


Energy-efficient building

PowerShade MicroShade

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PhotoSolar PowerShade and MicroShade

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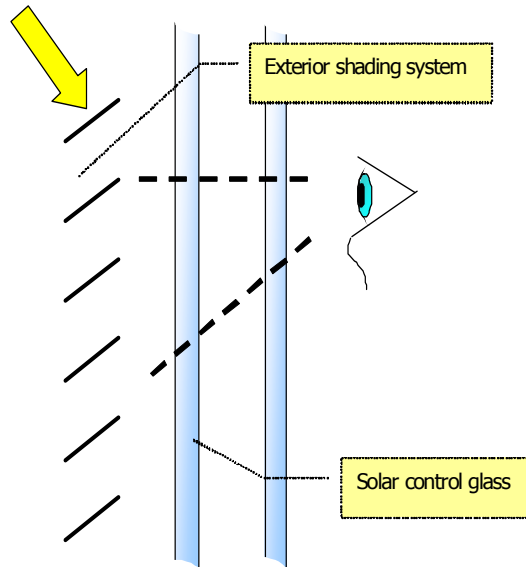
- Introducing the PhotoSolar concept
- Introduction to the products
- Advantages of PowerShade
- Advantages of MicroShade
- Pictures from pilot installations
- The Nordea case simulation
- More information

Conventional solar shading - and the PhotoSolar alternative

Conventional solar shading:

(Exterior lamellas or screens)

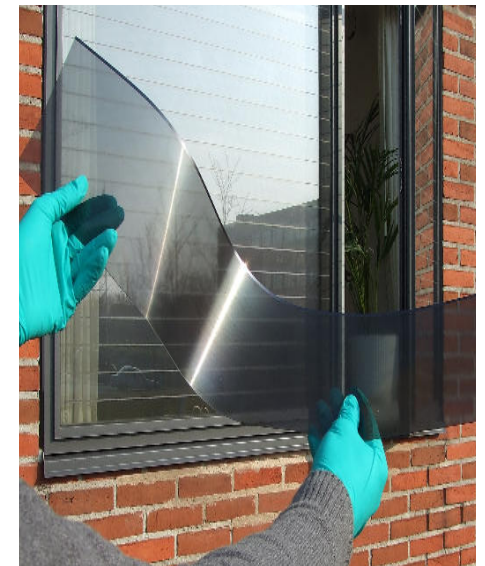
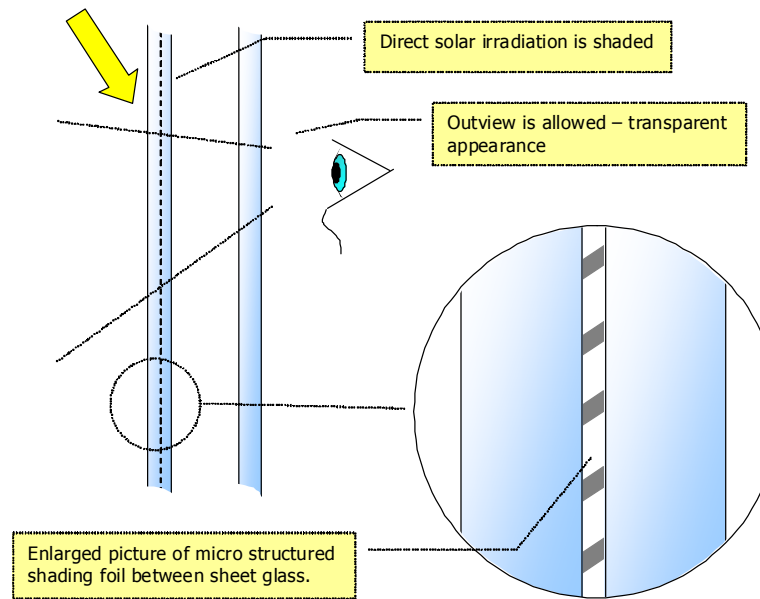
- Efficient
- Expensive
- Cleaning and maintenance issues



The PhotoSolar concept:

(Micro-structured shading embedded in front glass)

- Same efficiency as exterior solutions
- Competitive price
- Less cleaning and no maintenance



