



Progress in CIGS-type thin-film technology
and its application in solar construction

-  SOLAR CONSTRUCTION
-  SUSTAINABILITY
-  TECHNOLOGY

Passion for CIS since 1991 –
more than 200 years of combined CIS experience



1991

Research
Preparation of Mini-Modules



2003

Pilot Production
3 MW/a



2010

Mass Production
35 MW/a



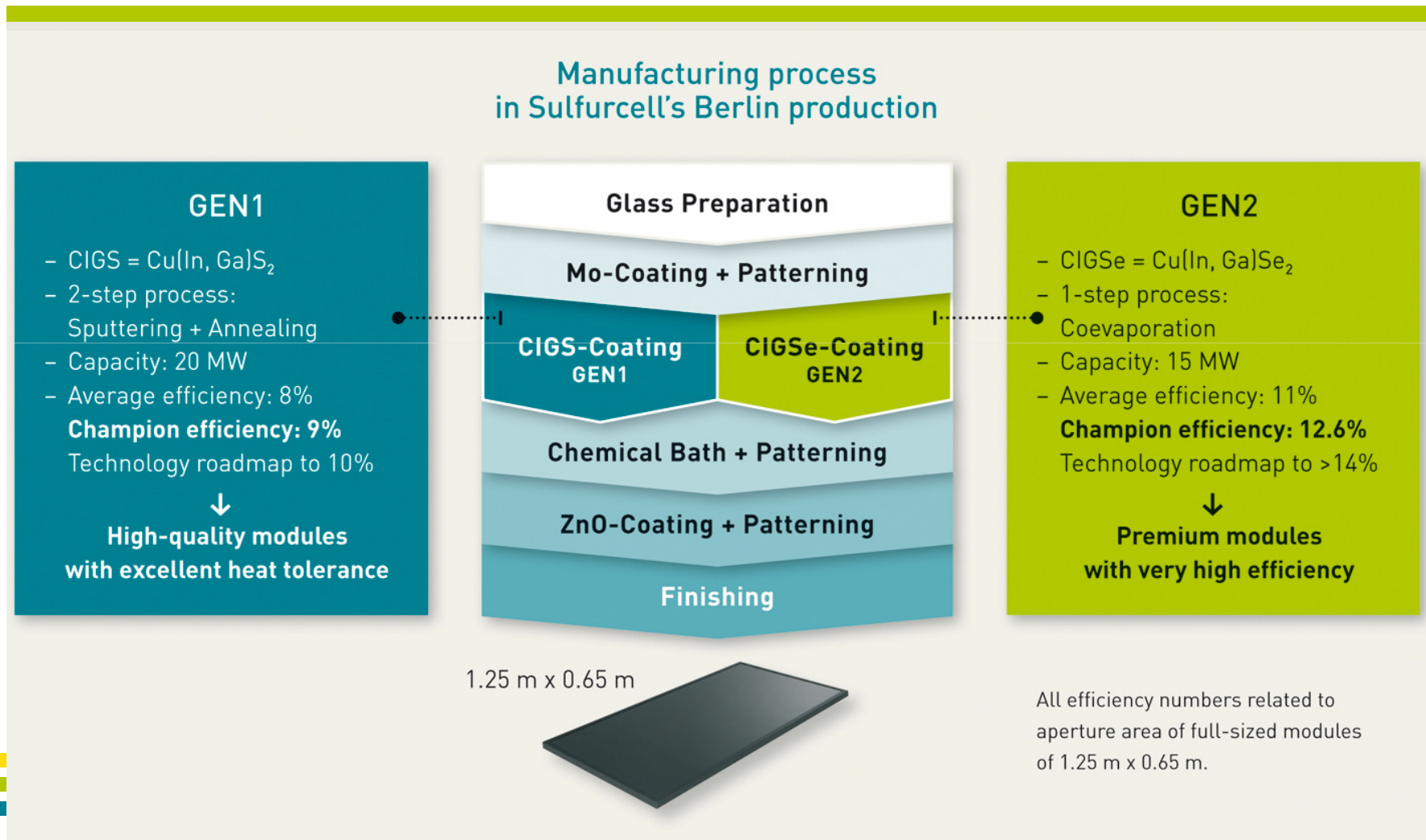
Commercialization

- Shipping products since 2005
- Over 150,000 modules sold
- Specialised modules and system solutions for solar construction

