

Success factors for the integration of Photovoltaic in Buildings: current and future solar cells technologies

EU PVTP Conference 2015 - 8 July 2015, London, UK

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AGC Glass Europe



AGC GROUP

- ▶ 3 main business segments : Glass
 - ▶ Glass
 - ▶ Electronics
 - ▶ Chemicals
- ▶ Sales : € 11 billion
- ▶ 50,000 employees
- ▶ 200 companies in over 30 countries
- ▶ Headquarters and stock exchange listing: Tokyo

AGC product range for building

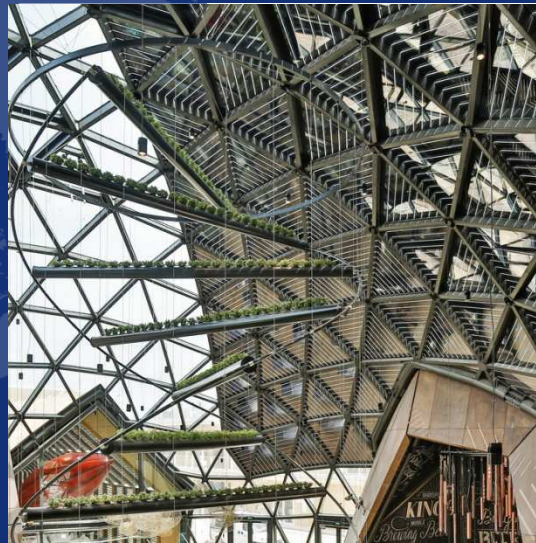


Wide range of
architectural glass solution
Passive / Active glass

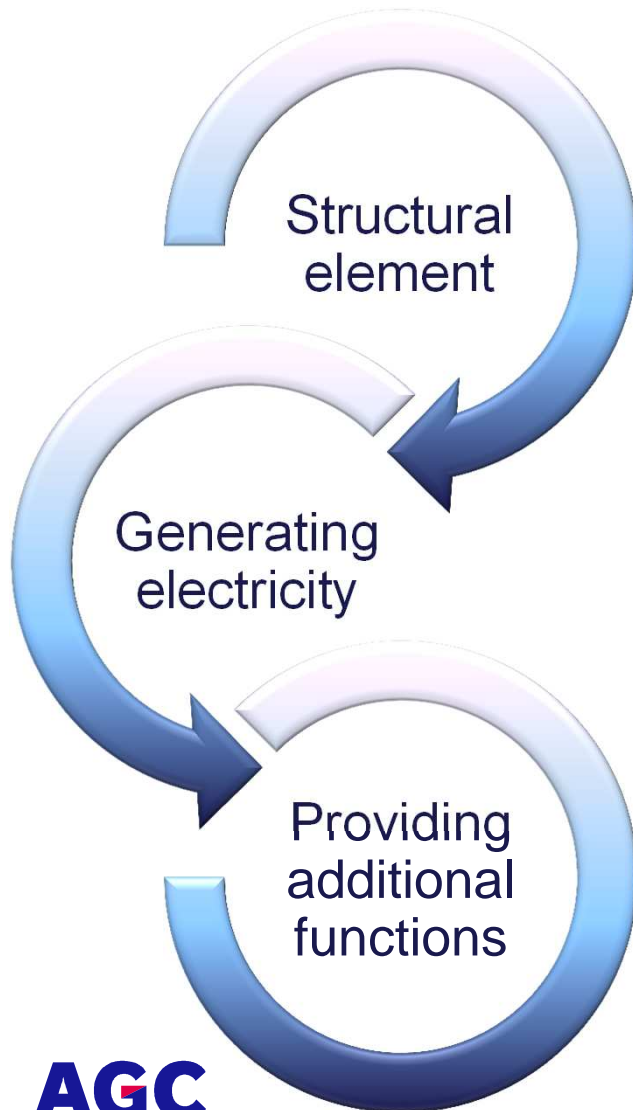


Large range of decorative glass
products specially designed
for interior applications
in homes and businesses

