the introduction of these planning requirements to January 2008 in order to leave some time for the construction sector to prepare itself.

A rising tide...

The achievement of Fingal and Dun Laoghaire-Rathdown County Councils attracted considerable attention among policy makers and relevant stakeholders in other local communities and at national level. This was hailed as a courageous move and very positive development by environmental NGOs, many politicians and the most progressive element of the building sector. The media covered it extensively and councillors and other officials from Fingal and Dun Laoghaire-Rathdown were regular invitees to conferences, seminars and other public debates in the area of sustainable energy and climate change.

Following in the footsteps of their colleagues, Wicklow County Council has adopted building energy requirements in two local area plans, Rathdrum LAP (voted on October 06, with 40% reduction in thermal energy [6]) and Greystones-Delgany LAP (voted on December 06, with 60% reduction in thermal energy [7]).

Similarly, Wexford County Council has introduced an energy policy in their County Development Plan 2007-2013 that all new building developments will have to meet 'low energy performance' targets (40% reduction on thermal energy demand compared to current building regulations) and achieve a minimum Building Energy Rating of B1 (primary energy requirement bet. 75 & 100 kWh/m^2,year for space+water heating and lighting). The County Development Plan also specifies that new buildings should incorporate renewable energy technologies in order to help achieve the required B1 rating . [7]

Legal basis for local energy standards

As mentioned before, one of the key elements in the debate for the introduction of local energy standards for buildings was the legal foundation that would give local authorities sufficient discretion to do so. A team of legal and planning experts looked into it and found that the Planning and Development Act 2000 [5] provided a sufficient basis. Within the Act, Section 19 says that Local Area Plans can include objectives set by the local authorities "for the proper planning and sustainable development of the area to which it applies, including detail on […] standards for the design of developments and structures". It also gives them authority in terms of "promoting design in structures for the purposes of flexible and sustainable use, including conservation of energy and resources" [2].

According to Conor Linehan, of leading law firm William Fry Solicitors' Environmental and Planning Unit, lends his opinion. "The Planning and Development Act 2000 obliges planning authorities to have regard to sustainable development when planning for local areas through formal Local Area Plans", Linehan explains. "The Act also affords a wide scope to planning authorities as regards the means and the detail for delivery of sustainable development, through Local Area Plans. The requirements regarding energy efficiency standards for buildings [in Fingal Local Area Plans] reflect that wide discretion". [1]

The Planning and Development Act 2000 can similarly be interpreted to afford Dun Laoghaire-Rathdown County Council the discretion required to introduce building energy requirements in the County Development Plan. Once in the County Development Plan, these requirements apply to all planning permissions for relevant building developments in the county.

Overview of the local building energy standards currently in application in Ireland

The following table presents a summary of the local building energy standards which are currently in application in the various jurisdictions mentioned before. In all cases, the targets set in the local building energy standards take the national Building Regulations 2002 (Technical Guidance Document, Part L) as a baseline. The text of these plans is not always clear on the energy system boundaries and the starting point for the calculation of the improvement in energy performance. It is assumed in this article paper that these targets are based on the 'delivered energy' (takes into account the efficiency of the system supplying the energy service) as opposed to the 'energy demand' (e.g. heat supplied by a gas boiler to provide hot water and space heating).

[5] Planning and Development Act 2000: Basis for the Irish planning code, setting out the detail of regional planning guidelines, development plans and local area plans as well as the basic framework of the development management and consent system. Source: http://www.environ.ie/en/DevelopmentandHousing/PlanningDevelopment/Planning/PlanningLegislation-Overview/