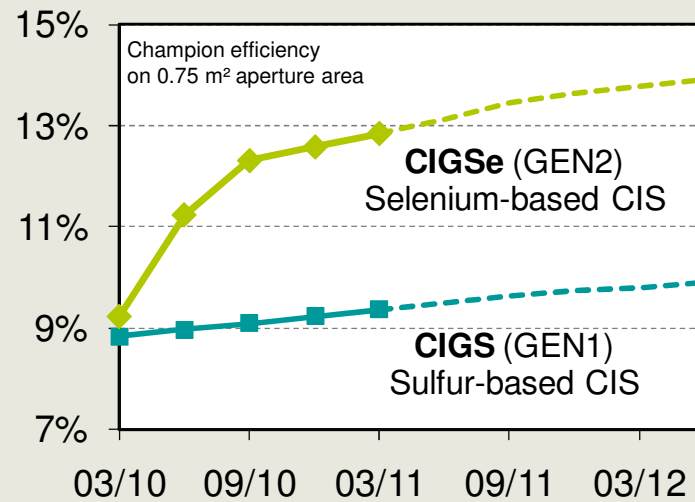
Funding

- Equity raised to date: € 114m
- Last equity injection in Jan 2011 (€ 19m)
- Blue-chip investor base, a.o. Intel Capital, Climate Change Capital, Vattenfall Europe, GdF Suez, Masdar

Sulfurcell's technology platform for CIGS & CIGSe: Modules with premium performance and top efficiency



Efficiency enhancement and roadmap



- Commercial production since 2005
- 35 MW facility in ramp

- Combined CIS experience of more than 200 years in Sulfurcell's staff of technologists

- Technology protected by more than 60 patents, key productions tools designed by Sulfurcell

What is a solutions based approach?



Solutions based approach

- Smartly assembled PV systems equally optimised for **aesthetics and performance** (energy yield, quality, safety)

→ **Solar Construction**

- Cost optimisation by selecting and developing modules, mounting materials and electrical components **perfectly fitting** to each other.