BIPV



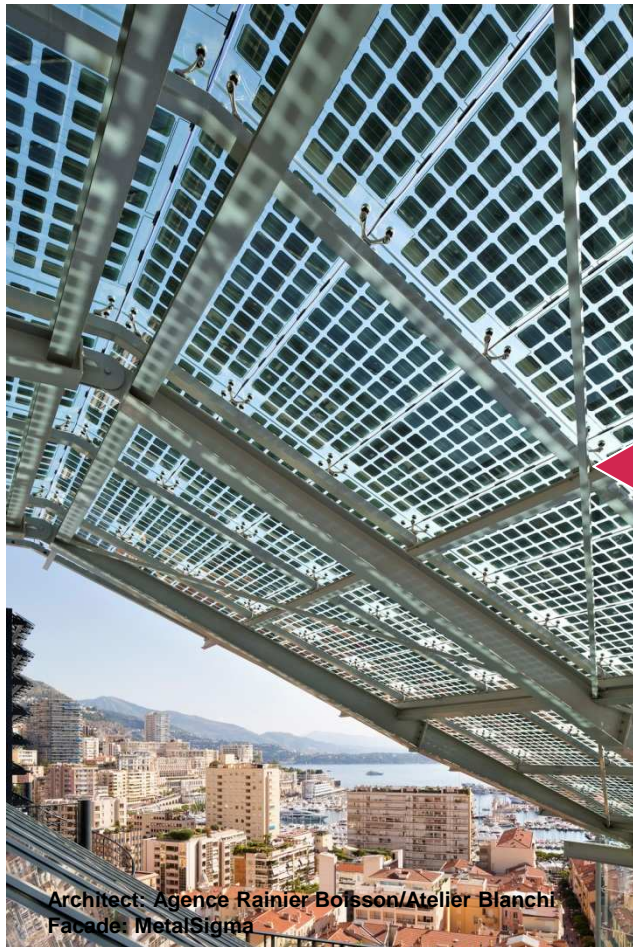
BIPV Specifics



- Replaces conventional building material
- If removed, integrity of the building structure is compromised
- Different from Building Added Photovoltaics (BAPV)
- Orientation, tilt angle, shadows and ventilation far from ideal
- Sunshading
- Daylighting
- Insulation
- Safety
- ...

Must fulfill Building **Standards**, including **aesthetic** expectations

SunEwat® XL: AGC BIPV product range



Architect: Agence Rainier Boisson/Atelier Blanc
Facade: MetalSigma

- Laminated Safety Glass
- Available in Insulated Glass Units: Thermobel SunEwat®
- All dimensions up to 2000x4000mm
- Certifications under both building and photovoltaic standards (EN14449, EN12600, EN1279, IEC 61215, IEC61730)

SunEwat® XL:
Mono / poly crystalline cells



GLASS UNLIMITED

SunEwat[®] XL



- Glass composition: tempered glass extra clear, clear, colored, silk-screened or other
- Glass thickness: 4 – 6 – 8 – 10 – 12mm depending on architectural constraints
- **Certifications:**
 - EN 14449 (Evaluation of conformity: laminated safety glass)
 - EN 12600 (Pendulum safety test)
 - EN 1279 (Evaluation of conformity: Insulated Glass Unit) Including moisture penetration and gas leakage
 - IEC 61215 (Crystalline silicon photovoltaic modules - Design qualification and type approval). Including Factory inspection
 - IEC 61730 class II (Photovoltaic module safety qualification)
- **Warranties:**
 - 10 years on product
 - 10 & 20 years on performances

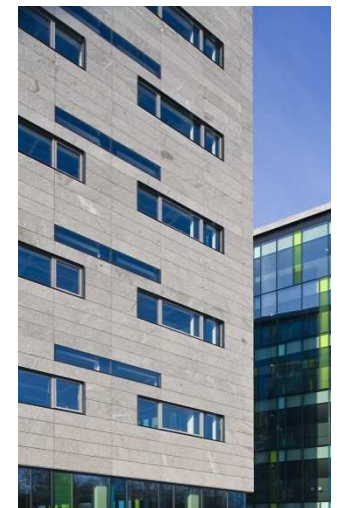
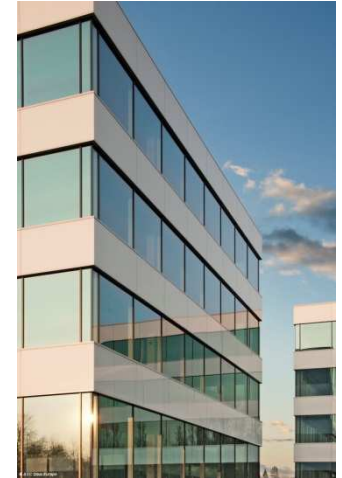
BIPV in spandrels

