Reconciling solar energy and heritage preservation

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Maria Cristina Munari Probst created a database of examples of solar panels that either fit or do not fit harmoniously in their urban setting. Credit: Alain Herzog 2016

EPFL researchers have developed a method to assess the aesthetic impact of solar panels on buildings and to set objective criteria for where they should be placed. Some municipal governments could apply this method as early as next year. The researchers have just received the

Innovator of the Year award in Sweden.

"We want to show that solar panels can be harmoniously integrated into their urban setting, even in fragile environments, as long as the necessary effort is made in terms of design and cost. 'If this effort falls short, it may be better to just postpone the work," says Maria Cristina Munari Probst, an architect in EPFL's Solar Energy and Building Physics Laboratory (LESO-PB). "Inelegant solar installations end up turning away potential solar-power users. If done properly, however, they can further spur the growth of solar energy, and this will easily make up for their slightly higher cost."

Together with engineer Christian Roecker, Probst designed an easy-to-use method for cantonal and municipal authorities in charge of planning and approving solar installations. How does it work? It allows the authorities to take local architectural constraints, such as historical districts, into account when analyzing where to install solar panels on existing buildings. This method should ultimately help reconcile heritage advocates and renewable energy supporters. On 16 November, the authors won the Innovator of the Year award in Sweden for their work.

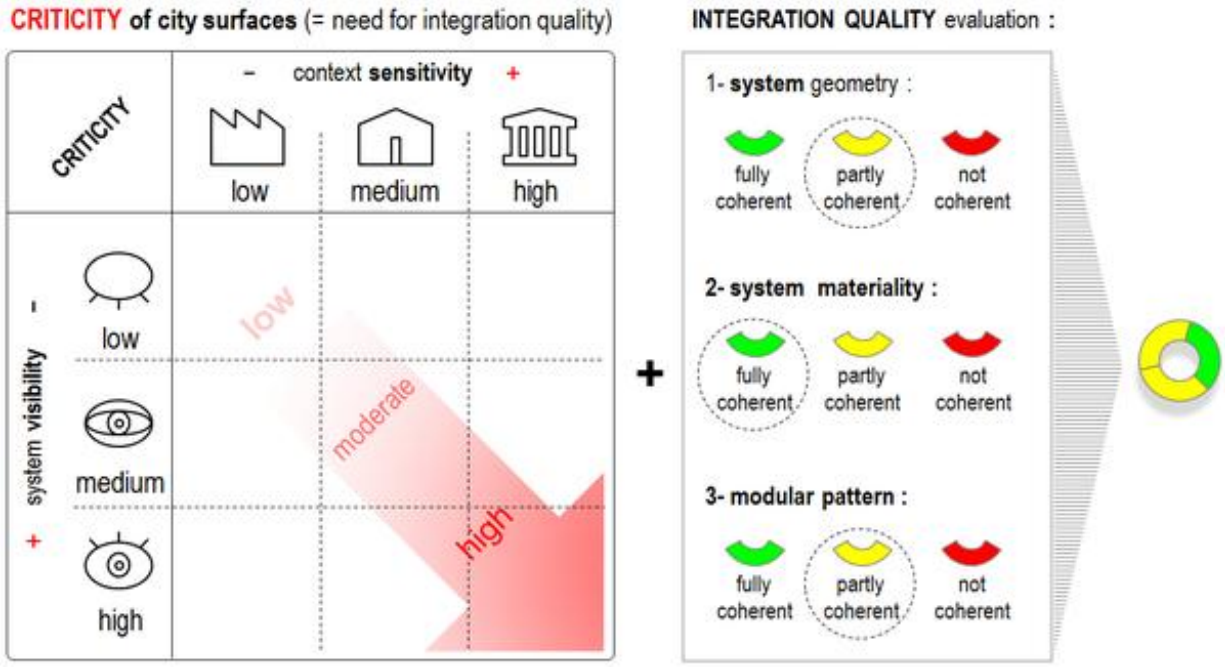
"These days, people tend to put up solar panels without thinking about the aesthetic impact on existing buildings," says Probst. "We presented our method to representatives of both the French-speaking cantons' energy services and heritage associations in French- and Italian-speaking Switzerland in April and October. Thanks to these discussions, we were able to refine our method and ensure that concerns on both sides were properly taken into account." The consultations have paid off: according to the researchers, several municipalities have already expressed interest in the method, which they may apply as early as next year.

Architectural "criticity"

Probst and Roecker call their method LESO-QSV (QSV refers to Quality-Site-Visibility). It is based on the new concept of "architectural "criticity"" in urban areas. Under this concept, the acceptability of solar panels is assessed against the sensitivity of the site and the visibility of the panels from the public space.

The higher the degree of "criticity" – such as the facade of a highly visible historical building – the more emphasis will be placed on harmoniously integrating the solar panels. On the other hand, a flat roof on a factory in an industrial zone will be given a much lower "criticity" rating, and, consequently, be subject to lower integration standards.

The researchers say that solar installations should always respect the surrounding environment. But it's not always critical. "In the effort to promote the use of solar energy, expectations can be scaled back in certain cases, such as in industrial or commercial zones where the architectural quality is lower, or on surfaces with low public visibility, such as flat or slightly angled roofs," adds Probst.



Credit: Ecole Polytechnique Federale de Lausanne

Objective criteria

Before aesthetic standards can be established, objective criteria need to be developed. While it is often thought that aesthetics is a matter of taste, the researchers' recent studies confirm the existence of clear criteria against which the appropriateness of solar power installations can be judged.

The LESO-QSV method can be used to evaluate solar installations through three simple and objective criteria: the project's geometry, materiality, and modular pattern. These criteria provide a framework for assessing how harmoniously an installation fits into the surrounding urban environment. The results of the evaluations are expressed with colored circles. A "criticity" grid identifies nine different situations (see Figure 1) for which the municipal authorities will set quality standards in view of local considerations.

Instructional software

To help the authorities set quality standards, the LESO-QSV method comes with software (QSV grid) that shows the impact of different acceptability grids on more than 100 existing buildings. These solar installations, many of which are in Europe, also serve as models for objectively evaluating quality. This database provides a large number of examples that can inspire architects, installers and building owners. More examples will continue to be added, including the most prominent cases handled by the municipalities and commissions that will use the method.

Future planning

The method also helps the authorities get ahead of the problem. It can map out the architectural "criticity" of a given city, identifying the most visible and sensitive sites. This map can then be laid over a map of the city's solar exposure, which shows which of its parts get the most sunlight. This approach makes it easier for the authorities to set their priorities in siting future solar power installations and to plan subsidies intelligently. The researchers call this system QSV Crossmapping.

The method is currently being used for the purposes of the International Energy Agency's Task 51 ("Solar Energy in Urban Planning") and as core resources in three courses currently taught at EPFL and Università IUAV in Venice. In addition, extensive discussions among the three entities and the researchers now focus on an innovative solar planning project currently under consideration for the city of Carouge, led by the Swiss Federal Culture Office together with the Canton of Geneva.

Starting in 2020, all new buildings in Europe will have to run mainly on renewable energy. This means that municipalities must now urgently come up with a strategic energy plan. With this new method, the researchers hope that municipalities will use solar power more wisely and efficiently in the future.

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