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SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

SHC Technology Position Paper
Building Integrated Solar Envelope Systems for HVAC and Lighting

March 2021. The quest to decarbonize society's electrical and thermal systems has never been more urgent. In this Technology Position Paper, experts of IEA SHC Task 56 on Building Integrated Solar Envelope Systems for HVAC and Lighting layout how to support the development of these systems. Below are key takeaways. To read the full paper, click on the link above or visit our website, www.iea-shc.org

SOLAR ENVELOPE SYSTEMS - TODAY AND TOMORROW

Solar envelope systems may not be a consolidated practice in the construction sector. Still, many concepts and solutions are being developed and innovative products are entering the market.

Current Status

Solar envelope systems can be split into two main segments.

Solutions that control solar radiation. Innovative solutions, such as motorized shadings and electrochromic glass, have a place beside traditional shutters, blinds and curtains, which already have a well-established market in the residential and tertiary buildings sectors.

Building integrated solar harvesting technologies. This market is structured around small-size enterprises that offer solutions primarily targeting architects and energy planners. These systems represent a niche market, even though the many building integrated photovoltaic products reaching the market in the last years speak of rapid growth.

Several challenges hindering the market penetration of innovative building integrated solar envelope systems include their more complex and time-consuming design, manufacturing, and installation compared to conventional solutions. These systems also require the collaborative involvement of a range of professionals during the planning and installation processes.

Potential

New materials entering the market are driving product innovation. For example, high-efficiency polymers are used to produce absorbers for solar thermal collectors and new light shifting options for semi-transparent photovoltaic solutions. The progress in solar envelope technologies is pushing advances in manufacturing and the assembling of existing materials, resulting in new concepts and application designs and improvements in existing technologies.

The main R&D trend is to achieve industrialized multifunctional solutions to move as much as possible of the building plants (i.e., space heating, cooling, and ventilation) into the envelope, thus speeding up the construction process. From the building construction perspective, the envelope assumes a higher value since it can replace central services, such as artificial lighting or entire parts of the HVAC system. Prefabrication offers a huge opportunity to the component manufacturers that can evolve and place higher added-value solutions on the market.

Actions Needed

Manufacturers offer systemic design and construction packages.

Manufacturers elaborate on new value propositions promoting solar envelope systems. User and human-centric solutions can be a strong “go-to-market” strategy.

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Manufacturers offer aesthetically flexible solar envelope systems to comply with specific architect requirements.

Manufacturers and industry associations promote professional training and dissemination activities on the opportunities offered by market available and near-to-market solar envelope systems.

Decisionmakers harmonize both construction and industrial regulations and promote energy sharing.

Decisionmakers support a framework of measures that creates a level playing for building integration of solar envelope systems with conventional solutions.

IEA SHC Technology Position Papers
At the end of an IEA SHC Task, the participants produce a Technology Position Paper based on the Task's results and outcomes. The papers published to date can be found along with the other IEA SHC publications at **https://www.iea-shc.org/publications**.

About IEA SHC
The International Energy Agency, Solar Heating and Cooling Technology Collaboration Programme (IEA SHC) is an international research and information program on solar heating and cooling technologies. Over 300 experts from 19 countries, the European Commission, and eight international organizations conduct collaborative research on a wide range of solar heating and cooling topics from technical solutions to regional applications. SHC is one of the oldest Technology Collaboration Programmes of the IEA, founded in 1977 and one of ten addressing a specific renewable energy source.

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