



**SHARING OUR EXPERIENCE with a BIPV*
installation on a multi-storey building
Conference & site visit _ 28th of November 2019**

(*Building Integrated photovoltaics)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 691768

WELCOME TO VILOGIA

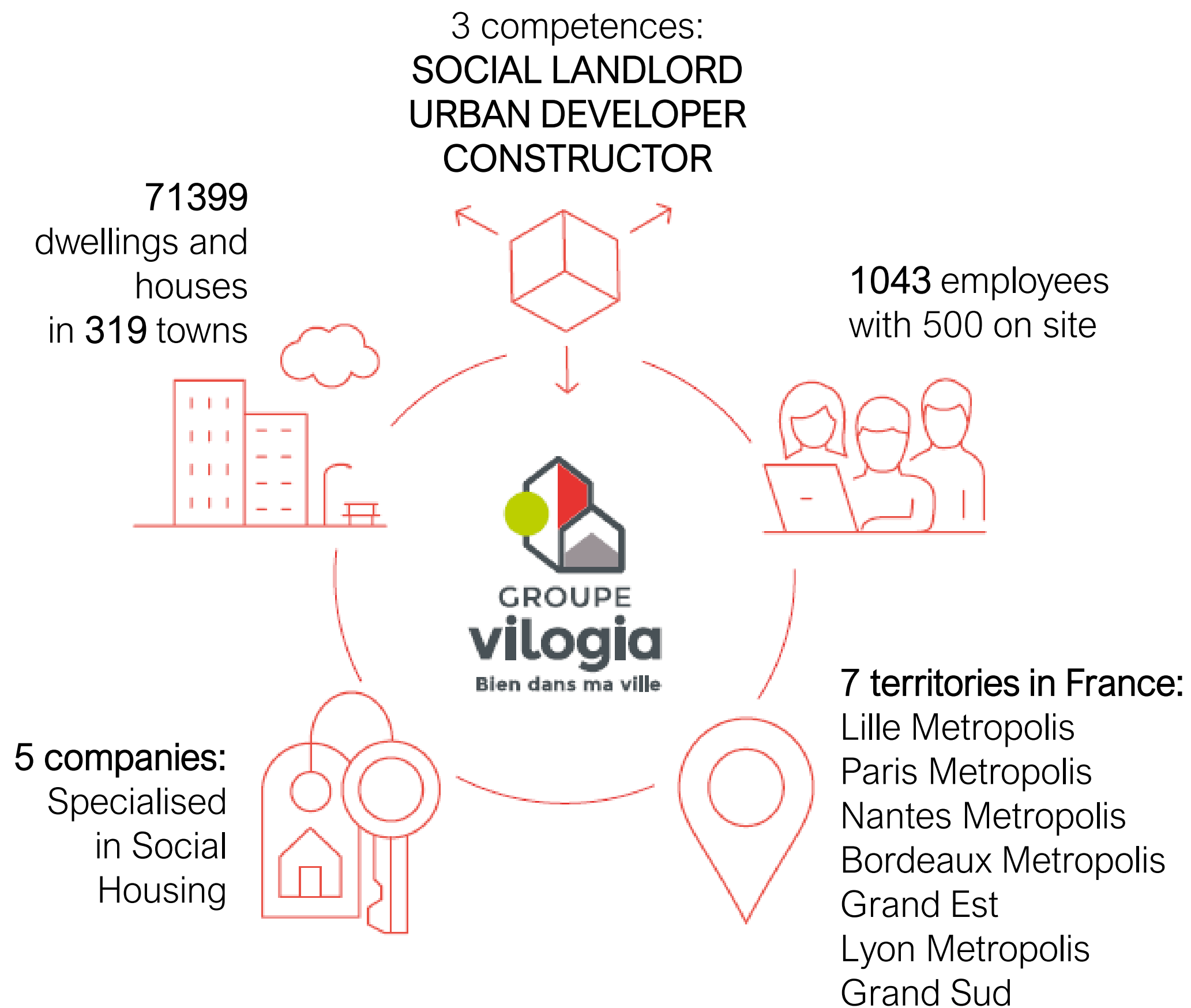
by Julie Xavier

Manager for Social Innovation and EU projects department

& Marie Longueville

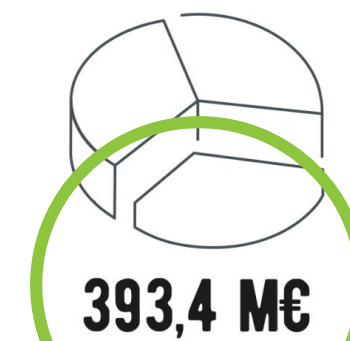
EU project manager

> VILOGIA- French National Social Housing Landlord

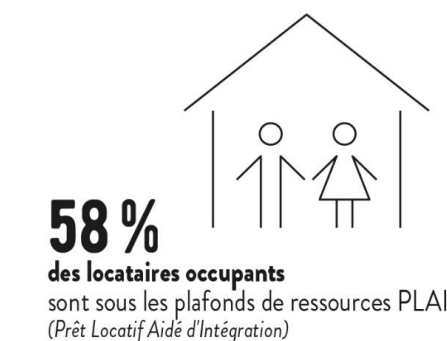


ACTIVITÉ

CHIFFRE D'AFFAIRES

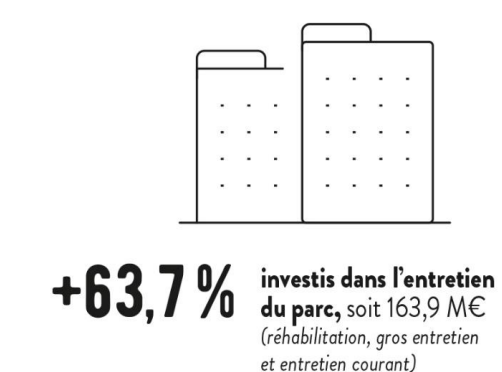


LOCATAIRES

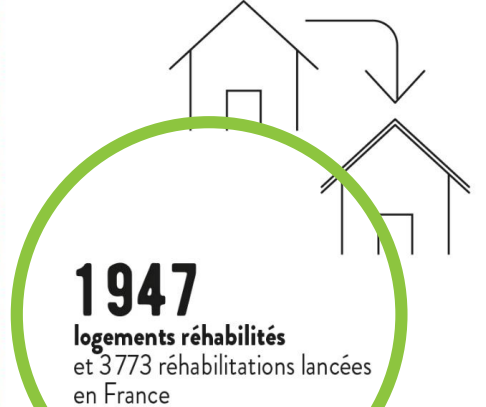


PATRIMOINE

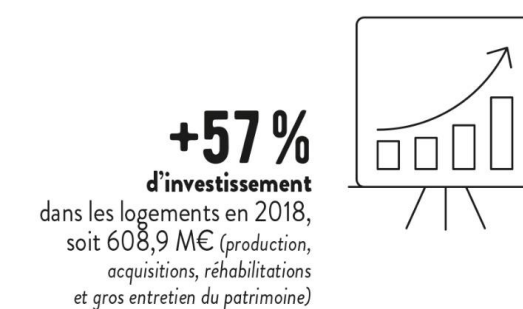
ENTRETIEN



RÉHABILITATION



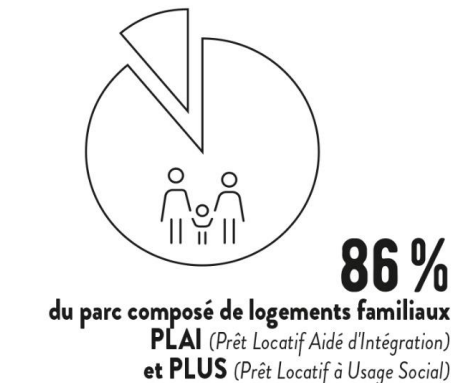
INVESTISSEMENT



CONSTRUCTION



LOGEMENTS



ÉNERGIE



INSERTION



PRÉVENTION



VENTE DE PATRIMOINE



PERFORMANCE ÉNERGÉTIQUE



Why did we join this project?

What is the objective of our meeting today?



THE PROJECT

What is PVSITES project about?

by Eduardo Roman

Coordinator of PVSITES project, Tecnalia, Spain



Quick facts

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

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

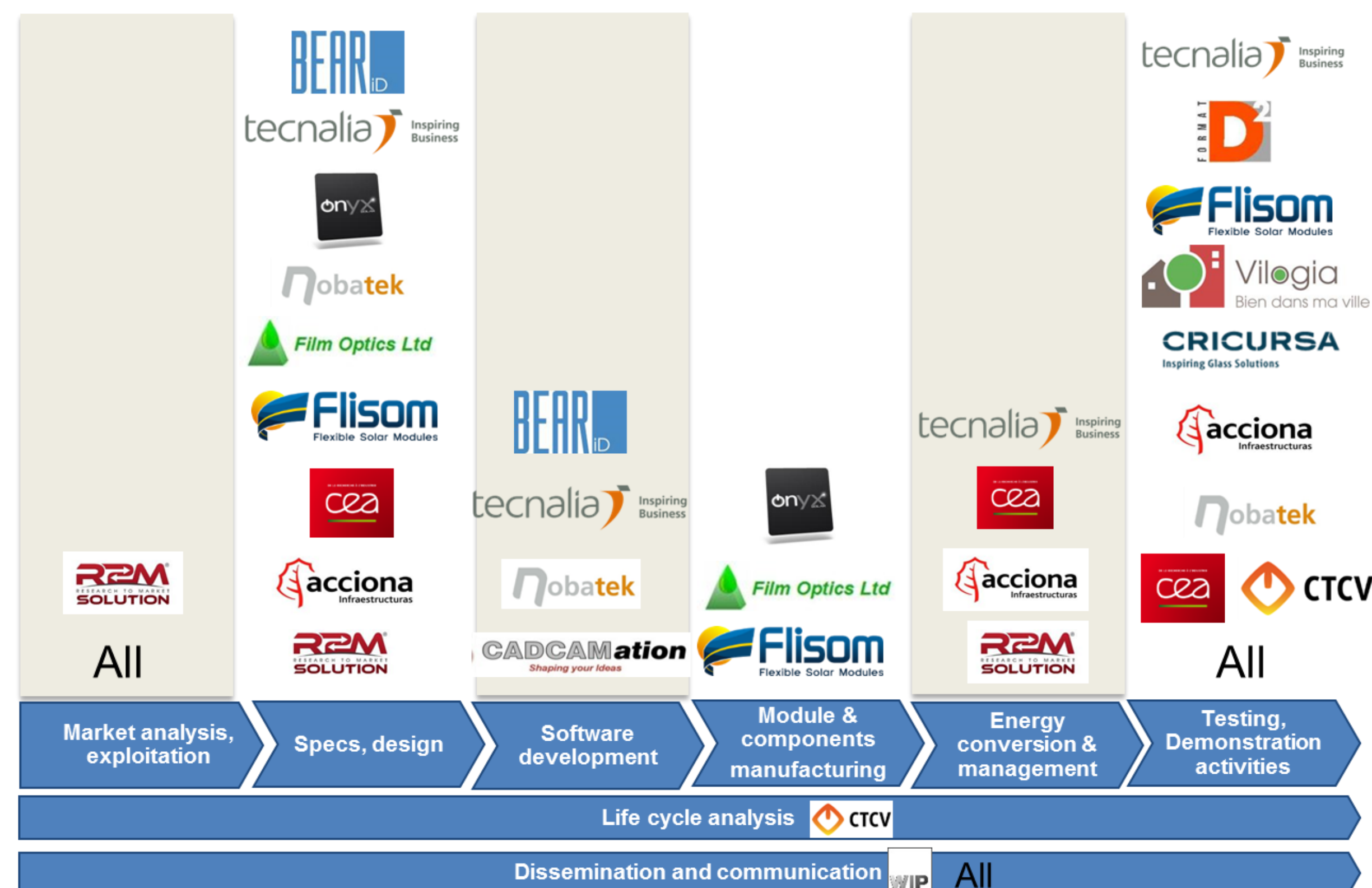
01/01/2016 – 30/06/2020

Coordinator: Tecnalia R&I

Website: www.pvsites.eu

15 partners

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



> Objectives & 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 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

> Challenge 1

Enhanced flexibility of design, outstanding aesthetical value, multifunctionality and increased performance



> Solution 1

A wide portfolio of BIPV products based on c-Si and CIGS technologies complying with market requests

CIGS on metal BIPV modules (FLISOM), developed in PVSITES

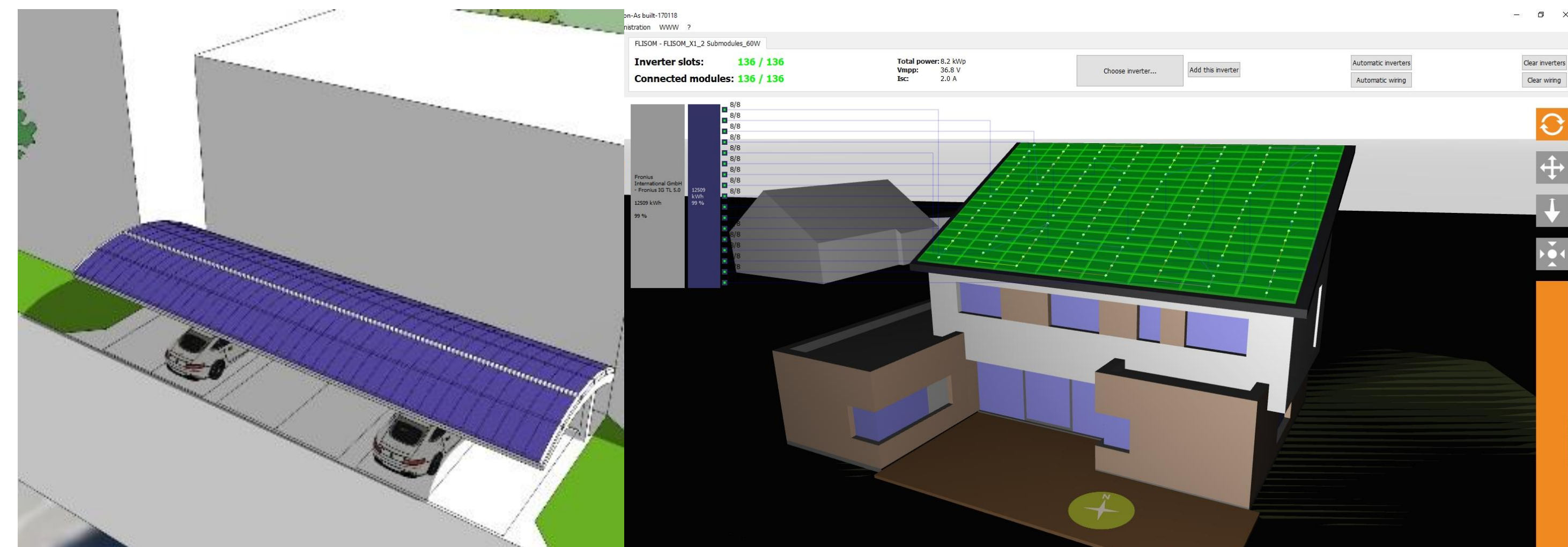
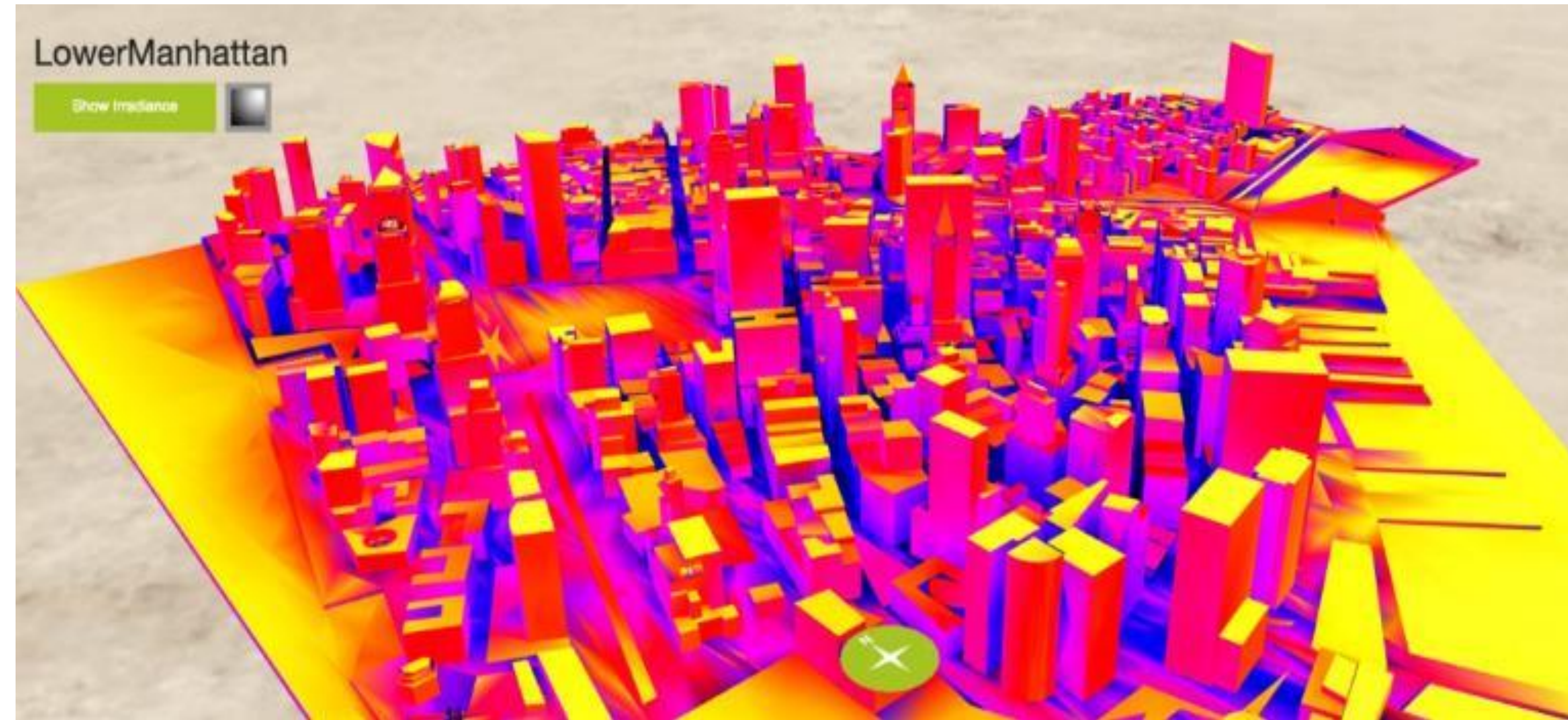


