



Ultralight Roof Systems and Solar Technologies for Membrane Structures

Dr.-Ing. Jan Cremers
SolarNext AG/ Hightex Group



Hightex Group plc, London



Hightex International AG, Switzerland

Hightex GmbH, Germany

Hightex Limited, United Kingdom

Hightex Structures Ltd., South Africa

Hightex Pty. Ltd., Australia

Hightex Americas LLC, USA

Metal-System Küstrin Sp.zo.o, Poland
(50 % stake)

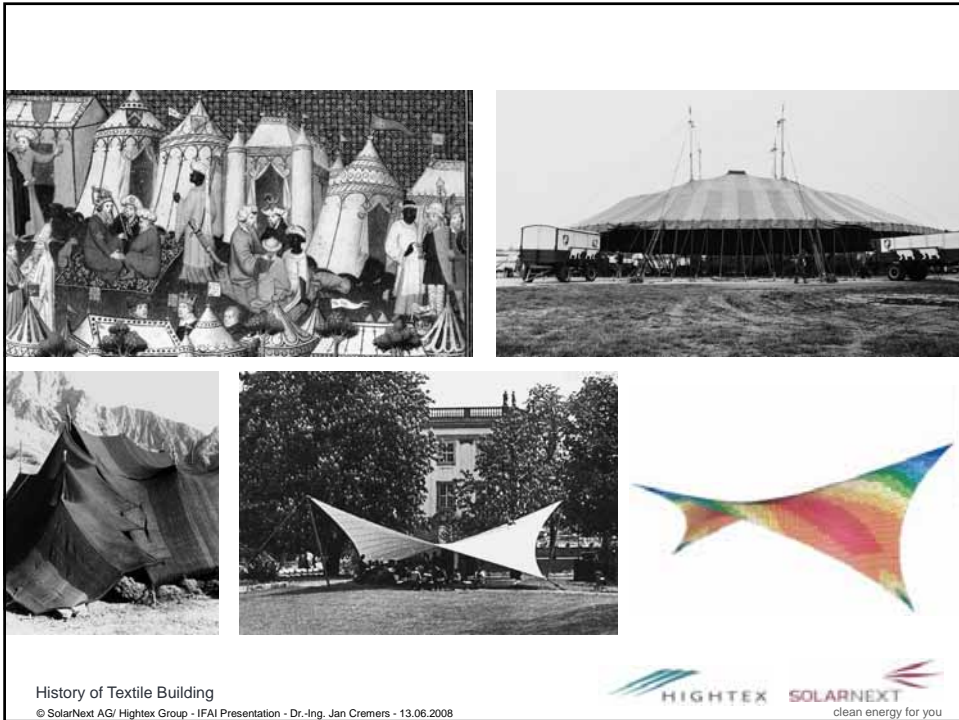


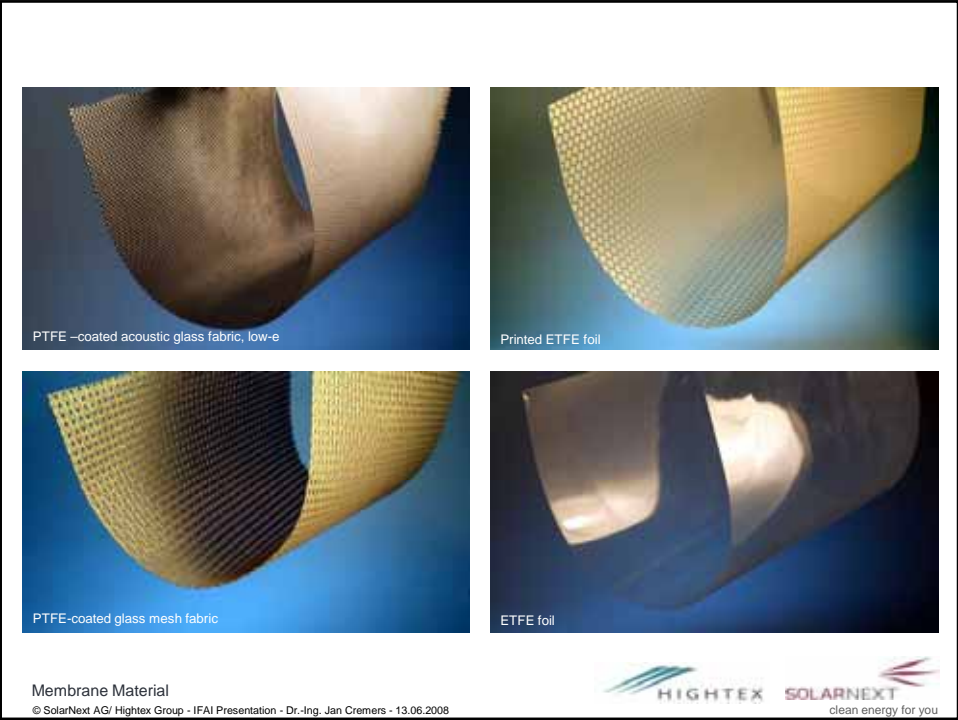
SolarNext AG, Germany



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World of Membranes





Busan Stadium, South Korea



Client: City of Busan, South Korea
Architect: Space Group
Engineer: Krebs & Kiefer, Berlin, Germany,
Schlaich Bergermann & Partners, Stuttgart
W. S. Atkins Consults
Contractor: Hyundai Eng. & Constr. Co. Ltd., Busan
Material: 55,000 m² PTFE-coated glass fabric
Year: 2001



