MiaSolé

CUSTOMER CASE STUDY

BIPVCo: Swansea Active Classroom

CUSTOMER PROFILE

SPECIFIC, an academic and industrial consortium led by Swansea University in Wales, UK, with BASF, NSG Pilkington, Tata Steel and Cardiff University as strategic partners, has a vision of "buildings as power stations" – a world in which buildings can generate, store and release their own solar energy. The Active Classroom is SPECIFIC's latest full-scale building demonstration project, located at Swansea University's £450 million Bay Campus. The Active Classroom is a full-scale building demonstration project that contains a laboratory and classroom used for teaching students. The project involved 20 partners, including BIPVco, a world leader in the design and manufacturing of building integrated photovoltaic systems.

BIPVco was chosen to deliver new photovoltaic technology to this demonstrator building. Tata Steel and SPECIFIC joined forces to functionalize steel roofing and selected BIPVco to directly integrate the MiaSolé solar cell onto steel roofs, a product BIPVco calls Metektron. BIPVco and the MiaSolé CIGS cell were chosen over traditional silicon panels for two reasons: 1) the module integrates seamlessly onto the steel roof panels, creating a more aesthetically pleasing roof, and 2) the energy production from thin-film is more consistent over the entire solar spectrum than the energy production from silicon, because the thin film can produce greater power at low sun angles and during partial shading of the roof.

THE BIPVCO SOLUTION

The Active Classroom was built in just 14 weeks using a range of brand new technologies and construction methods. The building was assembled using off-site modular construction. It uses a highly insulated fabric for the floor and roof, and resistive heating is integrated into the floor panels. Solar air collectors on the South facade consist of perforated cladding that is fitted onto the building skin. Warm air is drawn in through the tiny holes in the steel using a fan. Even during the winter, there can be enough warm air drawn in at peak hours to provide heat for a building.

BiPVco
The Building Integrated Photovoltaic Company

MiaSolé
A Hanergy Company

MiaSolé

CUSTOMER CASE STUDY – SWANSEA ACTIVE CLASSROOM

The south-facing roof is a fully supported standing seam metal roof using Tata Steel's Colorcoat Prisma Urban roof panels. BIPVco's Metektron integrates solar energy production seamlessly onto this roof, by layering a back electrode with multiple cell interconnects, MiaSolé CIGS high-efficiency solar cells, a front electrode with bypass diodes, and lastly a protective transparent polymer coating. The 149 building-integrated photovoltaic roof panels each produce 115W. The built up roof system has an extra layer of OSB to contain cables and electrical junction boxes are concealed underneath the roof. The power generated by the roof panels can be used onsite, stored in the building's innovative Aquion Hybrid Ion saltwater batteries, or sold back to the grid.

Inside the classroom, new resistive heating is integrated into floor panels powered by the Metekron modules on the roof. The heat is fast and controllable—the teacher can program in the number of students each day using an app, and the classroom will be the perfect temperature when they arrive ready to learn. This type of heating is ideal for frequent changes in occupancy typical of school buildings.

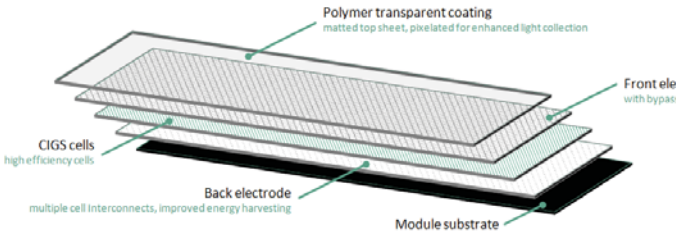
Once the building was completed, a living wall was planted with the help of local school children. Living walls have a number of benefits, including improved aesthetics, reducing the carbon footprint by helping to regulate temperature, protect the building facade, provide wildlife habitat, improve air quality, deter graffiti and reduce noise.

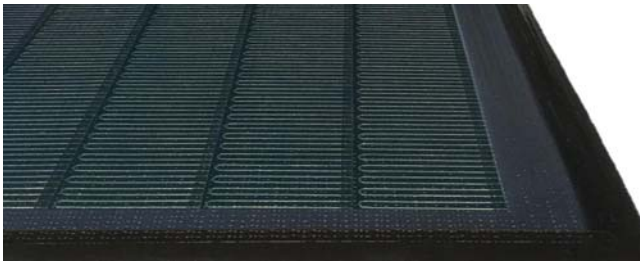
RESULTS

The BIPVco Metektron modules are ideal for the innovative Active Classroom project. The integration of the solar modules directly onto the metal roof panels is extremely cost efficient as they dramatically reduce installation costs. The Metektron solar roof panels generate sufficient energy to fulfill the Active Classroom's energy requirements and the excess energy is stored in the Aquion's Hybrid Ion saltwater batteries. These batteries are made using abundant, nontoxic materials, low-cost manufacturing techniques, and are maintenance free. The batteries are able to store 60kWh, enough to power the building for two days.

The Active Classroom contains a laboratory and classroom and will be used for teaching students. It will be monitored closely, enabling researchers to test and validate building performance in an education facility and to see how users interact with the technology. Demonstration at a building scale is vital in evaluating and proving techniques and technologies before they will be adopted by the construction sector, regulators and consumers.

METEKTRON MODULE





Unlike a silicon module, the Metektron thin-film module does not require that sunlight hit perpendicular to the module. Instead, the Metektron module can generate energy over a wide range of sunlight angles. Thin-film modules also produce more energy in high temperature conditions than silicon modules. Shading also disproportionally reduces the performance of silicon, while with the Metektron module the reduction in performance is proportional to the part of the module that is shaded.

MiaSolé
A Hanergy Company

BIPVco
The Building Integrated Photovoltaic Company

2590 Walsh Avenue, Santa Clara, California 95051, USA
1.408.919.5700 info@miasole.com www.miasole.com

990-197817-00-1