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PowerShade and MicroShade

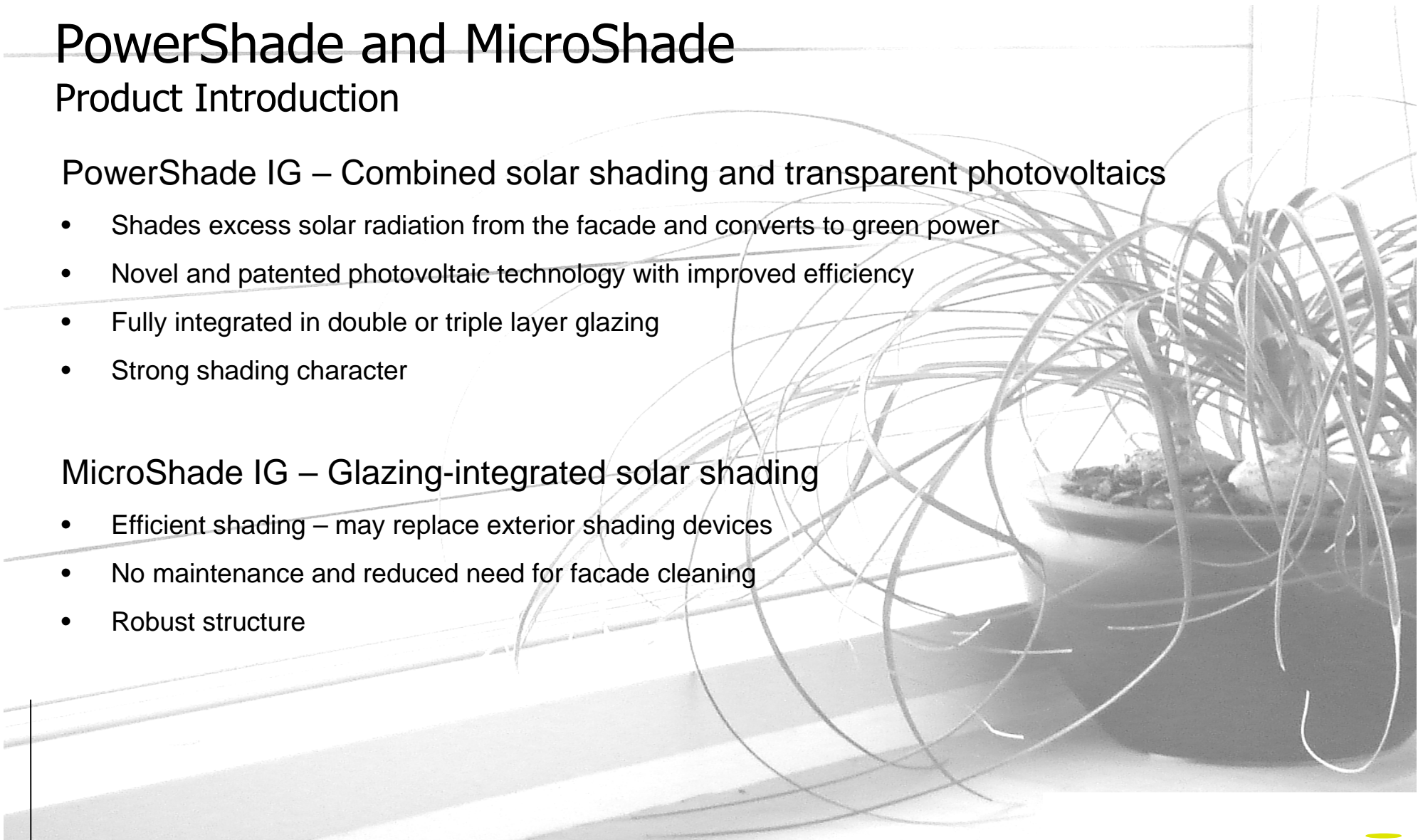
Product Introduction

PowerShade IG – Combined solar shading and transparent photovoltaics

- Shades excess solar radiation from the facade and converts to green power
- Novel and patented photovoltaic technology with improved efficiency
- Fully integrated in double or triple layer glazing
- Strong shading character

MicroShade IG – Glazing-integrated solar shading

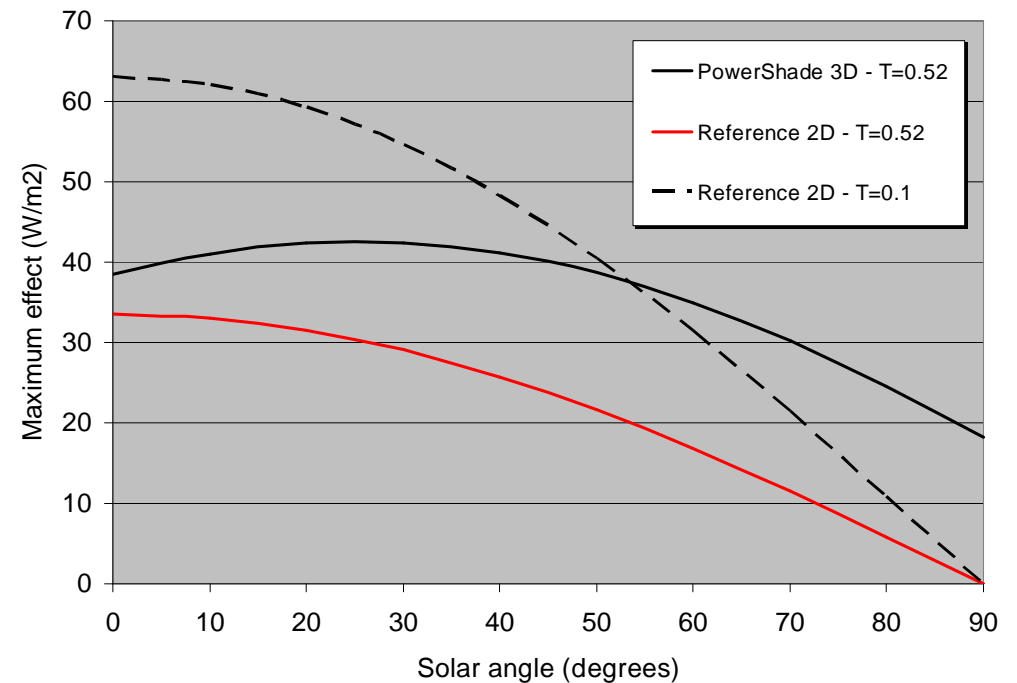
- Efficient shading – may replace exterior shading devices
- No maintenance and reduced need for facade cleaning
- Robust structure