- Spandrels represent 25 – 70% of facade totale surface
- The use of opaque spandrels allows highest installed power

	Spandrels	Vision glass		
Cells per m ²	36	28	24	16
Light Transmission (%)	0	25	33	49
Power (Wp/m ²)	146	116	99	66



Thermal challenge due to insulation



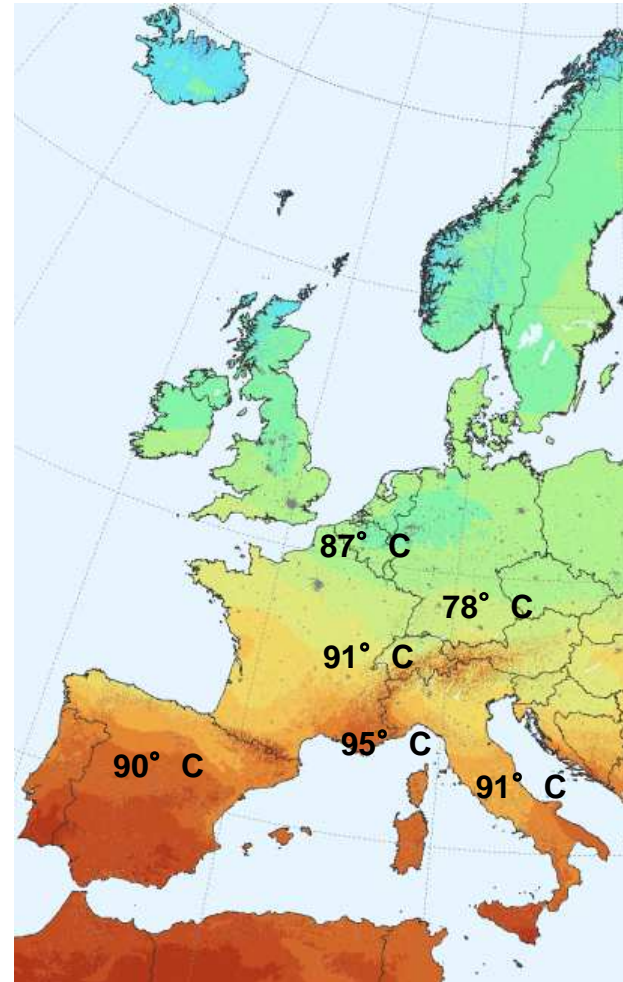
BIPV in Spandrels: the thermal challenge

Maximum potential temperature must be determined for each project.

Orientation	Time	Max. temperature (° C)
South	Summer	69
South East	Summer	75
South West	Summer	83
South West	Autumn	95

Maximum temperature Toulon (F). Source: AGC internal

BIPV spandrels must be adapted to high thermal load.



Interlayer maximum temperature in BIPV spandrel applications (Source: AGC internal)