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Busan Stadium, South Korea



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Busan Stadium, South Korea



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Olympic Stadium Berlin, Germany



Client: City of Berlin, Germany
Architect: gmp architects, Berlin, Germany
Engineer: Krebs & Kiefer, Berlin, Germany,
Schlaich Bergermann & Partners, Stuttgart
Contractor: Walter Bau AG, Berlin, Germany
Material: 60,000 m² PTFE-coated glass fabric
60,000 m² Mesh fabric
Year: 2002-2004

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Olympic Stadium Berlin, Germany



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Burj Al Arab, Dubai, UAE



Client: Jumairah Beach Resort LLC, Dubai
Architect: W. S. Atkins, Overseas / UK
Engineer: Al Habor Engineers, Abu Dhabi, UAE
Fletcher Construction, Auckland
Murray & Roberts, Bedfordshire, S. Africa
Material: 15,000 m² PTFE-coated glass fabric
Year: 1999

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Clarke Quay, Shopping Street, Singapore

Architect: Alsop, Singapore/ 2005/06



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Architect: Alsop, Singapore/ 2005/06



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Clarke Quay, Shopping Street, Singapore

Architect: Alsop, Singapore/ 2005/06



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Clarke Quay, Shopping Street, Singapore

Architect: Alsop, Singapore/ 2005/06



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Josefsburg Kufstein, Austria



Client: Stadtwerke Kufstein GmbH, Austria
Architect: Nikolai Kugel Architects, Stuttgart, Germany
Engineer: Alfred Rein Engineers, Stuttgart, Germany
Material: 2,000 m² PTFE fabric
Year: 2006

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Josefsburg Kufstein, Austria



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Josefsburg Kufstein, Austria

Kugel & Rein Architekten und Ingenieure, Images: www.smart-design.at



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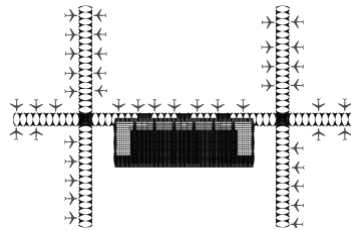
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Suvarnabhumi Airport Bangkok, Thailand



Client: Royal Thai Government, Thailand
Architect: Murphy/Jahn, Chicago, USA
Engineer: Werner Sobek Ingenieure, Stuttgart, Germany
Contractor: ITO Joint Venture, Thailand
Material: 108,000 m² PTFE-coated glass fabric
108,000 m² Open weave glass fabric Low-e
102,000 m² Polycarbonate Sheets
Year: 2003 - 2005



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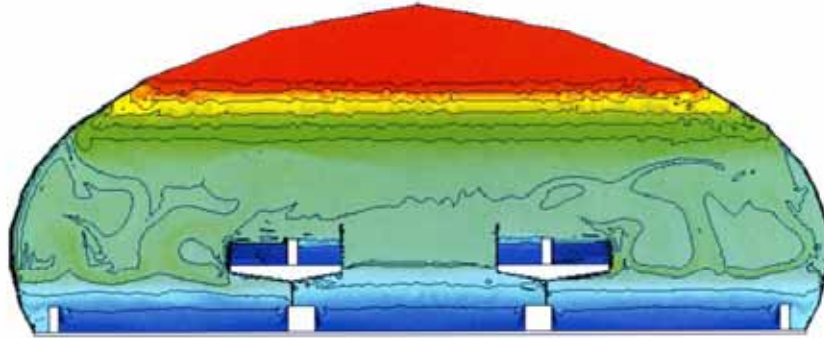
Suvarnabhumi Airport Bangkok, Thailand



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Suvarnabhumi Airport Bangkok, Thailand

Source: Transsolar Energietechnik München

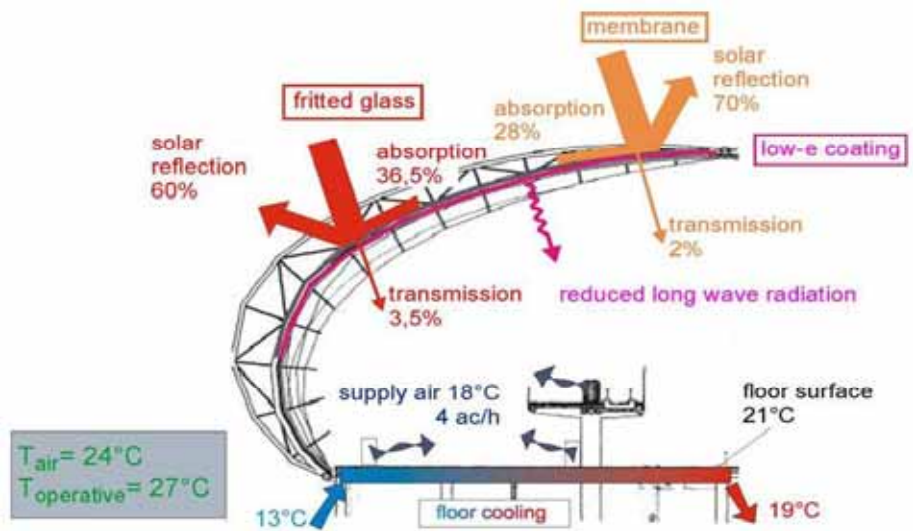


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Suvarnabhumi Airport Bangkok, Thailand

