

PVSITES Overview

BIPV Thematic Session

27 October 2020

Eduardo ROMAN, TECNALIA (ES), Coordinator



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- PVSITES objectives & challenges
- PVSITES achievements
- PVSITES Products in the market

PVSITES introduction - Quick facts

Funding EU: 5.47 M€ (+ 1.4 M€ Switzerland)

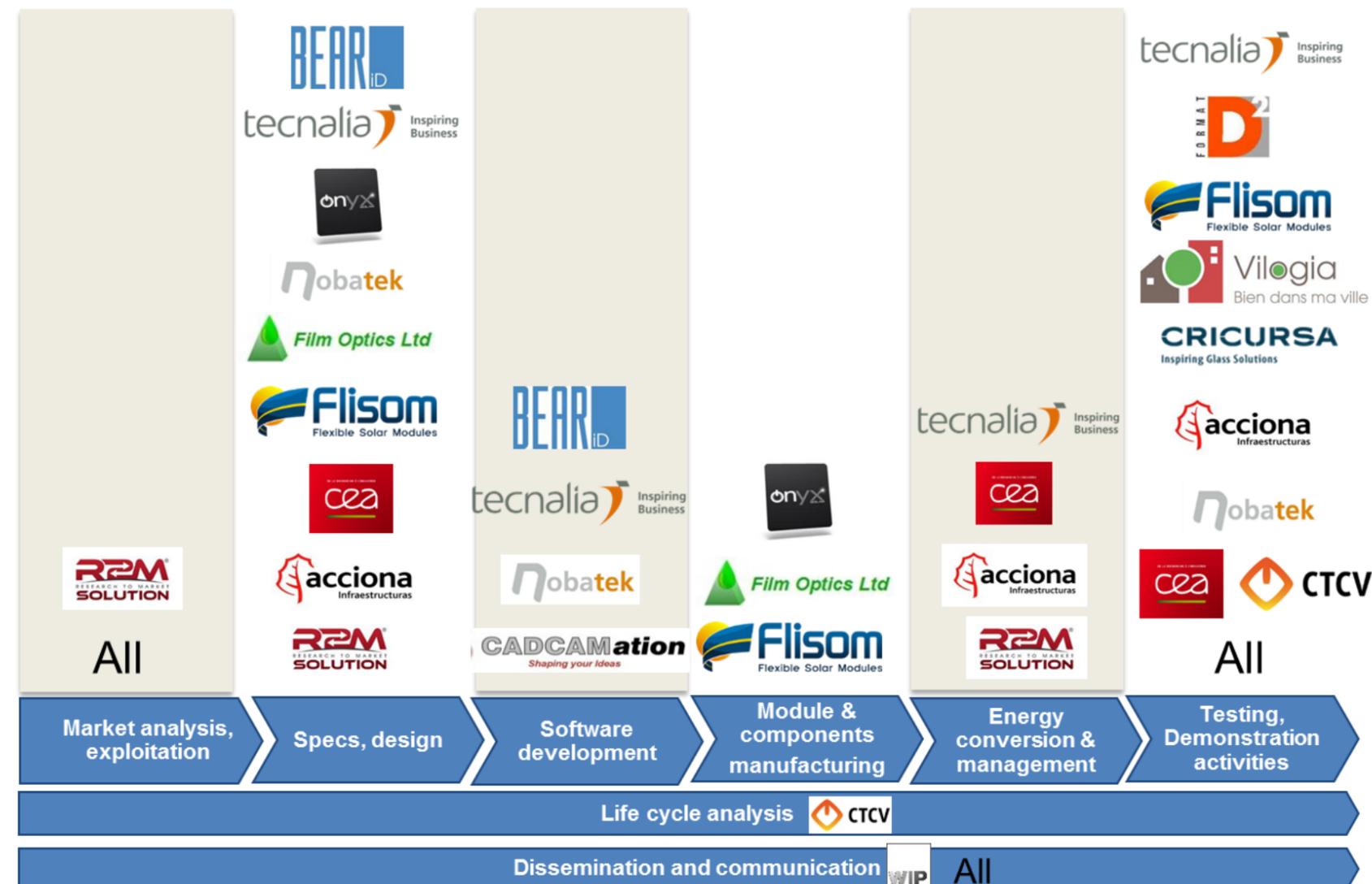
01/01/2016 – 30/06/2020

Contact: Dr. Eduardo Román – eduardo.roman@tecnalia.com

Coordinator: Tecnalia R&I

15 partners

- Spain (4)
- France (3)
- Switzerland (2)
- Portugal (1)
- Germany (1)
- Italy (1)
- Netherlands (1)
- Belgium (1)
- UK (1)



PVSITES Objectives and challenges

General objective: To drive BIPV technology to large market deployment led by EU industry

To be achieved by:

- Identifying and addressing BIPV market / business requirements
- Demonstrating in real buildings (TRL5 to TRL6-7) an **ambitious portfolio of BIPV solutions** in terms design and simulation, architectural integration, performance, cost-effectiveness, grid integration, energy management, LCA, training and awareness

Market challenges

Enhanced flexibility of design, outstanding aesthetical value, multi-functionality and cost-effectiveness

Assistance to design phase through the joint simulation of BIPV products and building energy performance

More predictable, manageable, grid-friendly profitable BIPV generation

Demonstration of performance and reliability of BIPV solutions through effective incorporation onto real buildings