Advantages of PowerShade IG

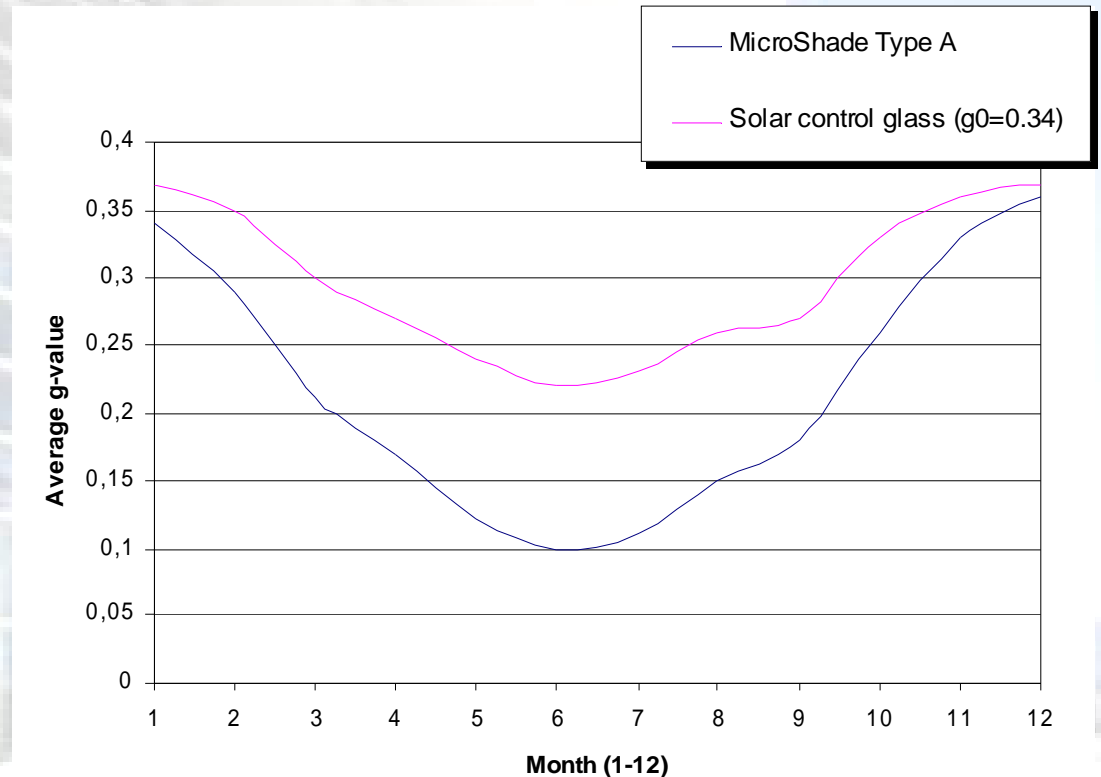
- **High Efficiency** – The 3D PV technology provides more power than 2D PV modules with same transparency.
- **Neutral in colour** – no colouring of the transmitted light. Reflected colour is dark gray or black (outside view).
- **Customized design** – Size and module layout is customer specified. Full or partial coverage of glass and gradient modules are possible.
- **Electrical output** – 50 kWh/m² per year when mounted in vertical facade.
- **Simple installation and robust products** – no moving parts, sensitive parts are protected by glass structure.
- **Clean technology** – no hazardous waste.

Electrical effect on facade - comparison
Conversion efficiency: 7%
Vertical installation
Beam intensity: 1000W/m²



Advantages of MicroShade IG

- **Robust design** – shading integrated in glazing
- **Neutral in colour** – no colouring of the transmitted light. Reflected colour is dark gray or black (out side view).
- **Customized design** – Size and module layout is customer specified. Full or partial coverage of glass and gradient modules are possible.
- **Progressive shading** – effective g-value in the range from 0.12 to 0.36. Low in summer – high in winter.
- **Simple installation and robust products** – no moving parts, sensitive parts are protected by glass structure.
- **Clean technology** – no hazardous waste.
- **Replaces exterior shadings** – no maintenance and less cleaning.



