

# Europe's transition to nearly Zero-Energy Buildings

**No one said the transition would be easy**

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**T**he building stock is one of the main drivers for Europe's energy demand. The European Union has set the path to a massive reduction in the energy demand within the building stock with the 2010 recast of the Energy Performance of Buildings Directive (EPBD). A major objective of the directive is essentially to make nearly Zero-Energy Buildings (nZEB) the norm across Europe. Besides the planned transition from fossil fuels to renewable energies, the building envelope is of major importance to achieve the

targets of a nearly zero-energy building stock in the future. The EPBD highlights the issue of cost-optimality for constructional measures. Thus, there is not only the need for sophisticated technological solutions, but for cost-effective yet still technologically advanced ones.

The building envelope consists of a complex array of opaque and transparent elements, which have to fulfil different functional requirements for the building. Besides their structural function, opaque facade elements such as walls and the roof, mainly keep the energy inside and weather outside the building. As opposed to this, windows are crucial for the solar energy gains of the building. These different functional requirements lead to a specific technical design of the different building elements.

Especially with respect to the insulation of walls and roofs, the requirements for the materials and technologies differ for existing and new buildings. For new buildings, the energetic requirements are an inherent part of the design of the building. In contrast, for a renovation, the architect or engineer has to deal with an existing building and its construction challenges. Furthermore, the integration of insulation in an existing building leads to specific requirements

for the handling of materials by the craftsmen.

In both new and existing buildings, technologically high sophisticated products such as vacuum insulation panels require highly skilled craftsmen for installation. They even raise technological challenges later on in the use phase. Innovative materials such as aerogel are superior in their installation requirements but not ready for a larger market yet. Due to their more complex production processes, those materials will have to move some steps on their way to being cost-effective.

Besides those constructional requirements, criteria like fire safety and pest resistance gain importance again also in the public perception. From the user's perspective, the windows main functionalities are the inlet of light into the building as well as the view outside. From a constructional perspective, further issues are important. Windows allow for passive solar gains, which is favourable in the winter but may become a problem in summer time depending on orientation of the building, etc. They are a potential outlet for thermal radiation energy from the building on the other hand. A modern window system has to be designed according to these sometimes conflicting challenges and fortunately, the windows



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*Photo courtesy of Saint-Gobain*

industry is coming out with many more energy-efficient options to help the process.

The requirements to save thermal energy in a building are heavily dependent on climatic conditions which vary significantly throughout Europe and these variations cannot be dismissed lightly. Therefore cost-optimal solutions are not the same over Europe because of these climatic conditions. On the pathway to nearlyZero-Energy buildings, cost-optimal solutions have to consider the local boundary conditions. Technological

developments will have to specialise to fulfil the different technological needs in this diverse market.

Due to the widespread continuation of traditional practices in the building sector, the dynamics are not as high as in other technological sectors. The diffusion of innovative technologies is therefore sometimes slower than in other sectors. A market stimulated by further design requirements may increase the learning curves and lead to more advanced cost-optimal solutions.

Finally, technologies are not the only solution. Having people invest in these technologies is an important part of the efforts needed but first people have to “want” them and so far this is not driving the market enough. Therefore, a wide array of policy instruments has to be developed to foster the transition to nearly Zero-Energy Buildings in Europe. There is a need to work at all levels of the buildings “market.” Within the Intelligent Energy Europe Project Entranze, innovative policies are being developed for the European Union’s member states. ([www.entranze.eu](http://www.entranze.eu)) ●