PVSITES Achievements - modules

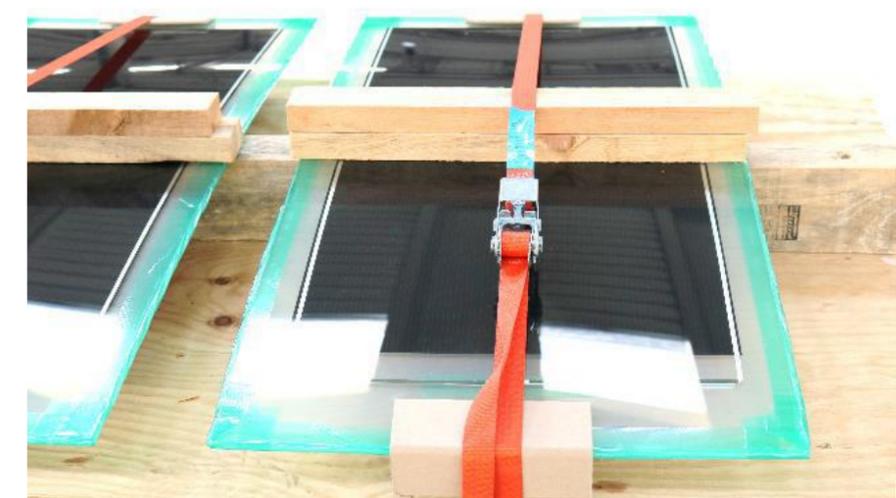
Glass-glass crystalline silicon based solutions (ONYXSolar)

- Hidden bus-bar and L-interconnections
- Back-contact solar cells as see-thru glass-glass
- Large formats
- Glazing treatments



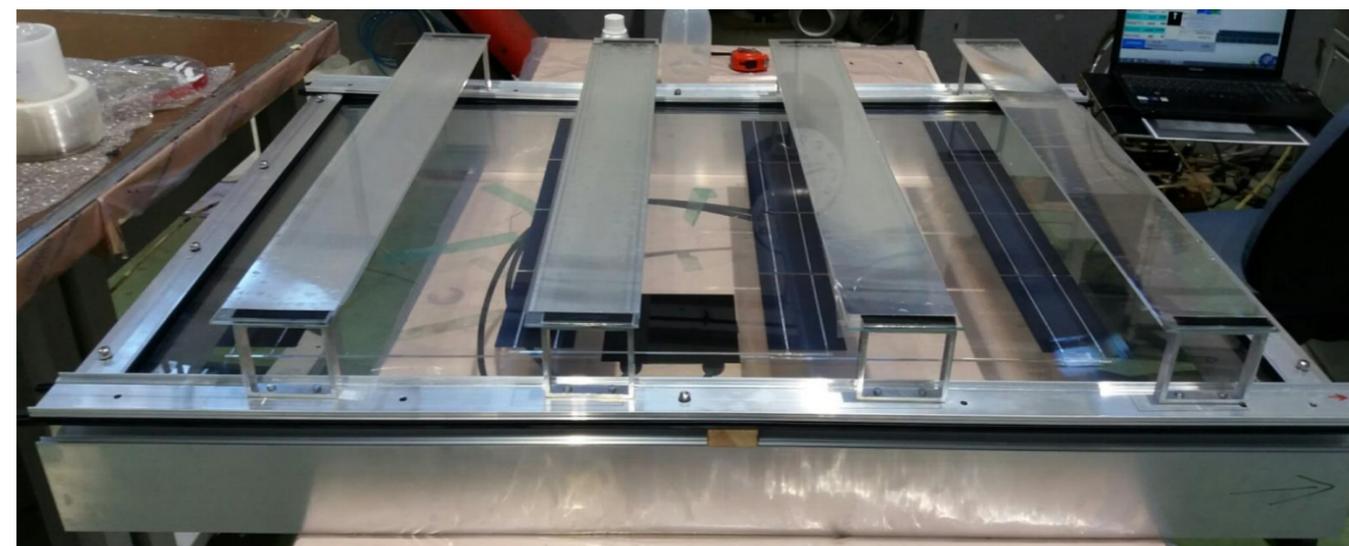
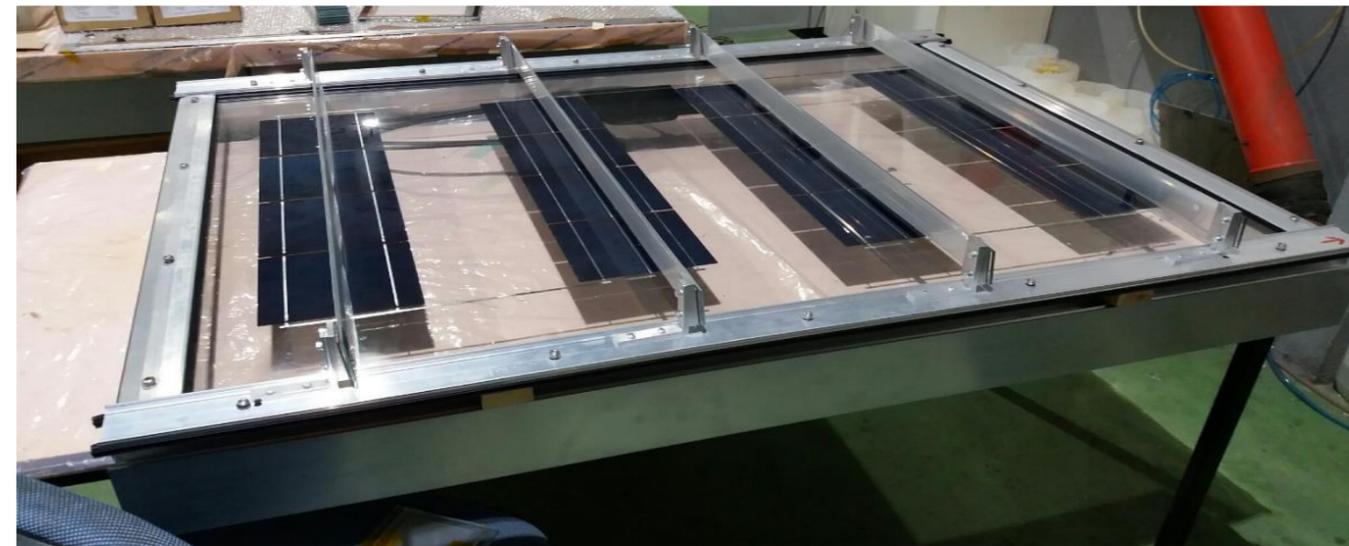
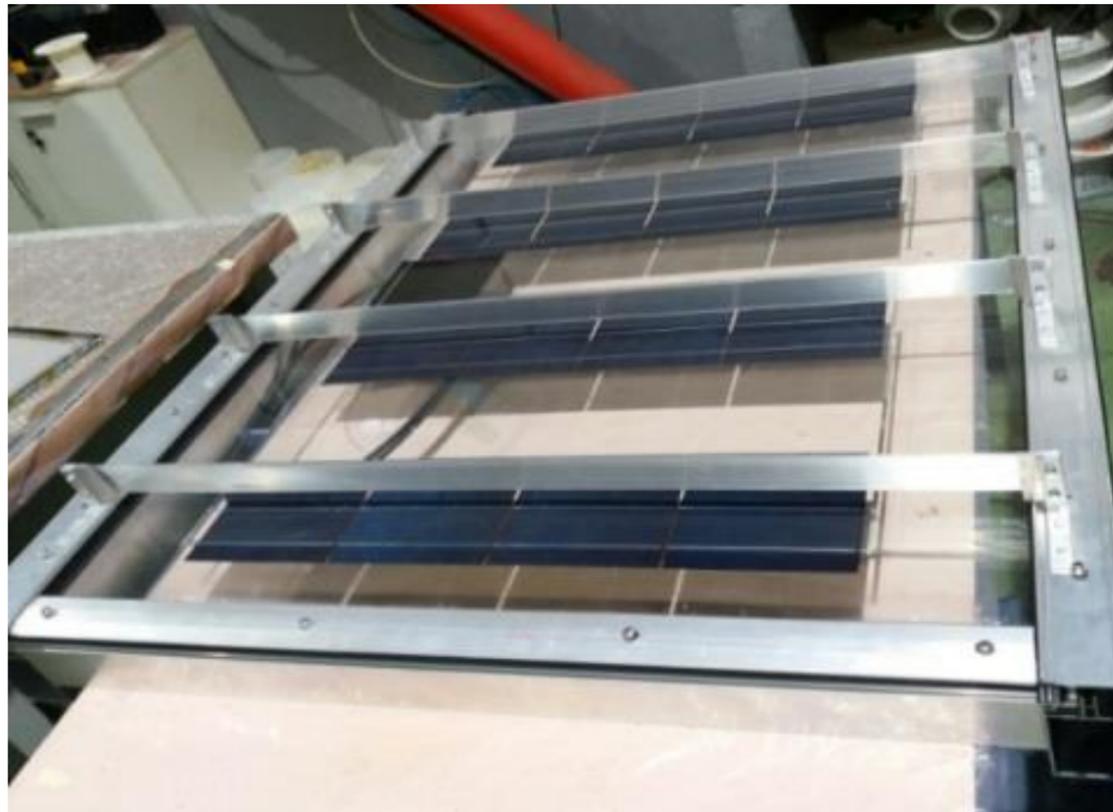
PVSITES Achievements - modules

