



BE  SMART

Together for Active and Efficient Buildings



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



Benefits of the project

For cities

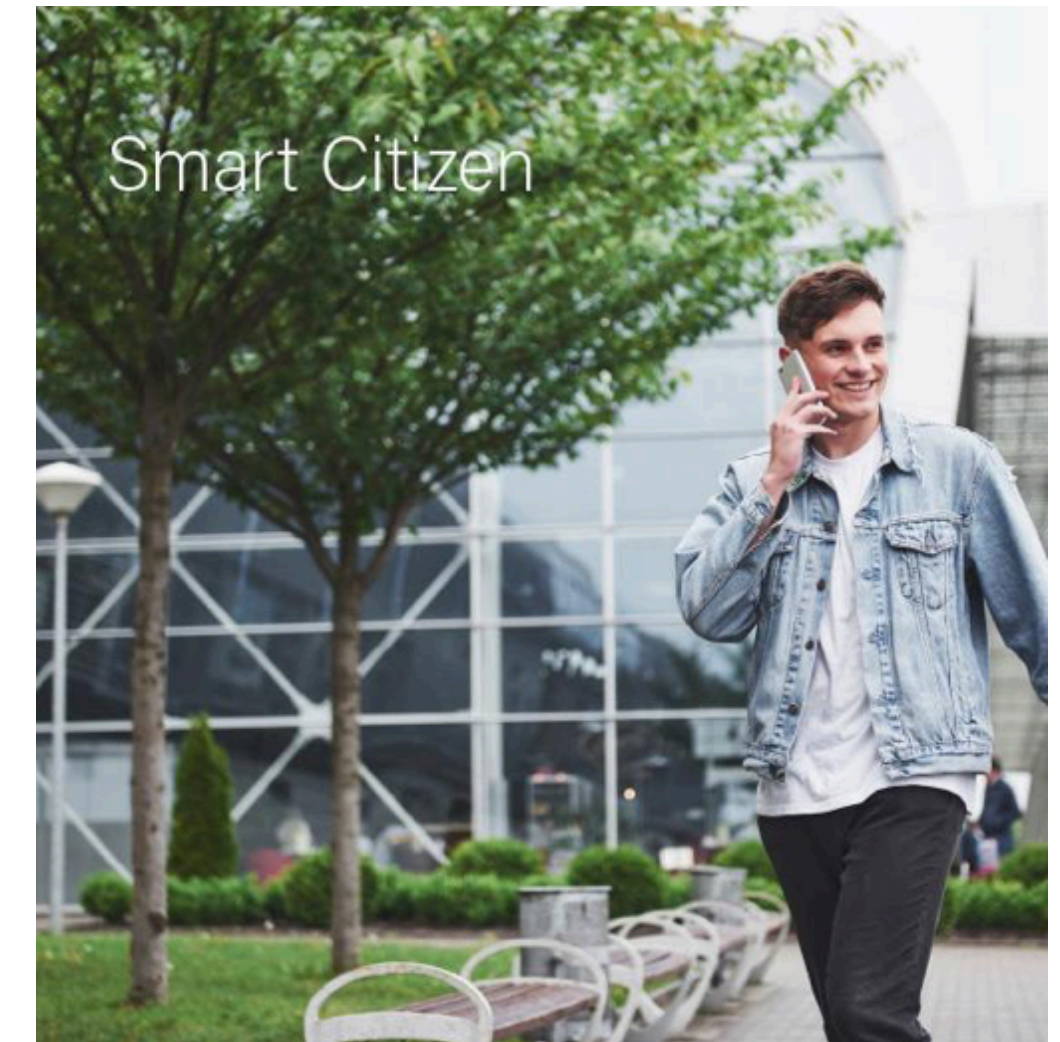
Through standardising EPoG technologies and offering cost effective solutions, Be-Smart aims to bring PV into the mainstream conscience of policy makers and stakeholders to effectively leverage a reindustrialization of cities across Europe.

For buildings

By offering substitutes to traditional building materials and performance-enhanced design features, EPoG technology not only offers competitive manufacturing conditions, but an additional and significant ROI through the generation and storage of clean electrical energy once a building is in operation.

For citizen

From building smart cities and buildings to building smart citizens – this is the ultimate shift in consciousness the Be-Smart project hopes to achieve. EPoG will become an integral part of the smart citizen's conscious choice of materials, thereby advancing individual wellbeing and promoting sustainable living in the future.



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An active element creating value!