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Suvarnabhumi Airport Bangkok, Thailand



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The Alnwick Garden, Visitor Centre & Pavilion, Northumberland, UK



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The Alnwick Garden, Visitor Centre & Pavilion, Northumberland, UK



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The Alnwick Garden, Visitor Centre & Pavilion, Northumberland, UK



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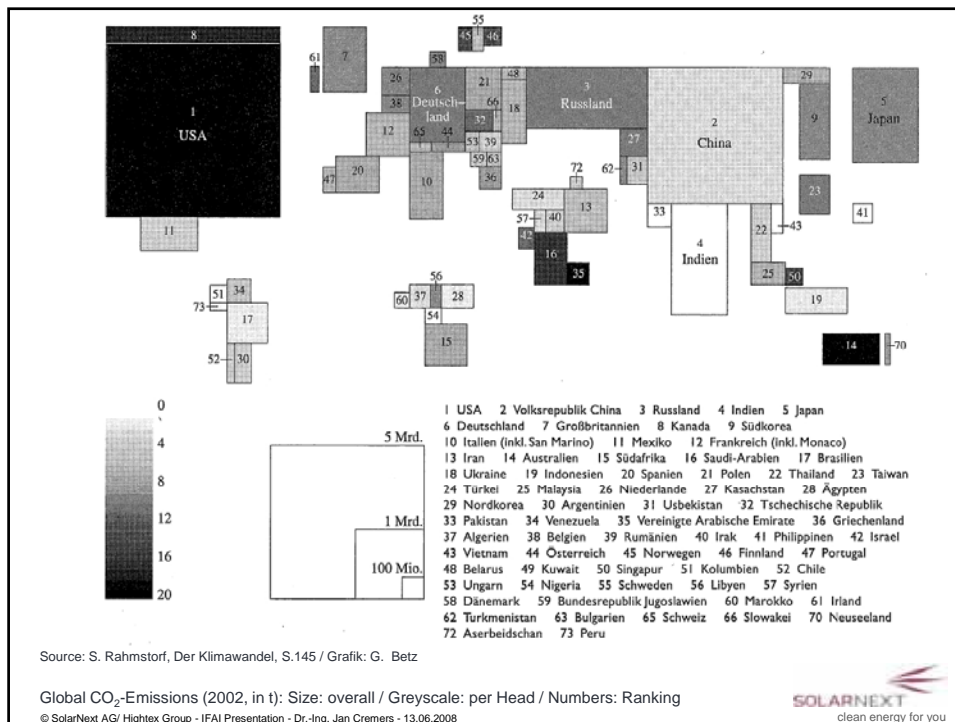
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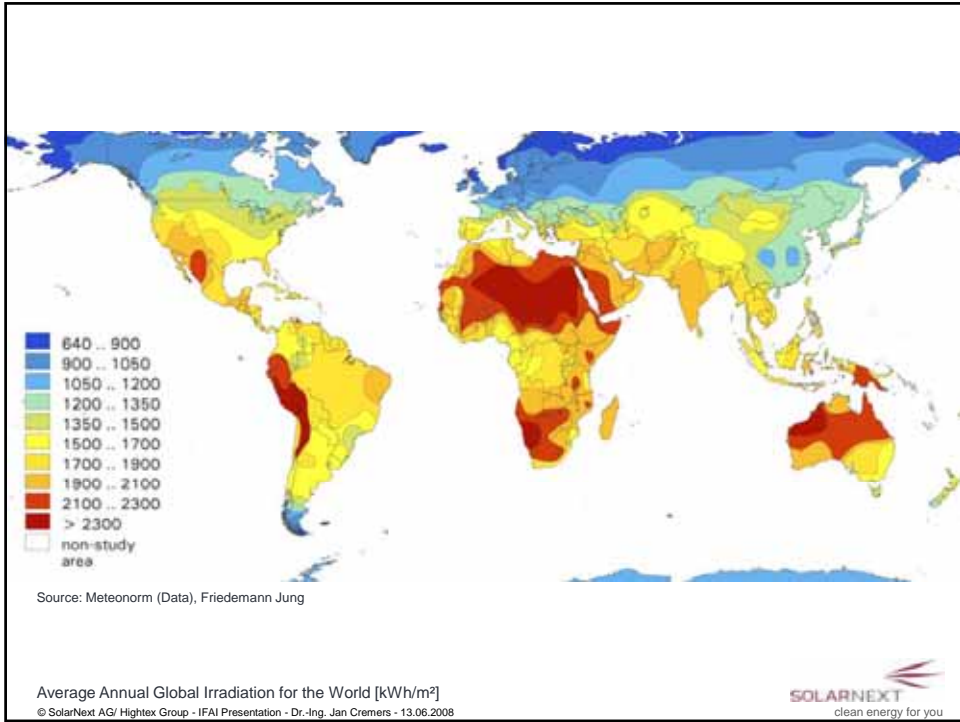