Glass-glass based solutions (ONYXSolar + FLISOM)



PVSITES Achievements - modules

Semitransparent low concentration – passive solar control BIPV solutions (Tecnalia – Onyx)

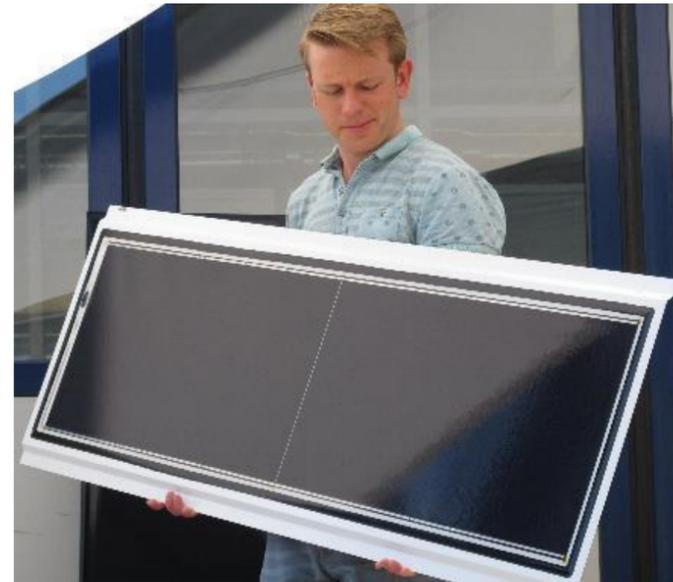


- Skylight
- Ventilated façade
- Shading elements

PVSITES Achievements - modules

CIGS on metal BIPV modules (FLISOM)

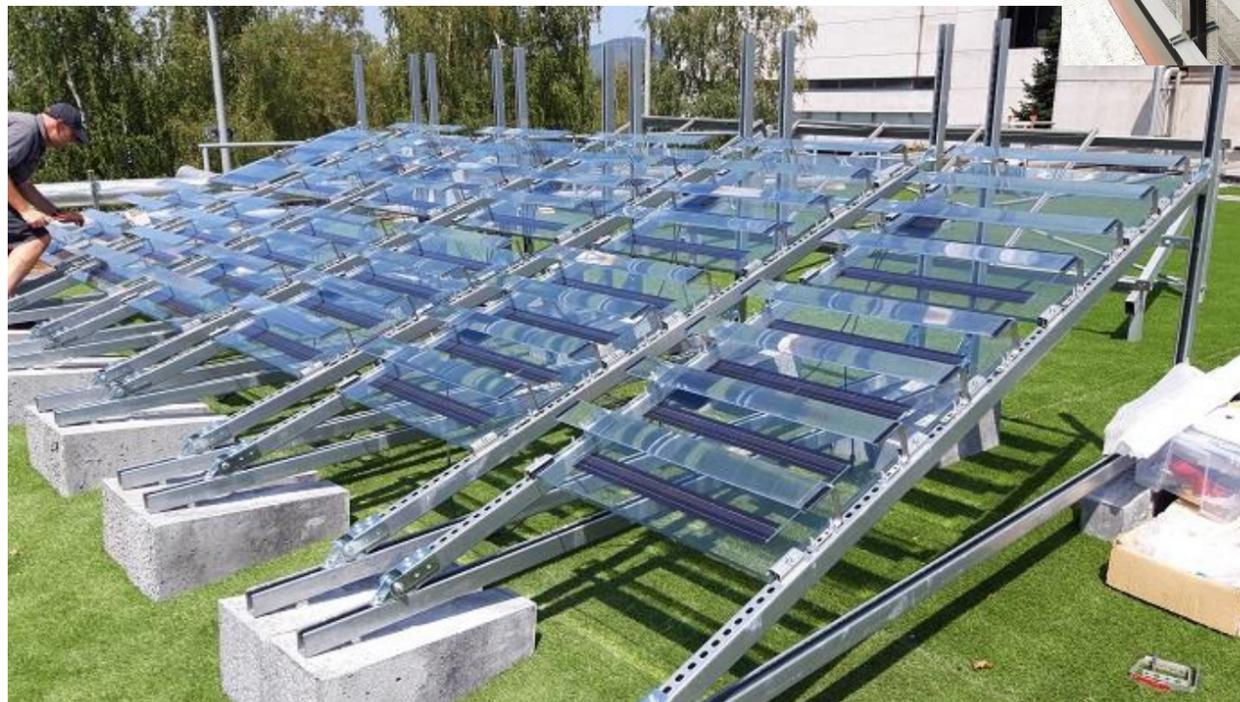
- Roofing shingles, CIGS on steel
- Solar roof tiles on different metal sheets
- Large area flexible membranes, roof and façade