≠ passiv element

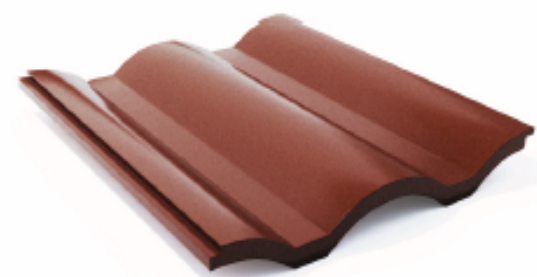
From BIPV to Energy Positive Glazing **EPoG**



From traditional PV...



to BIPV as Building Envelope Construction Material

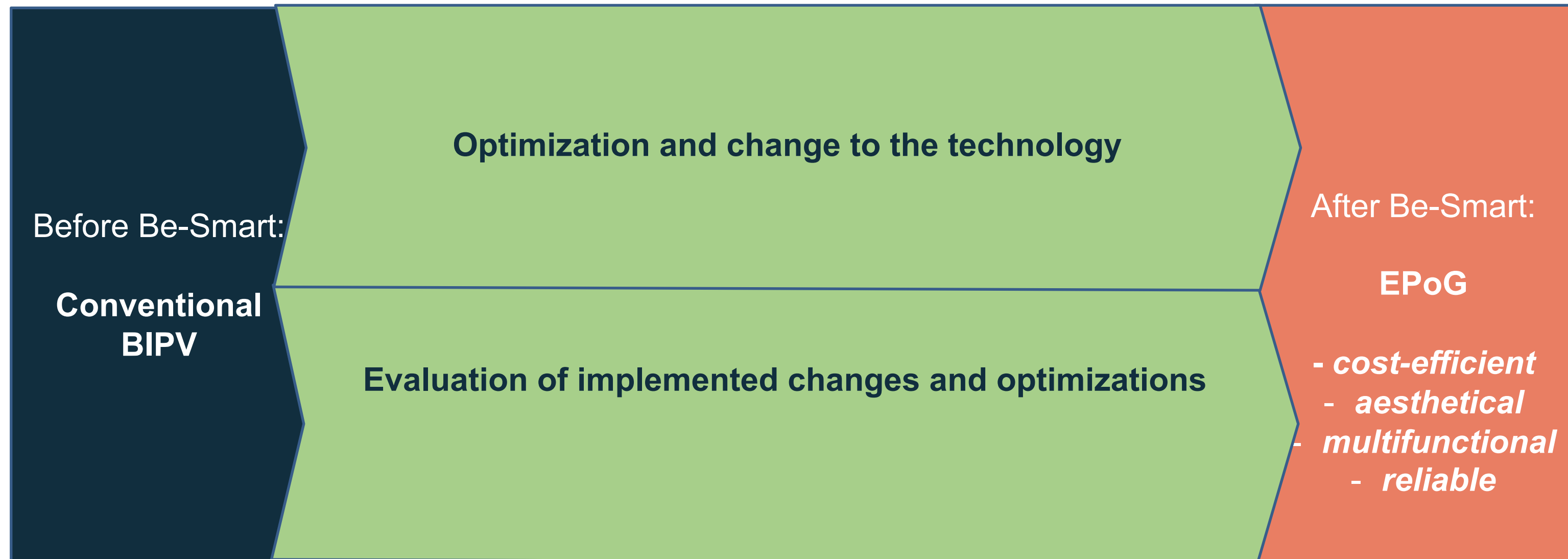


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Technical activities





Technical activities

- **Colour and multi-functionality**

- To develop technological solutions allowing cost-efficient fabrication of aesthetically attractive and reliable Energy Positive Glazing (EPoG).

Four technological routes to ameliorate the module appearance will be developed, namely:

- Ceramic glass printing
 - Digital glass printing
 - Coloured encapsulant
 - Interferential filters
- In addition, multi-functionalities such as **acoustic** and **thermal** insulation properties will be evaluated for the integration into the EPoG product.