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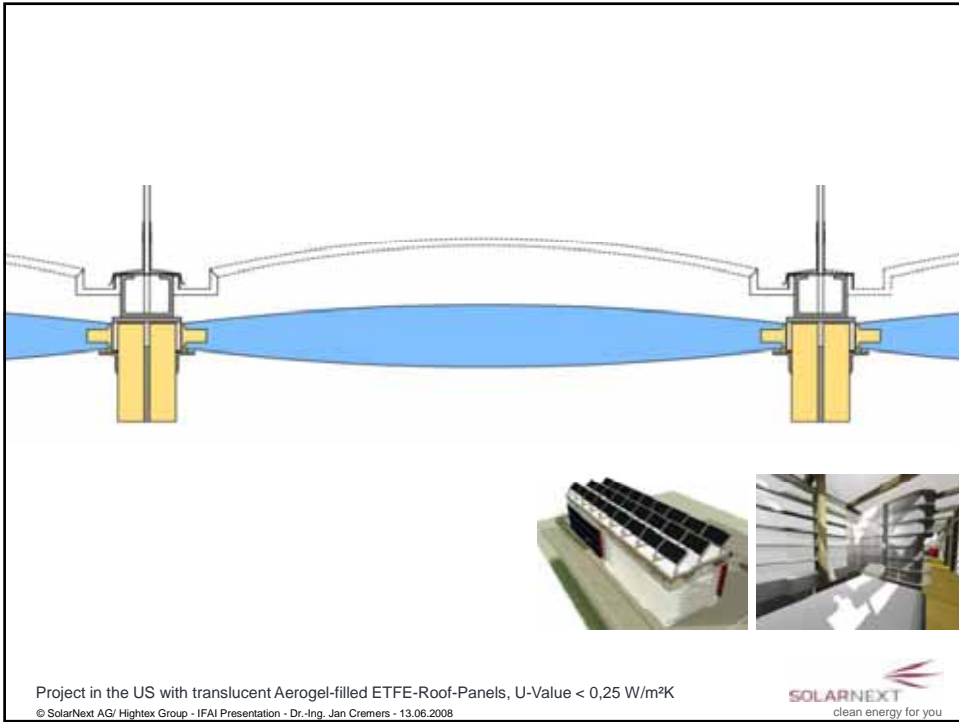
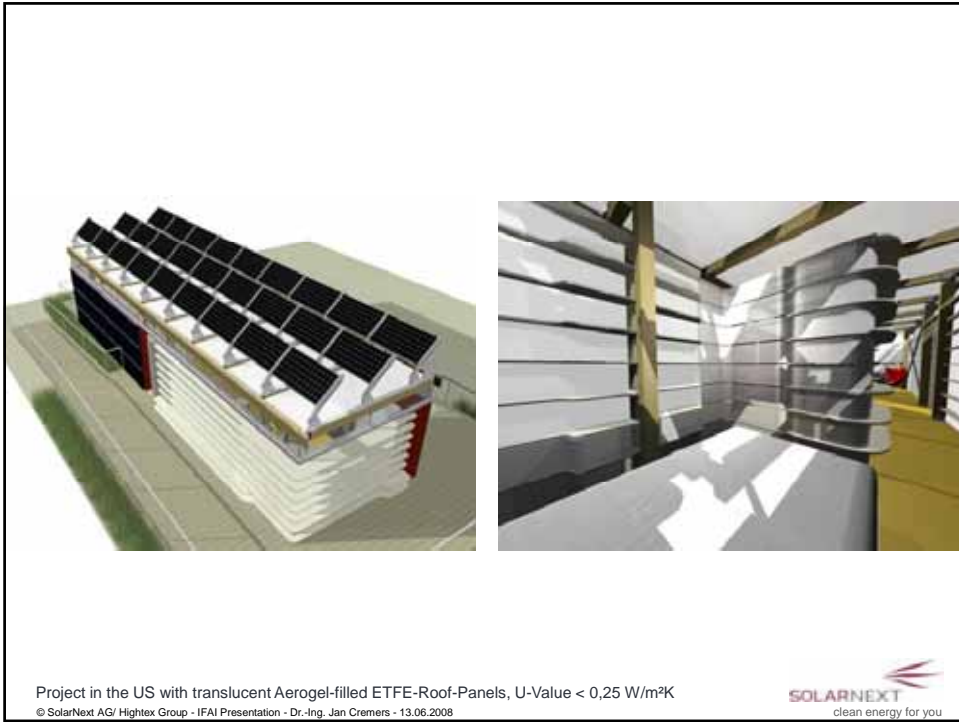
clean energy for you
Intelligent Building Envelopes





Intelligent Building Envelopes
AeroTherm -
 Translucent Insulation for Membranes







Project in the US with translucent
Aerogel-filled ETFE-Roof-Panels,
U-Value < 0,25 W/m²K