> Challenge 2

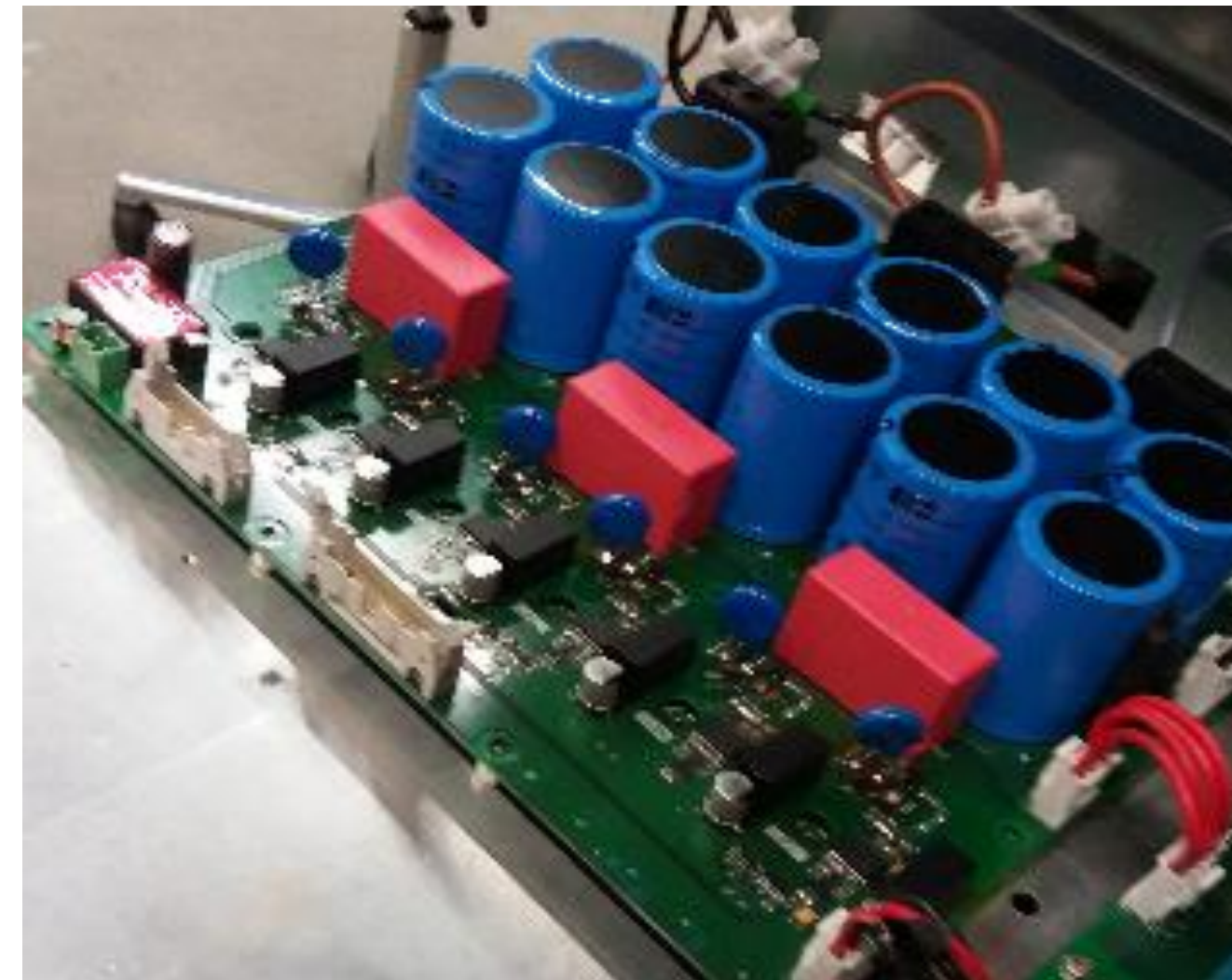
Software tool for the joint simulation of BIPV products and building energy performance

> Solution 2

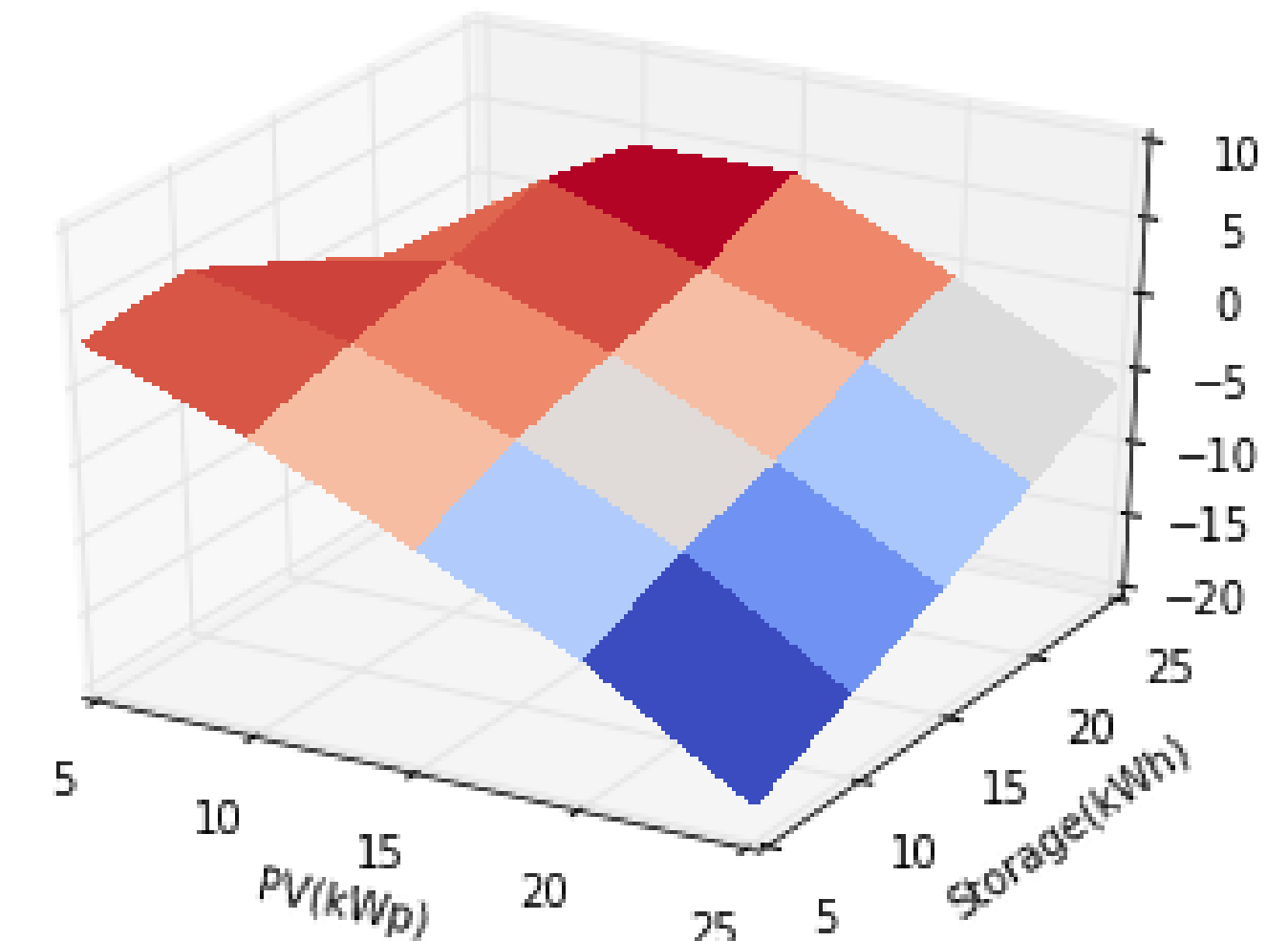
An accurate, user-friendly, integrated SW tool for the simulation of BIPV products performance and their impact on building energy demands



DC:AC converter TECNALIA



Planner tool TECNALIA

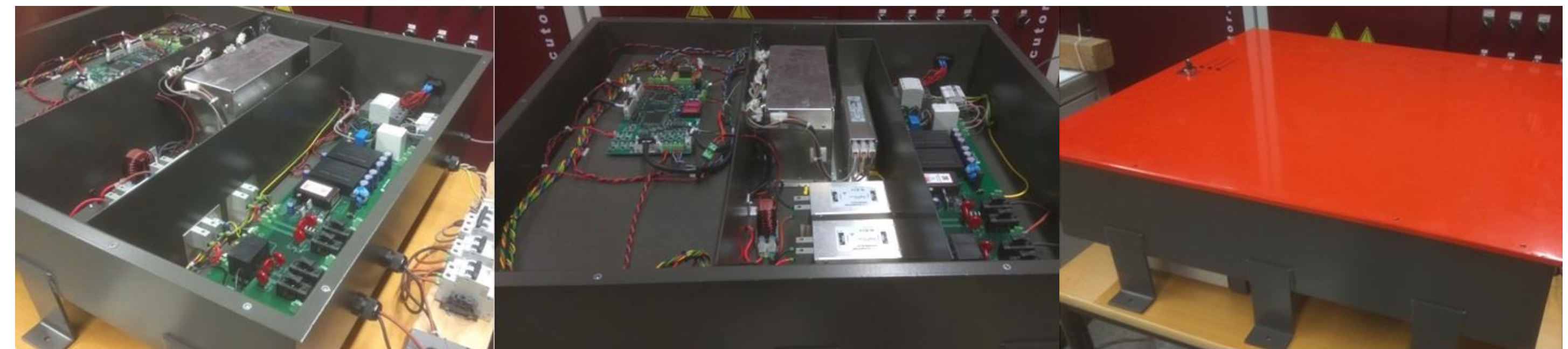


> Challenge 3

More predictable, manageable, grid-friendly and profitable BIPV generation

> Solution 3

A combination of flexible and high efficiency grid interface for BIPV systems and new building energy management strategies.



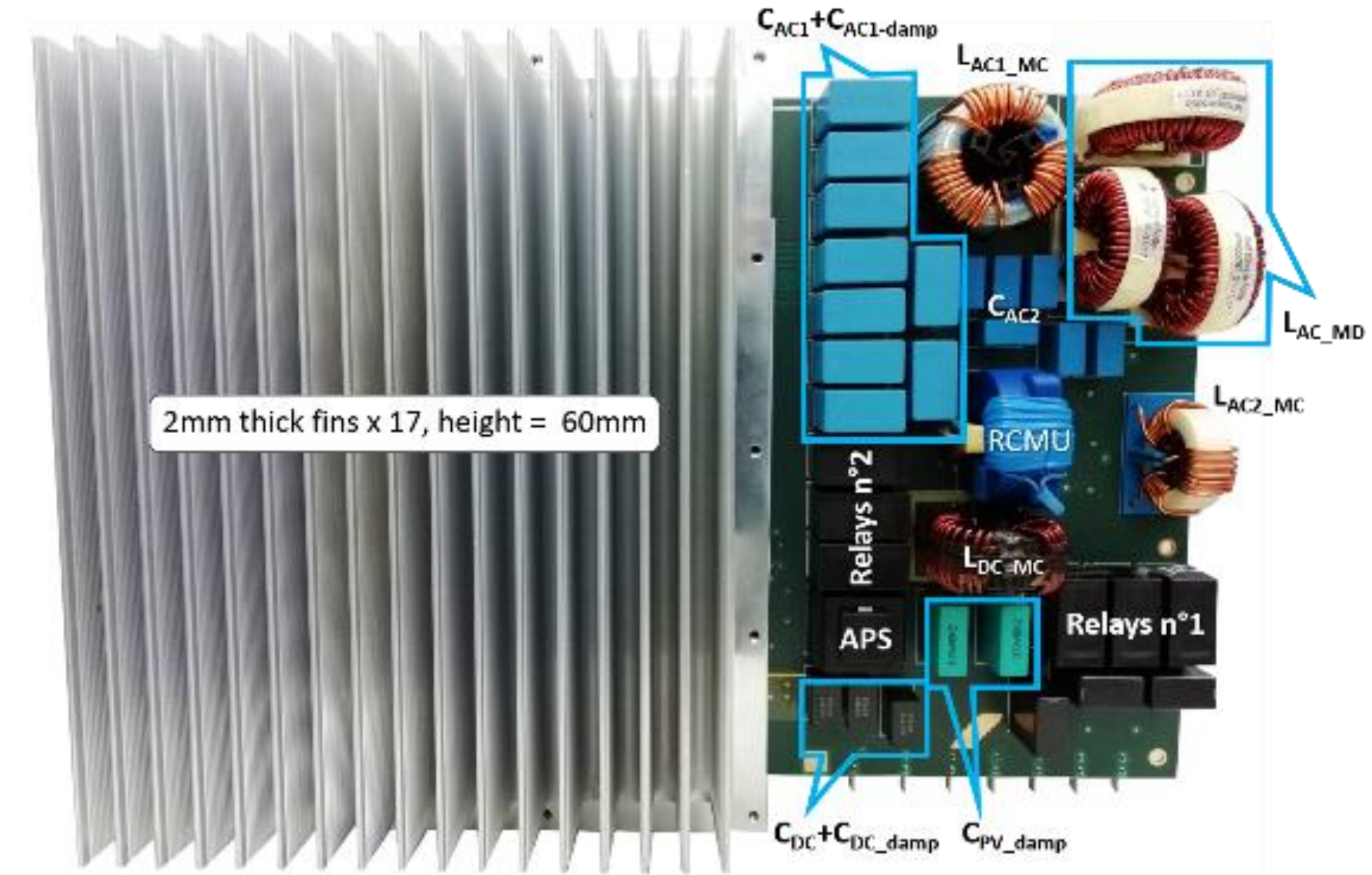
Grid interface using storage system with DC coupling TECNALIA

> Challenge 3

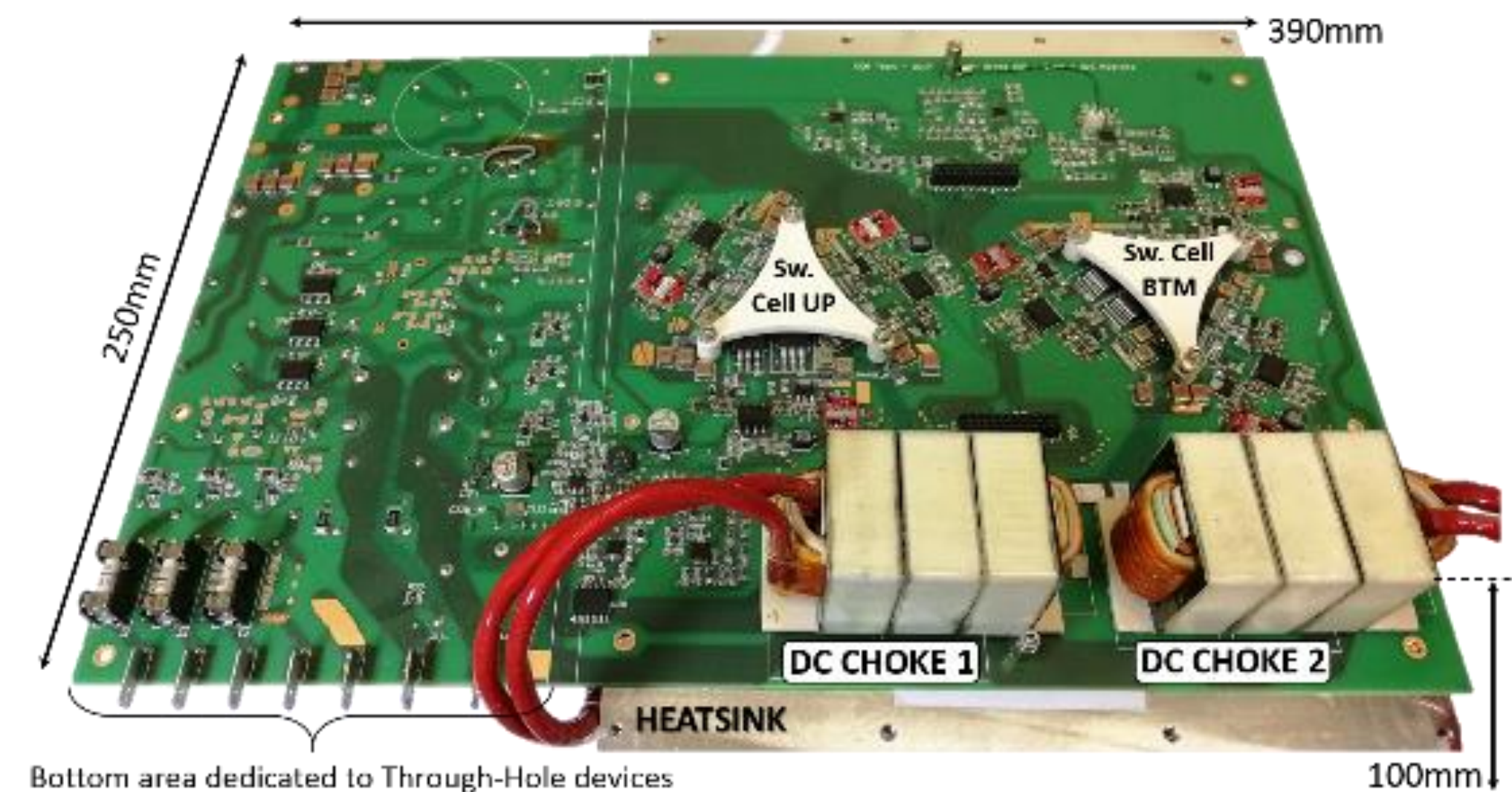
More predictable, manageable, grid-friendly and profitable BIPV generation

> Solution 3

A combination of flexible and high efficiency grid interface for BIPV systems and new building energy management strategies.