Local Authority	Where?	In application from	Applicable to	Energy demand target	CO2 emission target	Renewable energy target
Fingal County Council	Cappagh, North-West Balbriggan and Castlelands (LAPs)	October 05 and December 05	All housing developments	Max. 50 kWh/m2,year for thermal energy	-	Min. 30% contribution to thermal energy demand
Fingal County Council	Portmarnock, Kinsealy, Donabate (LAPs)	June 06	All housing developments		Min. 60% reduction from thermal energy usage	Min. 30% contribution to thermal energy demand
Fingal County Council	Portmarnock, Kinsealy, Donabate (LAPs)	June 06	Non-residential buildings		Min. 60% reduction from total energy usage	Min. 30% contribution to all energy usage
Dun Laoghaire-Rathdown County Council	County Development Plan (whole county area)	From January 08	Housing developments > 10 houses & non-residential developments > 1000 m2		Min. 40% from energy usage for heating & cooling + lighting	Min. 20% contribution to space and water heating
Wicklow County Council	Rathdrum LAP	October 06	All new building developments	Min. 40% reduction in thermal energy demand.	Min. 40% reduction in CO_2 associated with thermal energy demand.	None
Wicklow County Council	Greystones-Delgany LAP	December 06	All new building developments	Min. 60% reduction in thermal energy demand.	Min. 60% reduction in CO_2 associated with thermal energy demand.	None
Wexford County Council	County Development Plan (whole county area)	June 06	All new building developments	Min. 40% reduction in thermal energy demand. Building Energy Rating B1 at least	Min. 40% reduction in CO2 associated with thermal energy demand.	None

Proof of Compliance

The issue of checking and enforcing compliance is very important for the credibility and the effectiveness of the local building energy policies. In all cases, the local authorities require the submission of a report with the results of the calculations of the energy performance of the relevant building(s), as proof of compliance with the planning application.

However, there are variations in the methodology proposed by the local authorities to carry out these calculations and the nature of the associated reports:

- Fingal:
  - For residential buildings: *'The calculation is to be carried out for the time being using the Heat Energy Rating Method in TGD L, pending adoption of the official national methodology for determining energy performance of housing for the purposes of the EU Energy Performance of Buildings Directive (EPBD).'* [10]
  - For non-residential buildings: *'In the absence of an official national methodology for determining the energy performance of non-domestic buildings, this calculation is to be carried out using a method compliant with the draft European Standard prEN 13790.'* [10]
- Dun Laoghaire-Rathdown*: 'The preferred methodology for assessing the feasibility of such sustainable energy systems shall be the Sustainable Energy Ireland (SEI) software tool or other acceptable methodology.*' [12]
- Wicklow: *'a calculation report is to be submitted with the planning application). Each building's energy performance calculation will be demonstrated on the basis of a simple approved method carried out by a qualified or accredited expert.'* [6] [7]
- Wexford: the county development plan refers to the Building Energy Rating method for the calculation of the energy savings. [6] [8]

In addition, there doesn't appear to be any provision in the local planning regulations to check compliance at post-construction stage, nor is there an explicit plan for linking the enforcement of the local building energy standards with the building control system.

National building regulations lagging behind

Minister Eamon Ryan:

"… move to the 60% target through the revision of the building regulations…"

The rising tide of local building energy regulations raised a very important question: if local authorities are doing it, why can't the Irish government do it?

Buildings in the residential and services sectors are the largest primary energy users and contributors (43% of total) to energy-related CO_2 emissions (47% of total) in Ireland. Construction has taken place at a phenomenal pace over the last 10 years, peaking in 2006 with over 80,000 new houses built. However, this level of new builds has turned out to be a missed opportunity for radically improving the energy performance of the Irish housing stock. Instead, most observers would agree that the entire focus of the construction sector and associated property speculators on quantity, very often at the expense of quality. The frustratingly slow process of upgrading Irish Building Regulations, and the very low level of enforcement through proper building

[6] The Building Energy Rating (BER) method is the official method for the implementation of the Energy Performance of Buildings Directive for residential buildings in Ireland. SEI has published a software called DEAP (Dwelling Energy Assessment Procedure) to assist in the BER calculations. [11]

control, is widely seen as a failure in addressing quality issues in construction in Ireland. Some analysts would argue that this situation is symptomatic of a general tendency in the establishment to protect the status quo in the interest of the building industry.

