



Foto: Eurac Research / Ivo Corrà

LABORATORY

## PV Integration Lab

Facility for the integration of photovoltaic systems in buildings and grids

# PV Integration Lab

What is the electrical yield of a thin-film photovoltaic module placed on a south-facing roof inclined 30° from horizontal? What temperature does a module attached to a flat roof or façade reach? How much energy does a prefabricated façade system with integrated transparent or opaque photovoltaic modules produce? How advantageous is it to combine storage systems and PV systems? Which type of inverter should be used? What impact do photovoltaics have on electricity networks? The PV Integration Lab can answer these questions for producers, designers, installers and dealers.

Our laboratory characterises the electrical performance of PV modules and systems, both in the open field and integrated with architectural structures, under real conditions. We also test systems that are connected to storage systems and verify their impact on electricity networks.

## Rotating roof mock-up for tests on architectural integration of photovoltaics

The outdoor laboratory has a rotating roof mock-up (5 x 4 m) with a maximum tilt of 60° that can reproduce the pitch of a roof or any type of cover. The rotating mock-up is connected to a monitoring system that can evaluate the efficiency of any type of module through the electrical and environmental parameters (such as yield, radiation, temperature).

## Façade for tests on photovoltaic modules integrated into architecture

An exterior façade structure of 4 x 6 m can evaluate, under real conditions, the electrical yield of PV modules integrated into systems of active solar façades. The façade can support heavy loads to better recreate the actual conditions of a building in any weather condition. The structure is divided into six 2 x 2 m modules that can simultaneously accommodate various façade blocks. A monitoring system has also been designed to test

complex façade systems, such as those that can integrate PV, electrical storage and control systems. The infrastructure is also equipped with a thermal box that keeps the inside of the solar façade at temperatures typical of the interior of residential/commercial buildings.

## Photovoltaic Storage Systems and Inverters

Tests on innovative storage systems can be performed via a standard PV system connected to a system of electric storage and electronic loads. Storage systems are key to optimising the ratio between energy produced locally and energy consumed, especially in buildings.

Furthermore, it is essential to use suitably-sized inverters to minimise system losses. These must be able to convert the electricity generated from DC to AC with a high efficiency and push PV modules to their maximum power point. We test these requirements through a dedicated setup that performs tests according to the IEC 50530 standard.

## Company Service Expertise

The laboratory is part of a wider collaboration between research and business that can take a prototype to a market-ready product, by passing through simulation phases, specific tests and optimisation.

Eurac Research offers companies a consolidated knowledge-base that has been developed through international networks and applied in numerous projects with local companies, including focus on quality and reliability of modules, the study of the solar resources and the integration of photovoltaics within buildings and networks.

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