- **Module efficiency and aesthetics**

- optimum compromise between the module efficiency, the aesthetics and the cost
- Benchmarking of various cells technologies such as PERC and HJT in addition to various interconnection approaches

- **Reliability & manufacturing process**

- extended reliability tests at the material level (polymer, cells, interconnects and glass) and mini-module level
- A simulation tool that can predict the in-module temperature profile during the module lamination process
- A low-temperature processable encapsulant formulation will be developed





Technical activities

Comparison of different coloring techniques for EPoG elements

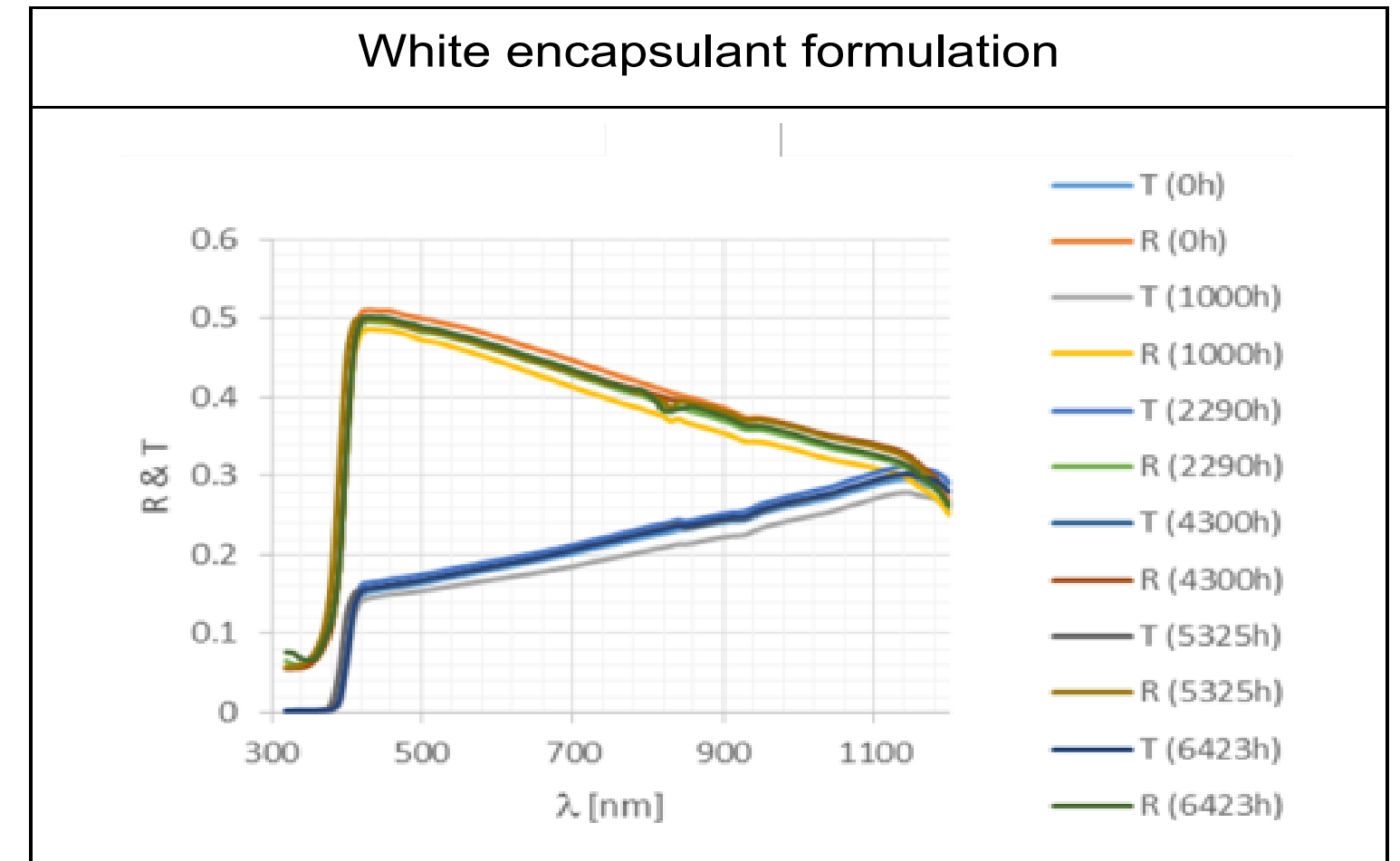