However, the tide is turning at national government level too. The recently elected Minister of Communication, Energy and Natural Resources, Green Party's Eamon Ryan, has announced that he will upgrade the energy performance standards of SEI's House of Tomorrow programme[7] to 60% reduction in energy usage compared to the current Building Regulations. The Minister also stated that "This reflects the Government's intention to move to the 60% target through the revision of the building regulations." [9] This is seen as a logical move in a context where, on the one hand, building developers can receive funding from the national government for achieving certain energy targets which, on the other hand, are similar or less demanding than standards currently required by certain local authorities. The adoption at a national level of similar building energy standards as in Fingal would result in 2.6 million MWh primary energy saving per year and 520,000 tonnes of CO_2 emissions avoided per year.

Impact of local building energy standards

The following table presents essential data on the estimated impacts of the local building energy standards which are currently in application, in terms of:

- reduction in energy demand and avoided CO_2 emissions
- increase in renewable energy supply;
- uptake of active solar thermal systems.

Local Authority	Where?	Additional population/ housing (*)	Delivered energy saving	Primary energy saving	CO2 avoided	Solar thermal potential
Fingal County Council	Cappagh, North-West Balbriggan and Castlelands (LAPs)	14,700 people / 5,240 housing units	34,500 MWh/year	41,400 MWh/year	2,253 t/year	6,075 m^2
Fingal County Council	Portmarnock, Kinsealy, Donabate (LAPs)	20,000 people / 7120 housing units	47,200 MWh/year	56,300 MWh/year	3,024 t/year	8,390 m^2
Fingal County Council	Portmarnock, Kinsealy, Donabate (LAPs)	26,900 m2 of non-residential buildings	980 MWh/year	1300 MWh/year	546.8 t/year	200 m^2
Dun Laoghaire-Rathdown County Council	County Development Plan (whole county area)	12,600 people / 4,500 housing units	20,200 MWh/year	26,300 MWh/year	5,237 t/year	5,400 m^2
Dun Laoghaire-Rathdown County Council	County Development Plan (whole county area)	240,000 m2 of non-residential	14,800 MWh/year	17,300 MWh/year	8,924 t/year	2,100 m^2
Wicklow County Council	Rathdrum LAP	3,600 people / 1,270 housing units	8,100 MWh/year	9,800 MWh/year	520 t/year	Not applicable
Wicklow County	Greystones-Delgany LAP	20,000 people /	45,800 MWh/year	55,000 MWh/year	2900 t/year	Not applicable

[7] The House of Tomorrow is a funding programme managed by Sustainable Energy Ireland, the national energy agency, which provides financial assistance (up to 8,000 Euro) to housing developers for adopting higher energy performance standard (<60 kWh/m2,year) in their developments (minimum of 10 houses). See www.sei.ie

Council		7,140 housing units				
Wexford County Council	County Development Plan (whole county area)	21,400 people / 7,640 housing units	48,700 MWh/year	59,000 MWh/year	3130 t/year	Not applicable

(*) Please note that the additional population and housing units figures in the table above represent the expected increase during the implementation period of the relevant LAPs or County Development Plans.

Most of the local energy standards discussed above leave flexibility as to which source of renewable energy can be used to fulfil the renewable energy contribution requirements. The potential for active solar thermal systems emerging from the implementation of the local area plans or the county development plans discussed above has been determined with the following assumptions:

- in average, solar thermal is used to fulfil 40% of the renewable energy contribution to the residual thermal energy requirement of buildings;
- the number of m^2 is calculated by dividing the solar thermal contribution by an average solar output of 450 kWh/m^2,year.

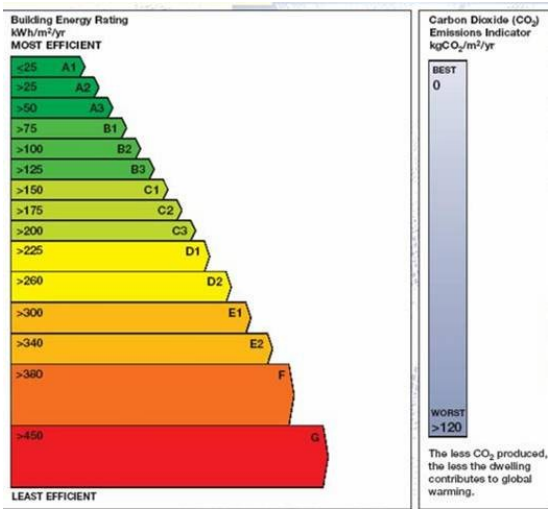
Figure 3: 200 low-energy housing development in Killeagh, Co Cork , with solar air heating system. Source: SEI REIO

On that basis, it is estimated that a total of 22,165 m^2 will be installed in the local areas or counties which have adopted a renewable heat target. Although not quantified, it is likely that a significant number of solar thermal systems will be installed on new buildings within the other areas (Wicklow, Wexford) as the housing market generally moves towards a higher penetration of renewable energy systems.

