

Cost-effective and innovative solar energy integration in stock and new buildings  
- how to generate revenue with your building façade and roof

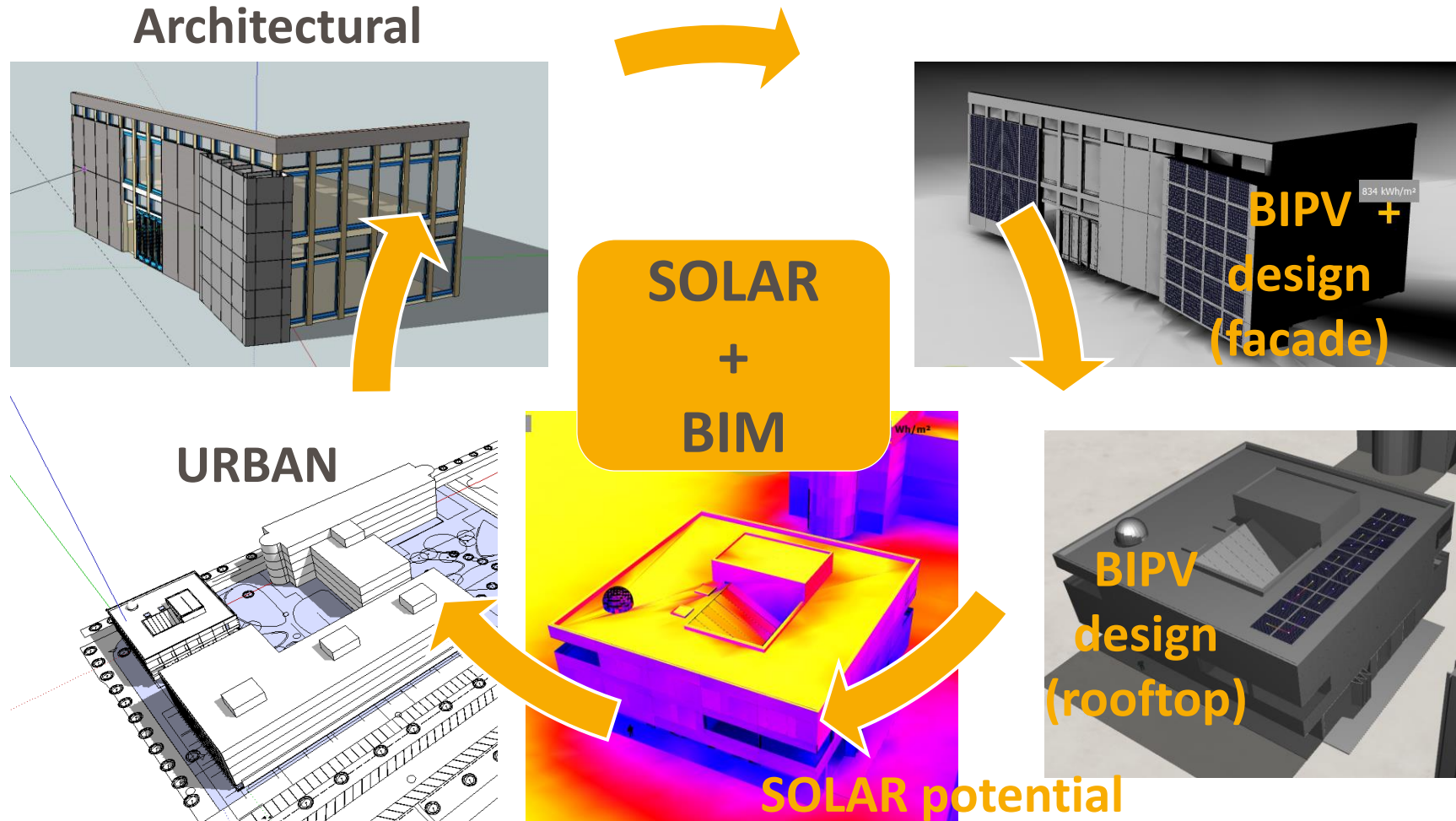
## BIM based simulation solution providing performance to solar systems integration for every building context