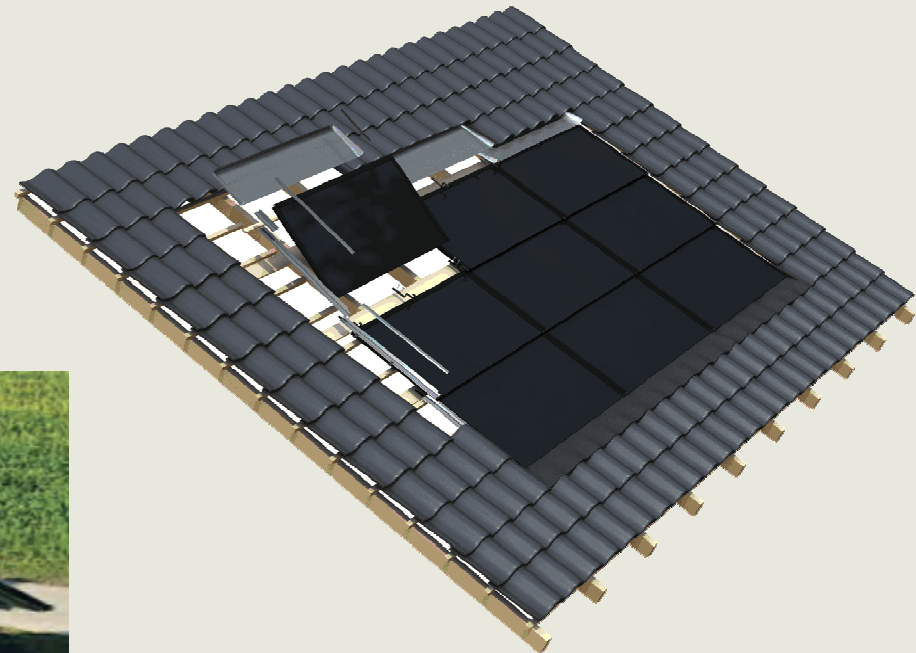
→ **Reduction of system costs**



Residential Rooftop Solution



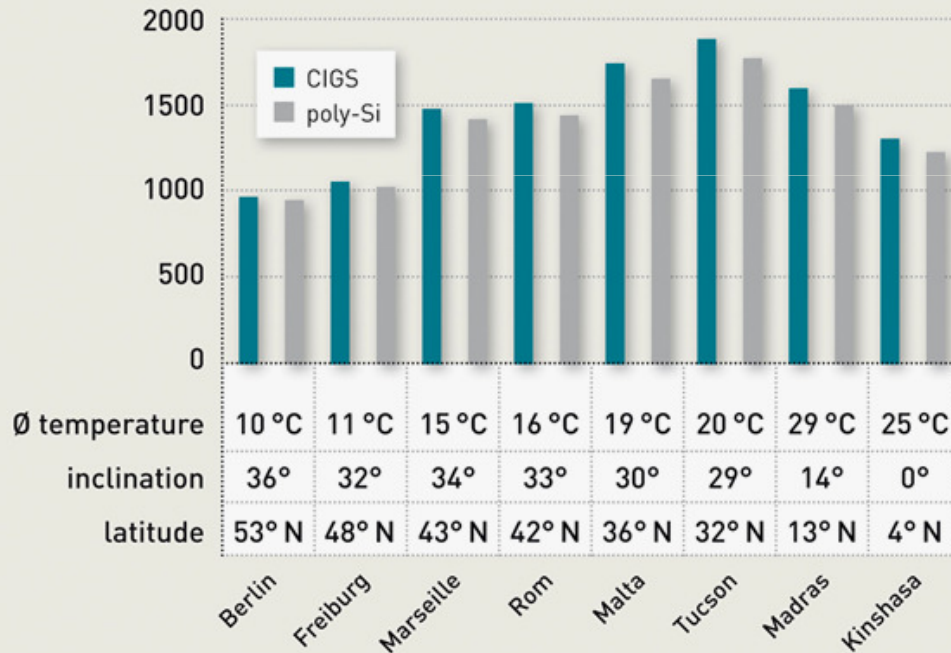
- **Replace entire roof tile** with Swiss framing system SOLRIF
- **100% weatherproof**
- **Available as 3 kW** kit including all mounting materials
- **Cost savings** on conventional roofing materials and labor (\approx \$.50/Wp)



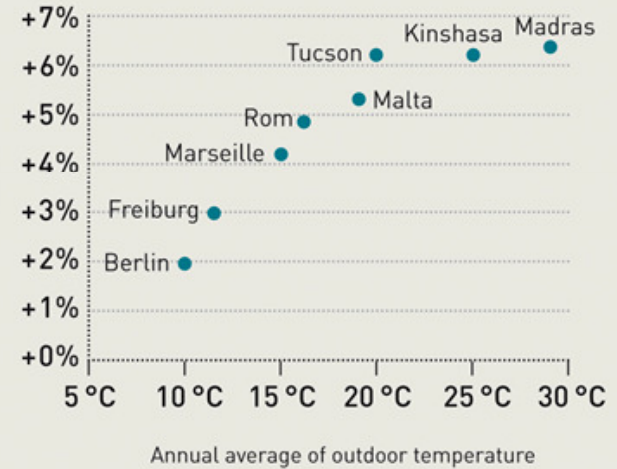
Top performance of Sulfur-based CIS modules on hot locations