PVSITES Achievements - modules in test-benches



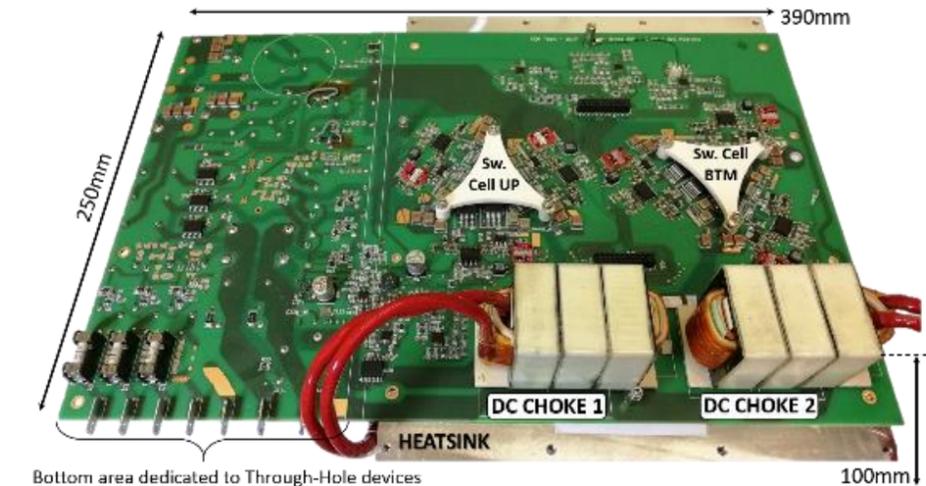
Modules in outdoor testing @ Acciona, Tecnalia, CEA



PVSITES Achievements – energy conversion & management

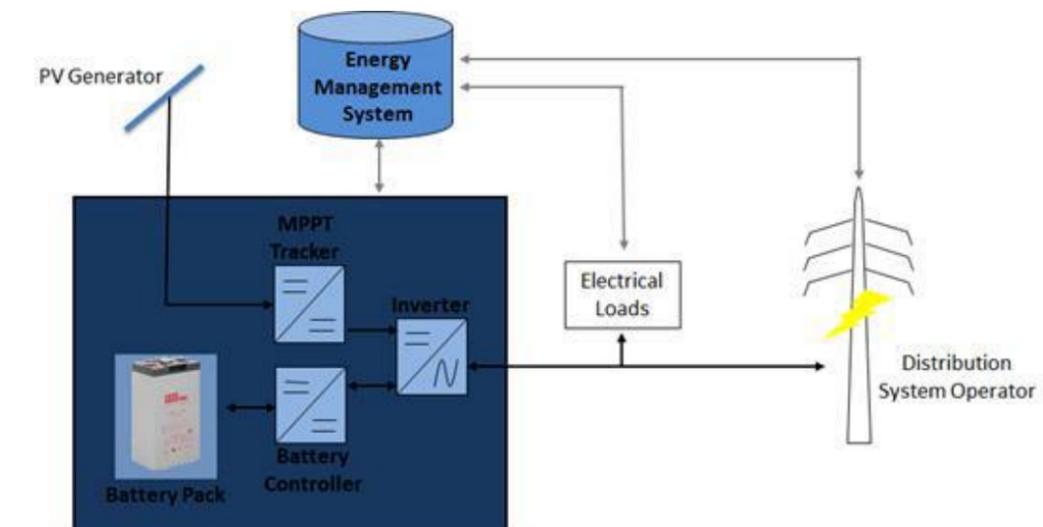
- PV storage inverter with high DC coupling (Tecnalia) and single-stage SiC based PV inverter (CEA)**

- High efficiency
- High reliability
- Cost reduction
- Flexibility in system design
- Scalability