Weather data for Copenhagen – MeteoNorm 4.0

Pilot installations and testing - MicroShade

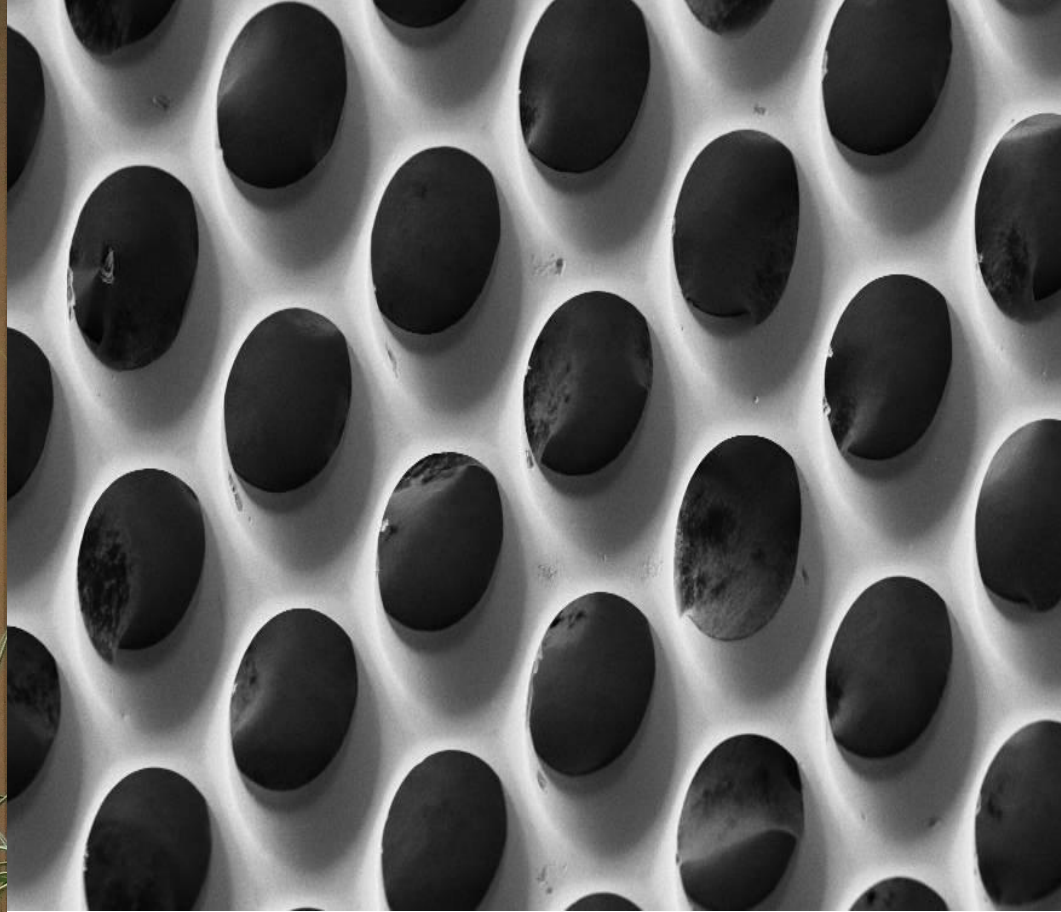
- **Test programme** – thermal performance has been tested by the Danish Technological Institute in full-scale installations for more than 18 months.
- **Manufacturing technology** has been tested by independent glazing manufacturers with succes.
- **EN1279 testing in progress** – final approval expected in December 2008.
- **25 m2 of prototype glazing** has been installed and subjected to visual judgement by more than 100 independent valuator.
- **MicroShade IG is ready for sale** – project orders are accepted by PhotoSolar and initial glass industry partners.