CEA's inverter printed circuit-board with surface-mounted electronic components



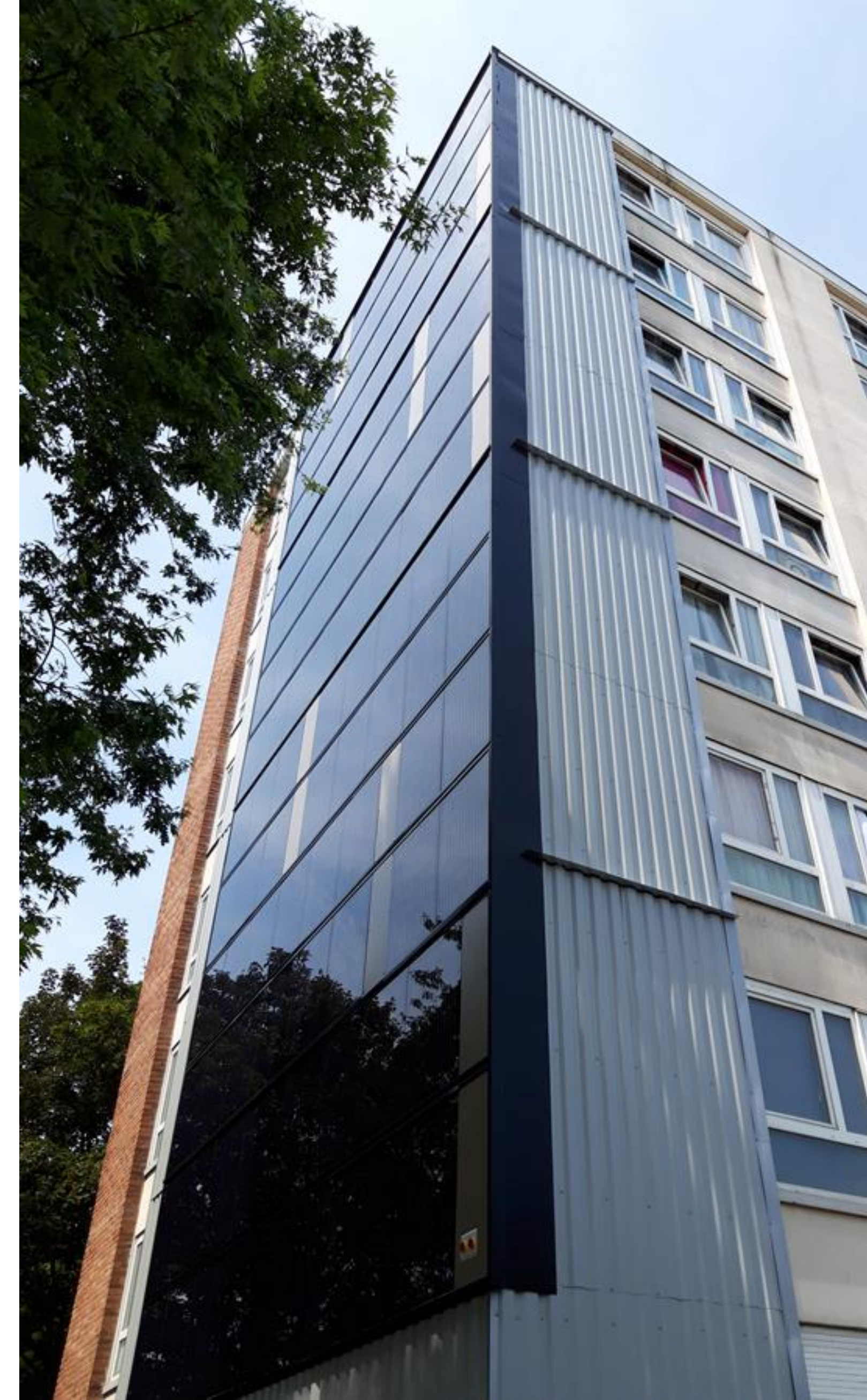
Roof, Stambruges (BE), residential



Carport, Zurich



Opaque facade, Wattignies (FR),

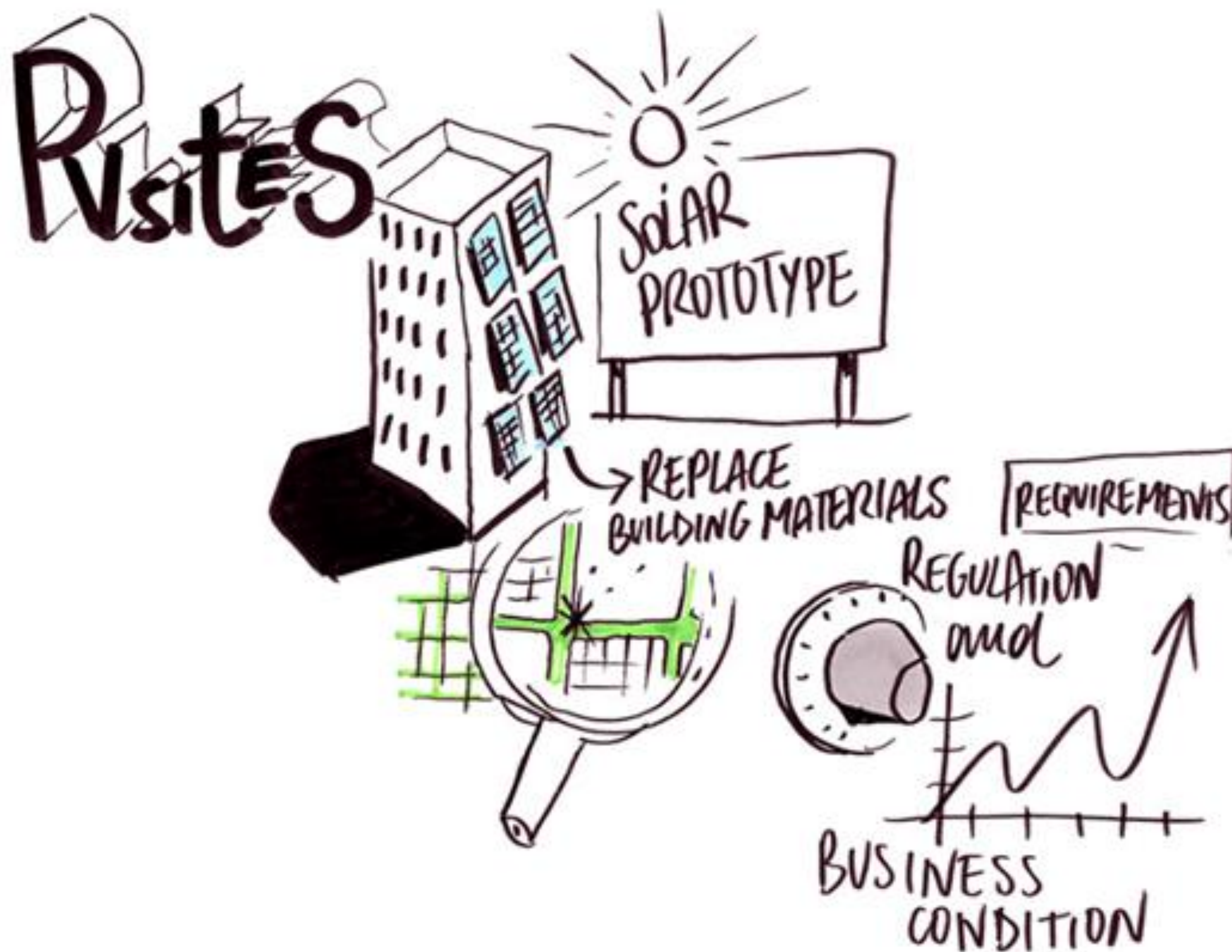


> Challenge 4

To demonstrate reliability of advanced BIPV solutions through effective incorporation onto real buildings

> Solution 4

High impact, replicable demonstrations and training activities in real buildings and experimental facilities throughout Europe



What is BIPV?

by Tjerk Reijenga

Architect: www.BEAR-iD.com, PVSITES project partner, The Netherlands

> What is BIPV?

Definition in EN 50583: “Photovoltaics in buildings -Part 1: BIPV modules”

“**Building integrated photovoltaics -BIPV**” form a building component providing a function as defined in the European Construction Product Directive (CPD 89/106/EEC). (The dismounting of PV modules leads to their replacement by an appropriate building component).”

Functions provided : mechanical rigidity or structural integrity - primary weather impact protection (rain, snow, wind, hail) - energy economy - shading, daylighting, thermal insulation – fire or noise protection - enclosure - security, shelter or safety.

> What is BIPV?

Definition in EN 50583: “Photovoltaics in buildings -Part 1: BIPV modules”

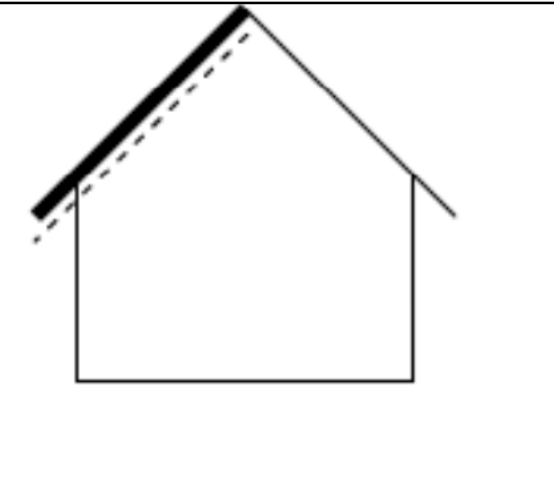

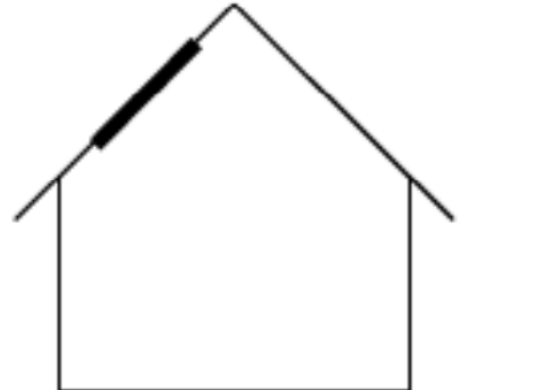

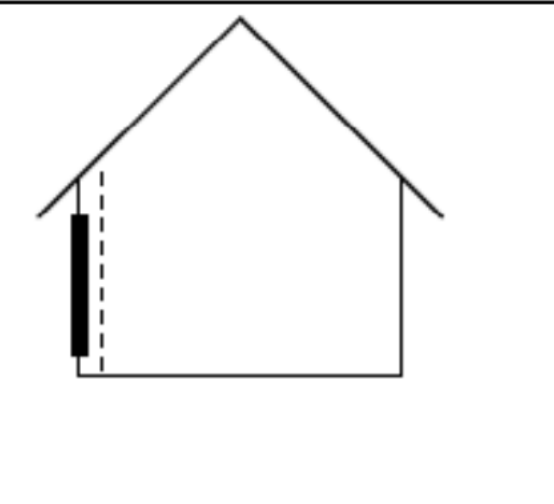

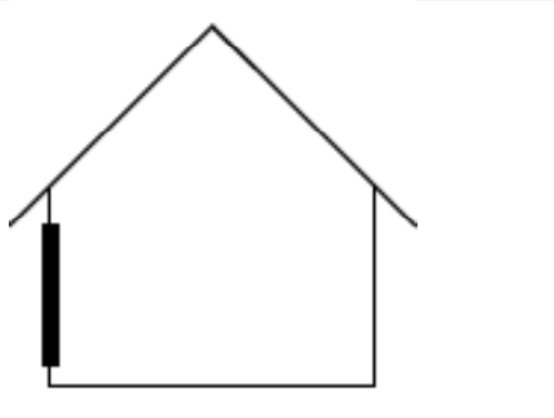
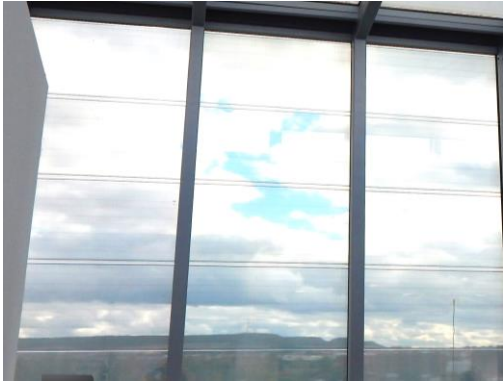
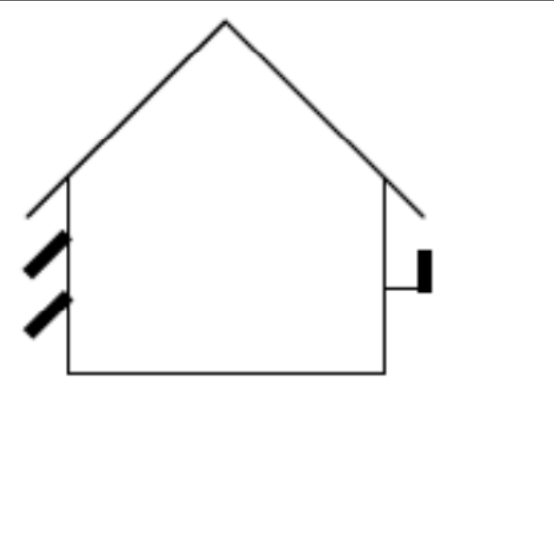

BIPV system, photovoltaic systems are considered to be building-integrated, if the PV modules they utilize fulfil the criteria for BIPV modules as defined in EN 50583-1 and thus form a construction product providing a function as defined in the European Construction Product Regulation CPR 305/2011.”

> What is BIPV?

Definition in EN 50583: “Photovoltaics in buildings - Part 1: BIPV modules”

“Building Attached Photovoltaic system –BAPV system. Photovoltaic systems are considered to be building attached, if the PV modules they utilize do not fulfil the criteria for BIPV modules as defined in EN 50583-1.”

> EN 50583 - Mounting categories

Category A: Sloping, roof-integrated, not accessible from within the building The BIPV modules are installed at a tilt angle between 0° and 75° including horizontal (see Fig.1), with another building product installed underneath.		
Category B: Sloping, roof-integrated, accessible from within the building The BIPV modules are installed at a tilt angle between 0° and 75° including horizontal (see Fig.1).		
Category C: Non-sloping (vertically) envelope-integrated, not accessible from within the building The BIPV modules are installed at a tilt angle between and including both 75° and 90° (see Fig. 1) with another building product installed behind.		
Category D: Non-sloping (vertically), envelope-integrated, accessible from within the building The BIPV modules are installed at a tilt angle between and including both 75° and 90° (see Fig. 1).		
Category E: Externally-integrated, accessible or not accessible from within the building The BIPV modules are installed to form an additional functional layer (as defined in 3.1) exterior to its envelope (e.g. balcon y balustrades, shutters, awnings, louvers, brise soleil etc.).		

> Development of standards

Project/ Standard	2012	2013	2014	2015	2016	2017	2018	2019
ISO 18178	NP			DIS: approved	FDIS: disapproved	NP: Proposed as TS	TS: Issued	
EN 50583 -1 & 2					Issued			
IEC 62980			NP	CD				
Old IEC 63092					NP		Consolidated as IEC 63092	
New IEC 63092 -1 & 2						NP		IS: Planned

> Why is BIPV so important?



PVsites



vilogia

- ‘**Sustainable -Green -Smart**’ Building becomes more and more important **vs climate changes?**
- There is a fast developing trend of **Net Zero Buildings** (USA) or **Nearly Zero Energy Buildings** (EU)
- **Locally produced energy is in almost every case Photo-Voltaic energy**
- We want to invest in buildings that have a **future**
- In difficult economic times “**well designed**” buildings keep the value



BIPV



BAPV

Solar City Freiburg - Germany






5 MW City of the Sun
Heerhugowaard – The Netherlands

Carbon Neutral offices Vale Gard - Sweden



A photograph of a red brick house with a blue pitched roof. The house has several windows, some with dark frames. The sky is blue with white clouds. The text "Watertight system/ Invisible profiles" is overlaid on the roof area.

Watertight system/
Invisible profiles

Pitched roof Mons - Belgium



Pitched roof
transparent – Spain (Onyx)