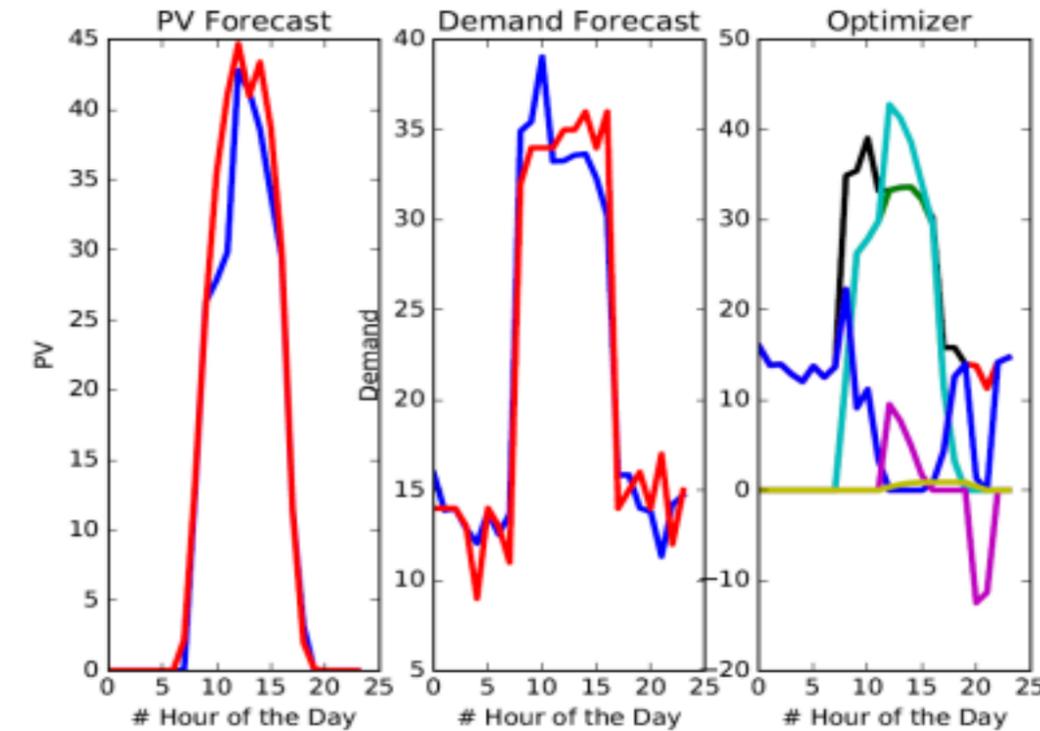
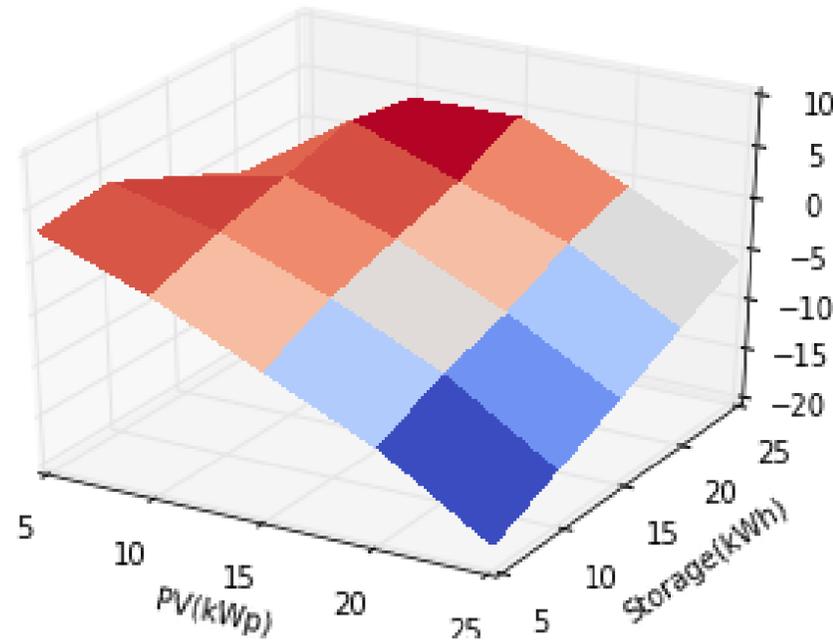
- Building Energy Management Systems (BEMS) (Tecnalia, Acciona, R2M)**

- Planner tool for CAPEX optimization
- Low-cost and reliable BIPV generation and building electrical consumption forecasting tools
- Optimal use of BIPV excess
- Active load management capability