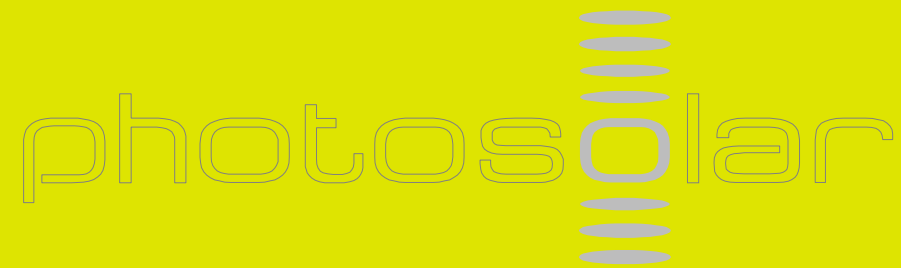




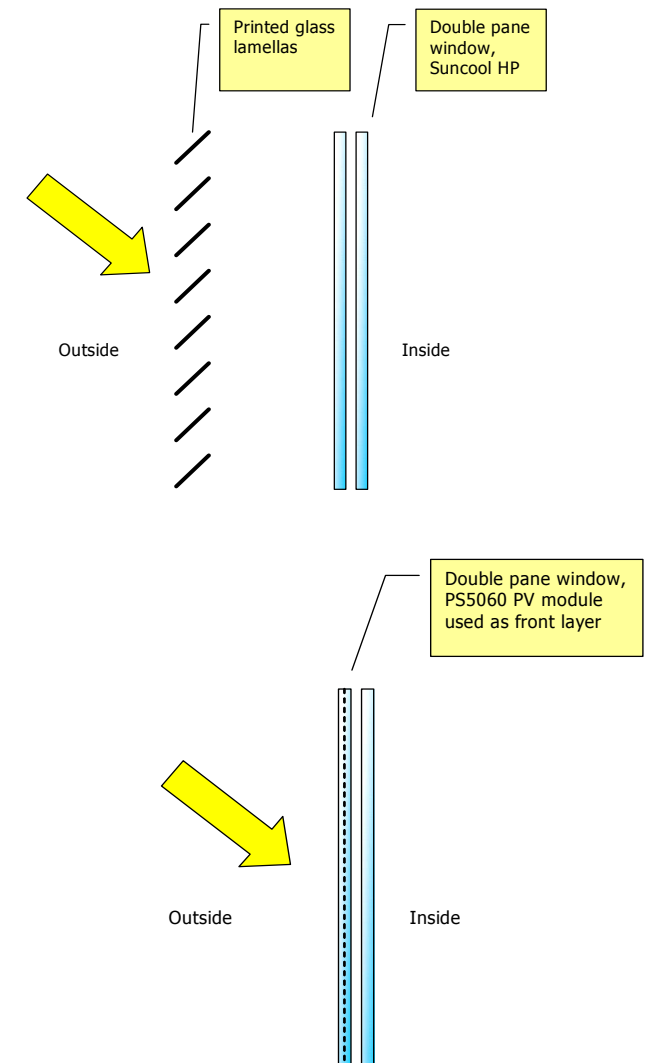


Shading and solar power envelope

Nordea case



Case study – The Nordea building



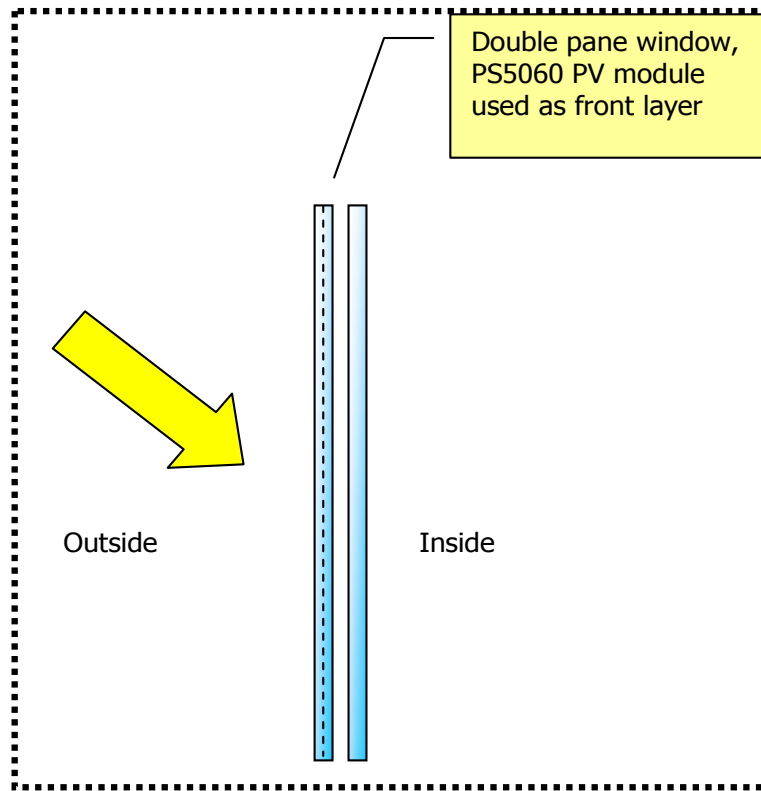
Simulation of the Nordea building: Teknologisk Institut – Industry and Energy, University of Strathclyde; supported by Eltra through PSO R&D funds.

The existing solar shading

- Exterior solar shades in combination with solar control glass.
- Exterior solar shades are movable in 7 steps, controlled automatically.
- Solar control glass is state of the art - Pilkington Suncool HP Brilliant.