Glass cladding wall –Bolzano - Italy





Cladding system -Slagelse- Denmark



Building components



Building components





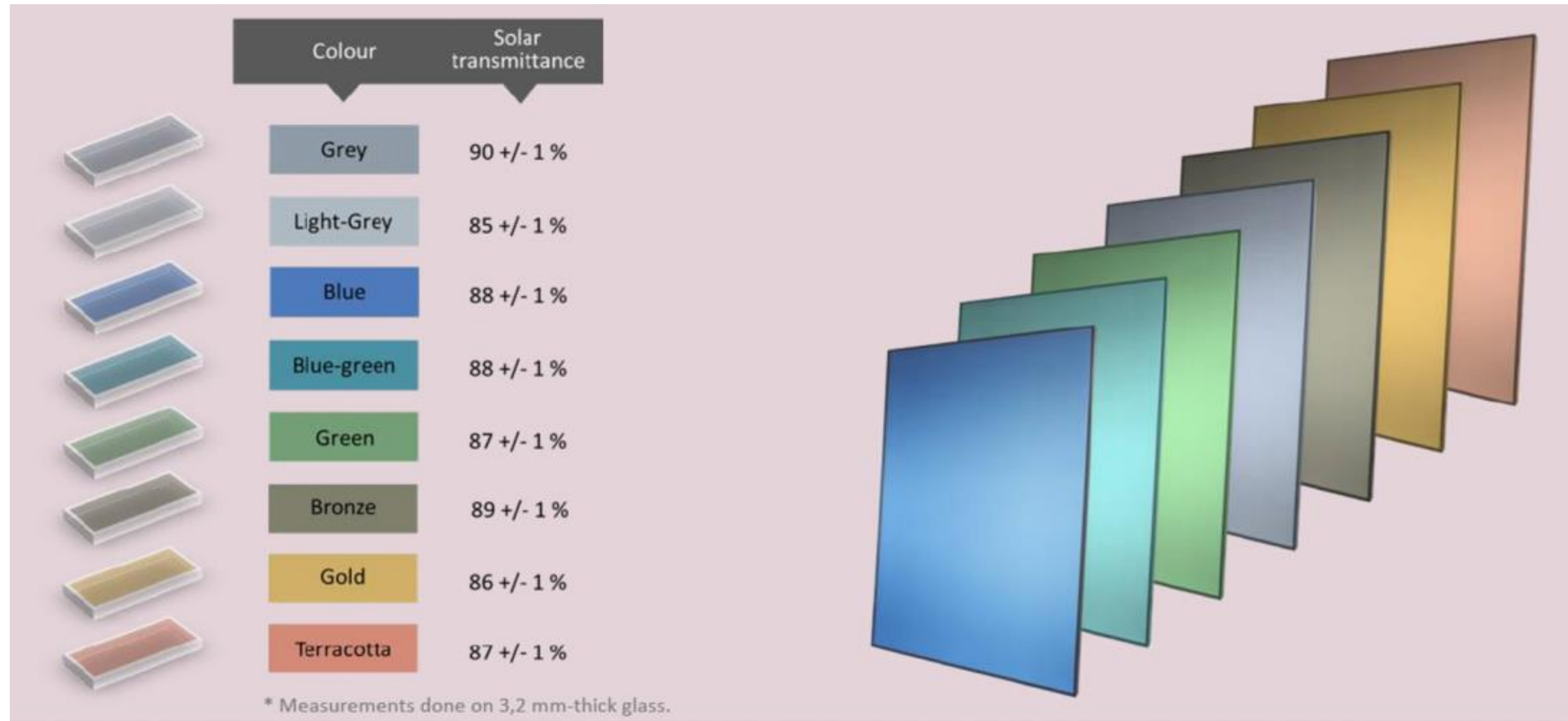
Building components



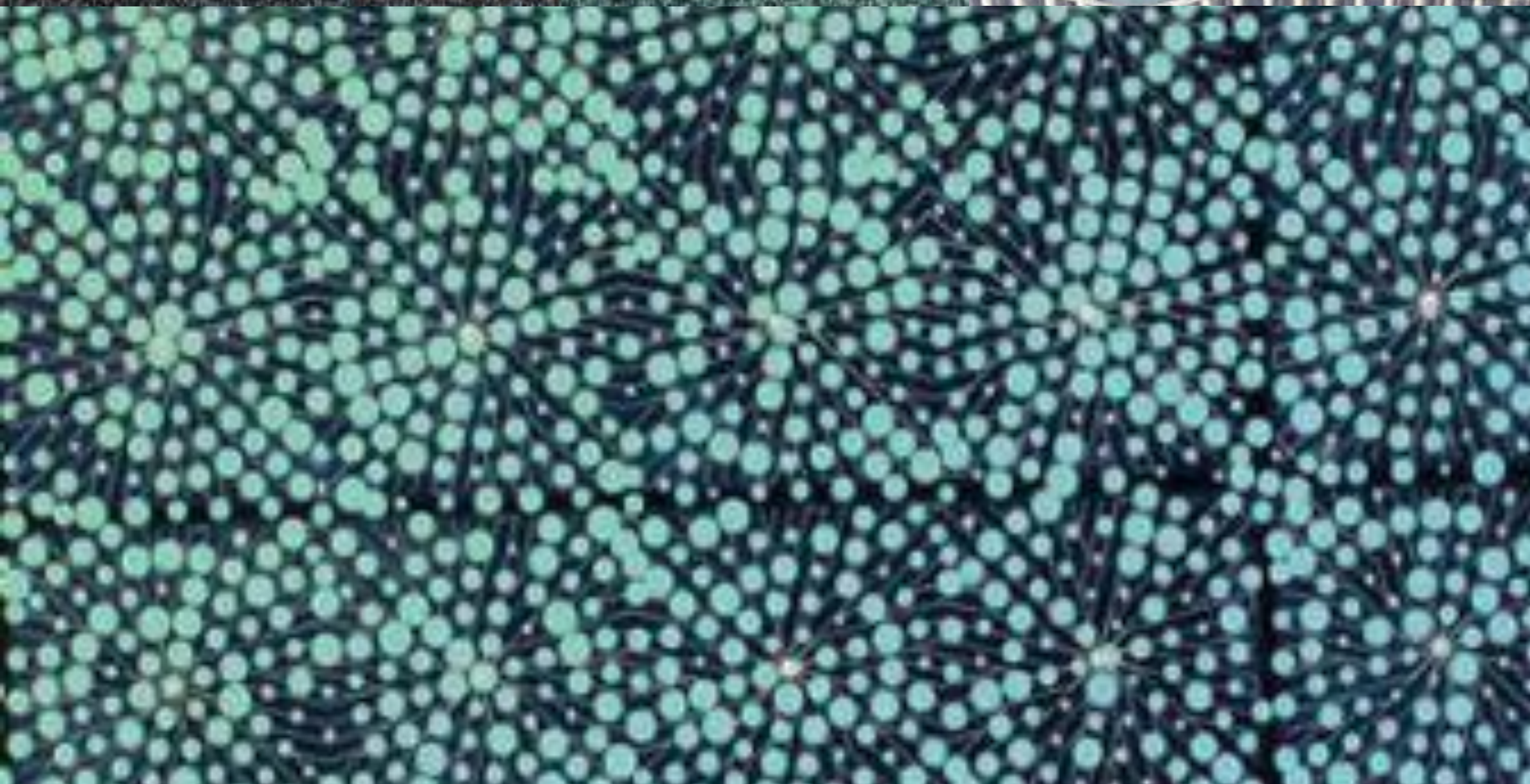
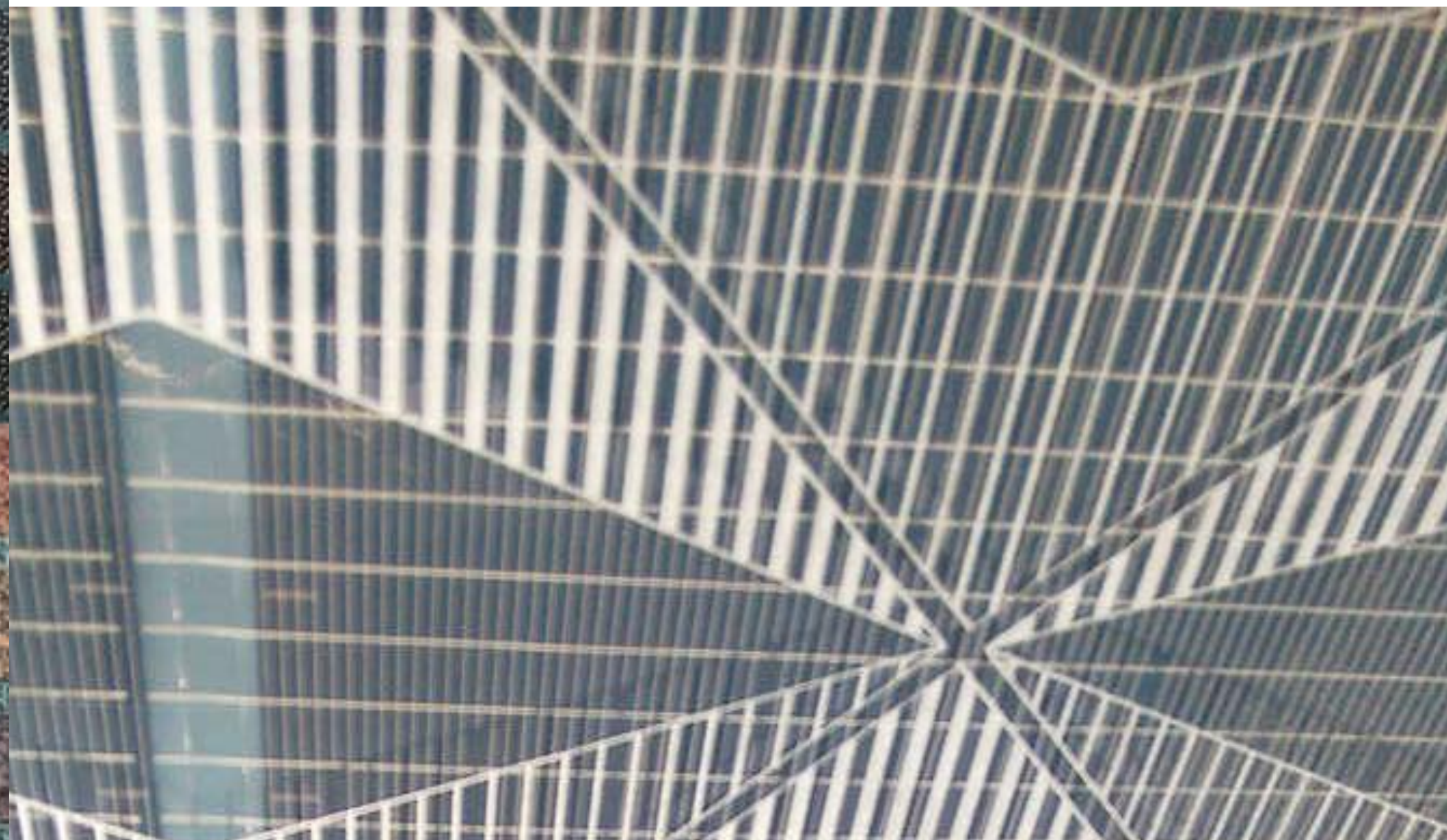
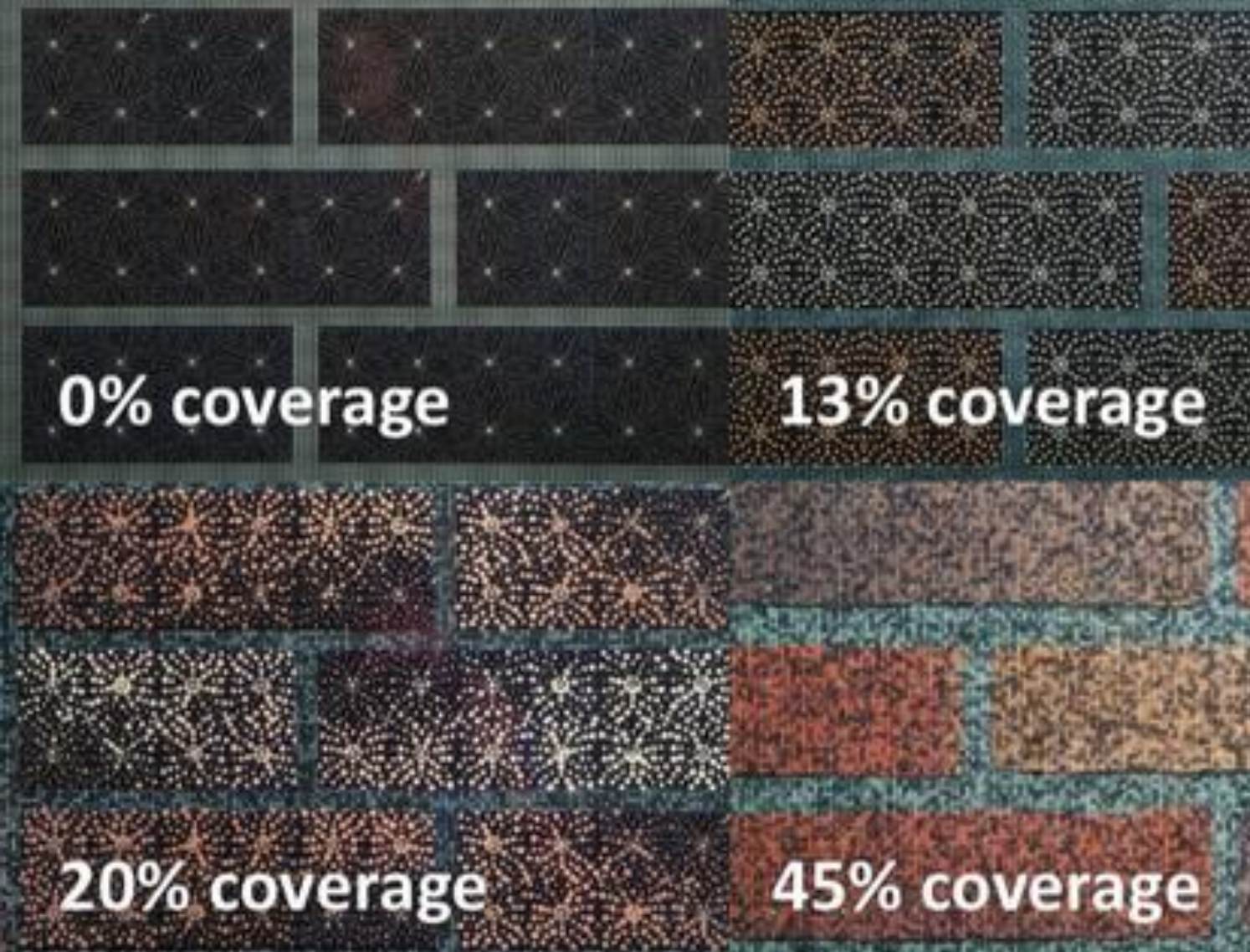
Recent developments



Recent developments



Recent developments



Recent developments



Recent developments



we have already BAPV and BIPV but
now we get BHPV ...
Building Hidden Photo-Voltaics



Building **Hidden Photo-Voltaics**
Onyx



Building Hidden Photo-Voltaics



**Building Hidden Photo-Voltaics
WHITE Solar
(Solaxess)
Switzerland**





Costs

	Regular cladding	Solar cladding
Investment	€ 300/m ²	€ 550/m ²
Lifecycle	20 years	20 years
Cost a year	€ 15/m ²	€ 27,5/m ²
Energy production	0 kWh	100 kWh
Energy profit	€ 0/year	> € 35/year
Energy profit 20 years	€ 0	> € 700
Total cost 20 years	- € 300/m ²	> € 150/m ²



> Conclusions:

- The development of PV systems in building goes on
- The cost are decreasing. Competitive with other cladding
- We have to think about the holistic design
- We have to think about (aesthetically) well integrated Photo-Voltaics in order to add value to the building and to keep that value

THE PRODUCTS

PVSITES Software



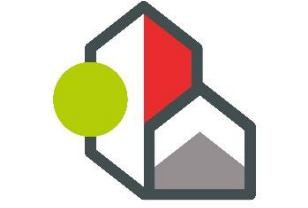
by Philippe ALAMY

CADCAMation, PVSITES project partner, Switzerland

- > What is PVSITES sw,
based on BIMsolar[®]?
What is the role of CADCAMation?



> PVSITES software The movie



PVSITES demos

PVSITES Demo-systems

by Jorge Escribano Troncoso

ACCIONA CONSTRUCTION, PVSITES project partner (Spain)

> PVSITES demonstrators



> 1. Educational Building - Geneva



Demo-system:

BIPV ventilated facade system integrated in two brick masonry facades.

Orientations: -80° (E) / $+100^{\circ}$ (W).

Inclinations: 90° / 90° .

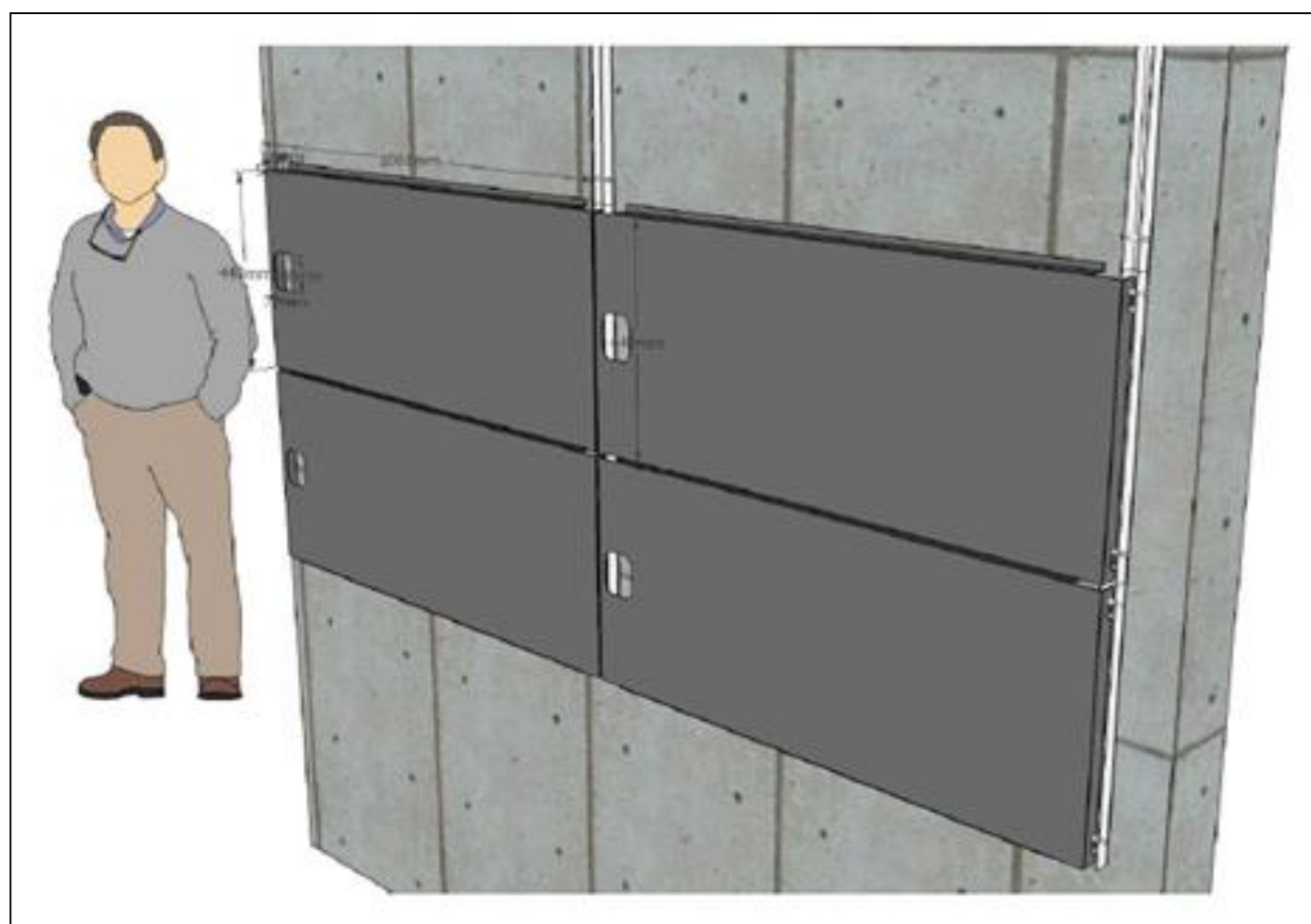
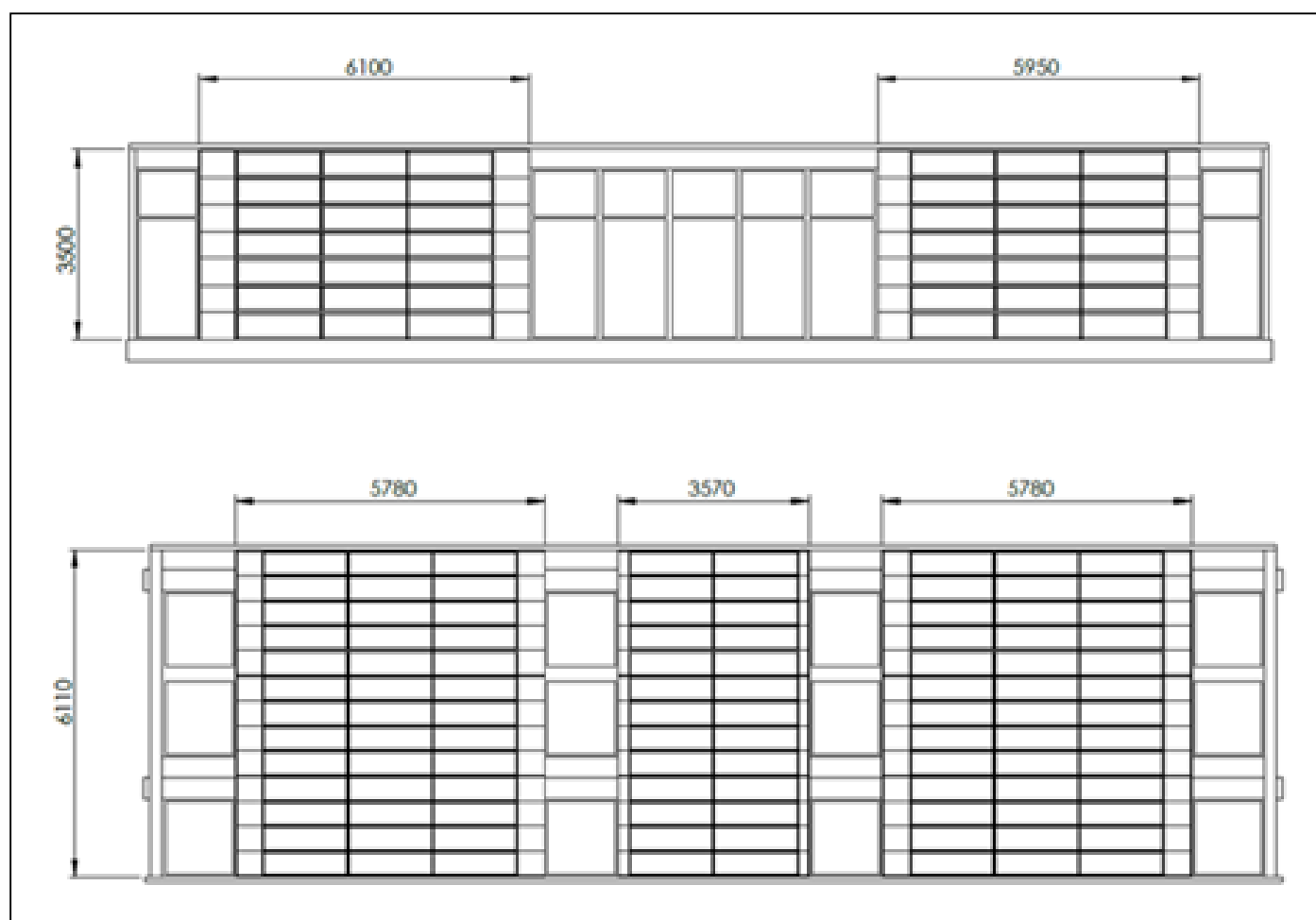
BIPV ventilated facade panel by FLISOM:

Semi-flexible and lightweight solar panel, based on CIGS photovoltaic technology laminated on a black aluminium backsheet.

