Building retrofits critical to Europe's low-carbon pathway

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New near-zero energy buildings are increasingly springing up around Europe, though their impact on reducing the region's energy consumption will remain a drop in the ocean without a drive to apply new technologies to existing building stock.

From thatched roofing in cold regions to reflective walls in hotter climates, buildings have been constructed for centuries with materials that maximize comfort within a given environment. Today, innovative construction technologies and materials are widely available, though they are troublingly absent from a broad swathe of Europe's buildings.

More than 40 percent of the region's existing homes, for example, were built before the 1960s, when there were few requirements for energy efficiency, leading to low insulation levels.

Worldwide, space heating and cooling account for one-third of all energy consumed in buildings. In 2013, space heating alone contributed to 62% of energy consumption across Europe's buildings.

"Traditionally, it was thought that an improvement on the performance of the active parts of a building, let's say the energy generation systems, had a bigger impact on the building performance in comparison with a retrofit action on the building envelope," says Jesús García Domínguez, industrial engineer for Acciona. The construction company collaborates on European project BRESAER, which seeks to deliver retrofitting solutions for Europe's existing building stock.

Through the use of building envelope technologies, including dynamic windows, insulation panels and photovoltaic modules integrated into a structural mesh, the retrofit design aims to deliver near-zero energy performance—below 60 kilowatt hours per square meter—to existing buildings.

The design reduces energy demand for space heating and cooling by 30 percent. Air sealing alone can reduce the need for heating by 20 to 30 percent, while the design allows for a contribution of solar thermal energy for space conditioning of around 35 percent, and a contribution of electricity generation of around 10 percent from renewable energy sources.

For John Dulac, analyst at the International Energy Agency's (IEA) Sustainable Energy Policy and Technology directorate, retrofits represent an essential part of reducing Europe's energy consumption.

"Deep energy retrofits of the existing building stock are critical to meeting a sustainable, cost-effective, low-carbon pathway for the European building sector," he says.

Dulac estimates that around 70 percent of Europe's building stock in 2050 will be composed of buildings that already exist today.

"Even if you're building hundreds of thousand of these passive-style [energy efficient] new buildings, when you're talking about 225 million existing households, it's peanuts, it's nowhere near where we need to be," he says. "So there really needs to be a drive of taking these new technologies for new constructions and translating them to low-cost technologies for existing buildings."

Dulac says that the technologies that need to be applied to existing buildings in terms of insulation, air sealing and low-emissivity, double-

pane windows are typically readily available in most markets in Europe for new construction and are often highly cost effective.

The problem is that there isn't a huge market demand for them in the existing stock, as the use of mass-produced products is hard to apply to existing buildings that require specialized retrofit designs.

"However, we are seeing some promising work in Denmark, Germany and the Netherlands, for example, with their Energiesprong program. These countries are using some policy incentives and market tools to get these highly efficient building envelope retrofit packages out there at cost-effective prices," he says.

Via agreements between housing associations, builders and manufactures, the program uses building envelope materials that are made off-site and customized to each project, delivering near-zero energy retrofits to social housing in the Netherlands.

There is no upfront cost for occupants (this being the major barrier to building renovations in the residential sector), and the cost is covered over time by the guarantee in energy savings. The United Kingdom picked up the Energiesprong program this year.

For García Domínguez, these are the kinds of programs that will allow adaptable retrofits, that are compatible to the residential market, to roll out on a wide scale.

"There is a lack of incentive for the promotion of retrofitting actions," he says. "It is vital that local governments are encouraged to launch financial support plans to accomplish deep renovation actions under the premise of reaching near zero energy building targets."

More information: www.bresaer.eu/

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