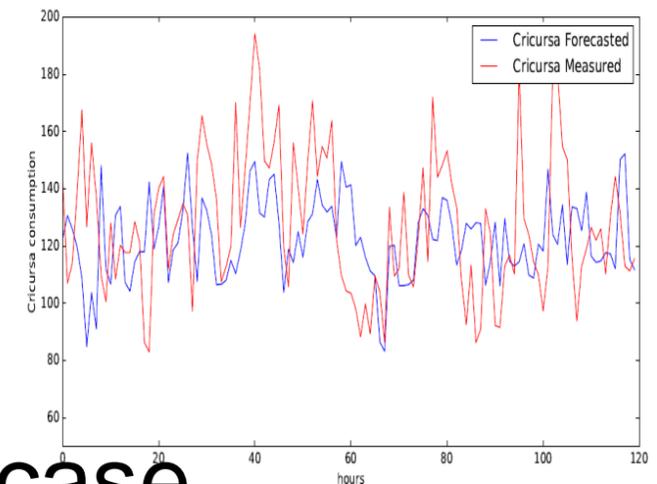


PVSITES Achievements – energy conversion & management

- Planner tool PV storage systems



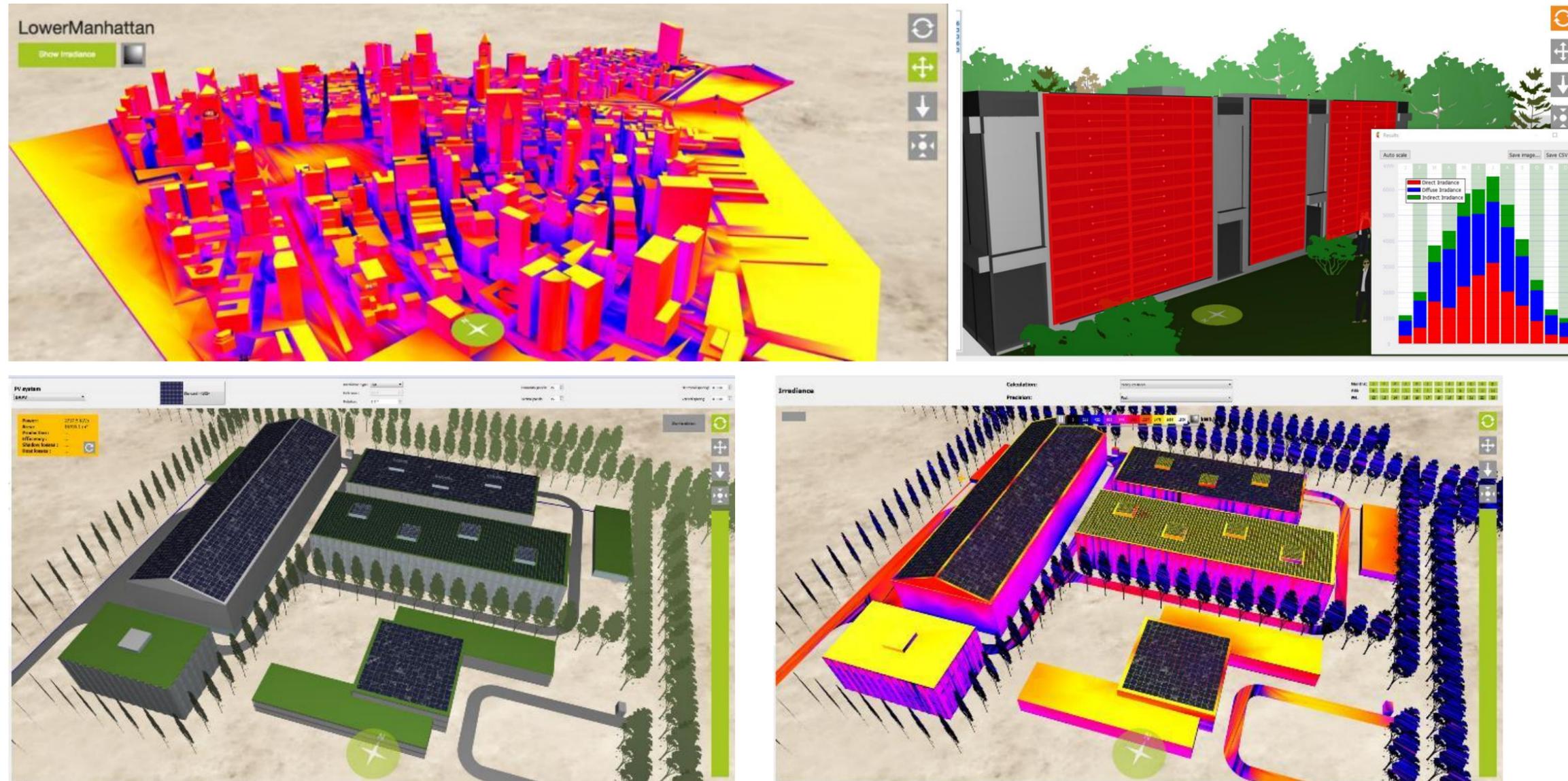
- Refinement of **BIPV** generation and building electrical consumption **forecasting tools**



- Building Energy Management System** for each use case

PVSITES Achievements – software development

BIM-based SW tool (available at <http://pvsites.enerbim.com/>)



Integrated tool for BIPV and building energy performance simulation

PVSITES Achievements – real demonstrations (ES, FR, BE, SW)



FormatD2



Cricursa



PVSITES Achievements – residential demo (BE)

Residential building, Stambruges (Belgium)



PVSITES Achievements – carport demo (SW)

Carport, Zürich (Switzerland)



PVSITES Achievements – carport demo (SW)

Carport, Dübendorf (Switzerland)



PVSITES Achievements – industrial building demo (ES)

**BIPV industrial roof
CRICURSA, Spain**



Building installation result

PVSITES Achievements – social housing demo (FR)

**BIPV ventilated
façade**

Wattignies (FR)



Building installation result

PVSITES Achievements – office building demo (ES)



Office building – ventilated facade

Building installation result



Highlights



26 EXPLOITABLE RESULTS IDENTIFIED, WITH CLEAR ROADMAP FOR COMMERCIALIZATION, MARKET ANALYSIS, IP ANALYSIS, MARKETING AND FINANCIAL PLAN.



H2 SUCCESSFUL COMMERCIALIZATION OF PVSITES PRODUCTS, EVEN DURING THE PROJECT EXECUTION



June 14, 2019

Success story: Crystalline silicon photovoltaic skylight by Onyx Solar

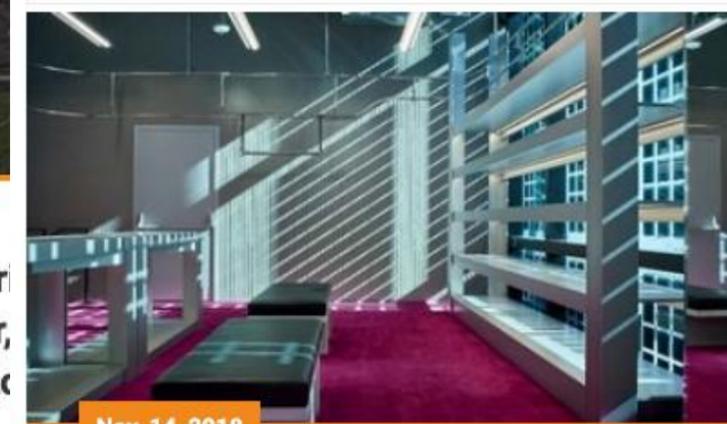
PVSITES partner Onyx Solar has used black frit PVSITES modules made of crystalline silicon for this installation in Denmark [...]



Dec. 12, 2018

Success story: Black frit modules by Onyx Solar, Castle Lane Street in London

Onyx Solar has completed a new installation in London, 300 meters from Buckingham Palace [...]



Nov. 14, 2018

Success story: Blue tinted crystalline silicon glass installed at Balenciaga storefront (Miami, USA) by Onyx Solar

Within PVSITES project, c-Si BIPV modules, manufactured by ONYX solar, have been intensively tested to take these products to the market [...]



