Setting higher energy efficiency standards and renewable energy requirements

In a nutshell

SUMMARY

It is best practice to introduce in the local planning system the provision that newbuilds and renovations within the territory are carried out to exemplary energy standards (i.e. high energy efficiency and integration of renewable energy generation). Local autonomy enables most municipalities to go beyond the energy standards and renewable energy requirements set by national legislation and implement positive changes at the local level. The requirements introduced in the local planning system can be regularly updated following the developments of the construction industry and new national targets.

It is also best practice to consider energy performance and integration of renewables in urban planning and building permits to require and/or encourage organisations and residents to adopt sustainable energy solutions.

Target group

Local authorities

Applicability

This best practice is applicable to all local authorities with a role in setting the local building code and/or in providing building permits. However, national legislation may pose limitations on what they can require.

Environmental performance indicators

- Establishment of regulations setting higher energy efficiency standards and renewable energy requirements (y/n)
- Level of energy performance required by the local building code (kWh/m²/year)
- Systematic consideration of energy performance and integration of renewables in the processing of building permits (y/n)

Bencharks of excellence

N/A

Description

In the majority of European countries building codes and standards for energy efficiency and renewable energy generation are set at the national level. However, municipalities, through the local planning system, have a mechanism to go beyond national building codes and standards and ensure that new-build and renovations within their territory are carried out to exemplary energy standards. Local improvements in planning regulations can play an extremely significant role in promoting the use of energy efficiency and renewable energy technologies at scale.

Setting local standards and regulations

Local building regulations, planning permissions and energy standards in land use planning provide an effective mechanism for local government to drive reductions in carbon emissions relating to commercial and residential buildings.

Local autonomy enables most municipalities to go beyond the energy standards and renewable energy requirements set by national government and implement positive changes at a local level. Setting local regulations will not only reduce the per capita emissions of a municipality but will also upskill and develop the local construction industry and help drive growth in environmental technologies.

It is important that local standards and regulations are well integrated and thought through and that they are not carried out in isolation. For example, it is not effective to impose high renewable energy requirements on new buildings if these are energy inefficient. An example of standard driving improvements of both energy efficiency performance and renewable energy generation is the requirement to generate a certain percentage of the energy demand by on-site renewable energy, which can be met best by both minimising the energy demand and implementing renewables. Moreover, the most effective standards and regulations co-exist with a combination of other push and pull factors to improve the energy performance of buildings. Policy instigated by municipalities should comprise integrated packages of measures (e.g. incentives, soft loans, information and other actions) aimed at improving market efficiency, as technical solutions alone are not sufficient if the awareness, skills and resources are lacking to implement them.

To be effective it is essential that building codes and regulations are dynamic and change over time. They need to adapt to the constantly changing construction market, to shifting national targets in relation to energy standards, and to the emergence and increasing affordability of new technologies. It is also vital that any changes in the regulatory regime are announced well in advance to give the construction industry time to prepare and develop the right solutions to make the new requirements as cost effective as possible. For example, in Land Oberösterreich (Austria) there have been incremental increases in energy efficiency requirements since 1993, these have been transparent and consistent, enabling the construction industry to proactively prepare for changes and plan ahead.

The following summary presents matters to consider in the preparation, content and implementation of standards and regulations.

PREPARATION

Issues to consider before developing standards and regulations include the following:

- Scale – it is important that any standards are set at the appropriate scale; this will be dependent on the specific context of the municipality and the measures proposed:
    - Regional standards and regulations (where there is strong regional government and/or adjacent municipalities develop joint standards and regulations) can have multiple benefits in relation to wide spread energy reduction and a step change in the regional environmental construction industry.
    - Local standards can be set at various scales from the whole territory of the municipality, specific sites or individual buildings and building types. It is often easier to create standards in relation to a specific site and can be an effective way to test a new approach or a higher performance level. However, the impact of site specific standards will be lower in comparison to municipality-wide standards and regulations.
- Scope – it is important to identify what will be included in standards and requirements:
    - New build and/or renovations: best practice is to integrate policies aimed at new build and renovations to ensure that the maximum impact is achieved and the existing housing stock is improved.
    - Energy efficiency and/or renewable energy: in general renewable energy regulations should not be implemented where energy efficiency standards do not exist. When implementing renewable energy requirements it is important to define the scope of technology to be used, i.e. which renewable energy technologies are accepted (e.g. Solar Ordinances refer purely to solar thermal). However, it is often appropriate to define a range of technologies so that the most appropriate, cost effective and efficient technology mix can be implemented.
    - What aspects are included in the scope (building fabric, embodied carbon, fixed lighting, white goods).
- Timescale for development, implementation and review:
    - Provide sufficient lead-in time and ensure standards and regulations are communicated well in advance to enable the construction industry to prepare for future changes.

