EURAC research

MULTI-TECHNOLOGY PHOTOVOLTAIC TEST FACILITY

A large experimental installation for the testing, analysis and performance evaluation of photovoltaic systems

Foto: Othmar Seehauser

ABD AIRPORT
BOZEN DOLOMITEN
BOLZANO DOLOMITI

Multi-Technology Photovoltaic Test Field

DESCRIPTION

In cooperation with the Airport of Bolzano Dolomiti (ABD), EURAC research has set up a multi-technology photovoltaic test facility for the detailed performance evaluation of different module technologies and mounting systems. The site includes twenty-four separate technologies and four mounting systems. Established in the summer of 2010, the facility has been closely monitored ever since.

The test site has an overall nominal power of 724 kWp. The field orientation is 8.5° West of South, and most of the modules have a 30° tilt angle. In addition there are three other mounting systems:

i) A single axis active tracker with an inclination of 30° and an East-West rotation capability with a maximum angle of ±45°.
ii) A dual-axis active tracker that can adjust elevation and rotation according to the most advantageous angle for light-reception
iii) A white flat-roof substructure that mounts tubular CIGS modules.

The installation is further equipped with high quality sensors, including a pyrheliometer (CHP1, Kipp & Zonen), three pyranometers (CMP11, Kipp & Zonen), an albedometer (CMA11, Kipp & Zonen), along with a sensor for ambient temperature (Thies Clima), and a two-axis ultrasonic anemometer (Gill Instruments). Furthermore, the facility has a CIMEL sun photometer, which is connected to the international AERONET network coordinated by NASA.

PV reference cells (normal and KG5-filtered) are also used, positioned horizontally on the module plane and the two trackers.

STAKEHOLDERS

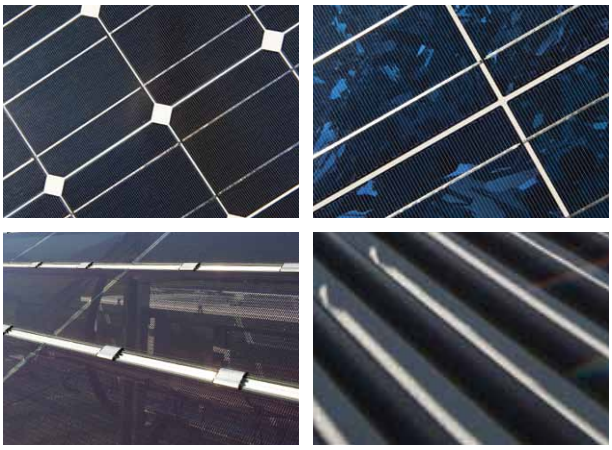
The experimental test site allows for a detailed performance analysis of the different technologies. It delivers information on:

· the performance of a specific technology in comparison to other technologies.
· the performance of specific technologies under various meteorological conditions (hot summer days with high direct solar radiation, or the cloudy days of other seasons with a relevant diffuse radiation).
· performance losses through the effect of age.

Developed primarily for project developers, installers and financial institutions, the data is of high interest for all stakeholders who wish to evaluate the energetic behaviour of solar installations and determine the most suitable technology for their particular needs.

Furthermore, the data is used by EURAC research to enhance the simulation processes for its performance predictions of future sites.

Overview of the multi-technology experimental PV test installation.



Four different PV technologies: m-Si (upper left), p-Si (upper right), a-Si transparent for BIPV (lower left) and tubolar CIGS (lower right).

View of secondary standard (ISO 9060) pyranometers to monitor diffuse and global irradiance.

TECHNOLOGIES INSTALLED IN THE EXPERIMENTAL PV FIELD IN 2010*

Number	Technology	Module	Watt peak
1	Monocrystalline silicon (m-Si)	Solarwatt M230-96 GET AK	220
2	Monocrystalline silicon (m-Si), for BIPV applications	Solarwatt 32 GEG opaque LK	124
3	Monocrystalline silicon (m-Si), for BIPV applications	Solarwatt 36 GEG LK	140
4	Back-contact monocrystalline silicon (BC m-Si)	SunPower WHT 300	300
5	Polycrystalline silicon (p-Si), pyramid-shaped glass	AlfaSolar PYR60	222
6	Polycrystalline silicon (p-Si)	Solarworld SW225-POLY	225
7	Polycrystalline silicon (p-Si)	Trina TSM-230-PC05	230
8	Polycrystalline silicon (p-Si)	REC 225-PE	225
9	Polycrystalline silicon (p-Si)	Kyocera KD210GH-2PU	210
10	Polycrystalline silicon (p-Si)	Canadian Solar CS6P	230
11	Polycrystalline silicon (p-Si), special cells connection	Day4Energy 48MC-S	175
12	Heterojunction with intrinsic thin layer (HIT)	Sanyo HIP-215NKHE5	215
13	Polycrystalline silicon (p-Si) String Ribbon	Evergreen ES-A-205-fa3	205
14	Amorphous silicon (a-Si), for BIPV applications	SchottSolar Asi Thru 30SG	27
15	Amorphous silicon (a-Si), flexible structure	Parabel UNIFLAT	272
16	Amorphous silicon (a-Si)	EPV Solar 50	50
17	Amorphous silicon (a-Si)	Inventux X115	115
18	Amorphous silicon (a-Si)	SchottSolar Asi TM 100+	100
19	Microcrystalline (µc-Si)	Sharp NA-F135 G5	135
20	Microcrystalline (µc-Si)	Bosch Solar Module µm-Si +	110
21	Copper indium gallium (di)selenide (CIGS), tubular	Solyndra SL-001-182	182
22	Copper indium gallium (di)selenide (CIGS)	Würth WSG0036E80	80
23	Copper indium (di)selenide (CIS)	Sulfurcell SCG55-HV-F	55
24	Cadmium telluride (CdTe)	First Solar FS 277	77.5

*This list will be increased in the coming years, and can be supplemented with specific technologies and products upon request.

RELATED ACTIVITIES

EURAC's Institute for Renewable Energy is active in applied research in the fields of solar heating and cooling systems, as well as energy management in buildings.

This includes:
- Execution of Integrated Design Processes for the planning of Net Zero energy buildings.
- Energy efficient refurbishment of historical buildings.
- Development of active solar building components in dedicated labs.
- Control assessment and optimization of installed complex energy systems.
- Testing of solar heating and cooling components in dedicated labs.
- Development of building-integrated photovoltaic solutions.

In-depth monitoring of pilot plants with detailed and dedicated simulations are carried out in all sectors.

Main building of EURAC research in Bolzano

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