






What are the needs of the PV industry to further enable the developments? Alexander Werner, Bosch Solar CISTech

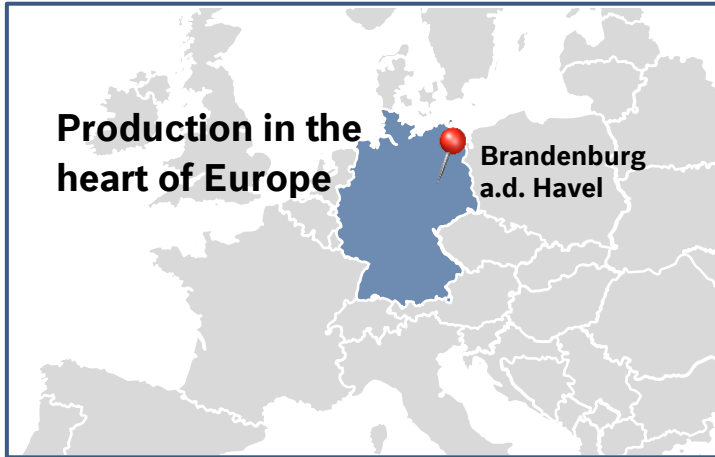
Reaching out for opportunities in BIPV

Bosch 2014 key figures

Bosch Group	<ul style="list-style-type: none">→ 48,9 billion euros in sales→ 290,000 associates→ 360,000 associates as per April 1.15*		
Mobility Solutions	<ul style="list-style-type: none">→ One of the world's largest suppliers of automotive technology	68% share of sales	
Industrial Technology	<ul style="list-style-type: none">→ Leading in drive and control technology, packaging, and process technology	32% share of sales	
Energy and Building Technology	<ul style="list-style-type: none">→ Leading manufacturer of security technology→ Global market leader of energie-efficient heating products and hot-water solutions		
Consumer Goods	<ul style="list-style-type: none">→ Leading supplier of power tools and accessories→ Leading supplier of household appliances		

*including BSH Hausgeräte GmbH (formerly BSH Bosch und Siemens Hausgeräte GmbH) and Robert Bosch Automotive Steering GmbH (formerly ZF Lenksysteme GmbH).

Bosch Solar CISTech at a Glance



- Solution provider for energy facades
- Outstanding module aesthetics with high efficiency
- Numerous energy facade projects
- Proprietary, proven and patented CIGS technology
- Technology development driven by energy facade requirements
- About 160 employees

Bosch Solar CISTech offers energy facade solutions - high technology and modern aesthetic for electrifying architecture. Invented for life.



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Comparison of valid regulations

PV world

- LVD – Low Voltage Directive
 - IEC 61646
 - Future 61215-1-4
 - IEC 61730
 - Inverter
 - Cable
 - Plugs

- **Product Safety requirements**

BIPV world

- PV regulations
- Glass
 - DIN EN ISO 12543
 - EN 14449
- Structural Sealant Glazing
- Published EN 50583
 - “Photovoltaic in buildings”
- To be developed
 - Building products directive
 - Future ISO 18178
- “Glass in building – Laminated solar photovoltaic glass for use in building.”

Regulations in the BIPV world are much more extensive



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Comparison of product and market requirements

PV world

- Most important requirements: power, reliability
- Highest yield under best conditions (STC 1000 W/m²)
- Standardization
- Reducing BOS costs



Mass production of standard modules

BIPV world

- Most important requirements: design, safety, fire resistance
- Resistance against shading
- Low system voltage
- Good yield under non-optimal conditions



Project related production of modules



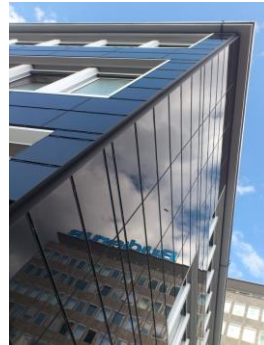
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Examples of project related product requirements

- Energy facade project Kassel
 - Different front glasses



- Energy facade project Wetzlar
 - Customized module sizes



- Requirements of BIPV projects can affect:
 - glass thickness, glass colour, glass structure, module dimension, module frame, cell layout, mounting structure and components, layout and components of interconnection



Who is involved in a BIPV project?

Stakeholder

- Building owner
- Architect
- General Contractor
- Facade Company
- Specialist Planner (TBE)
- Structural Engineer
- Installer (mechanic)
- Installer (electric)
- Building and construction authority



Ascent Project, Singapore

An early involvement of the energy facade supplier in BIPV projects and a very good collaboration between the stakeholders are essential



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What are the needs of the BIPV industry to further enable the developments?

Regulations

- Building products directive
- Building energy efficiency



- Its necessary to define harmonized BIPV regulations including safety standards

Products

- Each BIPV project has its own requirements
- There is no BIPV standard product



- Early involvement in upcoming BIPV projects to discuss the requirements and solutions
- Closer collaboration of building and BIPV industry



Thank you for your attention.

Contact information

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eFacade

Electrifying architecture.



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