- The strategy should have the ability to adapt over time to keep ahead of national policy and adjust in relation to the development of new technologies.

- Funding and resources:
  - If funding is required for the implementation of standards (e.g. if subsidies are to be applied) it is essential that potential funding sources are identified in advance.

- Capacity building of individuals:
  - It is particularly important for municipality staff involved in planning and development control to have the knowledge, skills and resources needed to implement and enforce the requirements.

- Mechanism for enforcement and control:
  - Standards and regulations are not effective if a mechanism for ensuring that they are implemented does not exist.

CONTENT

Standards and regulations should include the following aspects:

- Building subject to the obligation and exceptions:
  - It is not appropriate to have a blanket policy incorporating all buildings within a municipality. For example exceptions to regulations may include buildings of high cultural or historic values or buildings within areas of special conservation.
  - Respect of the architecture of the examined area – application of passive measures (e.g. insulation, natural ventilation, orientation (if possible in existing buildings) etc.)

- Definition of the required energy standard or renewable energy contribution:
  - It is important to define the required energy standard (usually expressed in kWh/m²/year) and/or the percentage of energy needs to be met by on-site renewable energy generation. For example the maximum energy consumption in new buildings could be sat at >50kWh/m²/year and 30% of electricity and heat used on site to be produced by renewable energy technologies.
  - Requirements can vary across buildings types. Best practice municipalities often set stricter requirements on buildings under the control of public administration.

- Technical parameters for the calculation of the fulfilment:
  - It is vital that a technical procedure used to calculate the energy performance of the building is standardised. Where possible these should be based on actual performance rather than planned efficiency to ensure that the “performance gap” is minimal. These should also be linked to the national building code and the energy labelling of buildings scheme.

- Quality assurance/ certification mechanism:
  - All works carried out to bring a building up to requirement should be carried out by an accredited installer and only certified products should be utilised (e.g. MCS accreditation in the UK or Solar Keymark certification across Europe)

- Definition of the accountable persons:
  - Standards and regulations should clearly set out who is responsible (usually the developer or landowner) for delivering buildings to the required standards and who will be accountable to sanctions if required standards are not met. It is usually the case that municipality Development Control and planning officers will be

responsible for ensuring that building standards are clearly set out and enforced. Where planning consent has been granted and standards have not been met then the developer and/or land owners will be accountable for any sanctions incurred.

- Control procedures:
    - Standards and regulations must include a description on how they will be controlled and enforced – this is often carried out by scrutiny on development plans and impromptu site visits at various stages of development

- Sanctioning regime:
    - Any potential sanctions for not meeting standards and regulations must be clearly outlined.

IMPLEMENTATION

Public Authorities should control the effective implementation of the requirements at three main points:

1. On paper, at an early stage of the planning of the buildings (or renovation): comparing the proposed installation/measure with the legal requirements.
2. Before the building is commissioned, comparing what has been effectively installed with the legal requirement.
3. After one or two years of operation, inspecting a sample of systems to see if they perform according to the requirements.

Environmental benefits

The main environmental benefit achieved by the implementation of this best practice relates to the reduced consumption of energy, and greenhouse gas emissions as a result of increased energy efficiency and the production of renewable energy. Due to the scale of these interventions the positive impact on the environment can be dramatic; in Europe approximately 40% of emissions are as a result of building energy consumptions and therefore any intervention that can reduce emissions related to buildings will have a significant environmental benefit.

The implementation of Bologna's Town Planning Building Regulations has also resulted in significant energy savings over and above the requirements of Italy's National Policy. Over just two years 371,961.55 kWh/year were saved as a result of the regulations (Bertocchi, 2011).