Building energy rating and uptake of active solar thermal systems

While there is a variety of approaches in the adoption of local building energy standards, the author would argue that future local standards should be based on the national Building Energy Rating (BER) system. The BER offers a very clear and robust scale and methodology to measure the energy performance of buildings and, being enshrined in national building regulations, it has legal status. It is the obvious choice to establish a common understanding on the meaning of the energy targets set by different local authorities. This approach also makes sure that there is no duplication in the procedures required to show compliance with the national and local energy regulations.

In addition, the lack of know-how on energy performance calculations could be a serious barrier to the proper implementation of local building energy standards. This barrier is being removed by the creating of a large body of energy assessors across the country for the BER scheme. These professionals are fully qualified to carry out the energy performance calculations required at local and national level.



The use of the BER system as a reference for the local building energy standards raises a serious question as to the adoption of specific targets for a renewable energy contribution. The BER, which is based on a CO_2 emission factor, takes into the consideration the combined effect of energy saving measures as well as of the contribution of renewable energy to the energy demand of the building. One could argue that this leaves a good degree of flexibility to the building designer in choosing the most appropriate method to achieve their target energy rating, given site constraints, budget limitations, etc. Some will say that it is not always possible to implement renewable energy solutions e.g. due to unsuitable orientation of roof space or shading problems for solar thermal, etc.

On the other hand, it can be argued that local and national energy policy should create the conditions for a substantial increase in the use of renewable energy. Renewable energy has a fundamental role to play to diversify the Irish energy mix away from fossil fuels, reduce our national dependence on energy imports (90% of total primary energy requirement) and our exposure to oil and gas price volatility.

In any case, the application of renewable energy and in particular active solar thermal energy is generally regarded as the most cost-effective way to achieve a high energy rating. For example, take a semi-detached house which complies with the SEI's House of Tomorrow standard (thermal energy requirements <60 kWh/m2,year) and equipped with condensing gas boiler. This type of house would typically achieves a B3 BER (primary energy requirement >125 kWh/m^2,year). When a solar water heater of 5 m^2 and energy efficient light bulbs (50% of all light bulbs) are added to the house specifications, the BER improves to a B1 (primary energy requirement < 100 kWh/m2,year). Achieving a similar energy rating by reducing heat losses would require pushing the house specifications to close to the Passive House standard (thermal energy requirement <35 kWh/m2), at considerable extra-cost and a much more demanding construction technique.

Adding a renewable heating target to local building energy standards not only demonstrates that it is a very practical way to achieve a high energy rating but it also forces developers to integrate renewable energy in the design process right from the start. A proactive approach to site layout and building design plays a significant role in facilitating the use of solar energy in particular by favouring a southern orientation of buildings, avoiding overshadowing, allocating sufficient suitable roof space, etc.

The retrofit sector next

So far, local building energy standards have all focussed on new construction. This ignores the existing built environment in Ireland which generally suffers from a poor to very poor energy performance. Although no hard data has been found to quantify it, a very significant amount of retrofit work has taken place in recent years in Ireland, iat the same time as the latest construction boom. It is common knowledge that many people can't afford to trade up in the property ladder, and choose to invest in upgrading and extending their existing house or apartment. This phenomenon is exacerbated by the maturing of SSIAs, a government-backed saving scheme, with house owners now being able to cash in substantial amounts of money to finance house renovations.

It is suggested that building energy standards should be introduced as part of the planning process for retrofit work and extensions to existing buildings. The adoption of renewable energy contribution targets would be particularly relevant for this type of projects since options for energy performance

improvements (insulation, air-tightness, etc.) are generally limited. Such an initiative would have a massive impact on the uptake of solar thermal systems, an obvious choice for energy retrofits.