System implementation:

- Easy installation thanks to the bended edges designed to assembly modules each other and to the mounting structure. Screws were located between the bricks, for not damaging the facade.
- Difficult negotiation and permitting process with the demo property and the municipality. High aesthetical requirements were requested.
- Some issues were more relevant than expected during the installation works, causing some delays: trees impeding the access to the building facades, closing of the buildings area during summer holidays, noises emitted during the works, etc.

> Solar ventilated facade



> 2.Parkings- Zurich



Demo-system:

Solar carports installed at: EMPA (Swiss Federal Laboratories for Materials Science) & EKZ (regional electrical provider) facilities.
About 100 m² and 6 parking spots each.

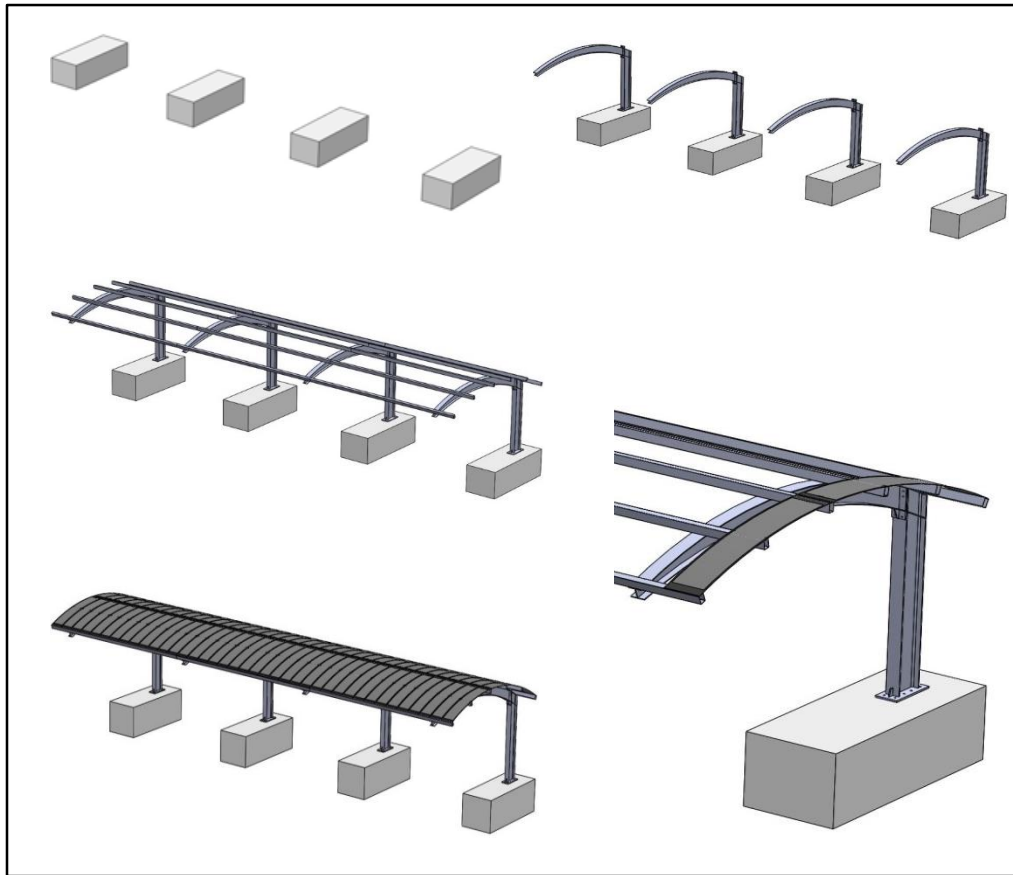
PV carport panel by FLISOM:

Flexible and lightweight solar panel, based on CIGS PV technology laminated on a black steel backsheet.

System implementation:

- Flexibility of modules allows them to adopt the curved shape of the carport roof. PV modules of two sizes were used in order to totally cover the curved surface and maximize performance.
- Solar carport components include: foundations, vertical pillars and stiffening profiles, where the PV modules are installed.
- Power generated will be used to cover the demand of an Electric Vehicle (EV) charging station.
- Mechanical and electrical works were carried out by the same installer, which was an advantage to achieve a success result.

> Solar Carports



> 3. Industrial Building - Granollers



PVsites



Demo-system:

Industrial roof of a glass factory.

Orientation: +2° (S).

Inclination: 6°.

Industrial roof module by FLISOM:

Large PV modules with CIGS PV cells laminated onto a steel sheet.

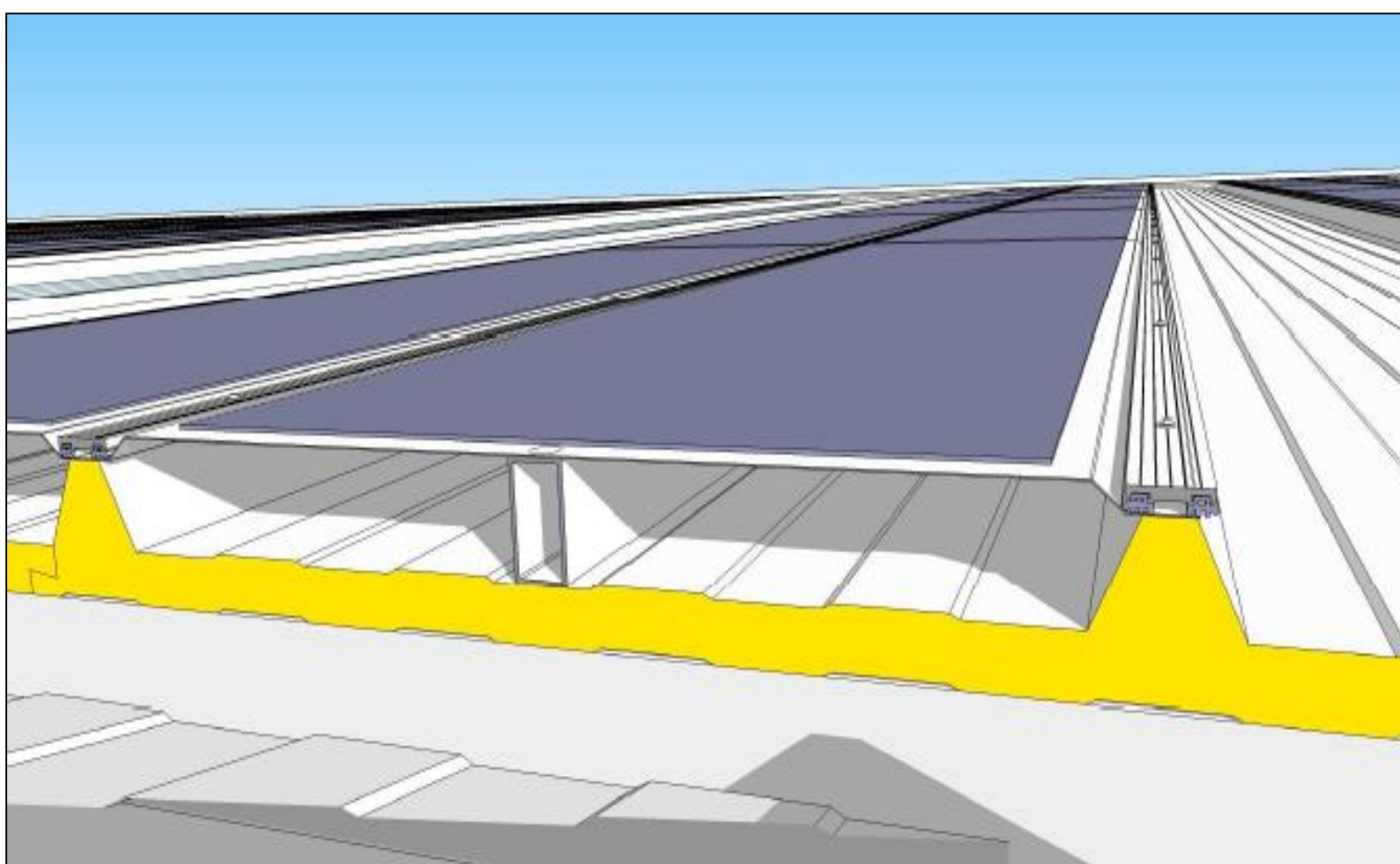
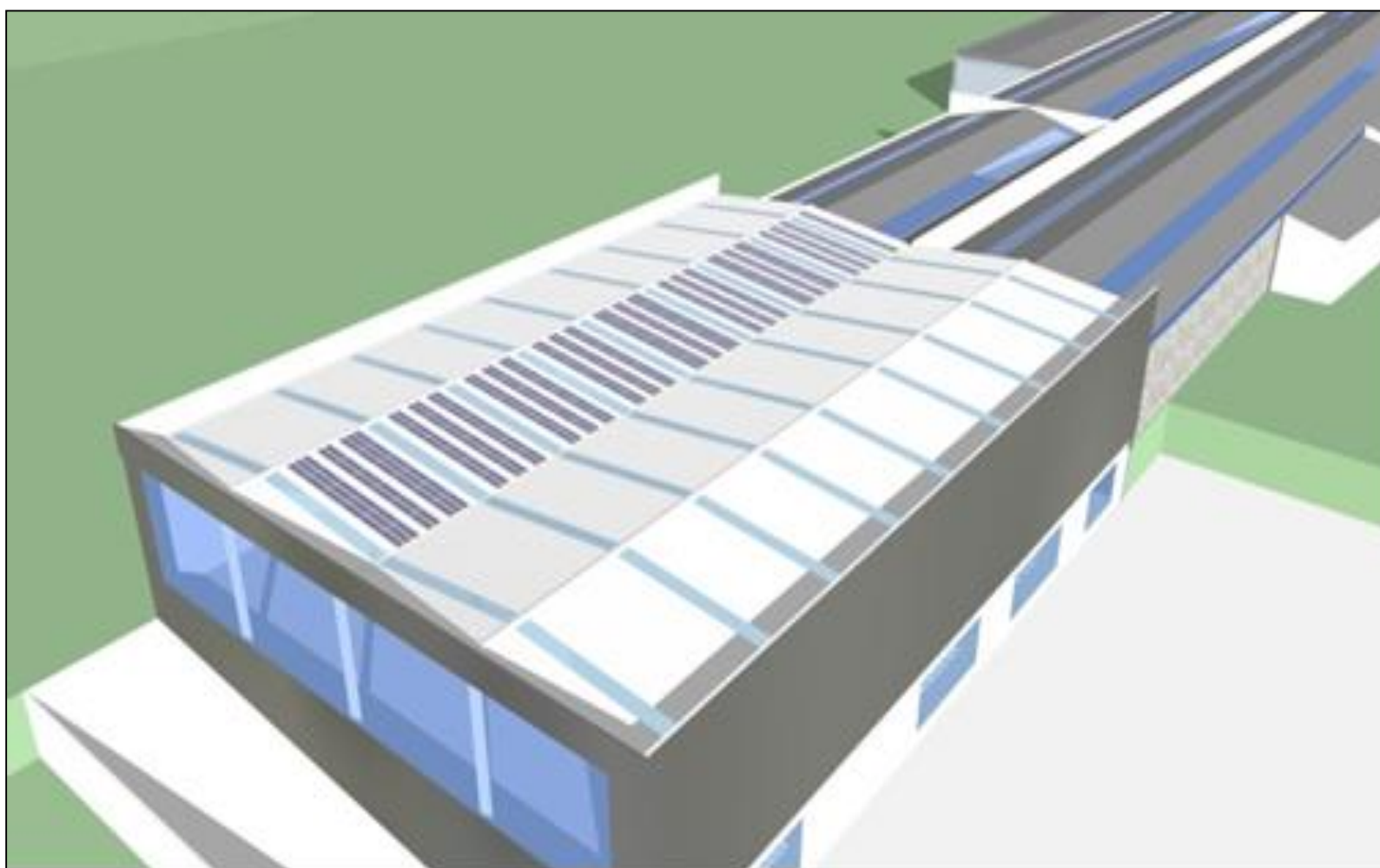
Solar inverter by CEA:

3-phase grid inverter based on silicon carbide, 5kW power.

System implementation:

- The industrial roof solar module was especially designed to enable assembly to the existing commercial sandwich panel.
- The metal sheet was bended and painted before printing and laminating the photovoltaic cells.
- The cavity between the BIPV modules and the sandwich panels works as an open air chamber for ventilation, improving the PV modules performance.
- System connected to the grid under the self-consumption modality.

> Solar industrial roof



> 4. Office building-San Sebastian



Demo-system:

BIPV transparent ventilated facade system integrated on an existing glass cladding.

Orientation: -1° to $+4^{\circ}$ (S) & -31° to -36° (SE).

Inclination: 90° .

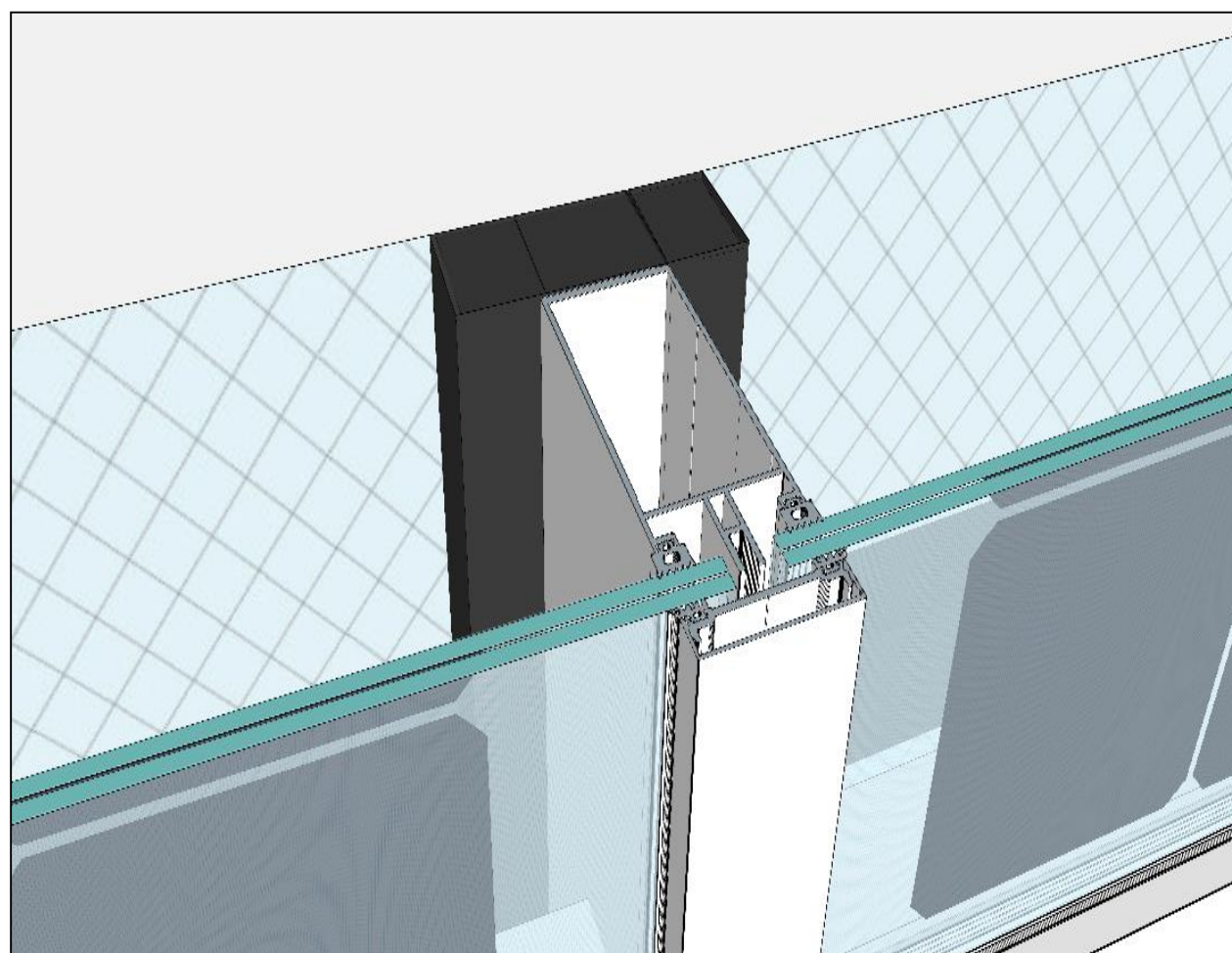
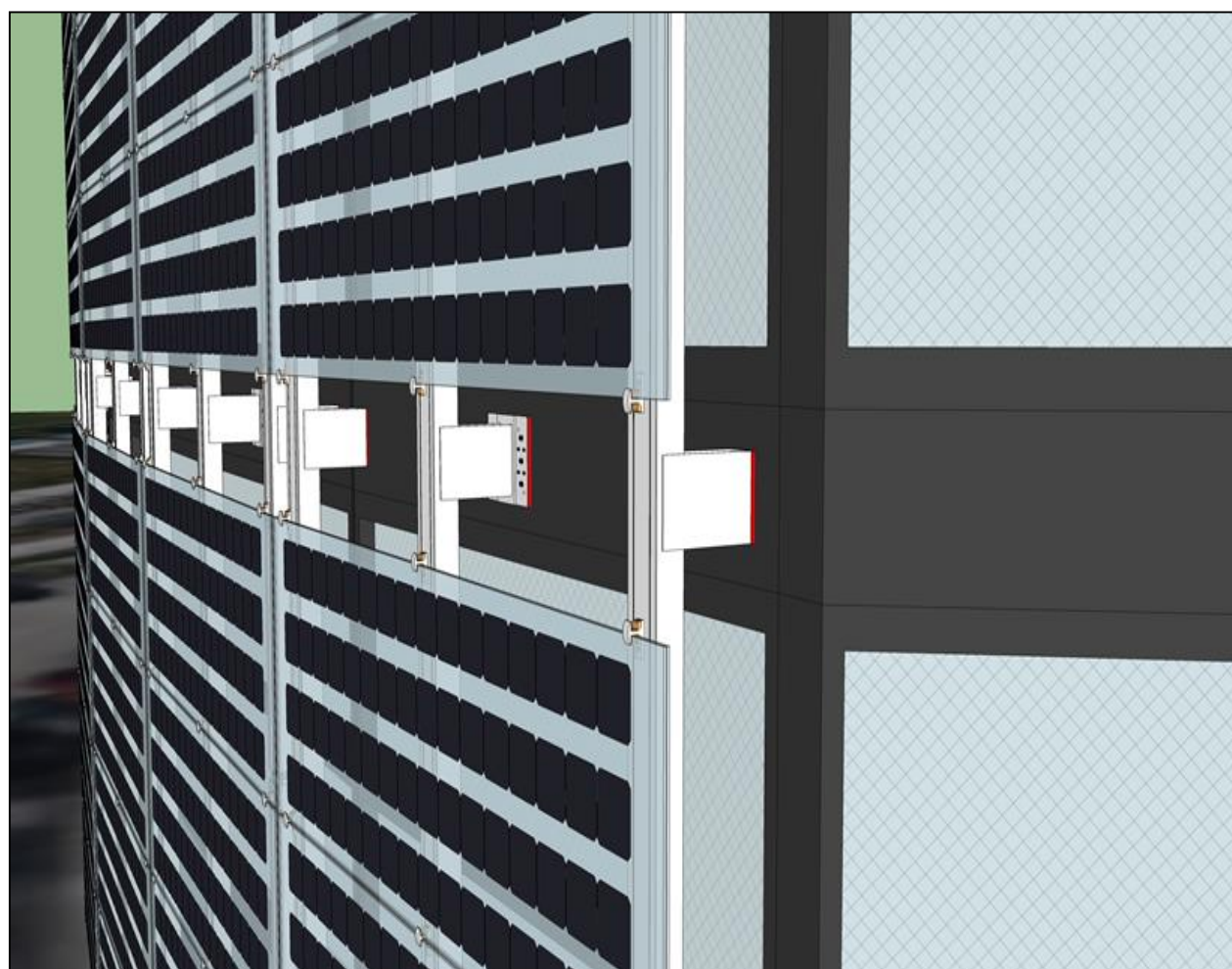
Back-contact C-Si cells transparent facade module by ONYX:

Back-contact crystalline Silicon cells PV module, for semi-transparent curtain walls and ventilated facades: 192 Wp power and 39% transparency.

System implementation:

- The geometrical design of the BIPV systems reproduces the existing curtain walls' one, with a high aesthetical final result.
- The BIPV systems works as a ventilated facade, since the original curtain walls were not removed.
- In order to make possible the ventilation of the PV modules, wide brackets were used to leave a ventilated cavity behind them.
- The systems works under the self-consumption modality without energy surplus injection to the grid, using a 'zero-injection device'.

> Solar transp. ventilated facade



Coffee break ☺

Belgian demo site

by Dominique Deramaix

FormatD2, PVSITES project partner, Belgium

> 5. Single family house

Location	Stambruges (Belgium)
Typology	Residential & office
Area	280 m ² (219 m ² heated floor)
Floors	3

Characteristics

New construction. Detached passive wooden house, located in a rural area, with residential and professional uses (architectural office).



Area available for BIPV

Single 30° sloped roof.
 Area of 107 m² available for BIPV systems.
 Small shadows caused by a chimney.
 Optimum orientation and inclination with maximum production guaranteed.
 Orientation: +14° (NNW).
 Inclination: 30°.

> Single family house



BIPV tile by FLISOM

Semi-flexible and lightweight CIGS PV element to be directly assembled to each other. Series connectivity enable to be carried out during the installation works, with hidden connection boxes and cables not disturbing fastening.



Solar inverter by TECNALIA

3-phase DC-coupled PV storage inverter 10 kW power, with advanced MPPT system, battery DC current/voltage regulation, and active and reactive current AC power regulation for grid-connected operation.

BIPV roof tile by FLISOM & Solar inverter by TECNALIA



Single family house

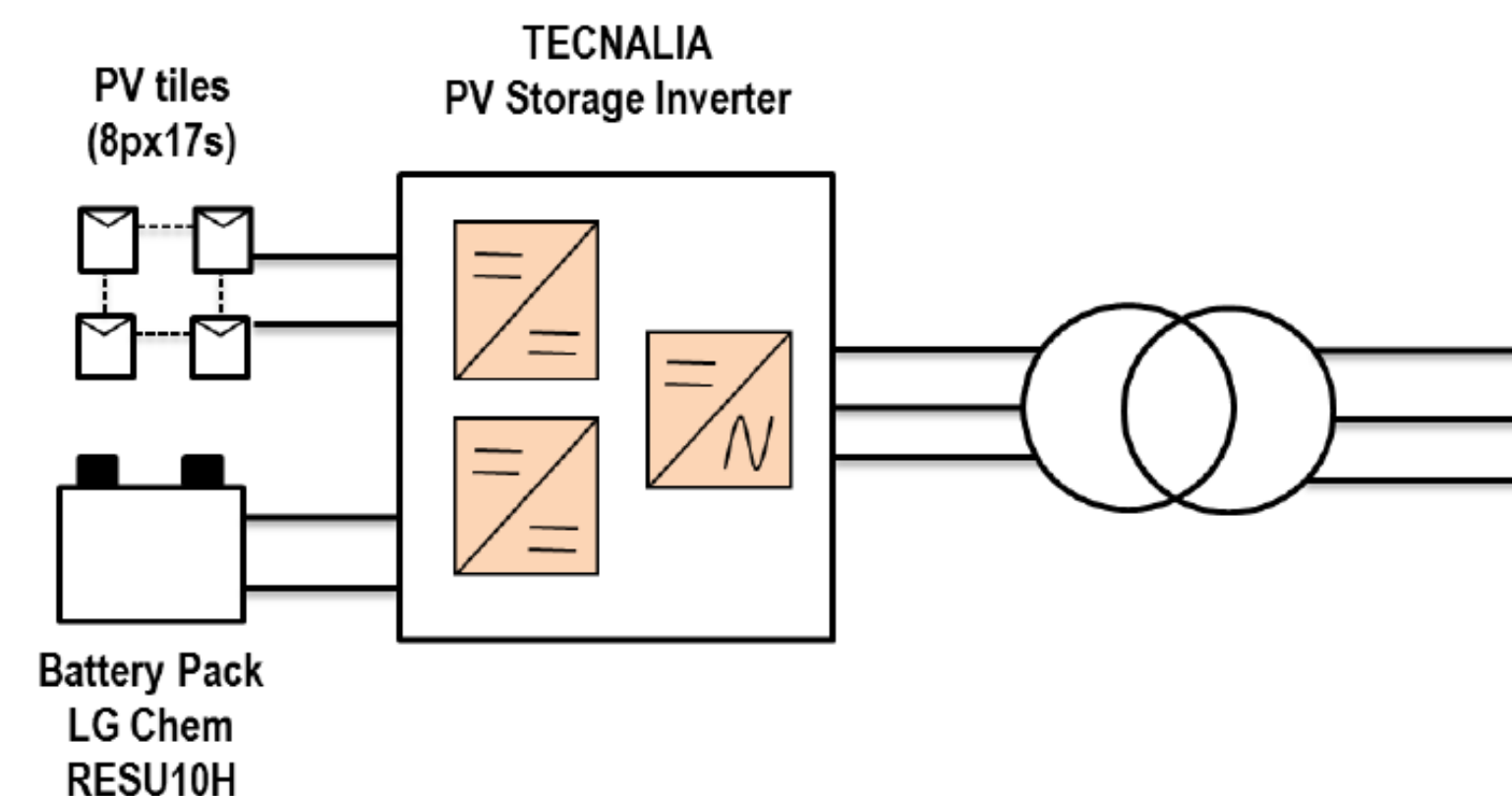
PV system 7.0 kWp

Solar field		
System power	8.7	kWp
Orient // Incln	+14° // 30°	(°)
Occupied area	100	m ²
No. modules	136	units
PV module		
Module power	64	Wp
Dimensions	465 x 1575	mm
Production		
Specific production	864	kWh/kWp/year
Estimated production	7517	kWh/year

Operation mode

Different operational possibilities, by means of both storing the energy produced and injecting it in the grid.

Electrical configuration for FD2 demo site:



- Size and shape: module dimensions chosen to guaranty a high aesthetical quality and make easy installation. and connection works.
- Joints and fixings: minimizing of joints and non-visible fixings for a better aesthetical quality, by means of the interlocking system for the assembly of the tiles each other: the bottom of the upper module connects with the top of the lower module by sliding the module up.
- Visual appearance: colour and material are close or compatible to those used in the building.
- Roof edges and rims: specially cared finishing for functional and aesthetical reasons.

> Single family house

BIPV solar roof



Installation process

- Taking off the tiles provisionally installed.
- Placing of a new underroof resisting more than 100 °C in case of overheating under the panels.
- Placing of the vertical and horizontal lathing, which allow ventilation in the higher air gap.
- Calculation and the previous placement of all the elements needed to install the tiles.
- Interconnection and installation of PV tiles and compressive bands on several finishing elements. Only 2 days were necessary to place the PV tiles.
- Strings connections and protections installation.

> Single family house

BIPV solar roof





Single family house

BIPV solar roof





Single family house



PVsites



vilogia

FormatD2 BIPV solar roof

- Permitting process was relatively easy, with short deadlines. Special aesthetic characteristics were required to get the construction allowance of the municipality. **35 calendar days were needed to have the agreement.**
- Finally, commissioning was executed as planned and on time. A storage system and a solar inverter by TECNALIA were installed.
- The use of the non-commercial inverter was accepted by the grid manager, by means of a special agreement. Once established all connections, **the installation must be controlled by an accredited body.**
- **Injection to the grid is currently permitted without being sold the surplus** (balance production/consumption) but from the 1st of January 2020, a tax for the kW reinjected into the grid must be paid.



Single family house



PVsites



vilogia

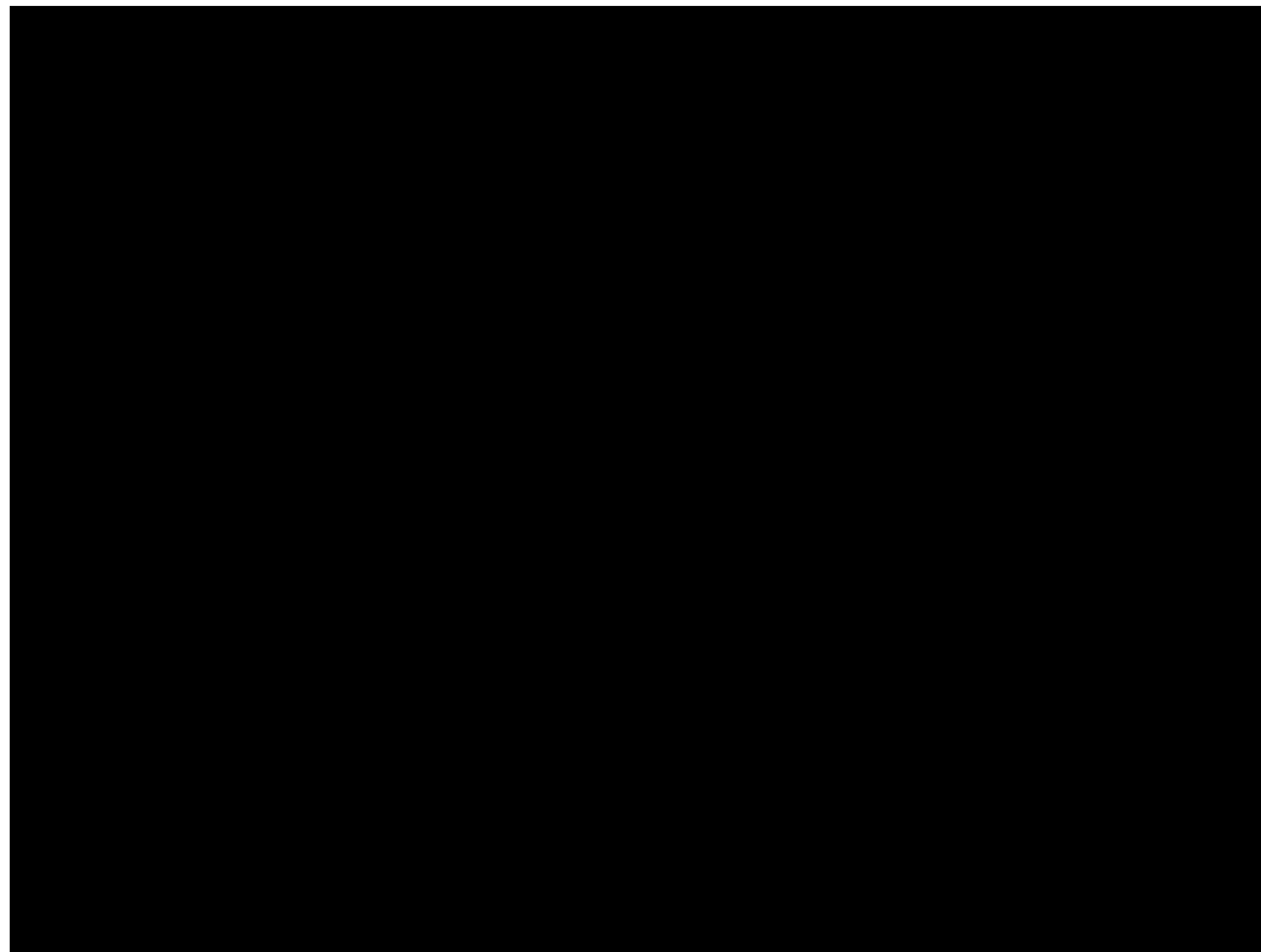
FormatD2 BIPV solar roof

- When mounting, **lost time to balance the power of the strings** due to difference of tiles power (50W, 55W, 60W, 65W).
- **Difference of color** between the cigs film on tiles (not due to difference of power) blue and black.
- Lost time to open the upper folding of the tile to permit assembly; **lots of details to finish perfectly the roof.**
- Placement of the electrical connector under the tile - **not enough spacing to the edges.**
- **Not enough possibilities to adjust the height of assembly of tiles.**
- **Only 1 out of 10 painted steel products is suitable for BIPV.** The solar norm of 1000 h 85°C at 85% relative humidity is too harsh for most painted steel substrates.
- Solar on steel is difficult with junction box on the backside. **Insulation of feed through is not trivial.**
- PVDF coated steel finally passed the test.



Belgium – FormatD2

single family house



PVsites



vilogia

https://www.youtube.com/watch?v=sgudsnLsmqY&feature=share&fbclid=IwAR2y77MgByVmRnI_GsW2xUAUKanUW89qrvl6oNc8NYIksFgDsrHMTr3KPv4