*Philippe ALAMY, Associate Director*

*philippe.alamy@enerbim.com*

*+33 670 747 596*

# BIMsolar<sup>®</sup>: from architectural design to BIPV valuation

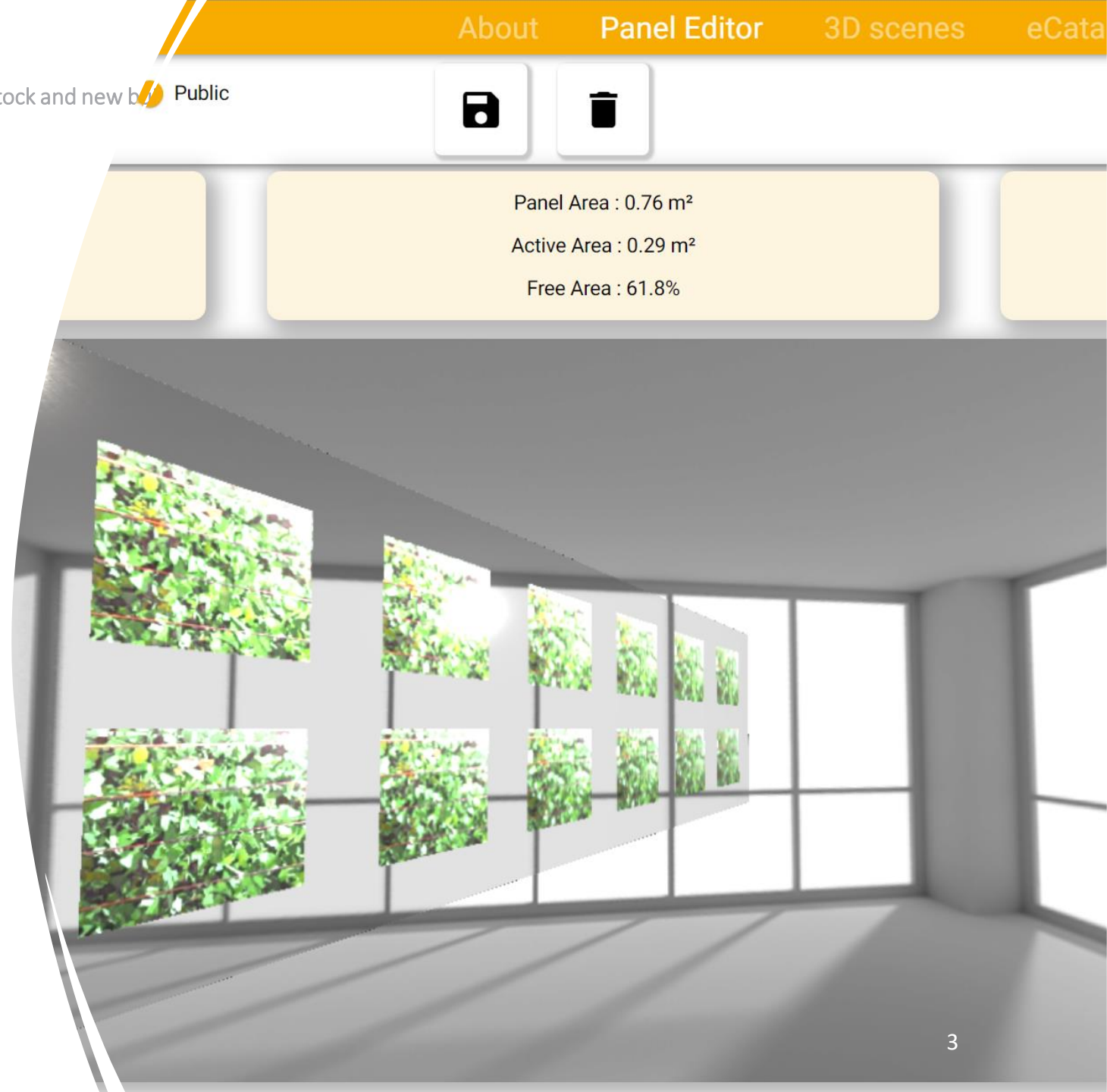


Panel Area : 0.76 m<sup>2</sup>Active Area : 0.29 m<sup>2</sup>

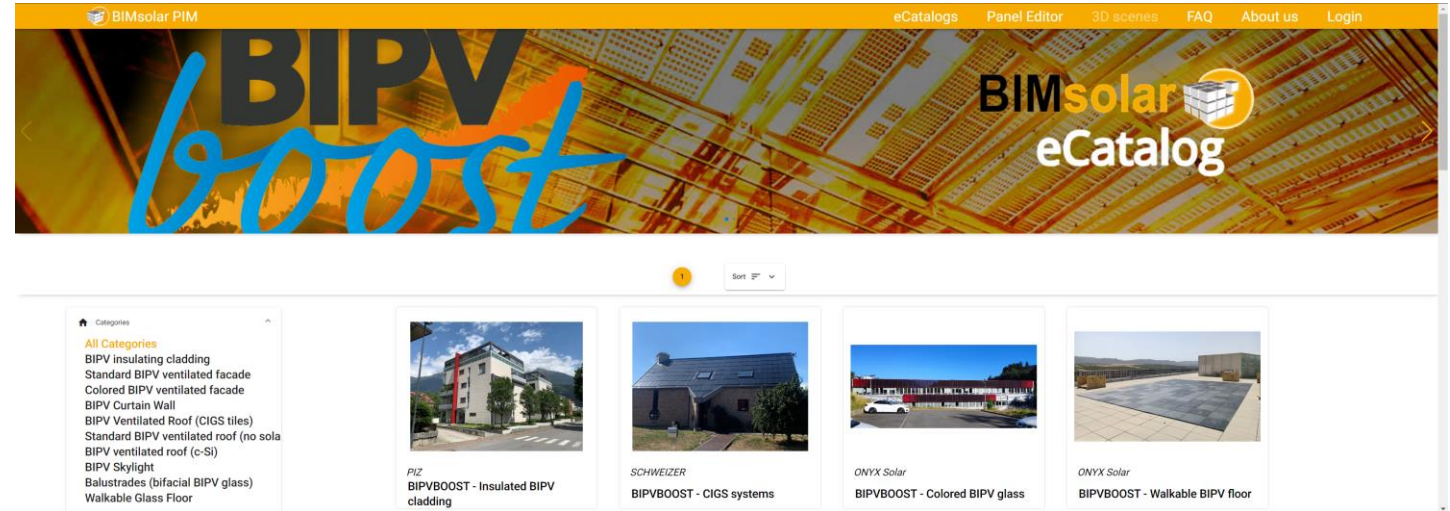
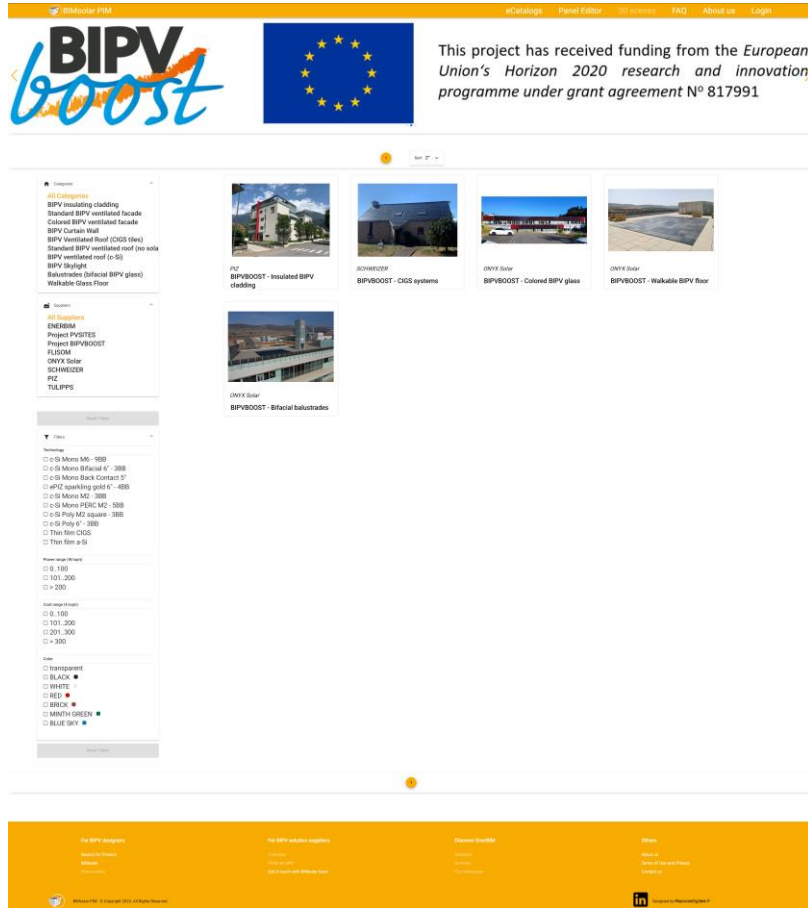
Free Area : 61.8%

## ▶ ANTICIPATION: BIPV significance as material

- > **BIMsolar web Panel Editor** to invent custom BIPV modules
- > Custom database of cells
- > Preliminary design of modules
- > Cell density → Power density
- > Reference cost rate
- > Reference CO<sub>2</sub>eq rate
- > Synchronization with BIMsolar



# The first eCatalog of connected digital modules



# BIMsolar Panel Editor: anticipating BIPV performance and BIM

BIMsolar WEB

[About](#)
[Panel Editor](#)
[3D scenes](#)
[eCatalog](#)
[Login](#)

You can test Panel Editor configuration features.  
Please login to access more Panel Editor functions (load, save, publish ...).

