Great opportunities for solar cells as building materials

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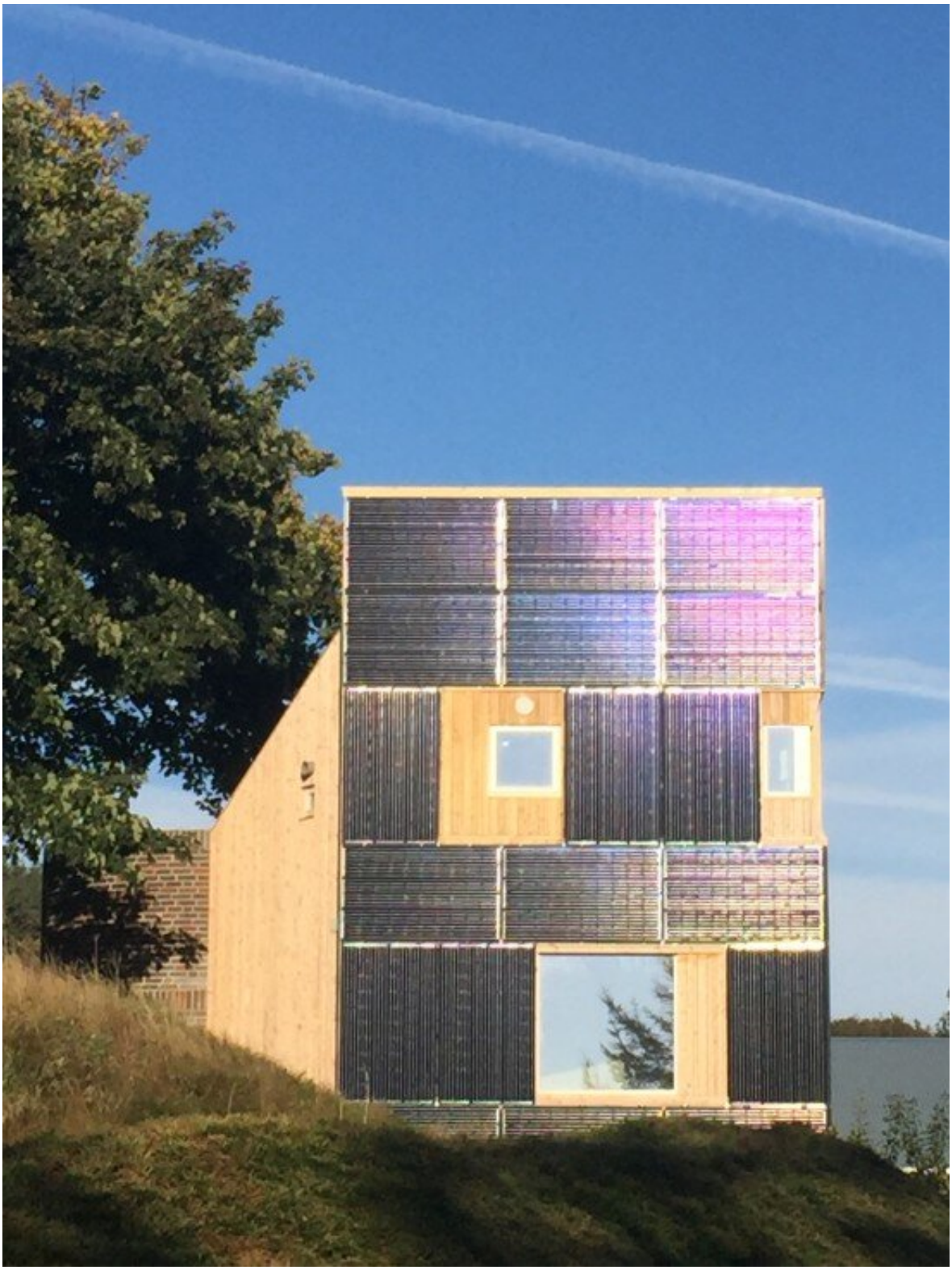

Credit: Harald N. Røstvik

Building integrated photovoltaics, BIPV, is a growing renewable energy source. This technology uses photovoltaic materials to replace conventional building materials on roofs and facades.

"Buildings play an important role in energy efficiency as they are responsible for a significant part of the energy needs in urban areas," says Gholami.

In Europe, energy consumption in buildings accounts for 41 percent of total energy consumption in cities. By using building integrated solar cells as a building material and power generator, it is possible to achieve zero-energy buildings, or even plus-energy building projects.

The findings in Gholami's dissertation show that BIPV technology as an alternative to other construction materials has already become economically viable in large parts of Europe. The total price of BIPV systems decreases every year, and at the same time efficiency increases.

What are the prospects in Norway?

"It is a common misconception that we do not have enough sun here, but the cold climate in Norway is actually very suitable and has a large solar energy potential, says Gholami. By dressing entire buildings in BIPV, one can take advantage of the cold weather and low sun.

Research has shown that when using wall-integrated solar power systems, even on the north side where the sun rarely shines, reflection can occur from opposite buildings with south-facing facades. Throughout its lifespan, the additional costs of this system can be reimbursed.

BIPV at the Norwegian Petroleum Directorate. Credit: Hassan Gholami

'Competitive materials'

Gholami believes that building implemented solar panels are competitive materials, with endless design possibilities.

"The material can be designed so that the solar cell function is barely visible. In terms of price, it competes with other building materials, if you include environmental and social costs in the calculation."

A milestone in line with the green shift

"The sun is our largest and most important energy source and the form

of energy with the largest annual growth in the world. This dissertation is a milestone at the University of Stavanger, and in line with the green transition," says Harald N. Røstvik. He is a professor at the Department of Security, Economics and Planning, in the research group for urban and regional planning.

Røstvik has been researching solar energy for over 40 years, and has been Gholami's main supervisor in his doctoral work. Daniela Müller-Eie was co-supervisor.

"This is the first dissertation dealing with solar energy in buildings and cities, and hopefully not the last. We are facing a new sector and must seize the opportunities. I hope the research on solar energy continues at UiS with more doctoral students involved in this brilliant industrial field," Gholami concludes.

More information: Feasibility Study of Building Integrated Photovoltaic (BIPV) as a Building Envelope Material in Europe. uis.brage.unit.no/uis-xmlui/handle/11250/2786695

Provided by University of Stavanger