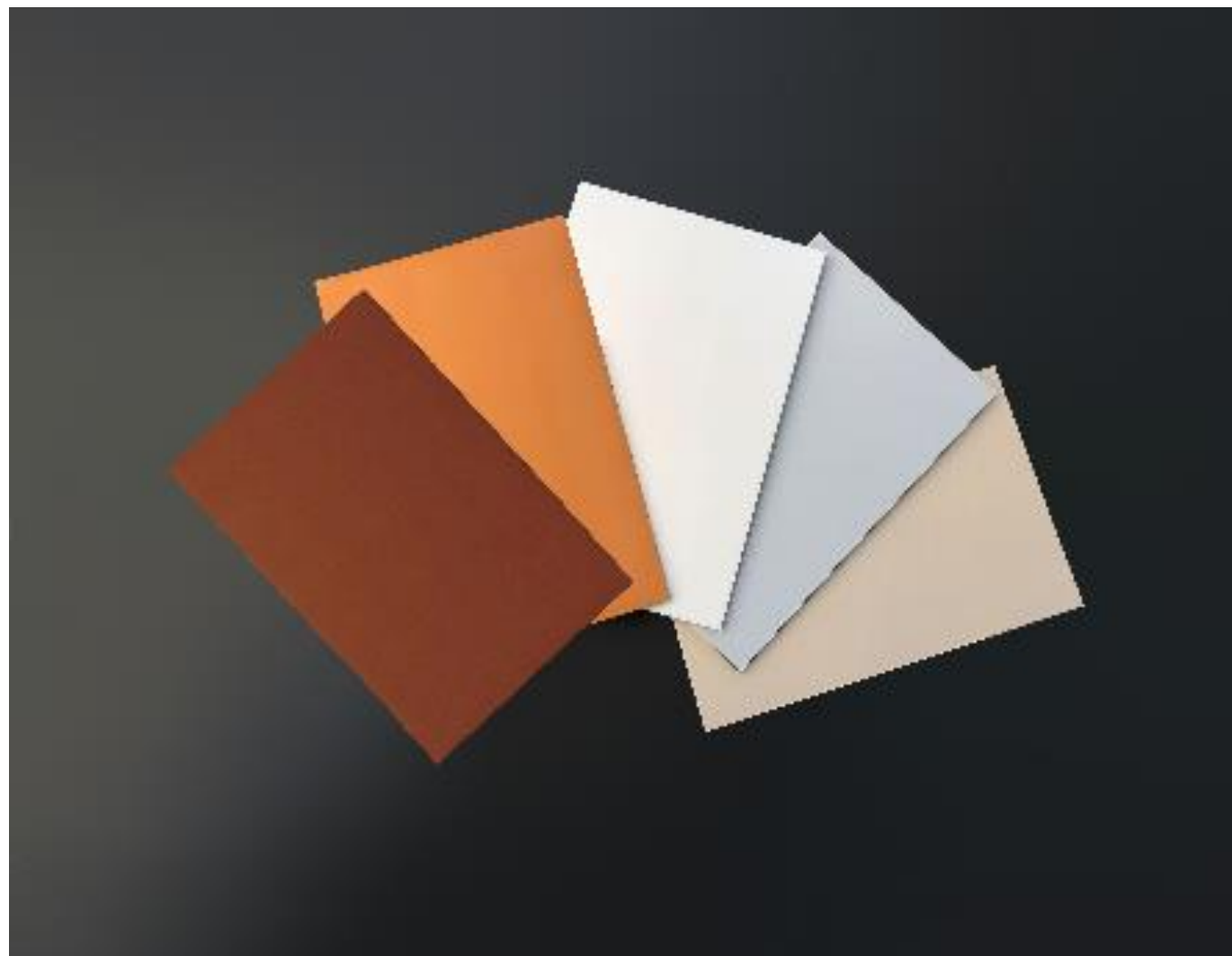
Code	Technology	Main contributing partner	Extra cost (compared to standard PV modules)		Aesthetic				Lifetime	Power
			Raw Mat.	Process	Color	White	Image	Pattern		
CT1	Colored encapsulant	CSEM								
CT2	Interferential filter	SOLAXESS								
CT3	Laminate Interlayer (Mesh/fabric)	ISSOL								
CT4	Laminate Interlayer (PET Based)	ISSOL								
CT5	Digital Interlayer (PET based)	SGDE								
CT6	Digital Printing (non ceramic)	ISSOL								
CT7	Digital Printing (ceramic)	SGDE								
CT8	Ceramic fritting	SGDE								
CT9	Enameling	SGDE								
CT10	Fused pigments	SGDE								
Symbol explanation										
Least advantageous								Most advantageous		