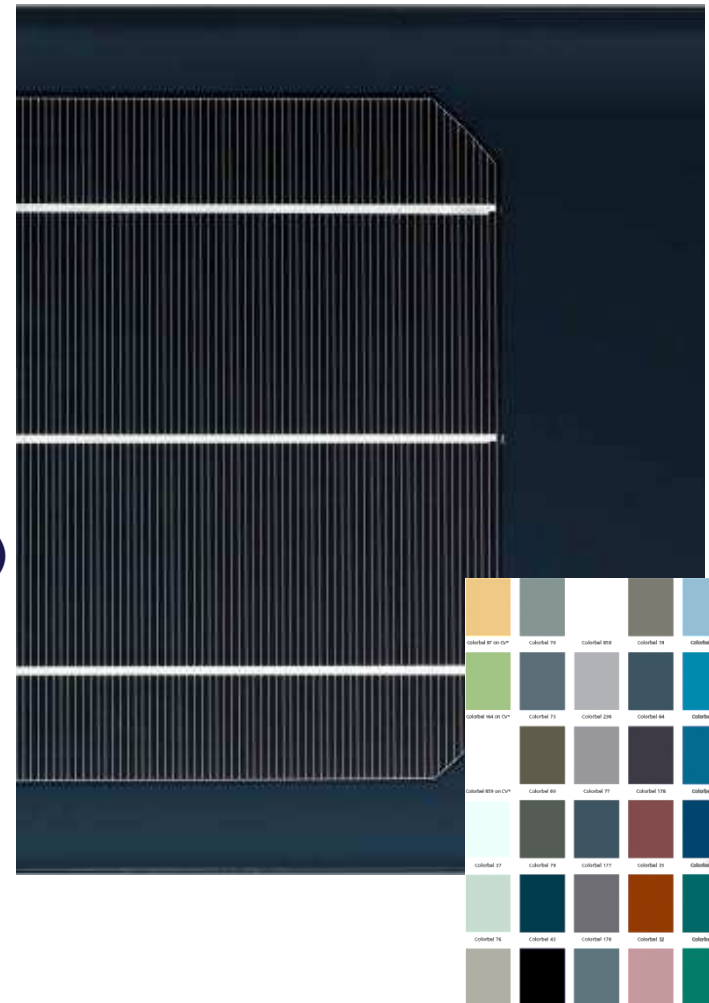
New product: SunEwat® XL for spandrels

SunEwat XL product features:

- Dimensions and compositions versatility up to 2.0x4.0m
- Laminated Safety Glass
- Certified under both Building and Photovoltaic standards

Multiple colors available for back glass (silk screen)

Product guaranteed for applications **up to 100° C**



BIPV Success Factors

PV

- Efficient and durable
- High performance in building environment (low light, no ventilation,...)

Building

- Easily adaptable to the broad variation in size and shape
- High visual uniformity and color quality

Tools

- Integration in the very early design phase of the building
- Quantify not only the energy but also the additional benefits

Cost

- LCOE comparable to that of standard PV roof panels
(additional cost compared to equivalent “non-PV” building element)

Gap analysis with Crystalline solar cells

PV

- Efficient and durable
- **High performance in building environment** (low light, no ventilation,...)

Building

- **Easily adaptable to the broad variation in size and shape**
- **High visual uniformity and color quality**

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AGC BIPV Roadmap

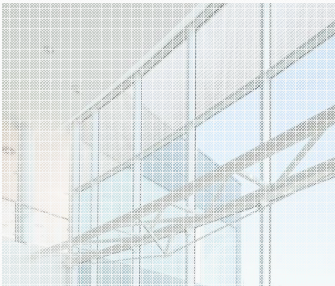
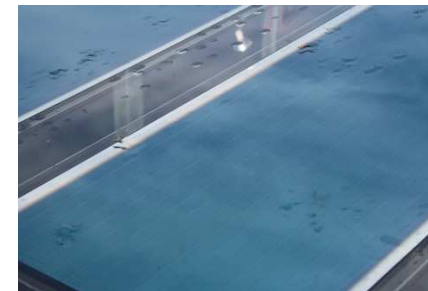
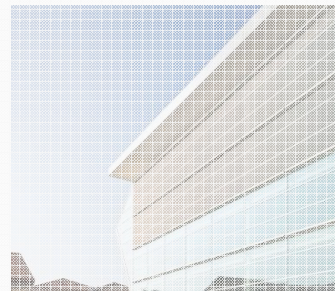
Applications

Vision Glass

Spandrels

Sunshades

Stepped out



Technologies

1st generation:
c-Si cells

2nd generation:
Thin Film (a-Si)

3rd generation:
OPV, DSSC...

BIOPV

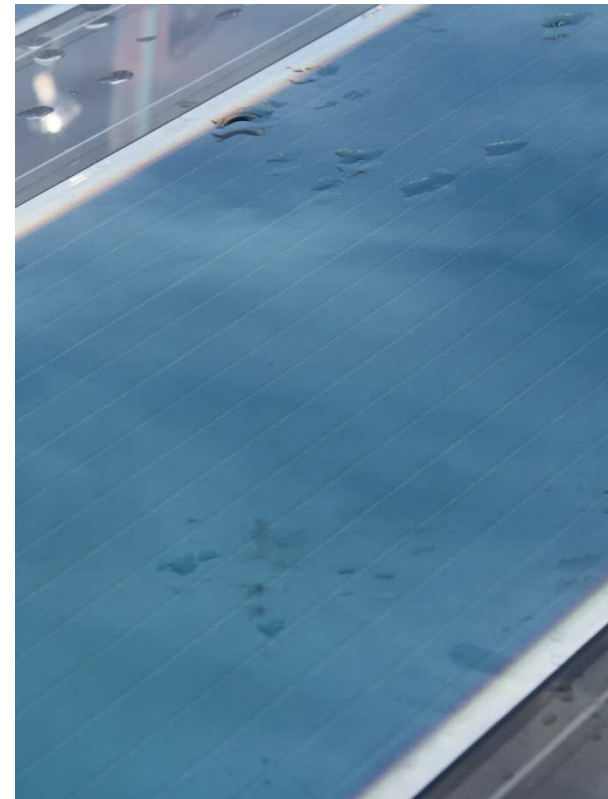


Heliatek and AGC signed a development agreement to integrate organic solar films in glass