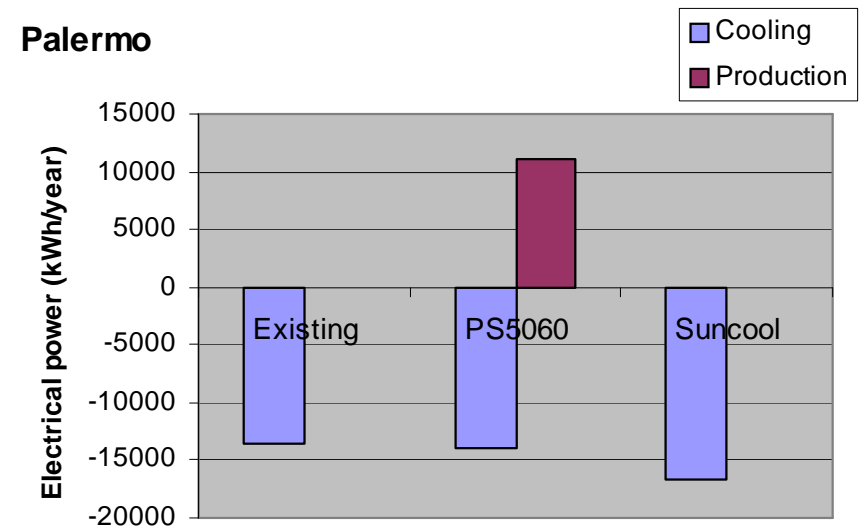
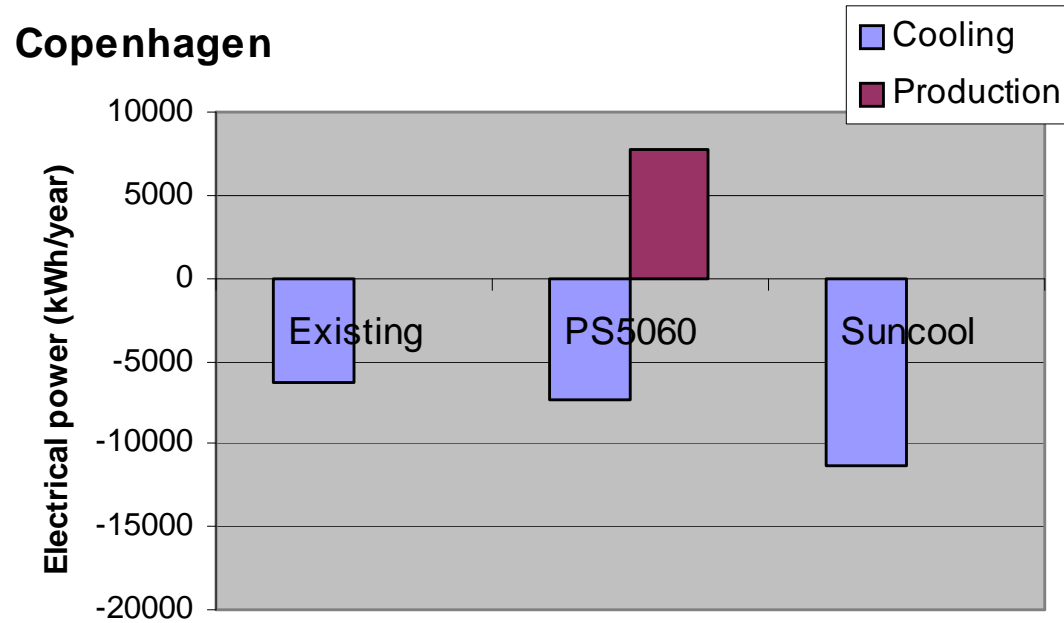
The PhotoSolar alternative