Side effects

There are no major negative cross media effects relating to other environmental pressures as a result of implementing energy standards and requirements for on-site renewable energy generation. However, it is worth bearing in mind the competing pressures between various renewable energy installations and other environmental options (for example solar competing with green roofs).

Applicability

This best practice is applicable across all typologies and scales of local and regional government and applicable across Europe. However, the scope of this BEMP will vary depending on the role of the municipality. For example a local planning authority may be able to influence the implementation of solar ordinances whereas other municipalities may only be able to set higher energy standards on buildings directly under their school (e.g. schools and municipality offices). Through setting higher standards across their own property portfolio municipalities have the ability to influence wider building codes and help raise local standards in sustainable construction. Energy standards and building requirements set will be dependent

on the ambitions of the municipality or region and may be affected by the local climatic condition (due to differential heating and cooling requirements across Europe).

Economics

It is very difficult to calculate the cost and benefits of the implementation of planning regulations relating to energy standards. This is partly due to the time between the adoption of regulation and the implementation of measures and enforcement. There are clear benefits relating to reduction in fossil fuel energy, however the aggregated energy savings will be determined by numerous factors, including (ESTID, 2007):

- the number of buildings subject to the obligation (and exemptions);
- the number and types of new and renovated buildings in a region or city;
- the specific requirement concerning the share of energy to be achieved;
- the quality of the technologies, their installation and maintenance;
- the behaviour patterns of the users;
- the intensity of the positive effects of the obligation on the voluntary market (i.e. the installation of larger solar systems than required, and the increase of solar energy use in buildings not subject to the obligation.)

It is important to note that the majority of the costs relating to implementing higher energy standards fall directly with building owners and property developers.

Driving forces for implementation

There are numerous driving forces for implementation and these vary in scale and scope depending on the specific context and location of the Public Administration body. Some driving forces for implementation include:

- EU directive on the energy performance of buildings requires all member states to set standards for energy efficiency in new buildings based on the energy performance of the building. This takes into account air-tightness, heating and cooling installations, ventilation, the orientation and position of the building, passive solar gain etc.
- Legal obligations to provide a specified percentage of heat and power via renewable sources e.g. the German federal *Renewable Heat Act* requires a certain percentage of heating and water demand to be met with renewable energy (15% in the case of solar heating systems) (Schönberger, P 2013).
- Implementation of this BEMP will help stimulate the local construction industry, drive innovation in low carbon buildings and lower the costs of energy technologies.
- Ultimately the main driving force for implementation is the reduction in municipality carbon dioxide emissions, which will help meet local, regional and national carbon reduction targets.

Reference organisations

Imposing higher energy standards in land use planning for new built and buildings undergoing major renovations through local buildings regulations.

Freiburg City Council, Germany

A zero-energy housing standard to achieve a maximum of 65 kWh/m²/year was established for all new house construction and house renovation in the city

Wien City Council, Austria

Environmental standards and legal regulations for the construction of new social housing.

Bologna City Council, Italy

Town Planning Building Regulations requiring a minimum level of energy consumption for all new buildings

Including requirements on on-site renewable energy generation in local building regulations/ planning permissions (e.g. the Merton Rule, the Solar Ordinances).

Barcelona City Council, Spain

An obligation imposed by the Barcelona Energy Agency requiring specific levels of solar thermal to be applied to all new buildings.

The London Borough of Merton, London, UK

A ground breaking planning policy developed by the London Borough or Merton in 2003 requiring new developments to generate at least 10% of their energy needs from on-site renewable energy technologies

Imposing higher energy standards in land use planning AND including requirements on on-site renewable energy generation

South Dublin County Council, Ireland

Local planning requirements for the 180 hectare Clonburris Strategic Development Zone relating to energy standards and renewable energy generation.

Oberösterreich, Austria

Energy efficiency requirements in housing for both new construction and renovation

Fingal County Council, Ireland

Local leadership in defining energy standards for buildings and influencing national planning policy.

Literature

Bertocchi, I. Fini, G. Ruboline M. C. Tondelli, S. (2011). *Sustainability achievements in building regulations. The example of Bologna.* Procedia Engineering [Online]. Available at: http://ac.els-cdn.com/S1877705811049344/1-s2.0-S1877705811049344-main.pdf?_tid=4866226a-2235-11e4-bbd1-00000aacb360&acdnat=1407857477_844d117b8231aef4287ca23cf72dff07 [Accessed 12th August 2014].