AGC targets

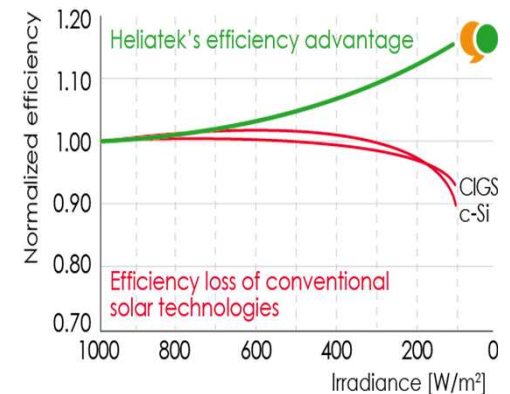
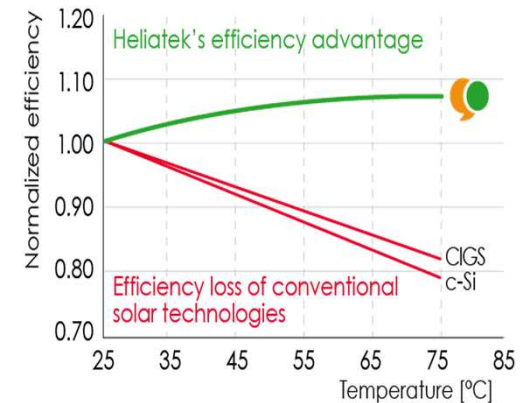
Integration of Heliofilm ® in Laminated Safety Glass

Delivery of integrated solutions for the glass envelope of buildings



Expected AGC BIPV value proposition with Heliafilm®

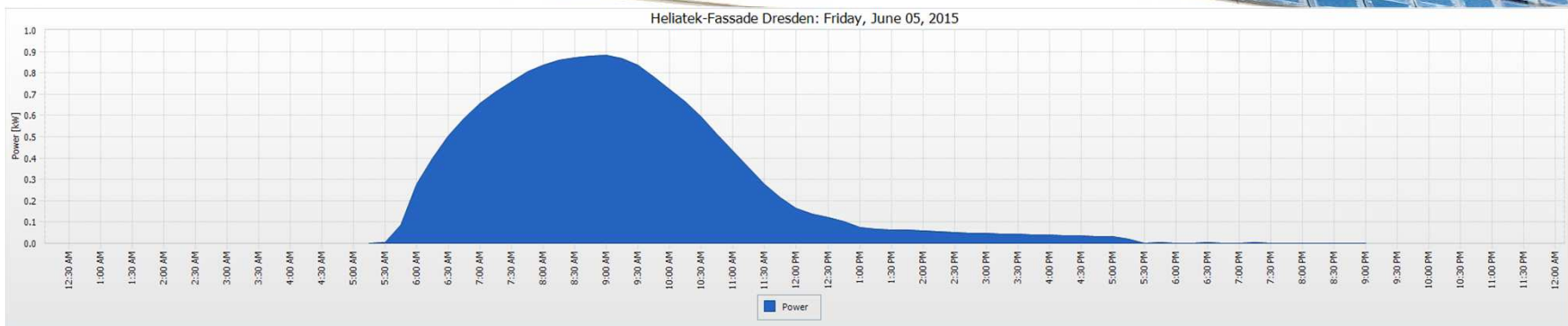
- Products for facade applications due to superior harvesting factor
- High temperature resistance products for spandrel applications
- Laminated glass for high durability
- High level of customization
- Short energy payback time



Source  Heliatek
Say hello to solar. Wherever you are.

SunEwat with Heliafilm[®] - pilot realisation

- Dresden, Germany
- 36 m², 960 Wp



Thank you for your attention

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www.yourglass.com