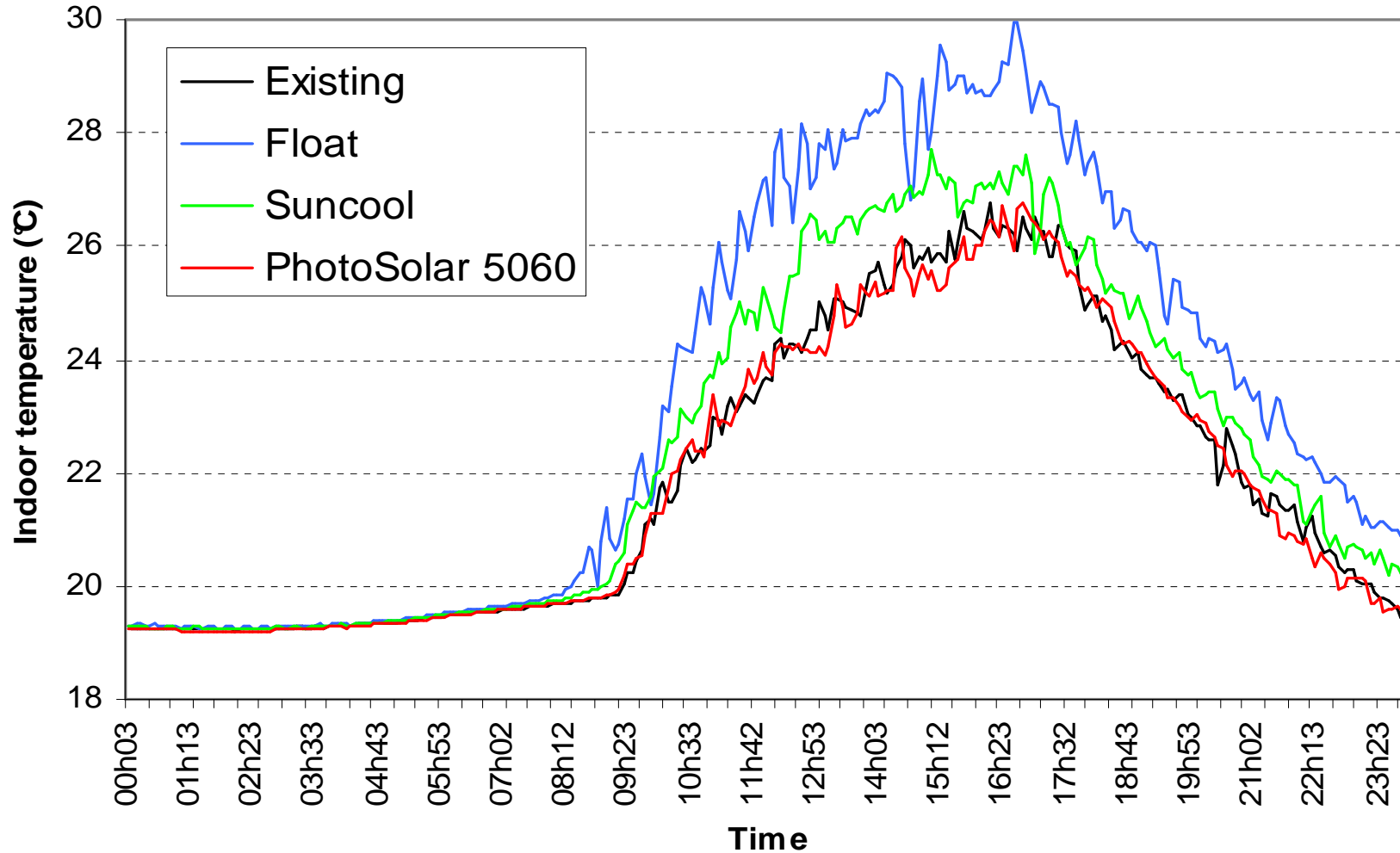
PS5060



Cooling need and electrical power production, yearly

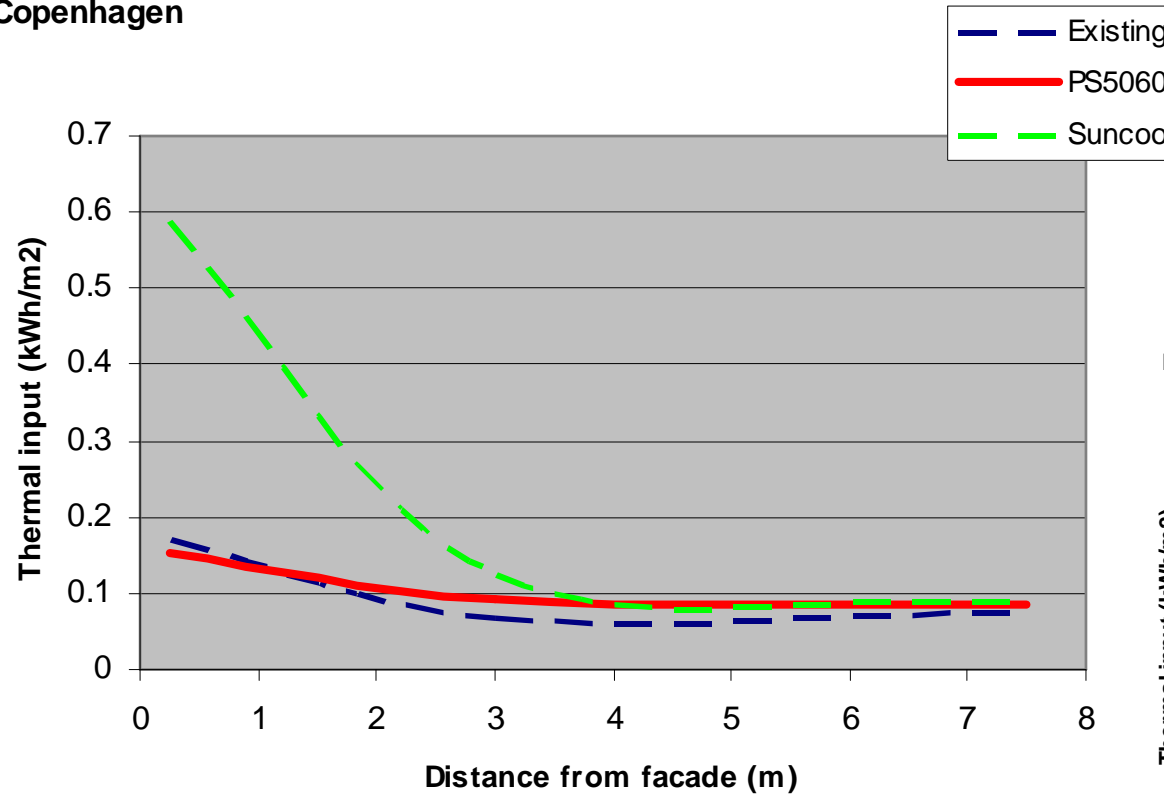


Room temperature – June 3 (Copenhagen)