Technical activities

Colored encapsulant developed for EPoG application



Color Difference in reflection respect to 0hours (ΔE_{CIE94})

QUV [Hours]	ΔE_{CIE94}
0	-
1000	1.85
2290	1.04
4300	0.79
5325	1.01
6423	0.69

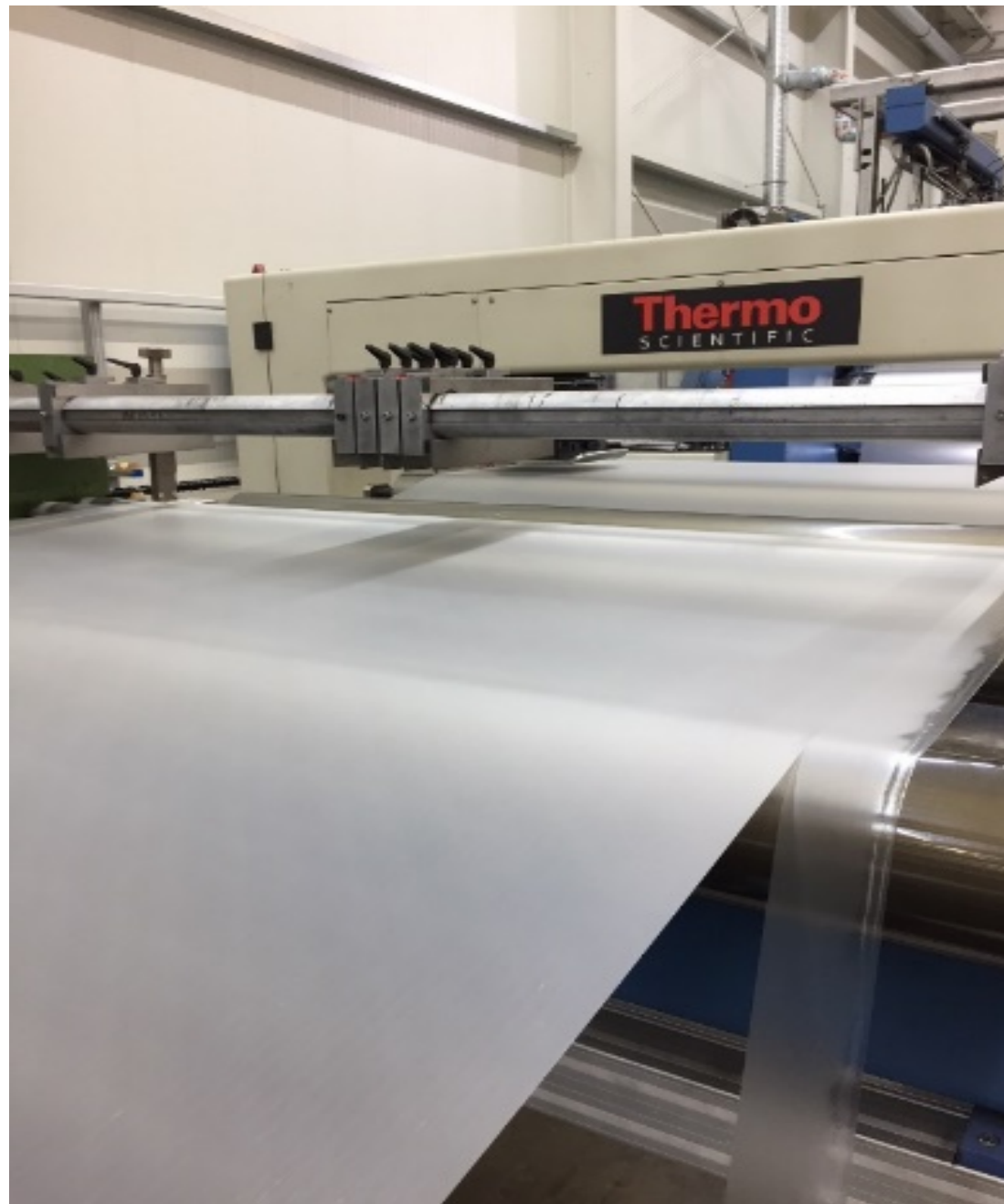


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Technical activities

Low-temperature processable encapsulant



	DH (0 hours)	DH (8855 hours)
LT encapsulant formulation I		
	DH (0 hours)	DH (8855 hours)
LT encapsulant formulation II		