Specific energy yield (kWh/kWp) for various locations



Relative yield advantage of CIGS against poly-Si

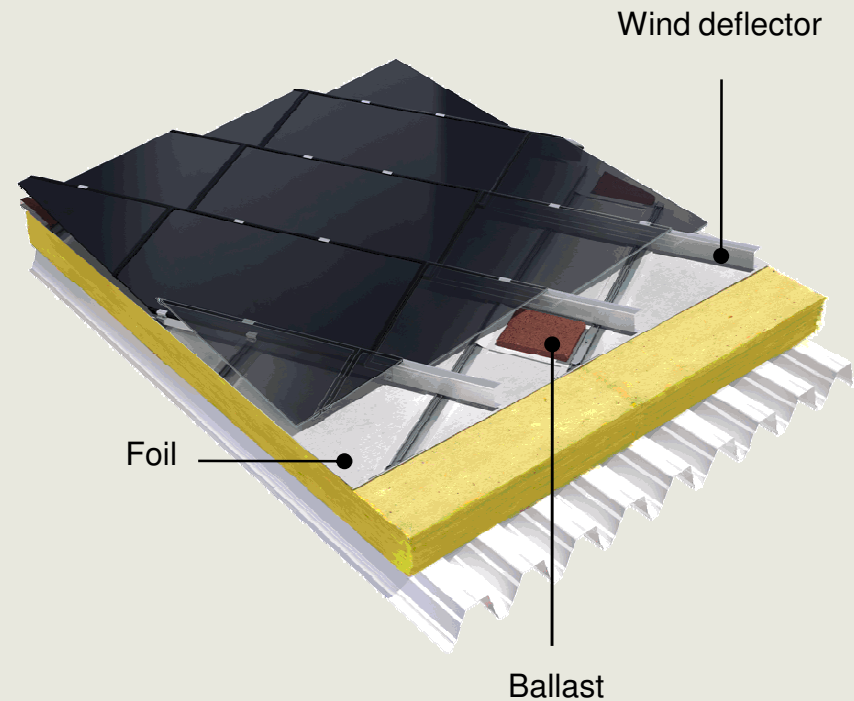


Exemplary calculation of the energy yield by PVsol (system size: 100 kW, CIGS module: SCG 62-HV-L, poly-Si modules: SunTech STP 220-20/Wd, inverter: 10x Fronius IG Plus 120, orientation: South)

Commercial Rooftop



- **No roof penetrations**
- **Minimized system weight** and wind load (system: 3.9 psf + ballast: 2 psf)
- **High power density** due to low angle installation (> 50kW / 10k sq. ft.)
- **High energy output** due to superior performance of Sulfurcell modules under heat and low angle insolation



German Headquarters

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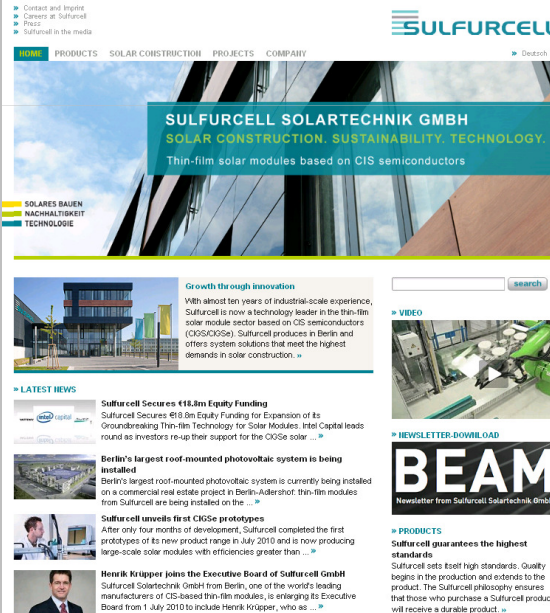
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Production video, data-sheets, applications, newsletter download, job vacancies etc.



The screenshot shows the Sulfurcell website homepage. At the top, there is a navigation menu with links for 'Contact and Inquiry', 'Careers at Sulfurcell', 'Press', and 'Sulfurcell in the media'. The main header features the Sulfurcell logo and a navigation bar with 'HOME', 'PRODUCTS', 'SOLAR CONSTRUCTION', 'PROJECTS', and 'COMPANY'. Below this is a large banner with the text 'SULFURCELL SOLARTECHNIK GMBH' and 'SOLAR CONSTRUCTION. SUSTAINABILITY. TECHNOLOGY. Thin-film solar modules based on CIS semiconductors'. A sidebar on the left contains the text 'SOLARES BAUEN', 'NACHHALTIGKEIT', and 'TECHNOLOGIE'. The main content area includes a section titled 'Growth through innovation' with a sub-headline 'With almost ten years of industrial-scale experience, Sulfurcell is now a technology leader in the thin-film solar module sector based on CIS semiconductors (CIS/CIS2e). Sulfurcell produces in Berlin and offers system solutions that meet the highest demands in solar construction.' Below this is a 'LATEST NEWS' section with three items: 'Sulfurcell Secures €18.8m Equity Funding', 'Berlin's largest roof-mounted photovoltaic system is being installed', and 'Sulfurcell unveils first CIS2e prototypes'. On the right side, there is a search bar, a 'VIDEO' section, a 'NEWSLETTER-DOWNLOAD' section with a 'BEAM' logo, and a 'PRODUCTS' section with the text 'Sulfurcell guarantees the highest standards'.