ONYX Solar – the product of Vilogia demo site

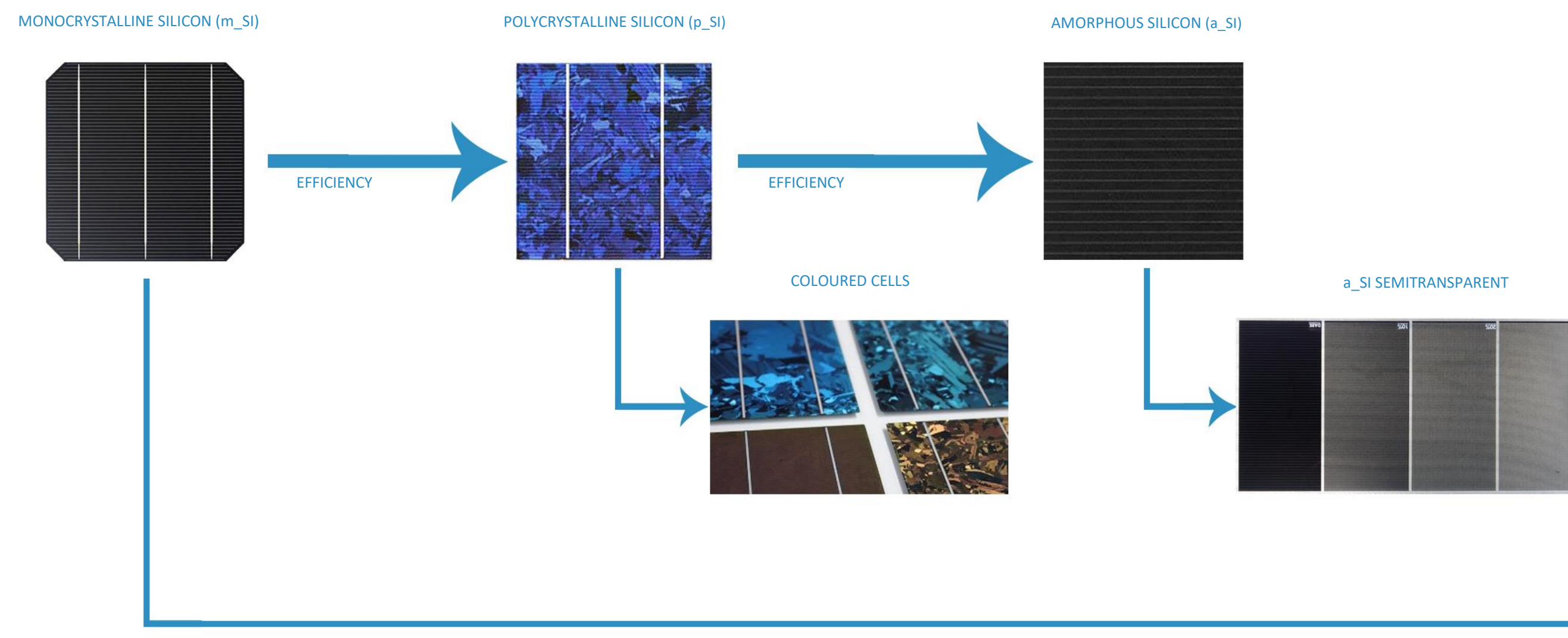
by Jose Jimenez

Onyx Solar Energy, PVSITES project partner, Spain



> Onyx-product

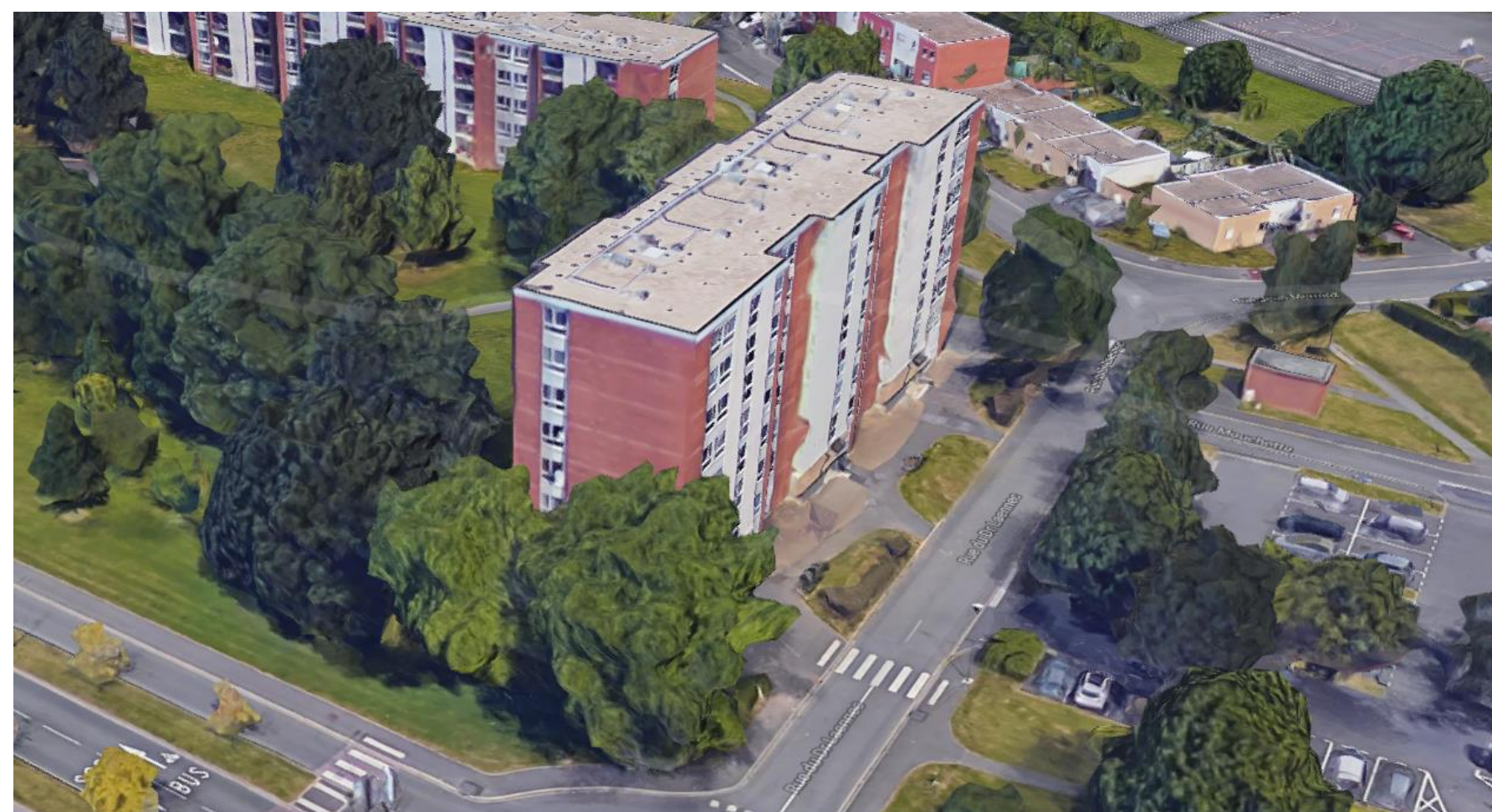
- The added value of the photovoltaic integration:
 - the electricity that the PV systems generate;
 - thermal insulation,
 - acoustic insulation;
 - solar control and an aesthetic finish among others
- The integration of photovoltaic installations in buildings (BIPV) consists in implementing photovoltaic constructive solutions **as if it were a conventional construction material**
- Onyx solar offers integration of solutions based on different photovoltaic technologies
It allow us to adapt the developments to the needs of the projects in which we participate



> Onyx-product

Wattignies demo site: implementation of a BIPV solution based on a ventilated facade with monocrystalline technology and hidden busbar (connections between the PV module cells)

The manufacturing process was launched after the signing of the manufacturing drawings that have been developed according to the BIPV solution designed for the project.



Proposal with horizontal (1700 x 1000 mm) or vertical modules (1000 x 1700 mm)



Proposal with horizontal modules (1700 x 1000 mm)

> Onyx- product Vilogia site



- **Surface:** 112 panels / 130m²
- **Installed power:** 17 kWc
- **Photovoltaic Power:** 153 WP/m²
- **Durability of the product:** up to 25 years
- **Maintainance:** Cleaning 2 x year / checking system connections / checking the structure
- **Weight:** 20-60kg/m²
- **Rigidity:** Rigid
- **Opacity:** Opaque

According to EN 50583 for modules and **BIPV systems**, they are **considered integrated in the building** if they constitute a construction product that fulfills a function (or several) as defined in the European Regulation of Construction Products CPR 305/2011:

ATTRIBUTABLE FUNCTIONS TO BIPV

- **Primary protection against climatic impacts:** rain, snow, wind, hail
- **Energy saving**, such as shading, natural lighting, thermal insulation.
- **Noise protection**
- **Separation between indoor and outdoor environments.**
- **Shelter or security.**

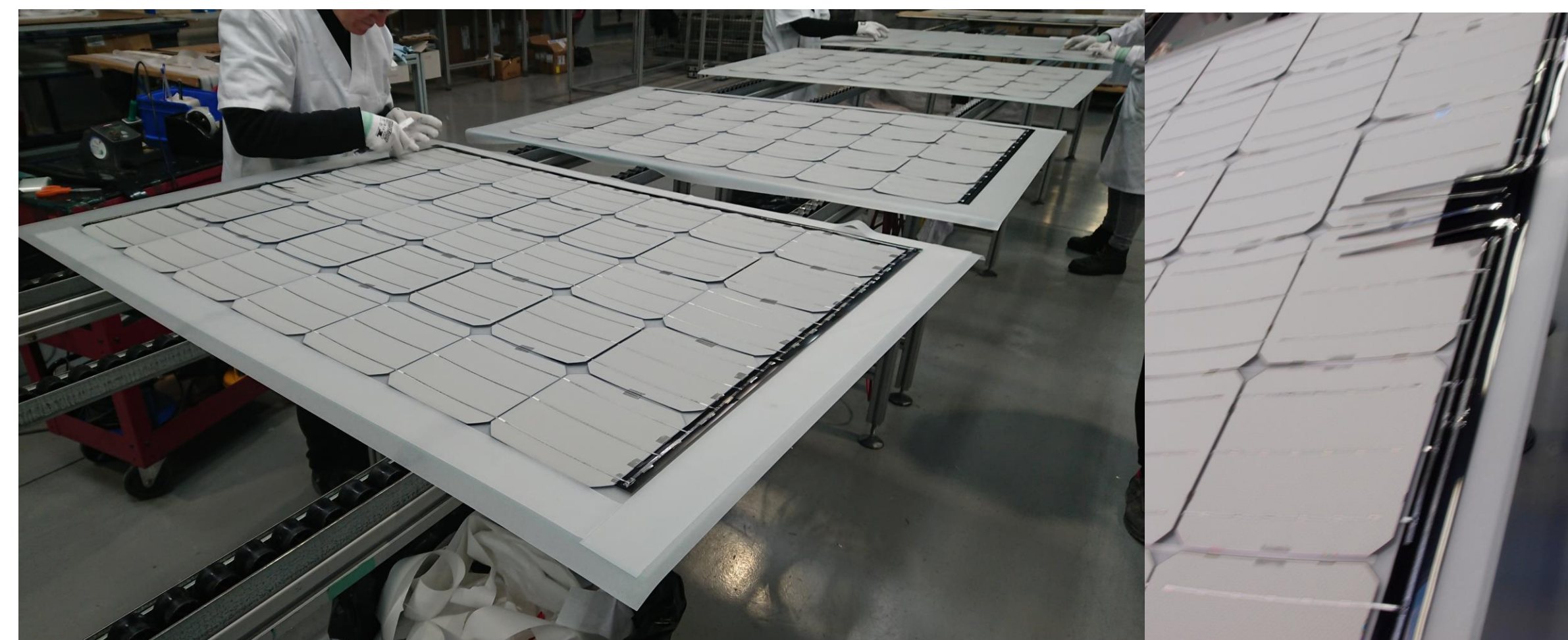
+ **Mechanical rigidity or structural integrity.**

+ **Fire protection**

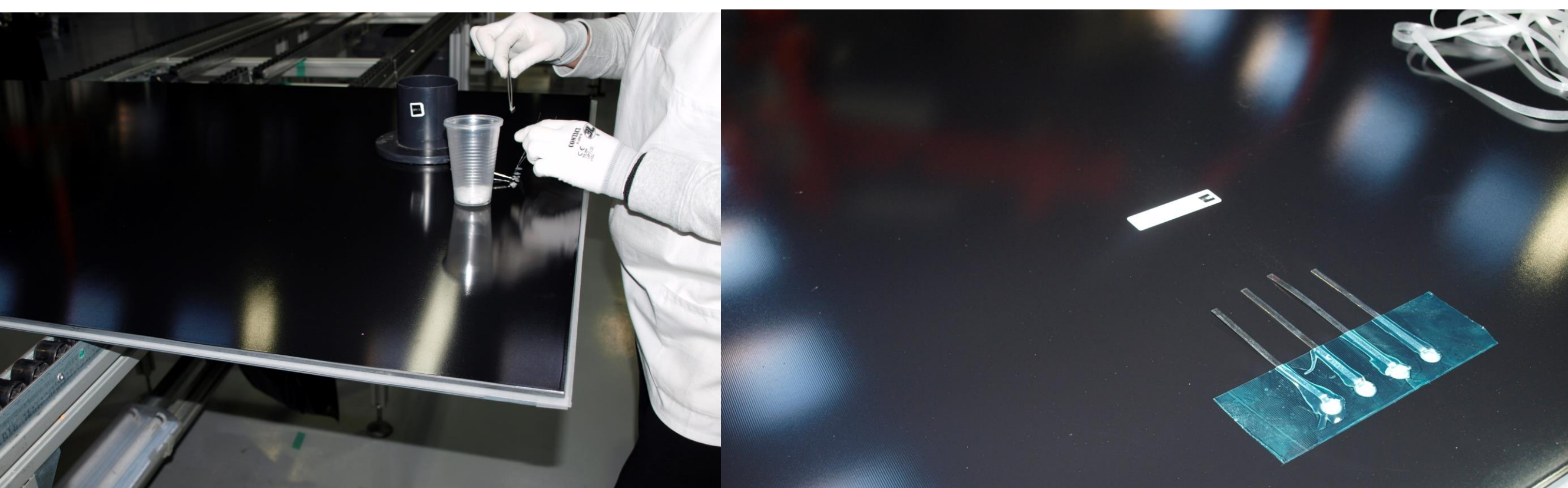
> Onyx- manufacturing



1. Classifying cells by power



2. Placing on a tempered glass + setting of interconnections

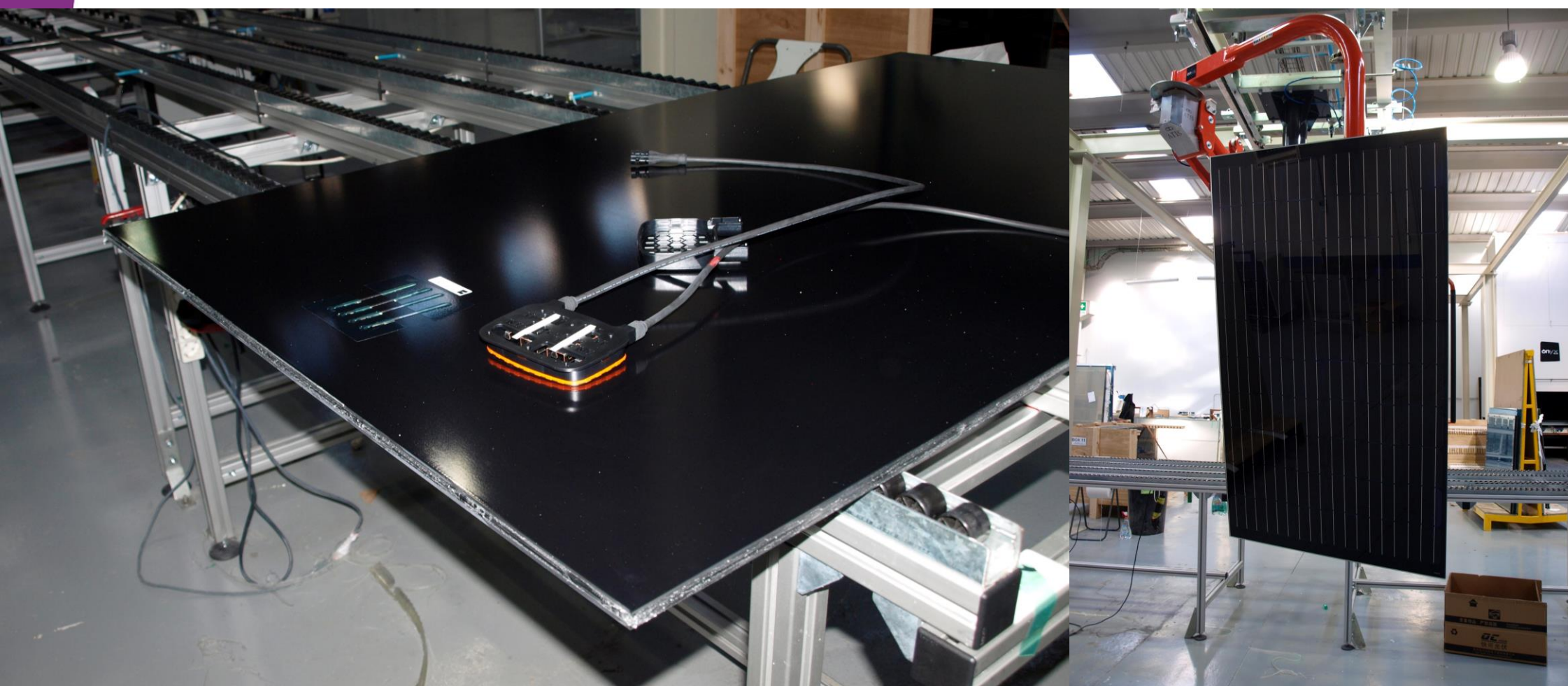


3. Extra EVA layer (Ethylene-vinyl acetate) + temper glass



4. Assembling and laminating

> Onyx- manufacturing

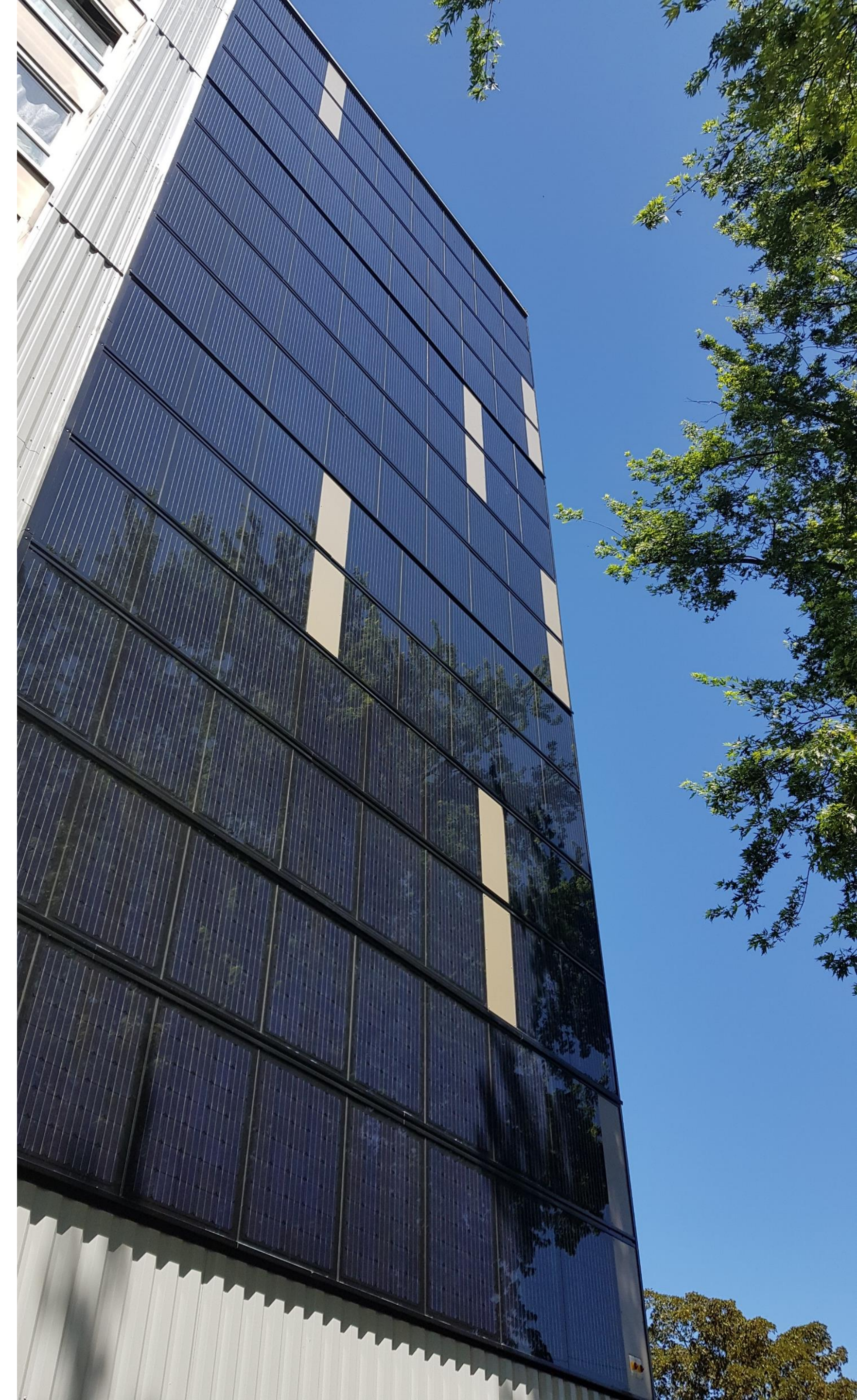


5. Junction box & positive and negative terminals placing



6. Checking, testing – transport to the project site

7. Final product



> Onyx- product Vilogia site



Tests carried out on the prototypes designed for the VILOGIA demosite:

IEC 61215-2:2017/AC:2018-04: terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures.