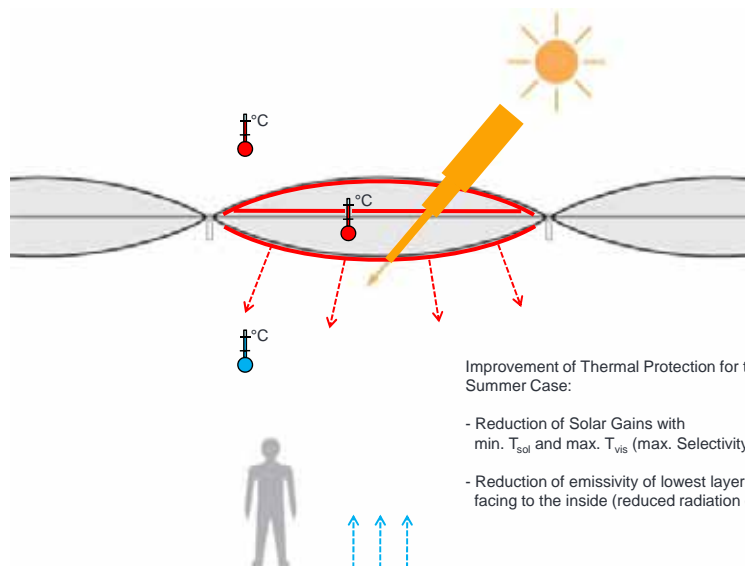


Project in the US with translucent Aerogel-filled ETFE-Roof-Panels, U-Value < 0,25 W/m²K
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Intelligent Building Envelopes ETFE+ / Innovative Functional Coatings



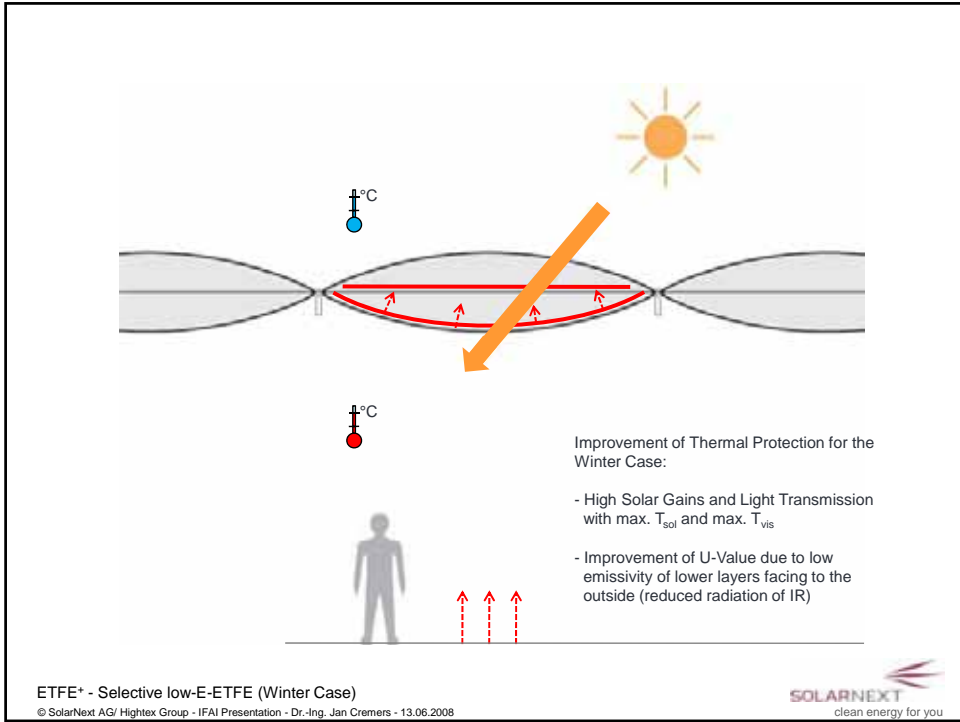
Improvement of Thermal Protection for the Summer Case:

- Reduction of Solar Gains with min. T_{sol} and max. T_{vis} (max. Selectivity)
- Reduction of emissivity of lowest layer facing to the inside (reduced radiation of IR)

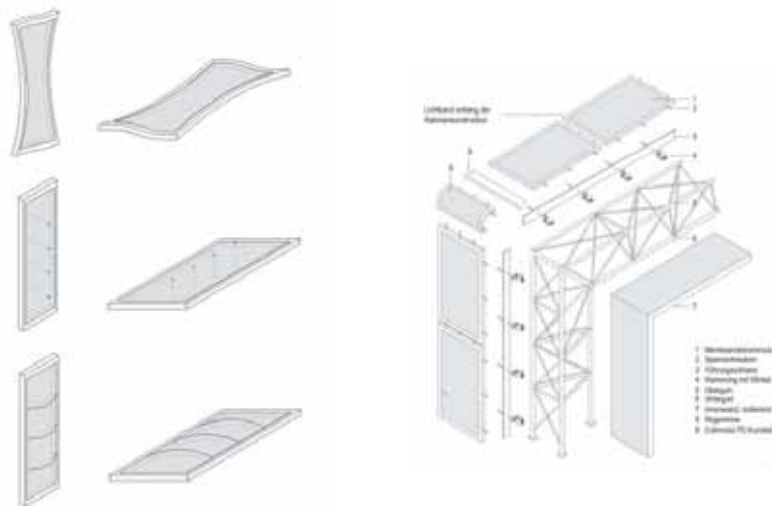
ETFE+ - Selective low-E-ETFE (Summer Case)