Max Cells : 72  
Current Cells : 45

Panel Area : 2 m<sup>2</sup>  
Active Area : 1.11 m<sup>2</sup>  
Free Area : 44.5%

Total Power : 135 W  
Panel Impact CO<sup>2</sup> eq : 144.3 kg  
Panel Cost : 481 €

**COST SAVINGS:**

- > Time to pre-design
- > No tool to install
- > Time to share discuss and decide

**GAINS:**

- > BIM ready objects
- > Main features to simulate BIPV layout
- > 1<sup>st</sup> cost assessment
- > 1<sup>st</sup> carbon impact

## ► BIMsolar desktop: 3D BIPV simulation with architectural ambitions

- > Every 3D CAD model imported
- > Weather data geolocated
- > Solar potential and shading all over the architectural envelope
- > BIPV layouts: from panel editor to parametric BIPV module design
- > BIM data generation to support decision and collaborative design
- > Consolidated bill of materials to feed financial studies



# BIMsolar desktop: 7-steps process to assess BIPV solutions

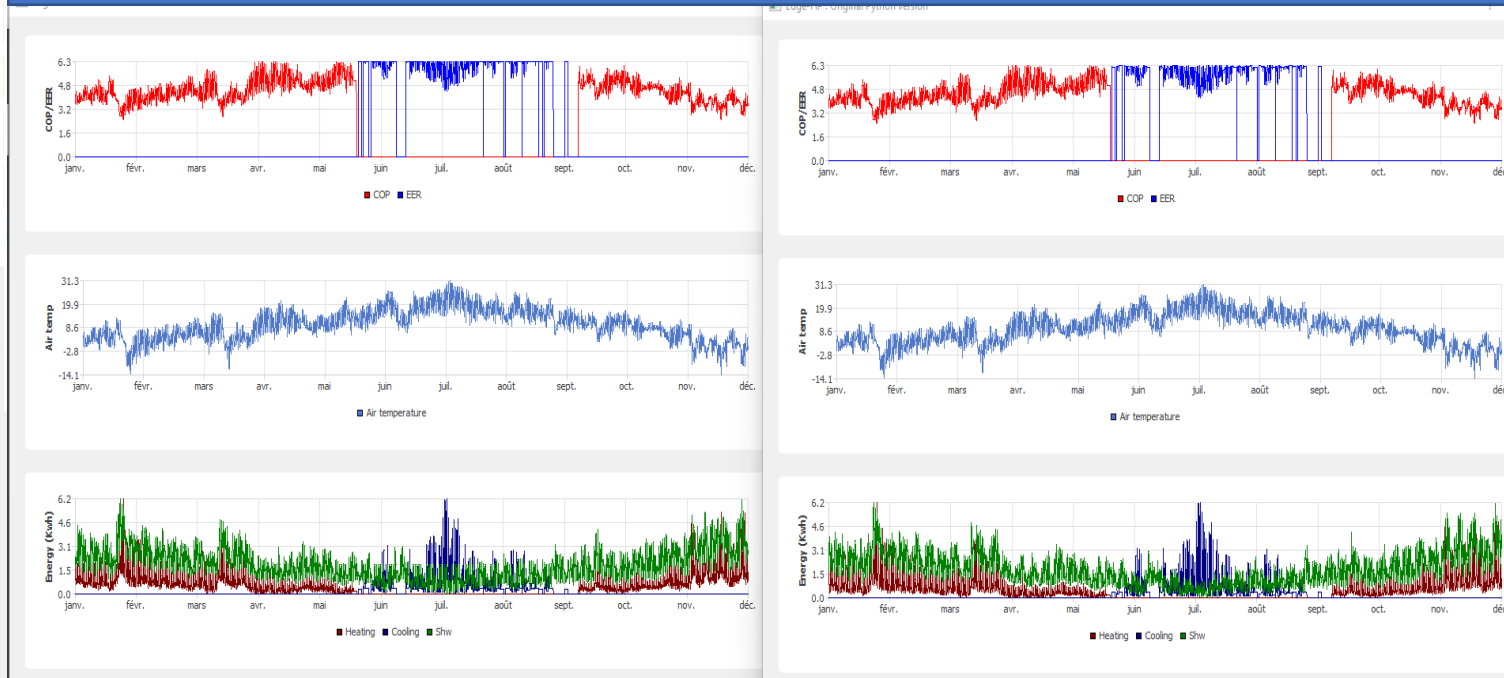
## COST SAVINGS:

- > Time to pre-design
- > Time to optimize
- > Risk of avoiding issues
- > Time to share discuss and decide

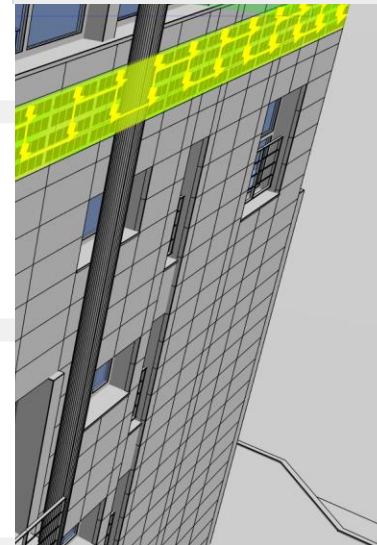
## GAINS:

- > BIM ready layouts
- > Unique workspace
- > Multiple KPIs
- > Modularity (plugins)

