A Change is gonna come

A New Mandate: nearly zero energy buildings

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Executive Boardroom Commentary

In the **hot** debate about climate change and energy savings, it is a well-known fact that the built environment is the focus of much attention. As the largest energy user, at more than 40%, and the most potent carbon emitter, at some 36%, its 200 million-odd buildings in the EU hold the most promising potential for savings. The recently adopted Recast Energy Performance of Buildings Directive (Recast EPBD) will help unleash this potential. If it is implemented properly and timely. But some items need clarification and harmonization.

To combat climate change, increase the security of energy supply and strengthen the competitiveness of the Union, the European Commission in 2007 launched its Climate and Energy Package, agreeing on the "20-20-20" targets, to be reached by the year 2020. Specifically, these are a reduction in EU greenhouse gas emissions of at least 20% below 1990 levels, a share of 20% renewable resources in the EU's energy consumption, and a 20% reduction in total primary energy use compared with projected levels, to be achieved by improving energy efficiency. Buildings – residential and commercial, new and existing – offer a particularly attractive potential for improved energy efficiency and could help reduce energy use by 20 to 40% in the coming decades. Carbon emissions, obviously, would follow, possibly by a higher percentage if renewable energy sources are brought into the equation.

Recast EPBD

In 2002, among the original EPBD's objectives to improve the energy performance of buildings, were better energy efficiency, minimum requirements and certification. The implementation, to say the least, has been slow and hesitant. Some member states have been less than enthusiastic and the building sector is 'critically fragmented with significant inertia to change', as an Intelligent Energy Europe publication[1] states. That is why a 'recast' of the EPBD (2010/31/EU) was needed and published in the June 18, 2010 issue of the Official Journal. It will have to be in full application in all Member States by mid-2013. The Recast EPBD maintains the principles of the original directive but intends to clarify and streamline a number of provisions, to extend the scope, to strengthen certain requirements, and to emphasize the leading role of the public sector in promoting energy efficiency. Among the key new elements of the Recast EPBD:

- It covers all buildings irrespective of size (the original EPBD's threshold of 1000 m^2 in case of renovation is removed; it excluded all single family homes and therefore missed a large part of the building stock);
- All new build must be 'nearly zero energy' by the end of 2020 (two years earlier for the public sector);
- Member States must set minimum energy performance requirements for all existing buildings that undergo renovation, at building, system and component level - which mainly applies to the building envelope;

From Directive 2010/31/EU, art 2,2:

"Nearly zero-energy building" means a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on site or nearby.

- Minimum energy performance levels are required for new buildings (until 2020) and for refurbishment, with a benchmarking method to achieve 'cost-optimal levels';

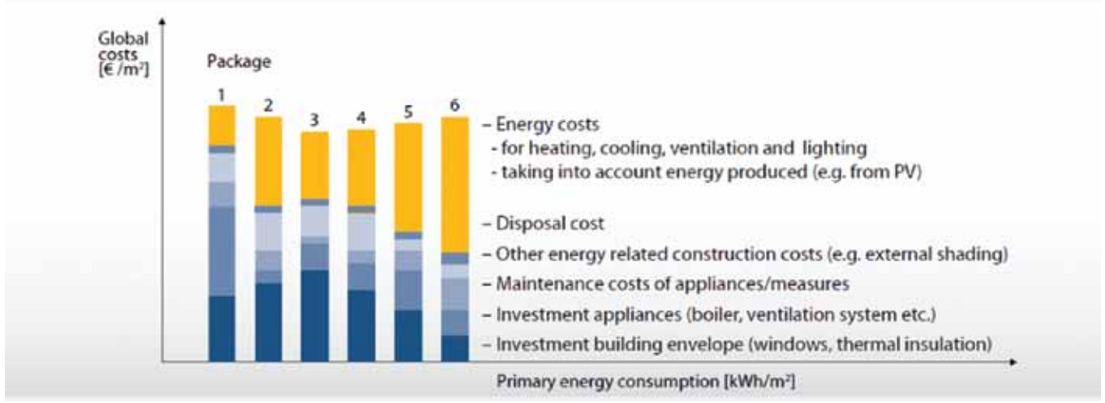
- 'Cost-optimal levels' is defined as the energy performance level which leads to the lowest cost during the life cycle of the building, including not just the investment costs, but also maintenance and operating costs as well as disposal costs.