Solar thermal boom in Ireland

While it is very early days to actually see the impact of local building energy standards on the deployment of solar thermal in Ireland, there is sufficient evidence to say that this technology is currently undergoing a real boom. There is a clear trend of rapid growth in the Irish solar thermal market over the last five years, with average sales increasing close to 100% per year. It is estimated that over 10,000 m^2 of solar thermal collectors were installed over the last year, approximately twice as much as the year before.

The Greener Homes Scheme managed by Sustainable Energy Ireland is an important driver for solar thermal installations by individual households. This scheme, in operation since April 2006, provides a financial incentive of 300 Euro per m^2 of solar collector installed, up to 12 m^2 per household. It has proved hugely popular, with a total of 5,070 applications made for solar thermal from its launch until June 2007. Among the different technologies covered by the scheme (solar thermal, heat pumps and wood pellet stoves/boilers), solar thermal is proving a very popular choice (35% of applications received). Given the level of applications so far and a very high level of conversion from application to installation, it is estimated that the scheme could generate the installation of between 15,000 m^2 and 20,000 m^2 over the next 12 months.

The House of Tomorrow programme previously mentioned has also been a strong driver for solar thermal energy in the residential sector since its launch in 2002. This programme, targeted at housing developers, has funded 42 housing development projects with a total of approximately 1,539 solar thermal systems or an estimated total installation of 7,000 m^2 of solar thermal collectors [13]. As mentioned previously, the Minister for Energy has declared that he will upgrade significantly the energy performance target for the next round of House of Tomorrow funding. Since a number of the Minister's colleagues at the Green Party were instrumental in the development of local building energy standards, it is expected that he will also support higher renewable energy requirements in the House of Tomorrow programme.

Figure 4: 300 m2 solar thermal system at Bewleys Hotel, Dublin airport. Source: SEI-REIO

Finally, the non-residential building sector is opening up to solar thermal too. A number of large installations like at the Inchidoney Island Lodge and Spa (West Cork, 80 m^2) and at the Bewleys Hotel at Dublin airport (300 m^2) have raised awareness and confidence in the technology. Investment is now supported by grants of up to 30% recently been made available by SEI for such projects. Initial response by hotels, leisure and sport centres, nursing homes and other high hot water users is very encouraging.

Figure 5: John Gormley on the bank of the Grand Canal at Portobello. Source: www.johngormley.com

In an interview with the author, John Gormley, Minister for the Environment, Heritage and Local Government, praised local authorities for their work and reaffirmed his commitment to increase a higher degree of sustainability in Irish buildings: *"I am very supportive of the advanced building energy standards introduced by County Councils like Fingal, Dun Laoghaire-Rathdown, Wicklow and Wexford, and I would like to see other local authorities following in their steps. They have paved the way for a rapid upgrade of our national Building Regulations in this regard and it is my intention to lower the maximum energy requirement of new buildings by 40% in the 2008 version. This will be followed by a 60% reduction compared to our current standard by 2010. I want to bring innovative policies that push for much higher levels of sustainability in our built environment, not only in terms of energy performance but also renewable energy supply, water conservation, waste management, ecological building materials, etc. Today, it is possible to achieve zero carbon houses and this should be our common aspiration for the future of Irish buildings."*

Conclusions

The process started in 2005 by Fingal County Council, and rapidly followed by other local authorities, has had a dramatic impact on the standards of energy performance of buildings in Ireland. First and foremost, it has moved the agenda of building energy standards setting away from central government firmly into the hands of local government. In doing so, it has brought a much higher degree of democratic control over the energy performance of new houses and their lifecycle energy costs.

The experience accumulated by local authorities at development stage, and the ensuing debate with the various stakeholders, has provided a number of important lessons:

- local authorities have the ability and the legal right to impose higher standards in energy performance of buildings as part of planning regulations, which could be extended to other areas of sustainability;
- there is a growing political appetite, at least at local level, to exercise this right in order to bring about a higher degree of sustainability in buildings as well as to protect the wellbeing of citizens;
- the introduction of renewable energy targets in buildings regulations is justified and feasible;
- the response of progressive elements in the building industry has demonstrated that these standards are technically achievable at a reasonable cost;
- energy standards are a very powerful tool which can yield significant environmental and economic benefits at no cost to the government.