Covenant of Mayors (2013). *Green social housing for all; Vienna, Austria* [Online]. Available at: http://www.eumayors.eu/IMG/pdf/Vienna_Case_Study_Covenant_Mayors.pdf [Accessed 11th August 2014].

Dubuisson, X. (2014). *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* [Online]. Available at: http://www.estif.org/fileadmin/estif/content/policies/STAP/Ireland_local_solar_regulations.pdf [Accessed 7th August 2014].

ESTIF (2007). Key issues for renewable heat in Europe; *Best Practice Regulation for solar thermal* [Online]. Available at: http://www.estif.org/fileadmin/estif/content/policies/STAP/Best_practice_solar_regulations.pdf [Accessed 5th August 2014].

GovernEE (2011). *Cross sectoral evaluation of existing energy projects and strategies on public heating* [Online]. Available at: http://www.governeeproject.eu/documents/outputs_of_the_project/3-1-1_pp5_Bologna_rev_5.pdf [Accessed 12th August 2014].

IEA (2009). *Cities, towns and renewable energy; yes in my front yard* [Online]. Available at: http://www.iea.org/publications/freepublications/publication/Cities2009.pdf [Accessed 12th August 2014].

IEA (2008). *Energy efficiency requirements in buildings codes, energy efficiency policies for new buildings. An information paper by Jens Lausten* [Online]. Available at: http://www.iea.org/publications/freepublications/publication/Building_Codes.pdf [Accessed 8th August 2014].

Intelligent Energy Europe (2013). *Intelligent Energy – Europe II; performance report 2007-2012* [Online]. Available at: http://ec.europa.eu/energy/intelligent/files/library/reports/iee-2-performance-report-2007-2012.pdf

IRENA (2014). *Integrating Ambitious Renewable Energy Targets in City Planning* [Online]. Available at: http://www.irena.org/Publications/RE_Policy_Cities_CaseStudies/IRENA%20cities%20case%207%20Malmo.pdf [Accessed 12th August 2014].

LG Action (2010). *Brief case study on local climate and energy actions; Barcelona, Spain – A new energy model to tackle climate change* [Online]. Available at: http://www.iclei-europe.org/fileadmin/templates/iclei-europe/files/content/Membership/MUTS/Barcelona/LG_Action_case_Barcelona_EN_final.pdf [Accessed 8th August 2014].

Ministry of Interior, Hungary (2011). *Climate-Friendly Cities – A handbook on the tasks and possibilities of European cities in relation to climate change* [Online]. Available at: http://politicadecidades.dgotdu.pt/news/Documents/Climate-friendly_cities_2011[1].pdf [Accessed 12th August 2014].

O. Ö. Energiesparverband (2009). *Policy development for improving RES-H/C penetration in European Member States; Regional Report, the RES-H/C market in Upper Austria* [Online]. Available at: http://www.res-h-policy.eu/RES-H_Policy_Market-Report-Upper-AT_(D3)_engl_final.pdf [Accessed 11th August 2014].

O. Ö. Energiesparverband (2001). *The sustainable buildings programme in Upper Austria* [Online]. Available at: http://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2001/Panel_5/p5_13/paper [Accessed 12th August 2014].

SECURE (2007). *European Sustainable Urban Development Projects, Benchmark Study; Vauban* [Online]. Available at: http://www.secureproject.org/download/18.360a0d56117c51a2d30800078420/1350483402652/Vauban_Germany.pdf [Accessed 12th August 2014].

Schönberger, P. (2013). *Municipalities as key actors of German renewable energy governance; An analysis of opportunities, obstacles, and multi-level influences* [Online]. Available at: http://epub.wupperinst.org/frontdoor/index/index/docId/4676 [Accessed 05th August 2014].

SDCC (2008). *South Dublin county Council; Clonburris eco-district, an exemplar of sustainable development*

Universitätsstadt Marburg (2014). *Marburg News: Solar power is made mandatory* [Online]. Available at: http://www.marburg.de/en/73351 [Accessed 5th August 2014].

Wömer D. (2006). *Sustainable energy solutions for cities – case of Freiburg* [Online]. Available at: http://www.roheline.ee/files/energia/worner.pdf [Accessed 12th August 2014].