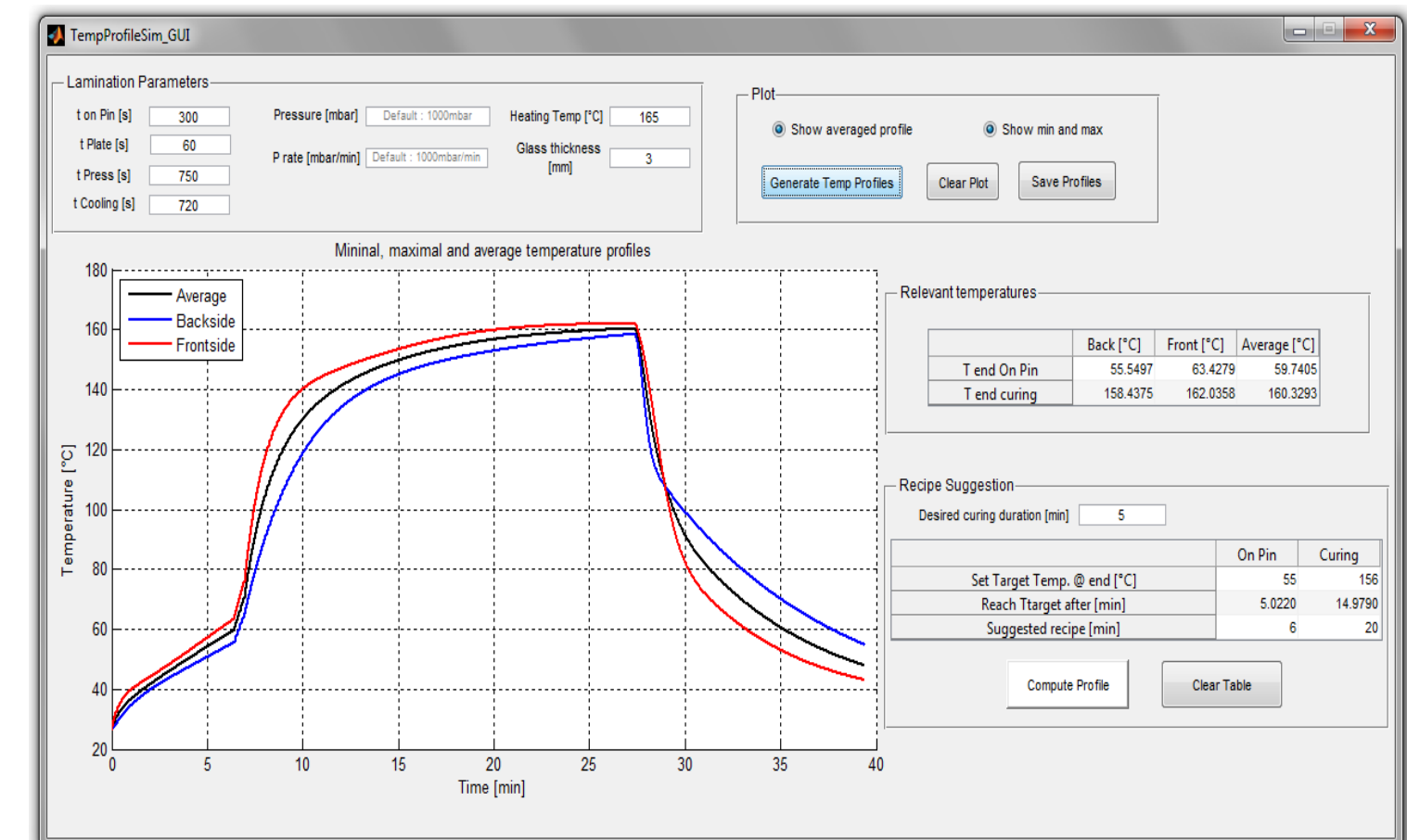
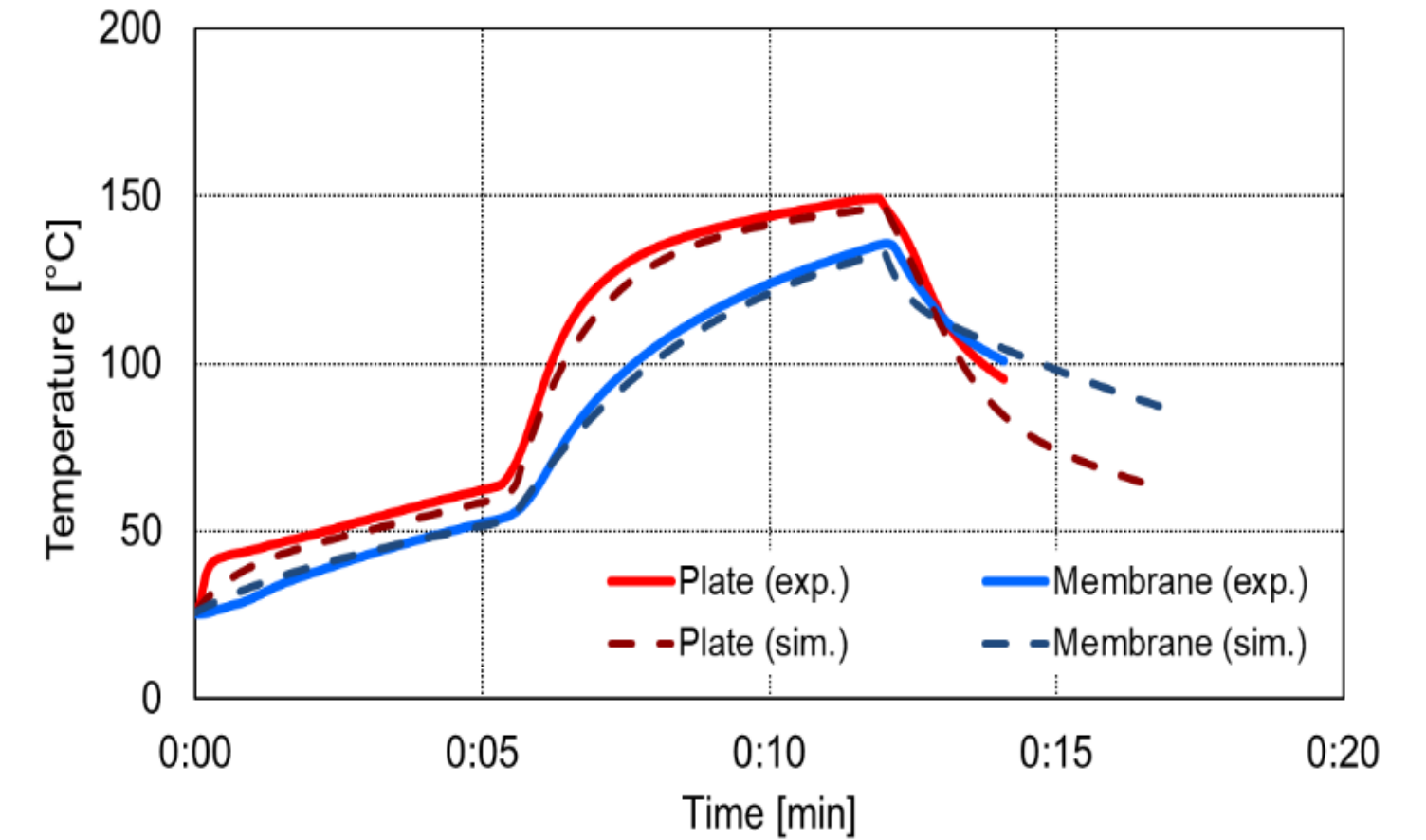