## OPTIMAL+EURAC modules to optimize technical+economic studies



Export to BIMsolar    Import from BIMsolar  
BIMsolar



Concept Design

Discussion

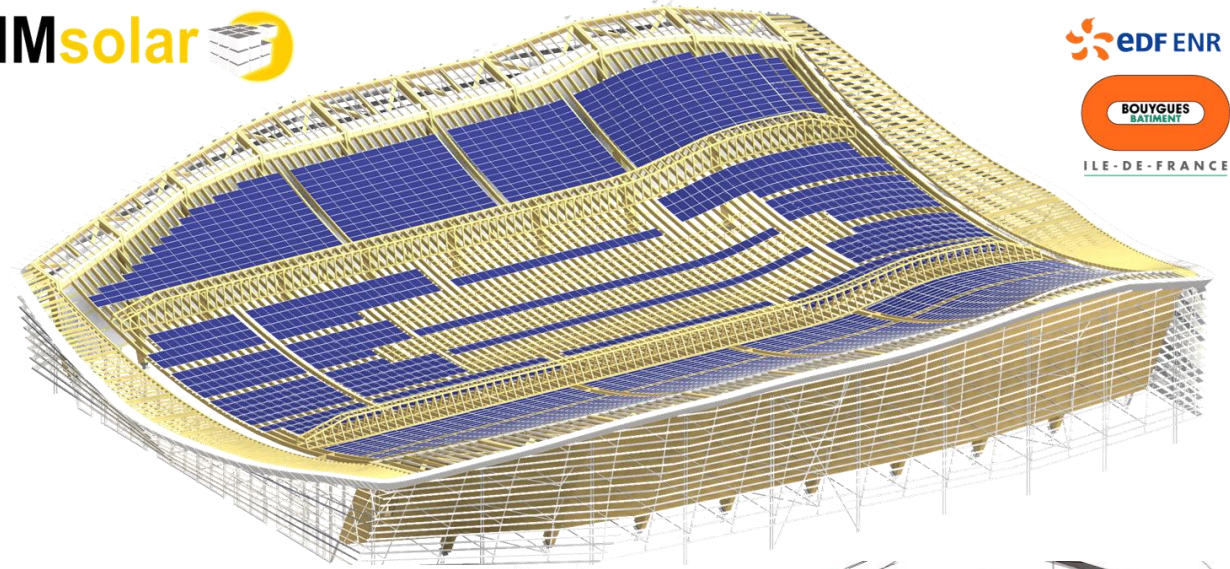
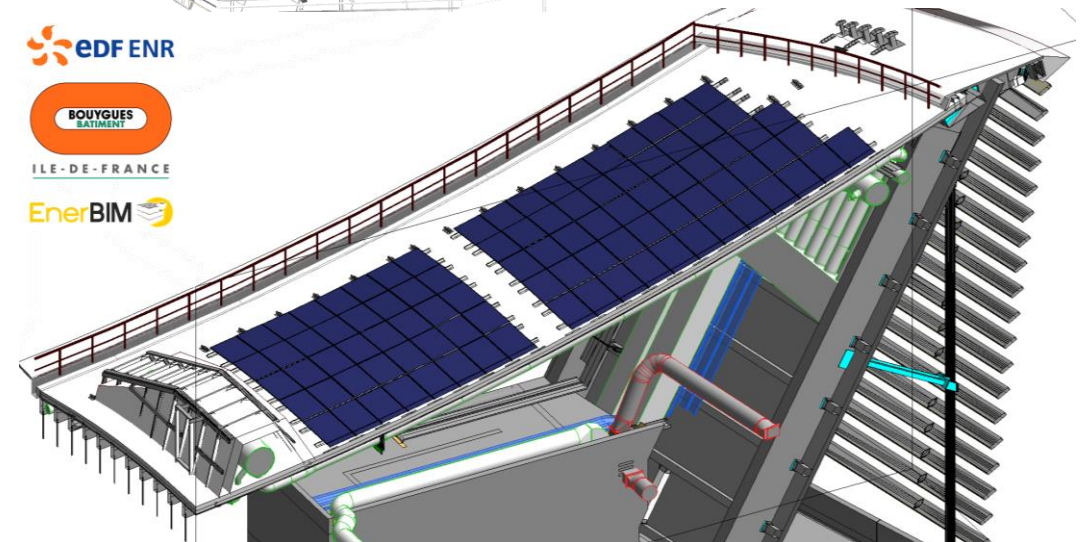
Optimization

Decision

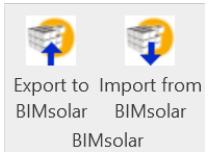
Technical Design

## ▶ BIM: the new paradigm to boost AEC & PV integration

- > AEC works in BIM + traditional processes
- > Autodesk® runs the market with REVIT®
- > BIPV to be integrated since concept design
- > Parametric BIPV+BIM objects: the opportunity
- > Fantastic potential of savings and gains
- > Interoperability is still a challenge between tools, digital workspaces, databases and teams
- > BIMsolar is the unique BIPV solution that creates BIM4BIPV from scratch within a continuous design to O&M process

**BIMsolar** EDF ENRBOUYGUES  
BATIMENT  
ILE-DE-FRANCEEDF ENRBOUYGUES  
BATIMENT  
ILE-DE-FRANCEEnerBIM



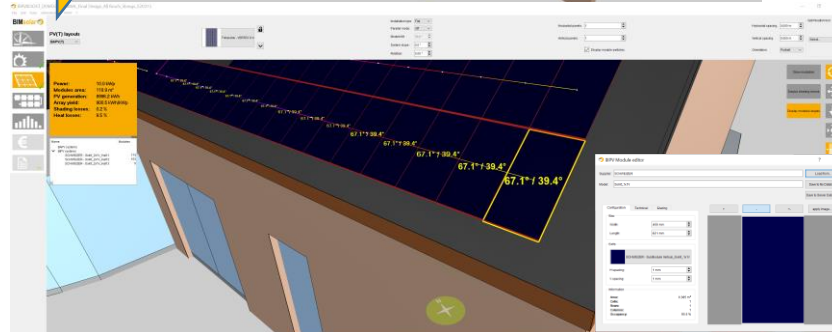
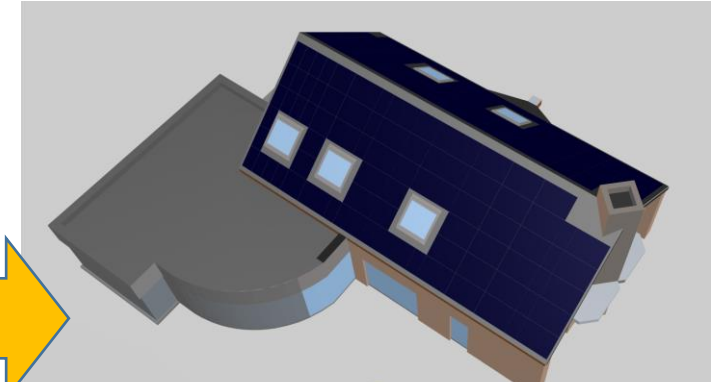
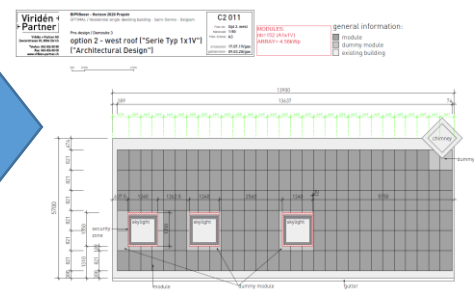


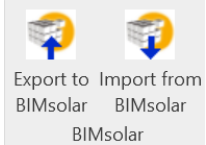
# From panel editor to Total BIM: collaborative workflows

*BIMsolar imports either non-BIM or BIM CAD models to support BIPV concept designs*