Nov. 14, 2018

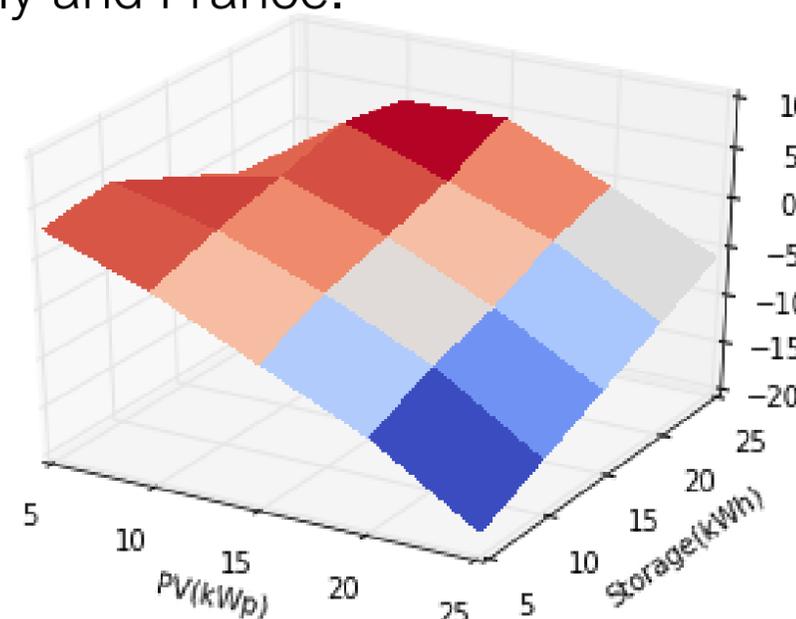
Success story: Flexible CIGS modules manufactured by Flisom, installed at a flower market in Johannesburg

250kW were installed at this flower market located in Johannesburg, South Africa. The challenge here was that the existing metallic roof could only bear [...]

H2

SUCCESSFUL COMMERCIALIZATION OF PVSITES PRODUCTS, EVEN DURING THE PROJECT EXECUTION

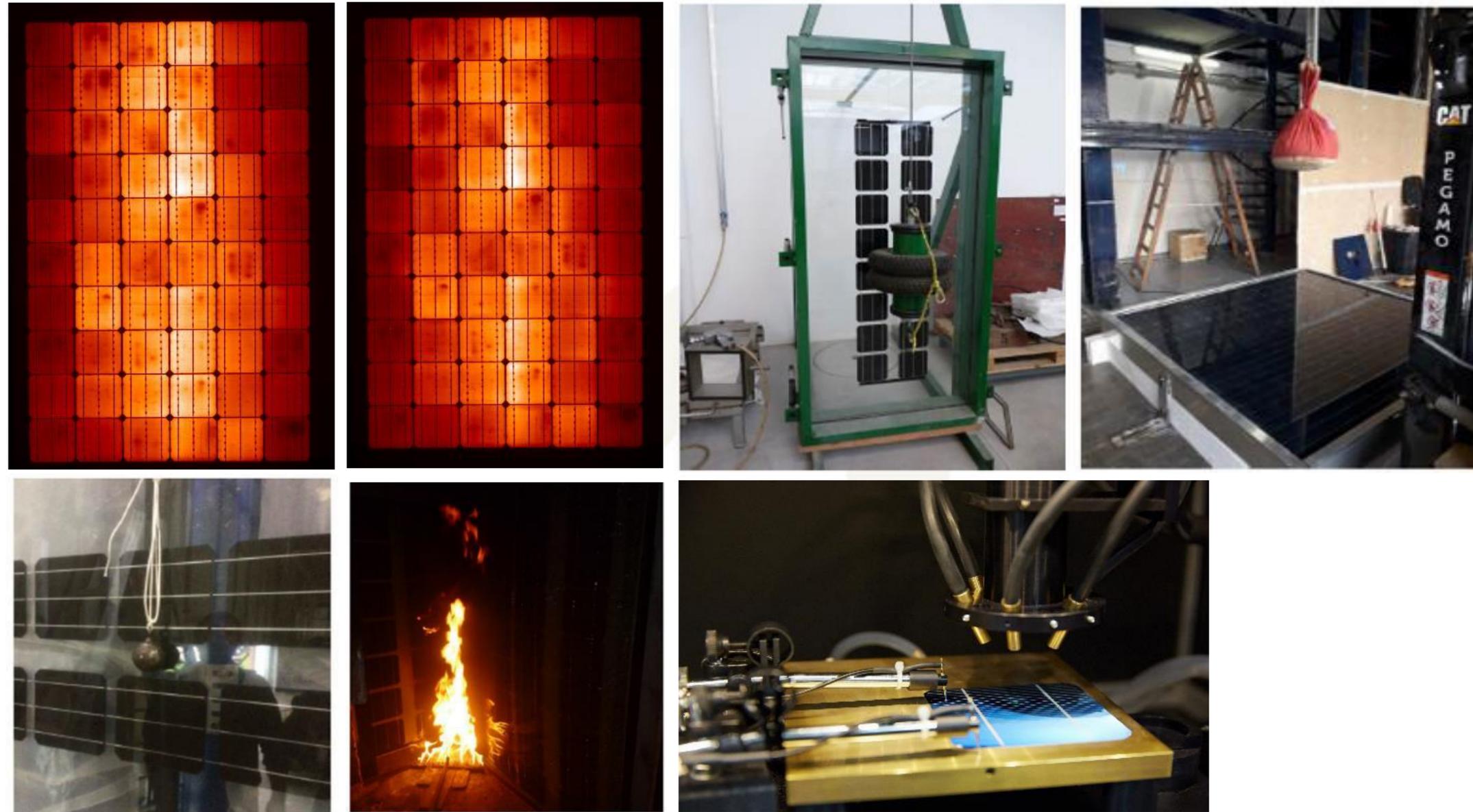
- Planner tool adapted and license sold by TECNALIA to different companies.
- Demonstration of forecasting tools and BMS, licensing to a large Energy company in Spain (TECNALIA).
- Exploitation agreement for TECNALIA storage inverter in progress with ELSON Electronics.
- BIMSOLAR platform BIM-ready on-line (free version)
- The collaboration between **R2M Solution** and **Onyx Solar** in the PVSITES project has led to a new commercial development, with R2M Solution now being the official Onyx Solar distributor in Italy and France.