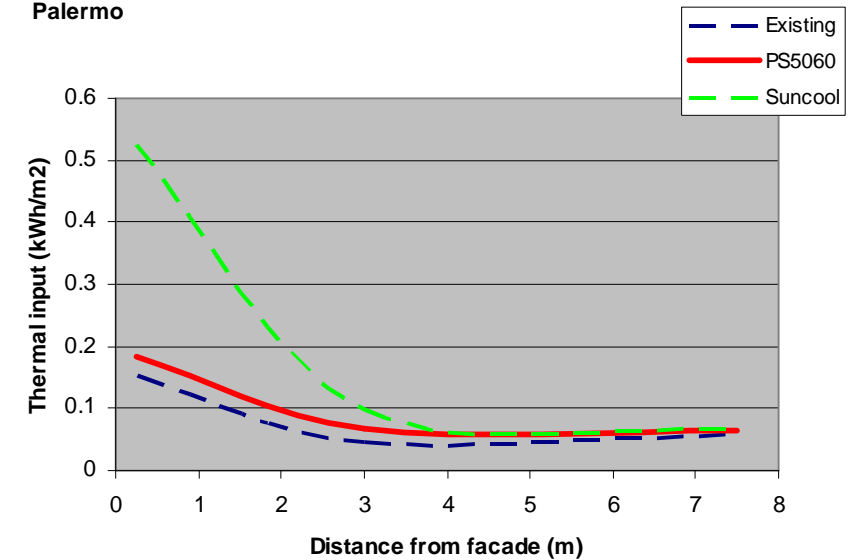


Comfort profile

Copenhagen



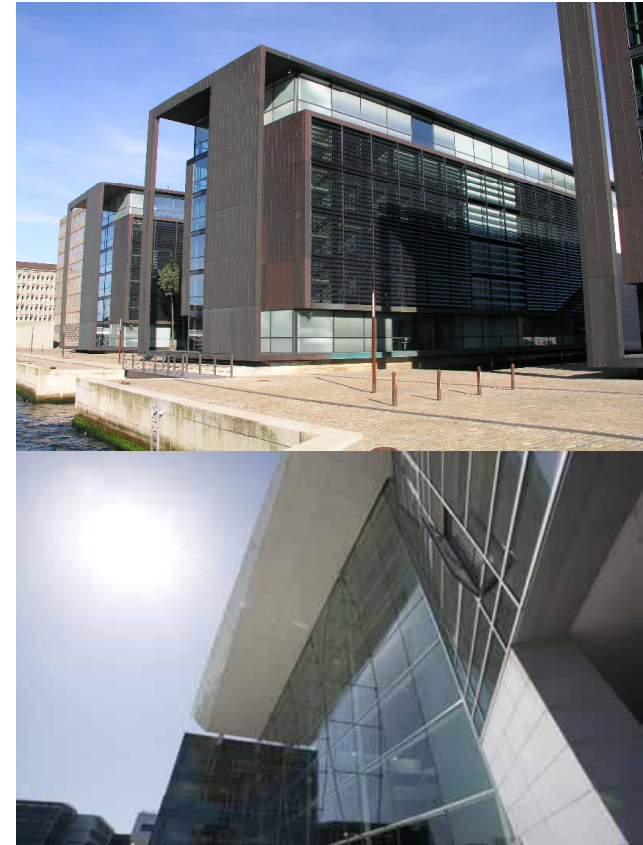
Palermo



Thermal energy flux into the building (kWh/m²) vs. distance from facade

Direct conclusions of the Nordea case

- The **shading efficiency** of PowerShade and MicroShade nearly equals the existing solution on the building in which both external blinds and solar control glass is used.
- PowerShade and MicroShade provides **more shading** than solar control glass – and **may replace exterior shading** devices.
- The **temperature profile** is equal to that found for the existing solution.
- The **comfort profile is identical** to that of the existing solution and better than solar control glass.
- The potential **power production** of the PowerShade module approximates the need for electrical energy to drive the cooling of the building.



More information - www.photosolar.dk

Downloads currently available

- **General information** – MicroShade IG (Danish)
- **Technical data sheet** – MicroShade IG (Danish)
- **Be06 calculation routine** - MicroShade IG (Danish)



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