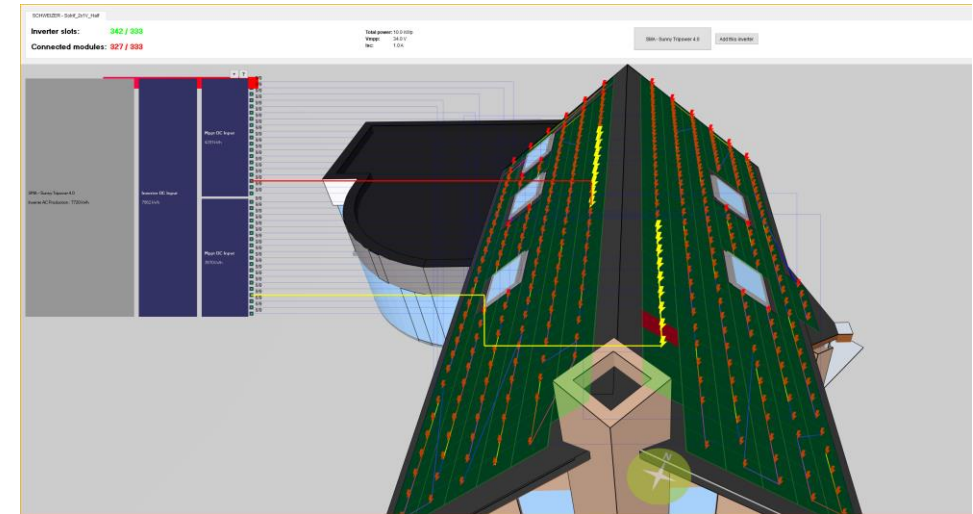
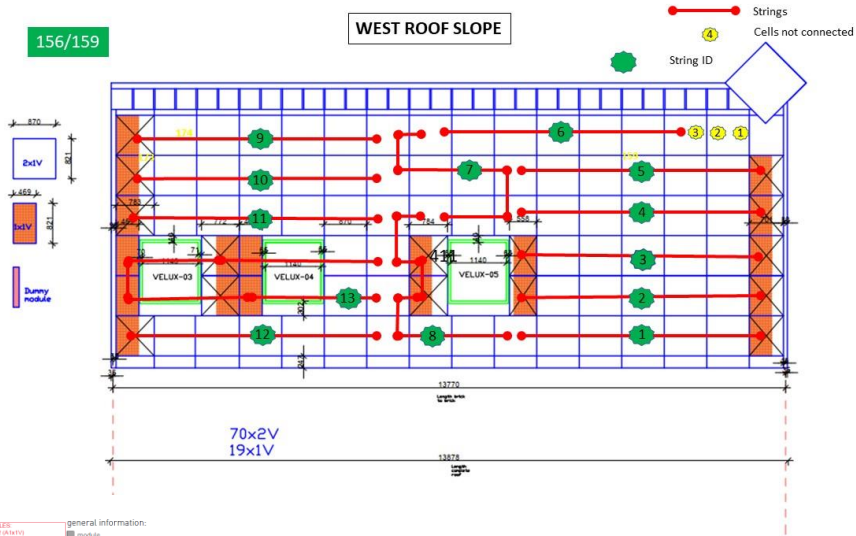


Type	Level [mm]	Area [sqm]	Area [sqm]	Area [sqm]	Area [sqm]	Level Total [sqm]	Area Total [sqm]	Total area [sqm]	Volume [m3]
1x1H	420	1020	420	1020	420	1020	1020	0.204	
1x1V	821	1020	821	1020	821	1020	1020	0.204	
2x1H	821	1020	821	1020	821	1020	1020	0.204	
2x1V	821	1020	821	1020	821	1020	1020	0.204	

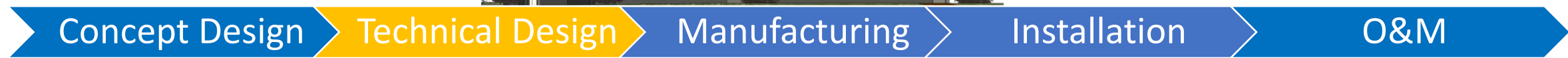
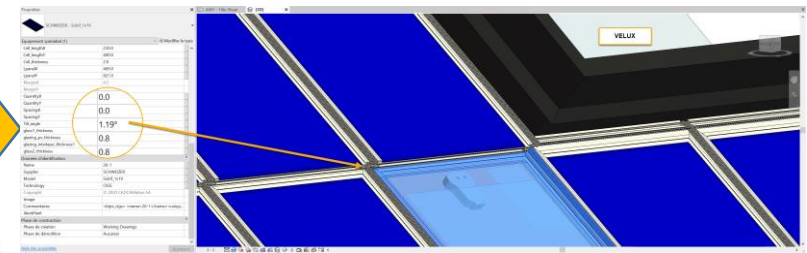
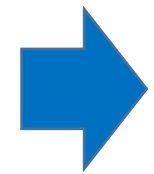
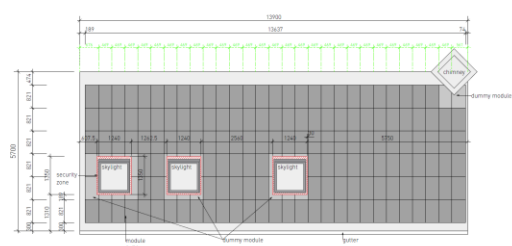




# Fine tuned mechanical integration together with electrical design



Viridén Partner  
C2 011  
option 2 - west roof ("Serie Typ 1x1V")  
["Architectural Design"]



# The unique CAD2CAM BIMsolar Editor to manufacture BIPV glass modules



Grant Agreement 817991

1.7 PV module with 24 poly crystalline cells.

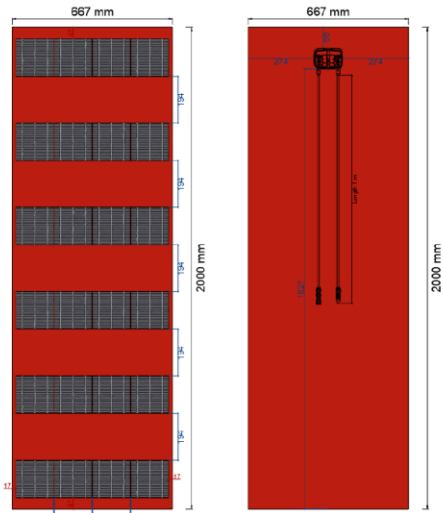
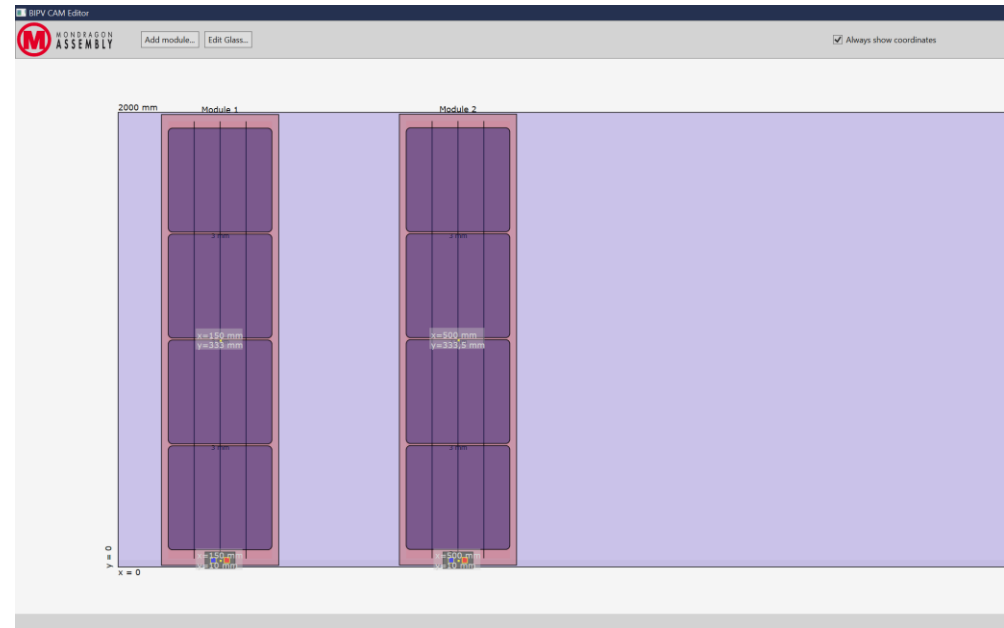
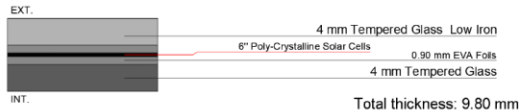