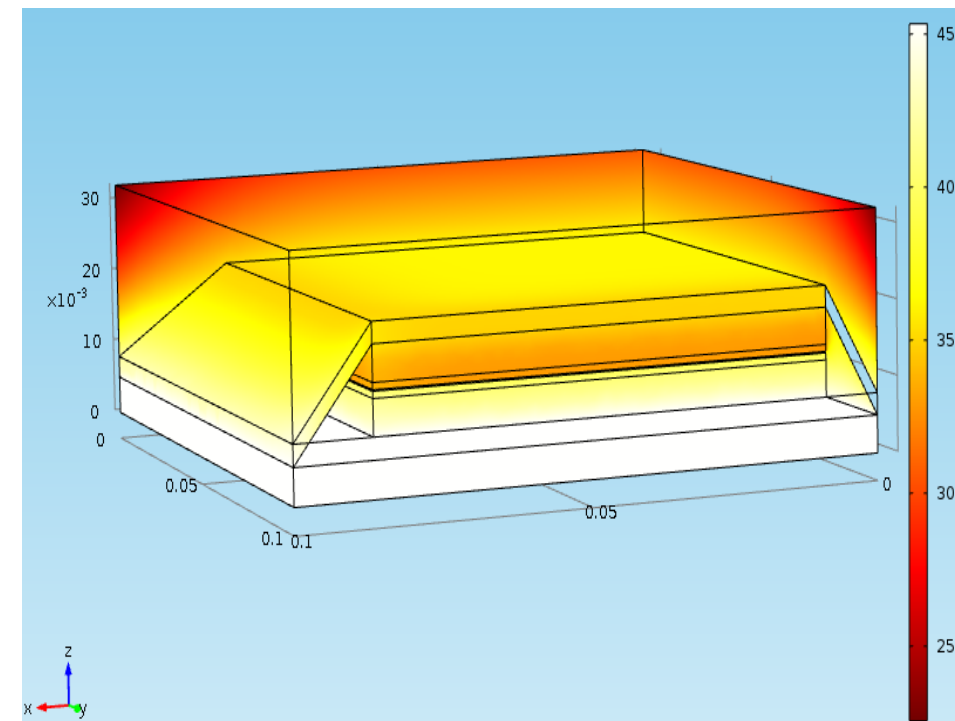
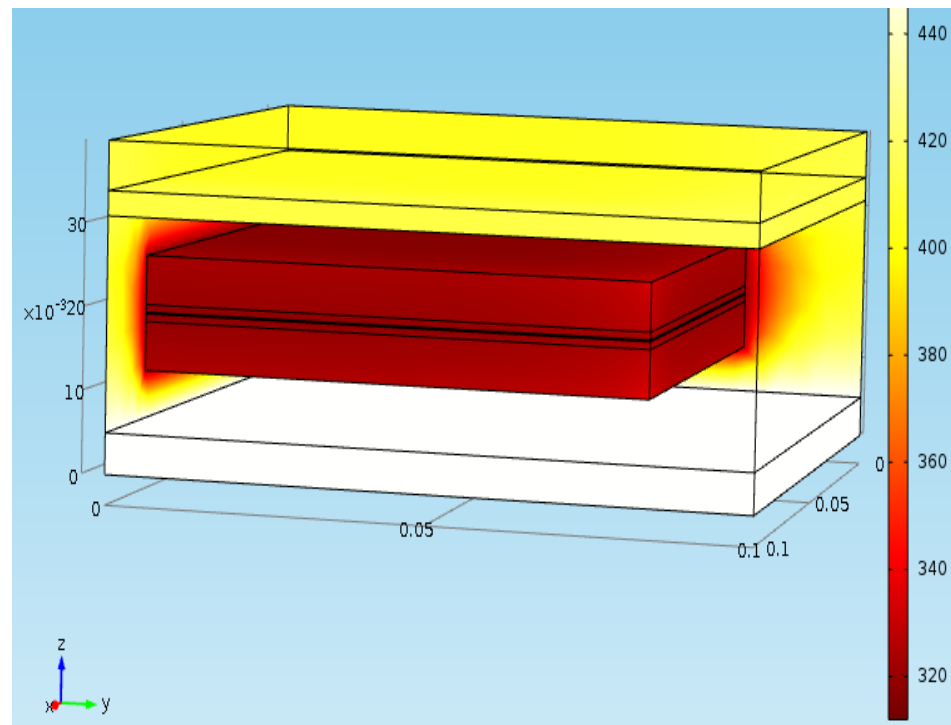