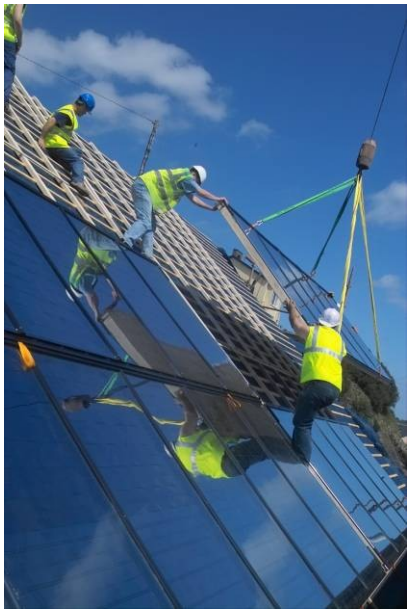


Figure 6: Inchidoney Lodge & Spa, 80 m2 solar thermal system. Source: SEI-REIO

The use of the Building Energy Rating system is recommended as the reference for energy performance target setting by further local authorities. This should also make the application of these standards easier and facilitate the control of compliance. It is also advisable to set specific targets for the contribution of renewable energy, at least for the thermal energy requirement of future buildings.

The lead taken by local authorities has paved the way for a radical rethink of building energy performance standards at a national level, with huge consequences in terms of energy savings (c. 2.6 million MWh/year primary energy saving) and CO_2 emissions avoided (c. 520,000 tonnes of CO2/year).

It is not yet clear what will be impact of local building energy standards on the uptake of solar thermal systems. However, it is estimated that, given the volume of housing development expected in the areas concerned, the implementation of these standards would result in the installation of over 22,000 m^2 of solar thermal collectors. The wider deployment of the local building energy standards will ensure that the current rapid growth in solar thermal system sales is reinforced in the future, and ultimately will position Ireland as a European leader in terms of solar thermal energy penetration.

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About XD Consulting

XD Consulting was founded in 2007 by Xavier Dubuisson, one of Ireland's leading experts in the field of renewable energy. He has worked for over ten years as a consultant in this area for both the private and public sectors, in Ireland, Belgium and at European level. Xavier has a degree in Agricultural Engineering and a Masters degree in Management for Agricultural Development. He started his career as a researcher and consultant in energy crops and bioenergy technologies, and gradually diversified his know-how in a wide range of innovative energy technologies.

From 2001 until 2006, Xavier worked for Sustainable Energy Ireland at its Renewable Energy Information Office (REIO), initially as an energy engineer for its renewable heating programme and then as Technical Manager of the office. In that capacity, he has been instrumental in creating a strong momentum for the renewable energy market in Ireland, through a combination of awareness raising, advice to policy-makers and development of know-how. More recently, he has operated as Technical Director of Cool Power Ltd, an Irish start-up company specialised in solar photovoltaic energy.

Our services

Our objective is to be Ireland's centre of excellence for the application of sustainable energy in the built environment. We offer a wide range of services in this area including:

Energy analysis of buildings and low-energy design
- Energy survey of existing buildings
- Building Energy Rating
- Design and specification for Low-Energy and Passive House buildings
- Design and specification of energy efficient building services, including heating, ventilation and cooling

Feasibility study, design and specification of renewable energy systems
- Solar thermal systems for water/space/pool heating
- Biomass heating systems
- Solar photovoltaic systems (grid-connected and stand-alone)
- Small-scale wind turbines

Education and training services for:
- Energy managers in private and public institutions
- Design teams (architects, engineers, etc.)
- Practitioners and trades people
- Third-level education institutions
- Community groups

Business-to-business services:
- Development of sustainability strategy and energy policy
- Strategic planning for sustainable energy businesses
- Market research and advice on marketing strategy
- Communication and PR support including writing, editing and design work

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