ISO 12543-4:2011: Glass in building - Laminated glass and laminated safety glass - Part 4: Test methods for durability (ISO 12543-4:2011).

EN 410:2011: Glass in building - Determination of luminous and solar characteristics of glazing.

EN 14449:2006: Glass in building - Laminated glass and laminated safety glass - Evaluation of conformity/Product standard.

EN 12600:2003: Glass in building - Pendulum test - Impact test method and classification for flat glass.

UNE-EN 356:2001: Glass in building - Security glazing - Testing and classification of resistance against manual attack.

ETAG 034 Parte 1: ventilated cladding kits that have cladding components and associated fixings

EN 13501-1:2019: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

IEC 61215-2:2017/AC:2018-04: The modules were tested under standard IEC conditions to verify their reliability and electrical safety. All tests were passed successfully:

- After the thermal cycles and the wet heat tests, all the modules showed a good performance and worked correctly. Loss of output power is highly below the standard IEC requirement.

- Severe insulation tests were performed on all modules and no fault was detected..

Electroluminescence imaging was performed to analyze the modules and no defect or failure was observed

ISO 12543-4:2011: The modules were tested according to the provisions of the regulations. All tests were passed successfully:

Humidity

High temperature

Radiation

**After the tests, the samples have no failures in the intermediate layer
(bubbles, cloudiness, delamination or fog)**

> Onyx- product Vilogia site

EN 410:2011: Building glass. Determination of the luminous and solar characteristics of the glazing.

Magnitude (%)	Glass configuration	
	4+4.1	6+6.4
Solar reflectance - opaque part (cells)	10,3	10,1
Visible reflectance - opaque part (cells)	5,9	5,9

ETAG 034:

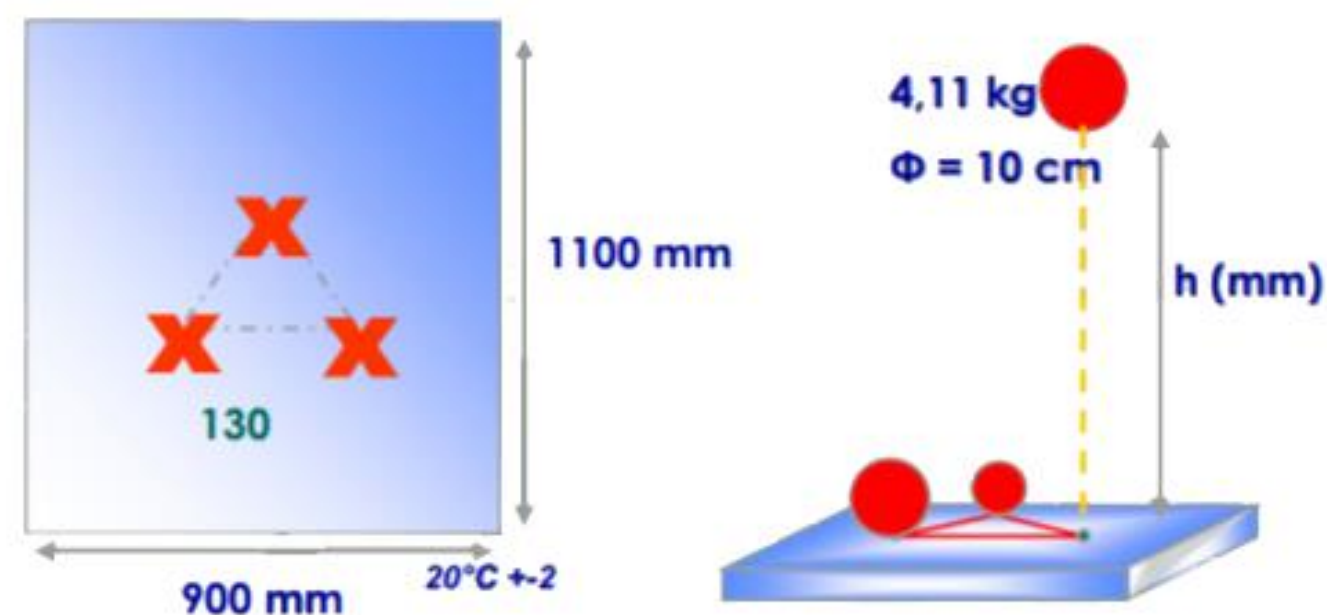
Wind resistance of the facade system, satisfactory result with deformations of less than 1mm in the assembly.

Fire resistance of the facade system and tests according to EN 13501, the global system classifies as B-S1, d0.

EN 14449: Safety glass in buildings, obtaining the following results:

EN12600 (impact resistance) classified 1(B)1. In type B numerous cracks appear but the fragments remain together and do not separate. As an example in areas with a slope greater than 12 m it would be necessary to use glasses such as 1(C)1 or 1(B)1

EN 356 (manual attack) obtaining P2A classification: 3 impacts in a triangle from 3000mm high.



Manufacturer's recommendations must be followed for handling this type of construction product!



> PVSITES in the market – c-Si products

Black frit PVSITES modules in Atic in Castle Lane Street,
close to Buckingham Palace, London (Onyx Solar)



> PVSITES in the market – c-Si products

16 kW BIPV glass-glass blue tinted curtain wall (ONYX Solar) at Balenciaga storefront (Miami, USA)





> PVSITES in the market – c-Si products

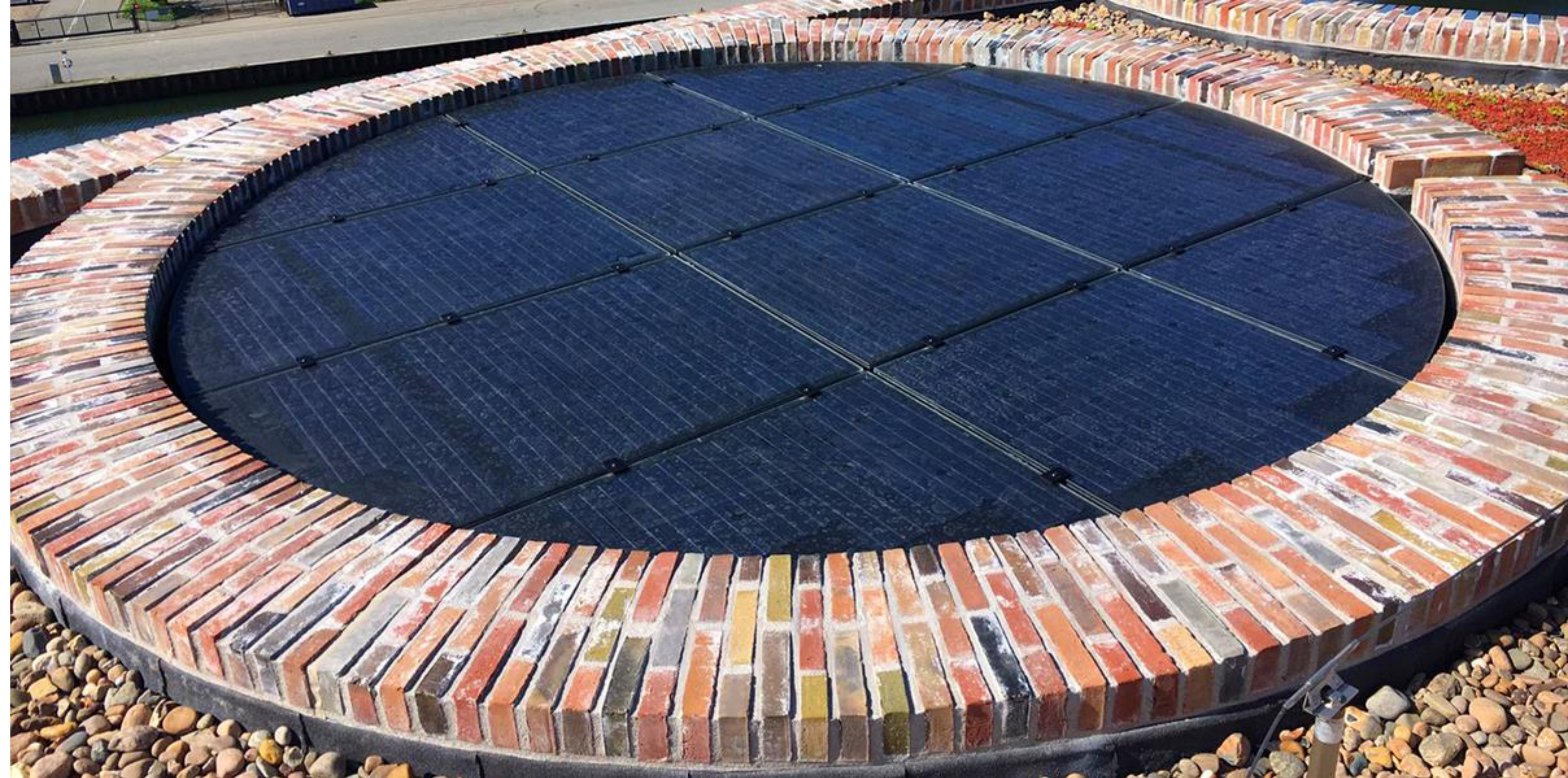
Awarded Most Innovative
Curtain Wall project ” in the US



2018 GLASS MAGAZINE
AWARD WINNER

> PVSITES in the market – c-Si products

Kirk Kapital HQ, Denmark
(Lego) PV skylight by Onyx Solar, 450 m², 51 kWp, 11 circles. Opaque glass, where the front of the glass is acid etch and the rear layer includes a black frit



French demo site

by Marie Longueville

Vilogia, PVSITES project partner, France

> 6. Apartments building

Location Wattignies (France)		Characteristics
Typology	Apartments building	
Area	3639 m ² (built area)	
Floors	8	



Area available for BIPV

The building is in a retrofitting process aimed to improve the building energy performance.

The double wall south façade is entirely covered with brick cladding and a vertical string of windows.

An area of 140 m² is available for BIPV, from the first floor slab to the roof.

Orientation: -16° (SSE).

Inclination: 90°.

> Apartments building

Facade PV module by ONYX & Solar inverter by TECNALIA



Opaque ventilated façade PV module by ONYX

Fully opaque C-Si glass-glass module, 152 Wp power, with hidden bus bars and L interconnection.

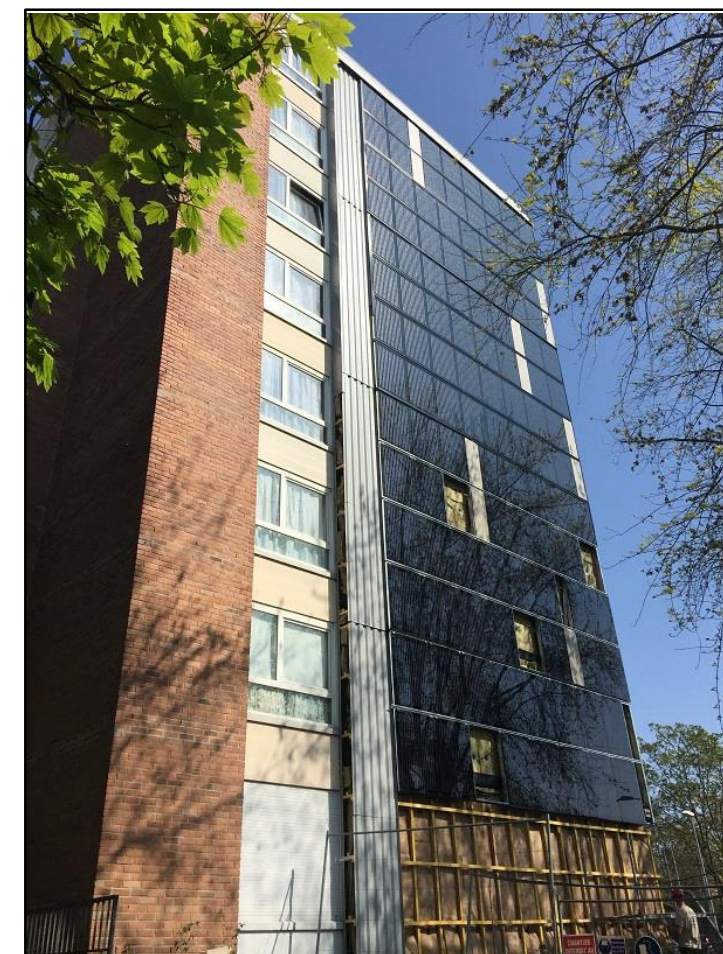


Solar inverter by TECNALIA

3-phase DC-coupled PV storage inverters 10 kW power, with advanced MPPT system, battery DC current/voltage regulation, and active and reactive current AC power regulation for grid- connected operation.

> Apartments building

BIPV ventilated facade



Installation process

- The SSE façade brick cladding was almost entirely removed, as part of the retrofitting, leaving the inner concrete wall exposed.
- The ventilated facade mounting system were attached to the concrete wall.
- Thermal insulation panels were installed on the concrete wall (behind the PV modules), and joining to the boundary elements were carried out.
- The BIPV modules were attached to the ventilated facade structure and connected.
- BIPV system commissioning.

> Apartments building



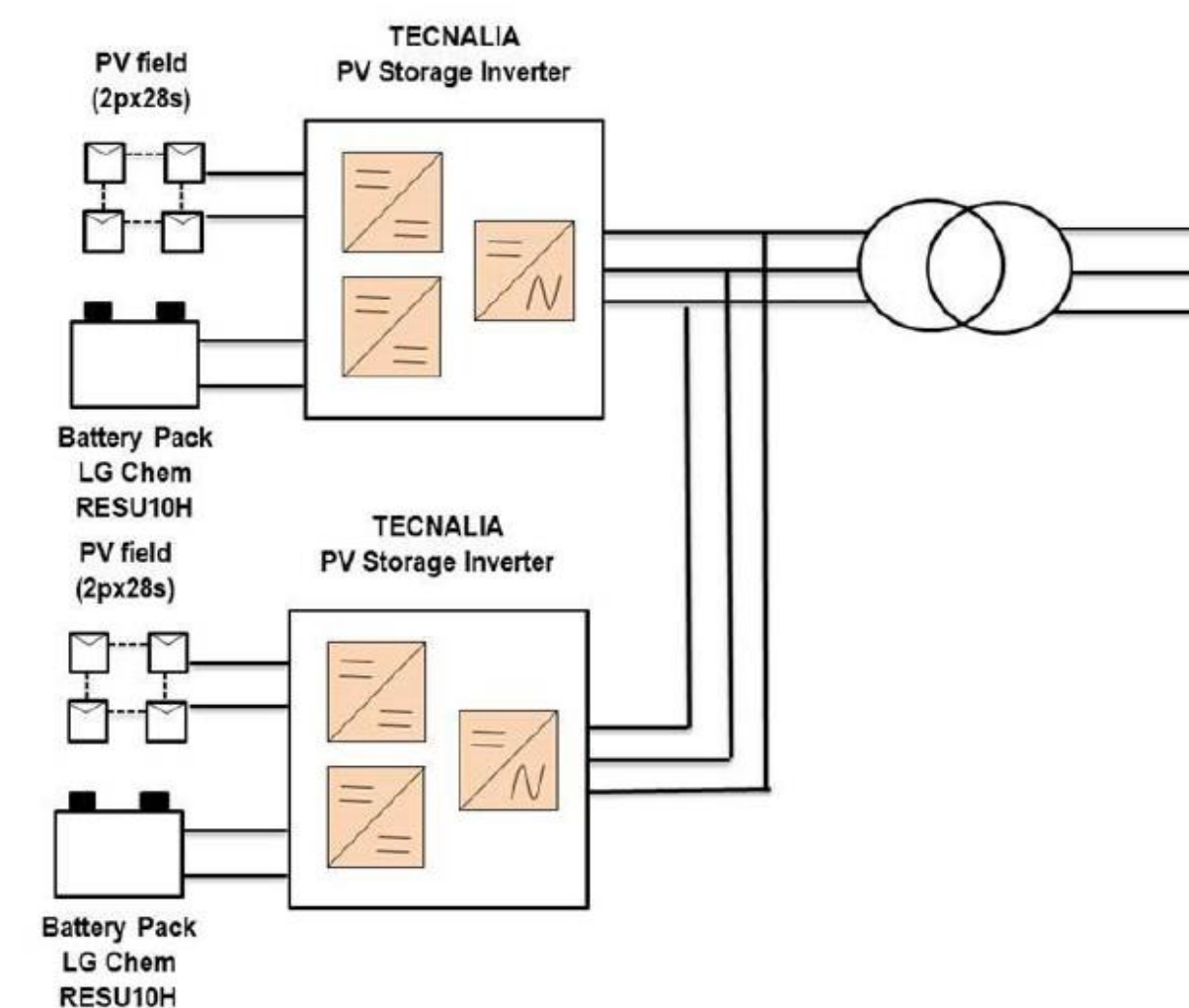
> Apartments building

PV system 17.0 kWp

Solar field		
System power	17.0	kWp
Orient // Inclín	-16° // 90°	(°)
Occupied area	133	m ²
No. modules	112	units
PV module		
Module power	152	Wp
Dimensions	910 x 1280	mm
Production		
Specific production	509	kWh/kWp/year
Estimated production	8653	kWh/year

Operation mode

Two 3-phase DC-coupled storage inverters 10kW power with advanced MPPT, battery DC current/voltage regulation, and active and reactive current AC power regulation for grid-connected operation. Electrical configuration for VILOGIA demo-site:



> Apartments building

- It was difficult to find a company with skills in such an innovative installation.
- Several milestones had to be respected for the system commissioning: complete definition of the system, agreement with the electricity provider to sell the surplus production, appointment of a “responsible of balance” to protect the network of the variations, official certification of the complete installation by an independent control office.
- The technical room couldn’t be placed in the basement and was shifted to the entrance corridor. The common electricity meters were changed to enable the consumption data collection.
- The electricity production from the BIPV panels will be used to cover the electricity consumption for the common parts of the building. The excess of production will be stored or sold to an electricity provider.
- Authorization for using not commercial inverters and batteries was obtained, with the support of the partners and the French controlling office.
- A collective self-consumption contract was formalised for the common parts of the building, a freshly new option in France.
- Wide and deep new knowledge and competences were gained by VILOGIA about BIPV, useful to be applied in future similar projects.

Round Table – French Installers

moderators **Amélie Ammeloot & Marie Longueville**



Framing - roofing - cladding - timber framing – **Mr Toni Piraino**



General electricity works – **Mr Jorge da Silva**



Engineering Office – **Mr Edouard Vangeenberghe**

Round Table – French Installation partners

moderators Amélie Ammeloot & Marie Longueville



National electricity grid manager – **Mme NANA KONATE DIOP**



Electrical works controller – **Mr JOAN LECOUBE**



Green electricity supplier – **Mr PIERRE GOUELLO**

Merci de votre attention,

**Et merci à tous les acteurs impliqués pour
la concrétisation de ce projet !**