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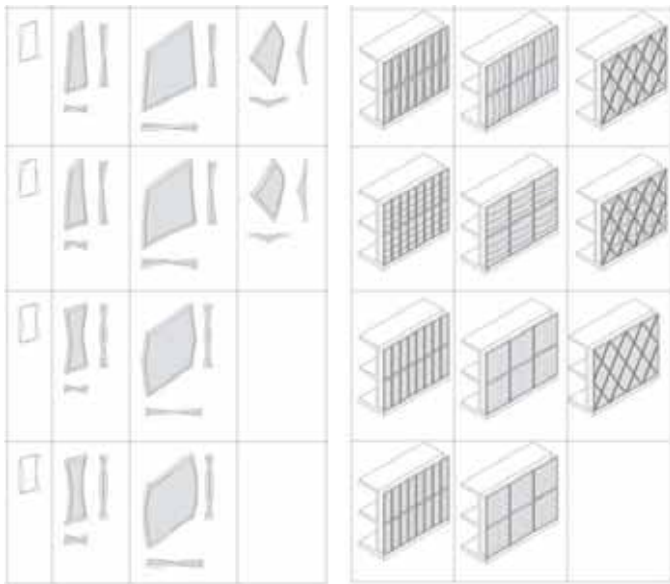


Modular Building Envelopes Standardized Membrane Elements



Basic Module Elements and their Assembly
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Typology of Membrane Modules

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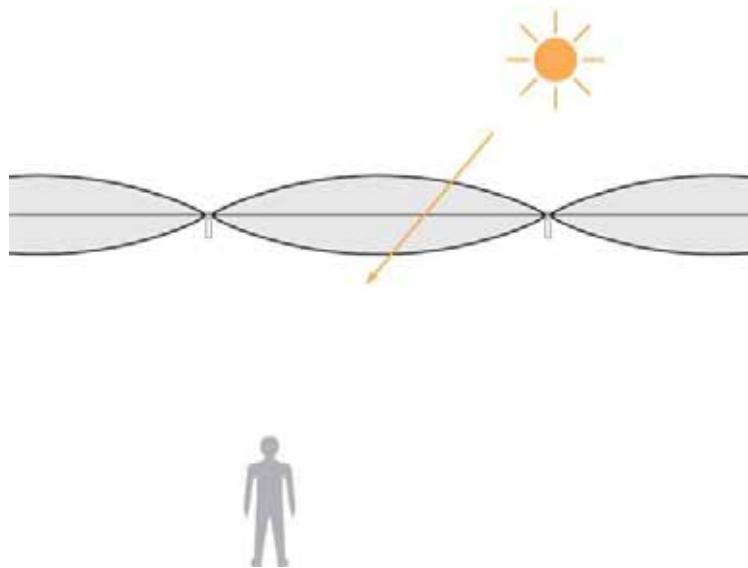


Prototype of a Membrane Facade Element

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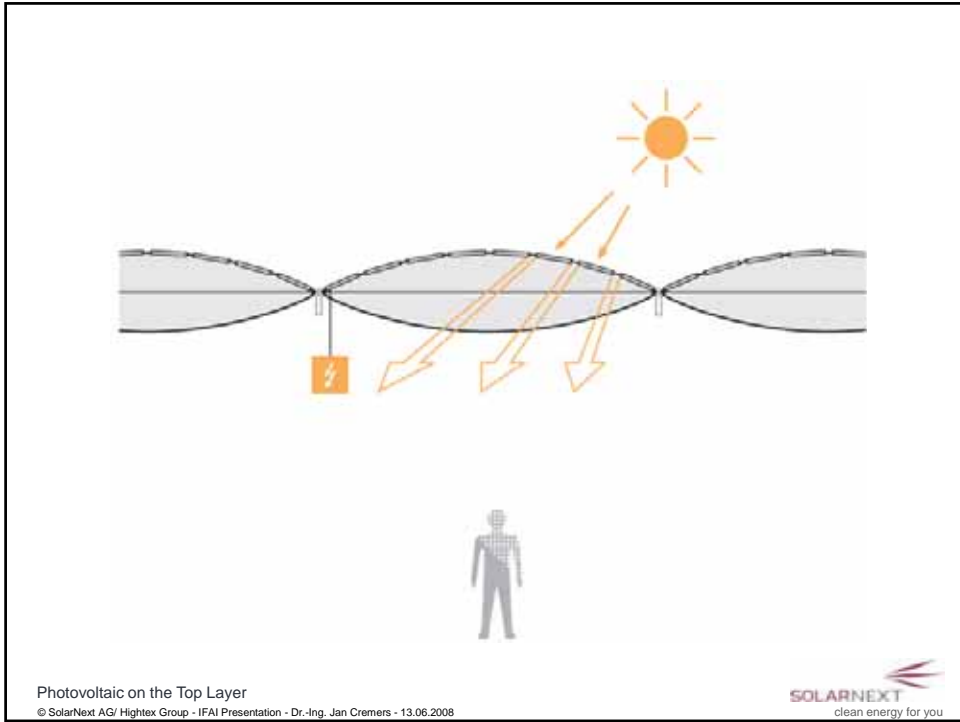