Highlights

H3

INNOVATIVE BIPV STANDARDS TESTING SEQUENCE DEVELOPED FOR PVSITES PRODUCTS, REPLICABLE FOR ANY NEW BIPV PRODUCT IN THE MARKET. EN 50583 (2016)



H4

ENORMOUS SUCCESS IN TERMS OF DISSEMINATION AND COMMUNICATION

- **53,355 views** of the PVSITES website
- **+72.250 downloads** of PVSITES reports and promotional material (and will increase with last public documents to be uploaded)
- **49 Publications** (scientific, peer-reviewed, generalist)
- **~ 5400 views** of Project Videos
 - Project video
 - <https://www.youtube.com/watch?v=RtRVEVcqUE0>
 - Demo sites videos
 - https://www.youtube.com/watch?v=tQDqVLmt6kQ&feature=emb_title
 - <https://www.pvsites.eu/demo-sites/>
- Package of **webinars (3)** and **on-site workshops (6) - training courses (1 for each demo site)**
- Participation **in 68 events + 2 events** (after the project end)

H5

PVSITES CATALOGUE – PVSITES BIPV PRODUCTS PROFOLIO

It gives the useful information to select the optimum PVSITES product at project design level.

For each product there are different types of information described:

1. a data sheet that describes the product;
2. a design description that describes how the design decisions are made and how the final solution is designed;
3. an overview and instructions for the installation of the product.





PVSITES CATALOGUE – PVSITES BIPV PRODUCTS PROFOLIO

2. Product overview



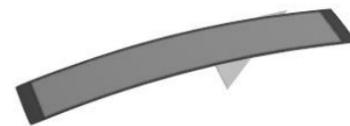
eRoof shingle

A BIPV roof shingle demonstrated in Stambruges, (BE).



eRoof industrial

A BIPV roof element for use on existing roofs. Demonstrated on a factory roof outside of Barcelona.



eCarport

A BIPV carport roof element with a big span. Demonstrated in two locations in Zürich.

4

3. Demosite overview



eRoof shingle

A BIPV roof shingle demonstrated in Stambruges, (BE).



eRoof industrial

A BIPV roof element for use on existing roofs. Demonstrated on a factory roof outside of Barcelona.

eCarport

A BIPV carport roof element with a big span. Demonstrated in two locations in Zürich.

6



eFacade

A BIPV metal facade cladding element. Demonstrated in the Ecole Hoteller in Geneva.



eFacade

A BIPV glass facade cladding element. Demonstrated in a housing block in Lille.



eGlazing

A BIPV glass double facade for renovation. Demonstrated in an office in San Sebastian.

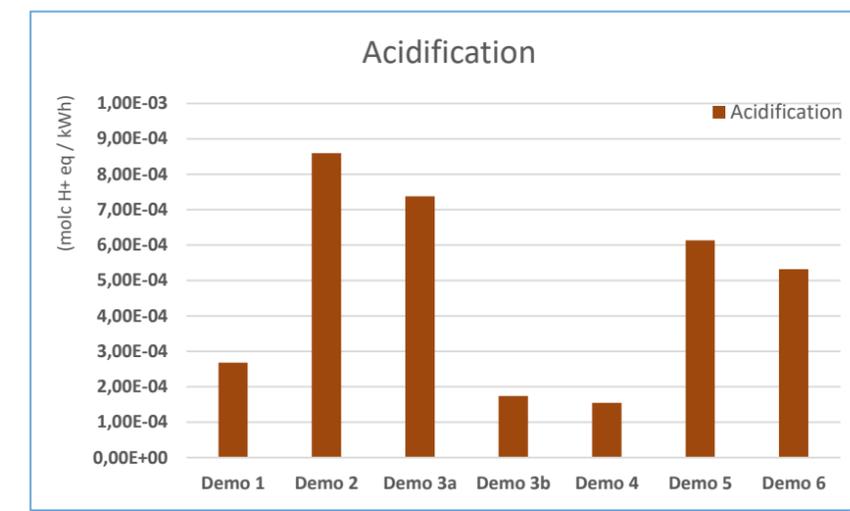
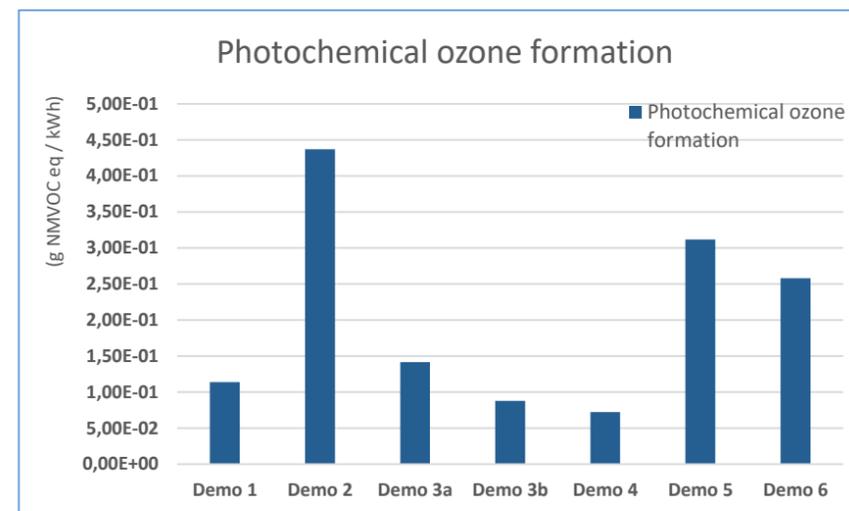


Web version – flipbook, integrated in BIMSOLAR

H6

EVALUATION OF ENVIRONMENTAL IMPACT ON BIPV MODULES AND SYSTEMS THROUGH THE LCA

- For the majority of the environmental impacts categories, results show that the **CIGS technology have lower impacts than the c-Silicon technology** (due to the raw materials and process used);
- The LCA results of the PVSITES demos are influenced by various factors including the solar radiation level, installation location, climate conditions, and other parameters that affect the system's electricity output. Demo 3 or 4 have the best impact while demo 2 has the worst impact in almost all categories due to these factors.



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