Figure 1.14 Façade glass-glass with 24 poly-crystalline cells, and tempered Glass RAL 3020



## COST SAVINGS:

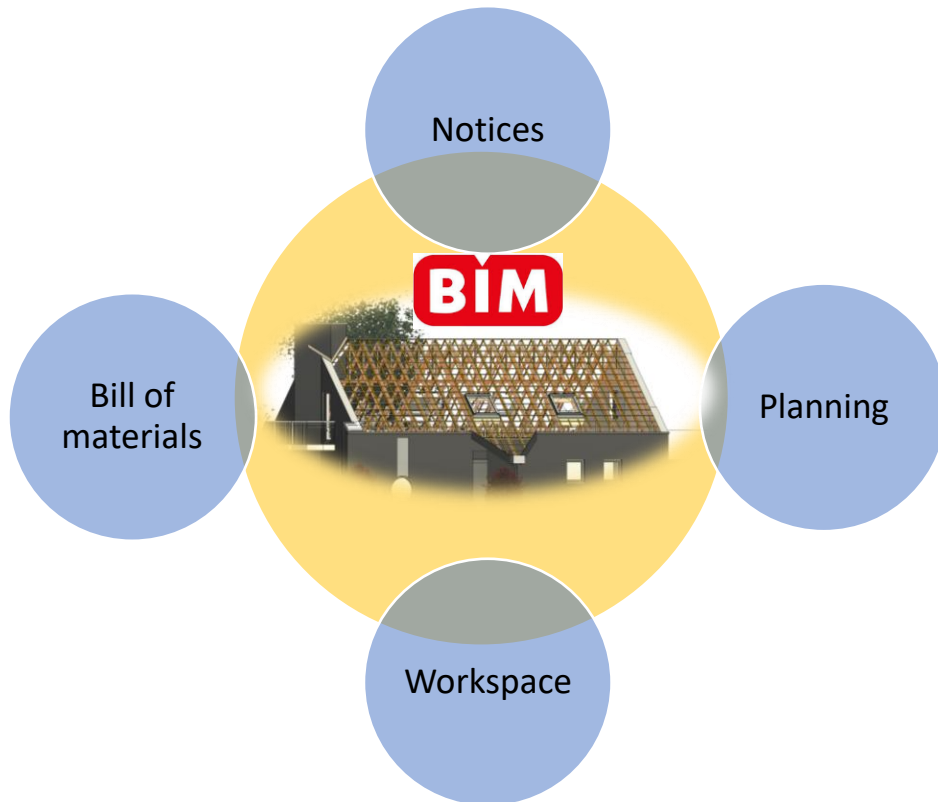
- > Time to pre-design
- > Time to optimize
- > Risk of avoiding issues
- > Time to share and manufacture

## GAINS:

- > Adaptable XML format
- > Dependable coding
- > BIM ready(CAD>CAM)
- > Modularity (plugins)



# BIM supports the preparation of successful installation phases



- > Online viewers to keep connected to the validated design
- > Bill of materials to manage procurement and preparation of the BIPV layouts
- > Planning can be managed in BIM 4D
- > BIM platforms becoming the new collaborative workspaces
- > Notices and guidelines attached to the model and the project phases
- > Clash detection/report in contextual and instant mode

### COST SAVINGS:

- > Time to procure
- > Time to prepare
- > Risk of avoiding issues
- > Risk of losing feedback

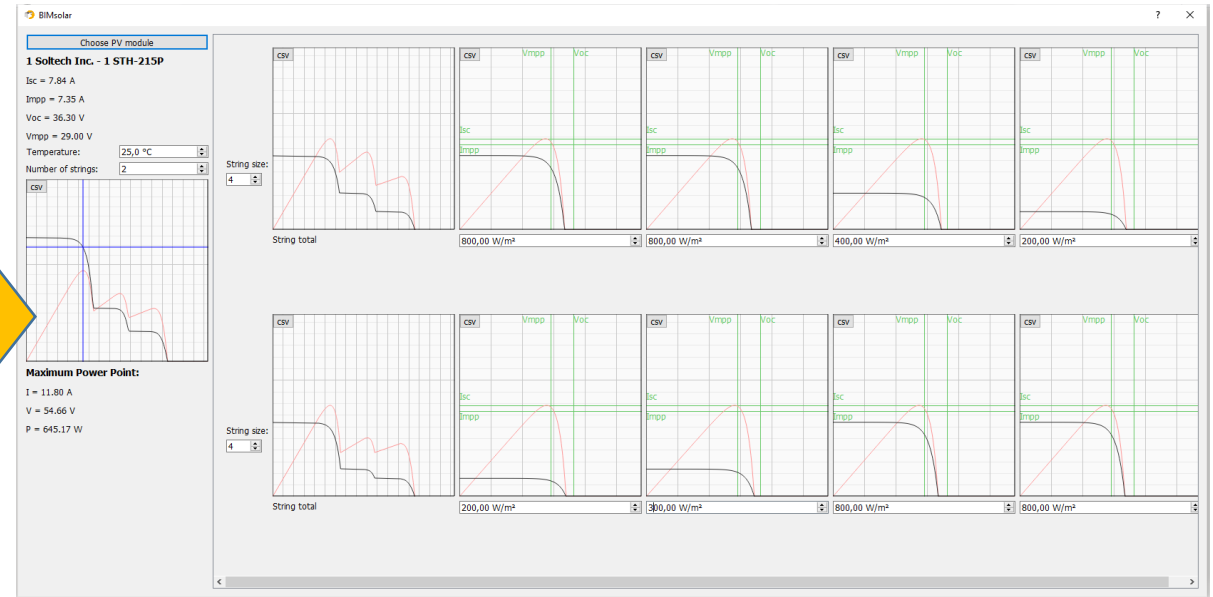
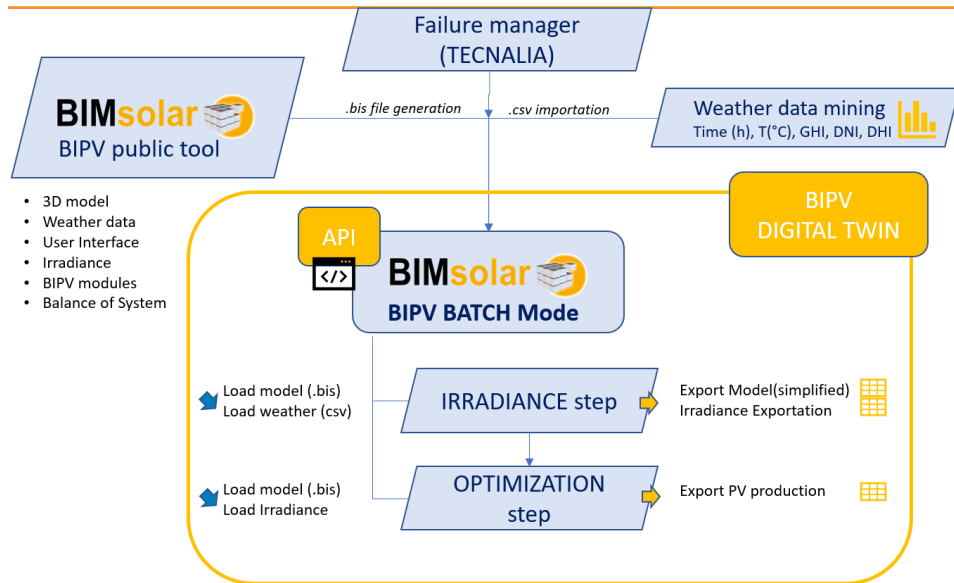
### GAINS:

- > Feedback / traceability
- > Planning
- > Quality / Knowledge
- > Commissioning



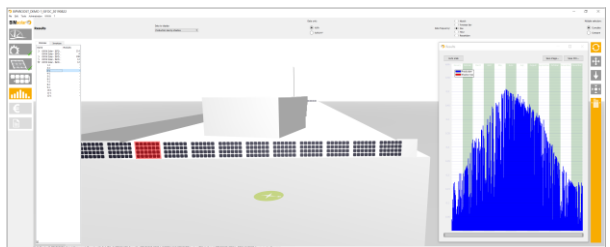
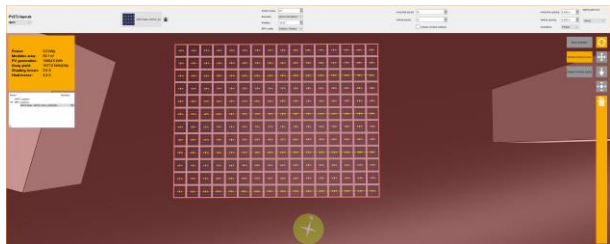
# BIMsolar DT: the unique Digital Twin addressing BIPV O&M

*BIMsolar projects are translated into analytic models (I/V) to perform FMEA*

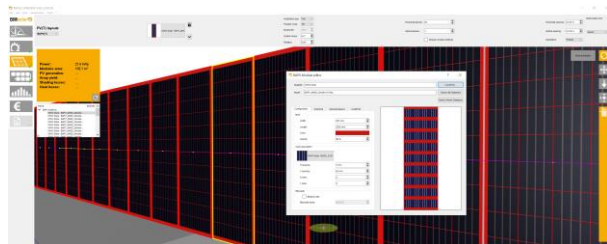


# Success Stories: BIPVBOOST

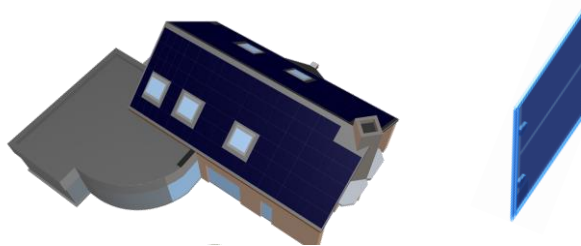
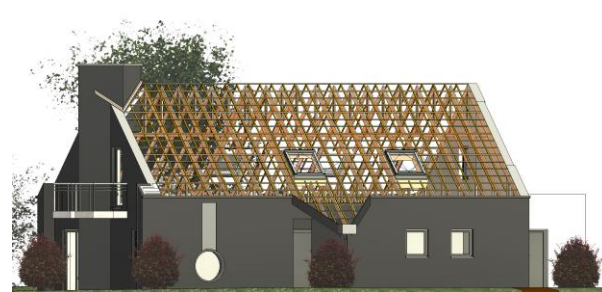
ISFOC



MONDRAGON



OPTIMAL



PIZ



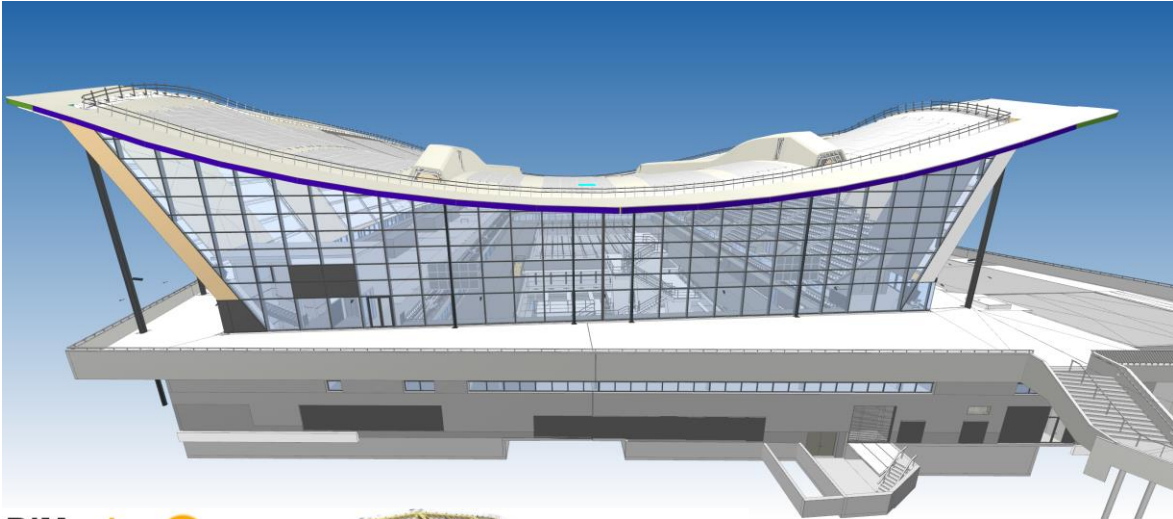
**BIPV boost** Grant Agreement 817991  
 "Mixed Reality for BIPV: a New Way to Experience BIPV in the BIPVBOOST project"



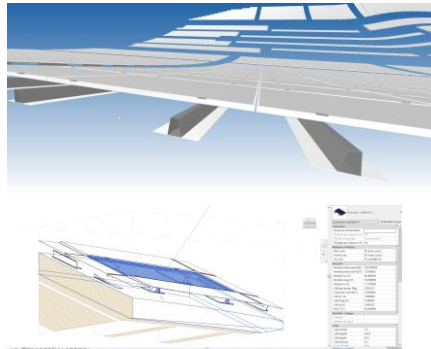
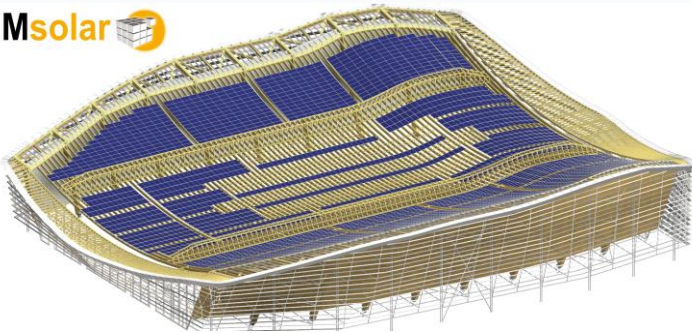
Visualization of a BIPV scenario overlaid on the real demo building thanks to MR app and HoloLens