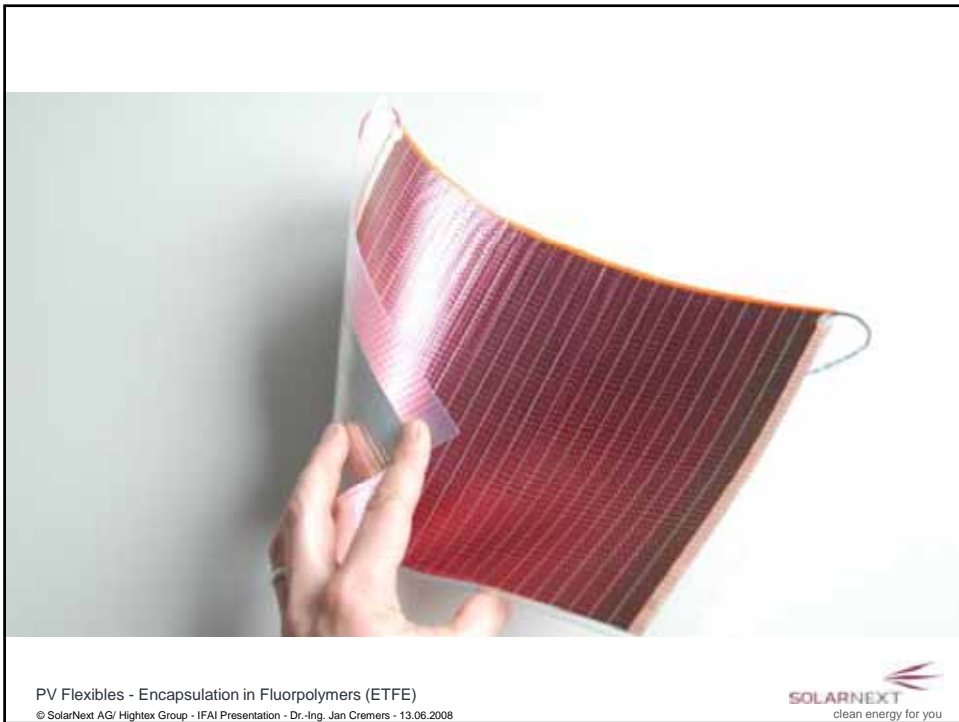
Intelligent Building Envelopes
PV Flexibles -
Integrated Photovoltaics on Membranes