Nearly zero-energy

It seems obvious that two new elements will lead to fierce discussions: both 'nearly zero-energy buildings' and 'cost-optimal levels' leave room for interpretation. The Directive states that 'nearly zero-energy building' means that a building has a 'very high energy performance', but that leaves the door wide open for many interpretations. As Michaëla Holl, policy officer in DG Energy[2], stated: "Since we do not give minimum or maximum harmonized requirements, it will be up to the Member States to define what for them exactly constitutes a 'very high energy performance'". Even the more precise term 'zero net energy building' has different definitions. IEA's Jens Laustsen proposes that 'zero net energy buildings are buildings that over a year are neutral, meaning that they deliver as much energy to the supply grids as they use from the grids'[3] . The European Council for an Energy Efficient Economy (ECEEE) suggests showing that the concern is additional carbon emissions by proposing that 'a zero carbon building is one that, over a year, produces sufficient carbon-free energy to offset the carbon emitted from all fossil-fuel derived energy consumed by the building[4]. Let's wait and see how the building sector will handle this problem. They've got ten years or so to work on it – and on their 'inertia to change'.

Cost-optimal

The term 'cost-optimal' will raise many questions. The usual way to look at 'cost' is to consider only the up-front investment, while maintenance cost, operating expense and disposal cost must also be included over the whole lifetime. The method to establish cost-optimal levels, as referred to in the Recast EPBD, is not yet available. A benchmarking framework must be presented by the Commission to the Member States by June 30, 2011, dealing with the calculation of the energy performance and the cost computation, based on Net Present Value in EN Standard 15459. Member States then must complete this framework to reflect their own variable national parameters, such as labor cost, interest rate, energy prices, etc. Net Present Value (NPV), says one definition, shows if an investment is profitable: taking into account the interest rate, it is the discounted value of an investment's cash inflows minus the discounted value of its cash outflows. To be adequately profitable, an investment should have an NPV greater than zero.



Cost calculation for different packages, example only
Source: BPIE: Cost Optimality, Discussing Methodology and Challenges within the Recast EPBD, 2010

An example of what such a calculation could result in is shown in the excellent report "Cost Optimality, Discussing Methodology and Challenges within the Recast EPBD 2010 by BPIE (the Buildings Performance Institute Europe)". Different possible packages of measures on a theoretical reference building are shown and the bar chart illustrates the costs of packages as global costs related to the primary energy used. The global cost calculation method is described in EN 15459: (Energy performance of buildings – economic evaluation procedure for energy systems in buildings).

A new approach

It will take some time for some of our industries to get familiar with this way of thinking and investing. For the solar shading industry, for instance, a quintessential SME industry, this is a whole new world. Yet it is essential for the future. The buildings in which we live and work are expected to be comfortable, practical, safe, healthy, energy-efficient and sustainable, all at the same time. For the existing buildings, this is a great challenge. It is to be expected that the refurbishment market will get a great boost from the Recast EPBD, as the ambitious energy savings targets can never be reached from the new build only. Existing houses and commercial buildings often show an annual energy use of 250 kWh/m^2 or more. Today's readily available building techniques allow for numbers well below 100, with recent or soon-to-be regulations in France, Germany and Switzerland – to name but a few -- requiring numbers at 50 or below for new buildings. That's a wide gap. But economic calculations provide a powerful incentive for successful investments in energy savings.

[1] Nearly Zero Energy Buildings in Europe, Brainstorming Workshop Intelligent Energy Europe, 2010
[2] REHVA Journal 5/2010, September 2010
[3] As quoted in Steering through the maze n°2 ', ECEEE, September 2009
[4] Steering through the maze n° 2, ECEEE, September 2009

From Directive 2010/31/EU, art 2,14:

'Cost-optimal level' means the energy performance level which leads to the lowest cost during the estimated economic lifecycle, where:
(a) the lowest cost is determined taking into account energy-related investment costs, maintenance and operating costs (including energy costs and savings, the category of building concerned, earnings from energy produced), where applicable, and disposal costs, where applicable; and
(b) the estimated economic lifecycle is determined by each Member State. It refers to the remaining estimated economic lifecycle of a building where energy performance requirements are set for the building as a whole, or to the estimated economic lifecycle of a building element where energy performance requirements are set for building elements.
The cost-optimal level shall lie within the range of performance levels where the cost benefit analysis calculated over the estimated economic lifecycle is positive.