## ► Success Stories: open market

Feature BIM project: PARIS OLYMPIC GAMES 2024

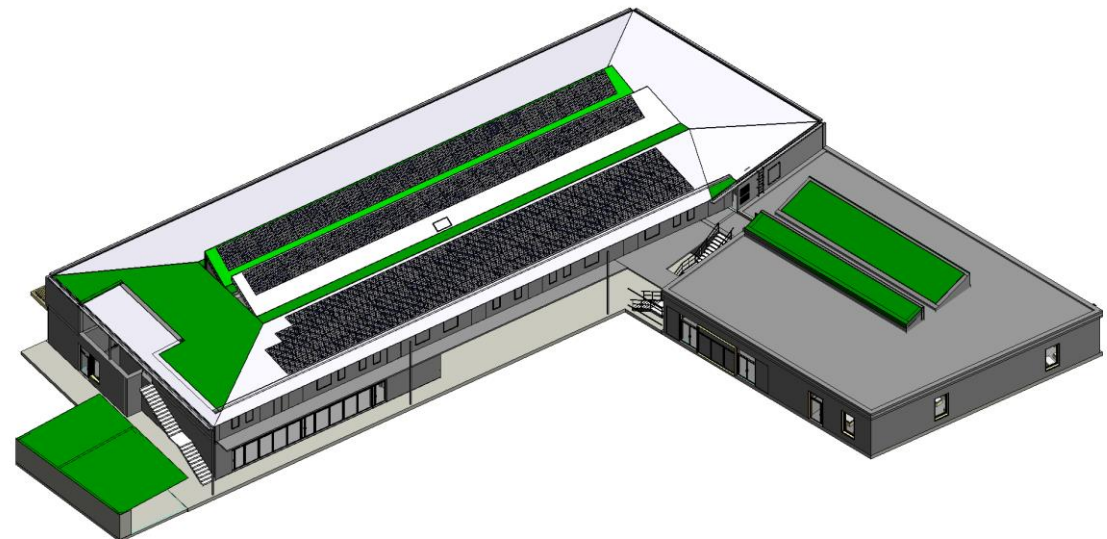
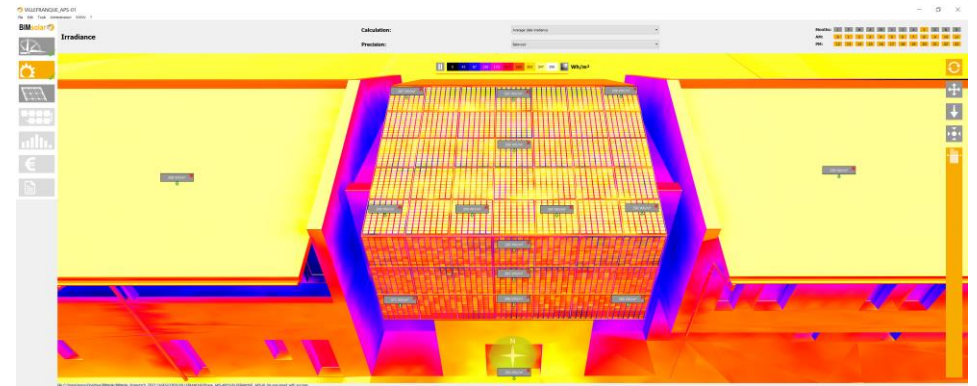


BIMsolar



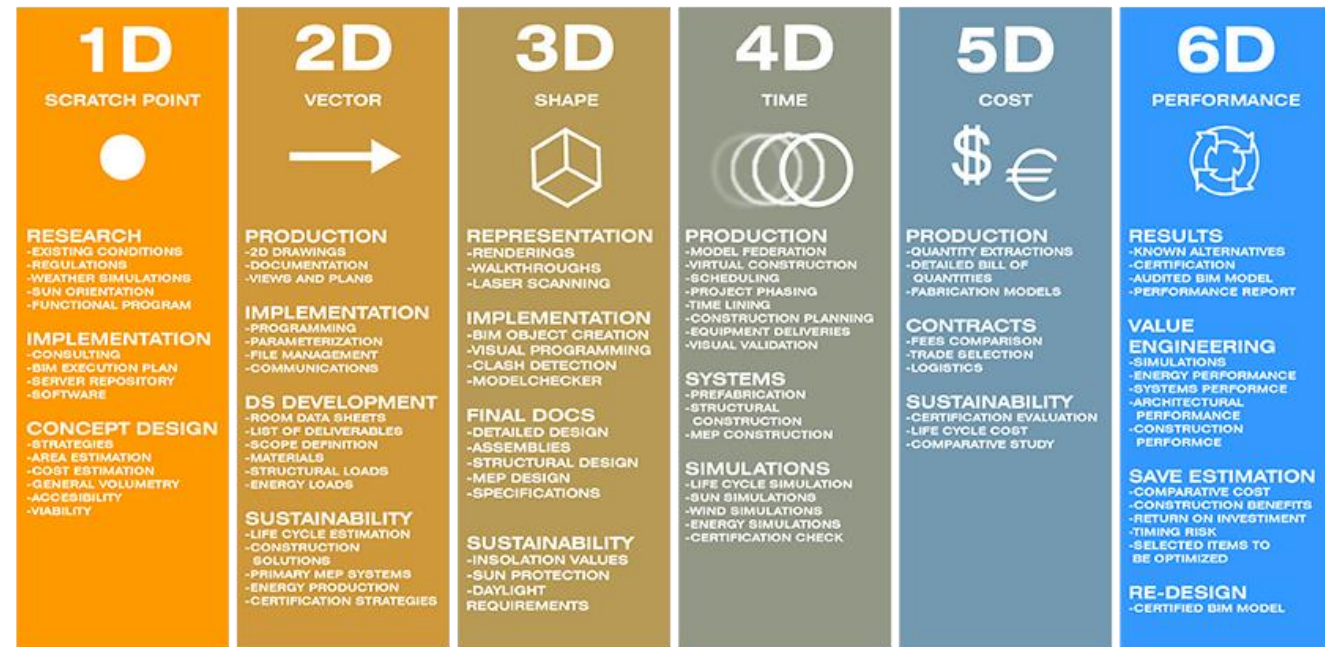
20/04/2023

From feasibility studies to delivery of BIPV/BAPV projects



# CONCLUSION - DISCUSSION

- Concept Design is the most crucial stage for BIPV with great potential of cost savings and gains
- BIM is a fantastic opportunity to boost innovation and anticipate BIPV + NZEB performance including renovation of the building stock
- More dimensions to be added to manage total BIM for BIPV within most of the projects
- BIMsolar is developed as a genuine BIM + solar platform: inputs and outputs can be generated from the user or from connected tools
- Data takes and share value all along the AEC workflows
- Bankability assessment of the BIPV projects is the key for the BIPV market and our unique objective to innovate



The BIM dimensions: boosting BIPV!



# Thank you

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Be-Smart project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818009

The information reflects only the project's view and the Commission is not responsible for any use that may be made of the information it contains.