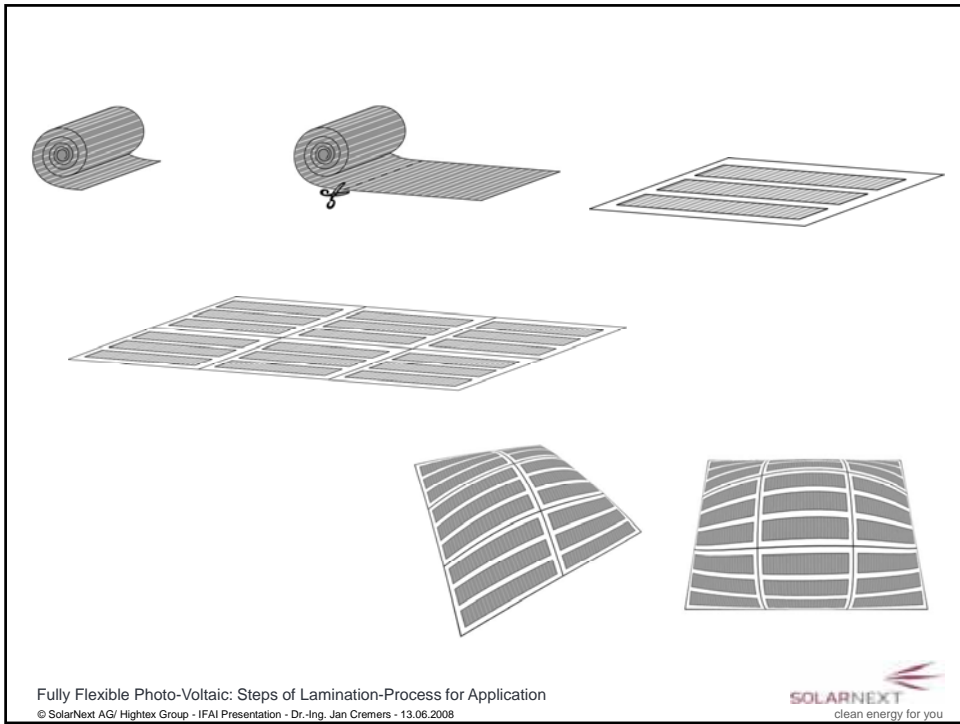


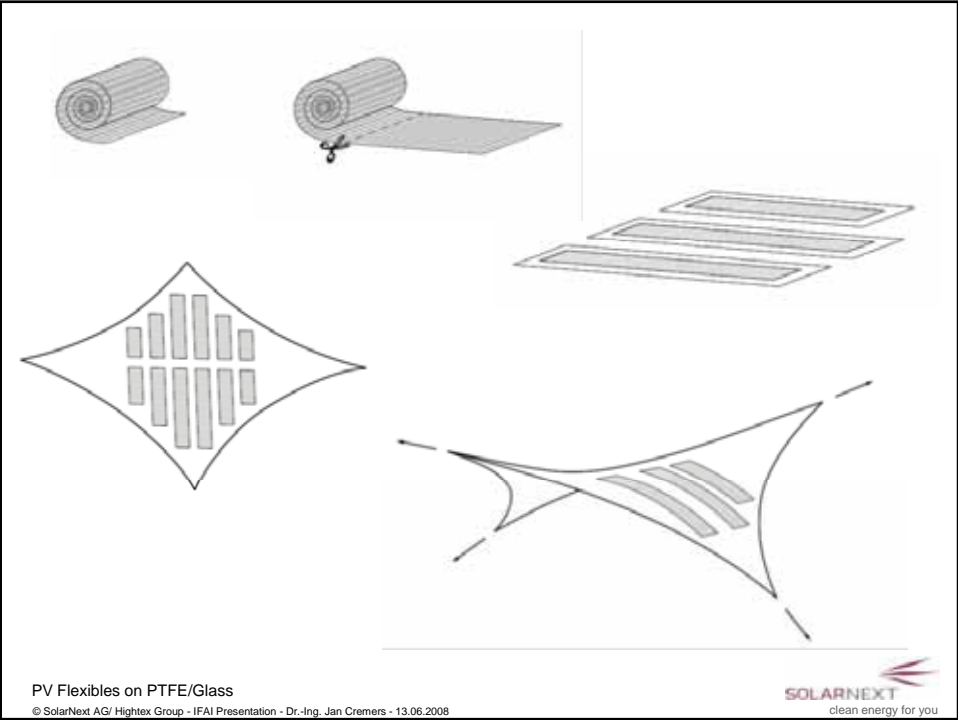
Photovoltaic (PV) Application on Inflatable or Other Membrane Constructions
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PV Flexibles on PTFE/Glass

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Basic Calculation of Power Output and Payback, Sample Scenario (for Stuttgart Stadium, 1993)

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Basic Calculation for Sample Stadium Roof
(with an assumed size of the Gottlieb-Daimler Stadium, Stuttgart)

PV-Technology	flexible a-Si thin-film, integrated in Membrane	
Power / m ²	~45-50 Wp	
Gross Roof Area	34,000 m ²	
... thereof used for PV	80 %	
Area with integrated PV	27,200 m ²	
... PV cover ratio (25 % of the area translucent)	75 %	
PV-Cell-area	20,400 m ²	
Installed PV Power	~918 kWp	
Annual Global Solar Irradiation	1,100 kWh/m ²	
Estimated Annual Power Output	730,000 kWh/a (@ approx. 800 kWh/kWp)	
Payback (43,99 Ct / kWh)*	~322,000 €/a	
CO ₂ -Reduction*	~650 t / year	

Basic Calculation of Power Output and Payback, Sample Scenario (* Values for Germany, 2008)
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Gottlieb-Daimler-Stadium, Stuttgart, Germany
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Gottlieb-Daimler-Stadium, Stuttgart, Germany (including PV, Computer Rendering)
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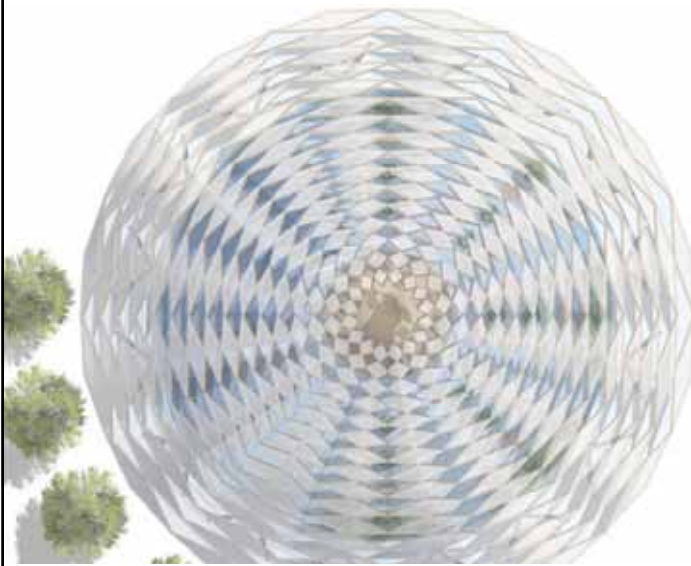


Architects: Lang Hugger Rampp, München

Photovoltaic integrated in Membrane Structure (Exclusive Restaurant Project)
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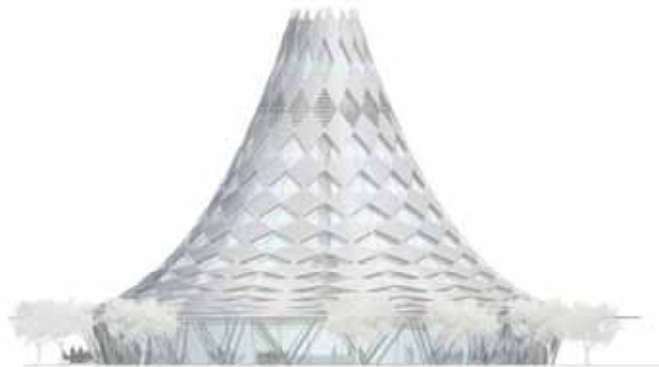
Architects: Lang Hugger Rampp, München



Photovoltaic integrated in Membrane Structure (Exclusive Restaurant Project)
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Elevation 1.200

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Photovoltaic integrated in Membrane Structure (Exclusive Restaurant Project)

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