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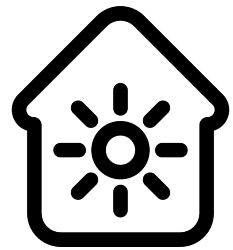
Technical activities

Modeling tool for the lamination process of EPoG elements

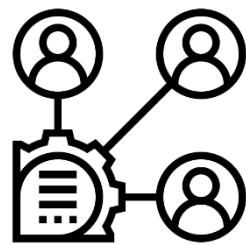




Exploitation activities



Making high-level business decisions to **launch commercialization plans for the establishment of the integrated business model with significant cost reduction for Building Integrated PV (BIPV) solutions, and more specifically for Energy Positive (E+) Glazing**, at European and International level. This involves analyzing market potential, applications, risks and opportunities.



Promote engagement of all the stakeholders through the value chain to ensure the most cost-effective options for significant cost reduction for BIPV solutions using E+ Glazing. Help business customers in determining the economic viability of results tested within Be-Smart when conducting workshops and activities with investors and key stakeholders.



To define the **most appropriate strategy for IPR management among partners**, defining it for each one of the business models and KERs within BE-SMART. IPR Management will be tackled within BE-SMART exploitation plan.





Solar-Terra

by Issol

Château d'Auvernier (NE)



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White Solar

by Solaxess

Boudry (NE)



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When Art & Science meet

by COMPÁZ



Kaleo technology by CSEM



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Be-Smart consortium



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