

Turning buildings into energy producers

EPFL has become the coordinator of Be-Smart, an EU research project that aims to step up the deployment of building-integrated photovoltaics (BIPV) and cut their costs by 75% between now and 2030. The project was launched in response to EU regulations that require new buildings to be nearly zero-energy by 2020.

Photovoltaics can be used directly in building and renovation projects and serve as a construction material in their own right. Integrating solar panels into facades and roofs can transform buildings into electricity producers and reduce CO₂ emissions. To develop and promote this technology, [Be-Smart](#) project partners will design multifunctional solar panels that not only produce energy but also do the job of other building materials with insulating, soundproofing or aesthetic qualities. The project partners will also develop a methodology for architects and construction companies and find ways to drastically reduce the costs of BIPV.

A boon for Europe's manufacturing industry

Fifteen research institutes, innovative companies, and architecture and construction firms have teamed up for this challenging project, which is being led by EPFL and the CSEM in Neuchâtel. "The use of BIPV in facades and in the construction sector more broadly is expanding rapidly, thanks in part to the pioneering technology developed by EPFL and CSEM," says Laure-Emmanuelle Perret-Aebi, coordinator of the project at EPFL's [Photovoltaics and Thin Film Electronics Laboratory](#) (PV-Lab). "But we need to make this technology more accessible so that it can be used more extensively and not just in flagship building projects." Greater uptake of the technology would considerably increase demand for photovoltaic facades, tiles and other construction materials, which would be a boon for Europe's manufacturing industry. "The technology is different from that used in solar panels, which are designed for mass production and now manufactured primarily in China," says Perret-Aebi. "But BIPV technology stands to boost European industry."

And this technology runs on solar energy – another of its major assets given recent progress in this area. "Solar energy produces 10 to 20 times less CO₂ than conventional thermal power plants," says Christophe Ballif, a professor at EPFL's School of Engineering, the head of EPFL PV-Lab and the director of CSEM PV-center. "What's more, large solar farms are the cheapest way of producing electricity, even in countries that don't get a lot of sunlight, like Germany."

A shift in mindset

It is already possible to construct or renovate a building with BIPV. In Switzerland, more than 10,000 roofs have already been built in this way, with photovoltaic panels available in various shapes and colors. Yet there is still a lot of reluctance, and uptake of this technology is slow. While the use of BIPV does drive up construction costs, the extra expense is paid off in 10 to 30 years. And that's without making use of potential subsidies or selling back the electricity produced. Nor does it account for the reductions in CO₂ emissions that can be achieved.

A standard for all new buildings

The photovoltaic technology used for this project is based on crystalline silicon, which is found in most solar panels. Since the panels need to have a guaranteed lifespan of 30 to 50 years if they are to be integrated into buildings, reliability is essential – and one of the project goals. At the moment, the energy payback period for a solar panel – i.e., the time needed for the panel to generate the same amount of energy used to make it – is between one and three years. According to the project partners, widespread use of this technology in facades and roofs could produce roughly the amount of energy currently consumed in Switzerland. "There is really no reason not to integrate photovoltaic panels into new buildings – it should be the norm," says Ballif.

Be-Smart Project

<https://www.besmartproject.eu/>

Coordinator:

EPFL, [Photovoltaics and Thin Film Electronics Laboratory](#)

Participants:

[AIT Austrian Institute of Technology GmbH](#) (Austria)

[Association Compaz](#) (Switzerland)

[Commissariat à l'énergie atomique et aux énergies alternatives](#) (France)

[CSEM](#) (Switzerland)

[Issol SA](#) (Belgium)

[Institutt for energiteknikk](#) (Norway)

[Immoroc SA](#) (Switzerland)

[L - UP Sas](#) (France)

[Oslo kommune](#) (Norway)

[Padanoplast S.r.l.](#) (Italy)

[Saint-Gobain Sekurit Deutschland GmbH & Co. KG](#) (Germany)

[Solaxess SA](#) (Switzerland)

[Sustainable innovations europe sl](#) (Spain)

[White Arkitekter Aktiebolag](#) (Sweden)

References

Be-Smart was launched in October 2018 and will run for four years. It has a total budget of 8,155,173 euros and is funded by Horizon 2020, the EU's research and innovation program, under [grant agreement No. 818009](#).

Images for downloading:

1. *The photovoltaic materials covering this facade meet aesthetic requirements (Made by Solaxess, based on a technology developed by CSEM. Both are Be-Smart partners)*
2. *These terracotta-colored tiles are photovoltaic. (Collaboration between ISSOL and CSEM, a project supported by the Swiss Federal Office of Energy, Userhuus, Canton de Fribourg. Installation: Solstis SA).*
3. *This photo is actually a solar panel designed to demonstrate the aesthetic potential of this technology. (Photograph created by CSEM, a Be-Smart partner, using its KALEO technology).*