



Say hello to solar.
Wherever you are

Company Presentation

Heliatek GmbH
Dresden, Germany



Executive Summary

Basis

- Focused on the **production of organic solar cells** based on proprietary IP
- The company was **founded in 2006** out of two leading universities
- **Headquartered in Dresden**, Europe's largest organic electronics cluster
 - Development centers in both Dresden (Physics) and Ulm (Chemistry)

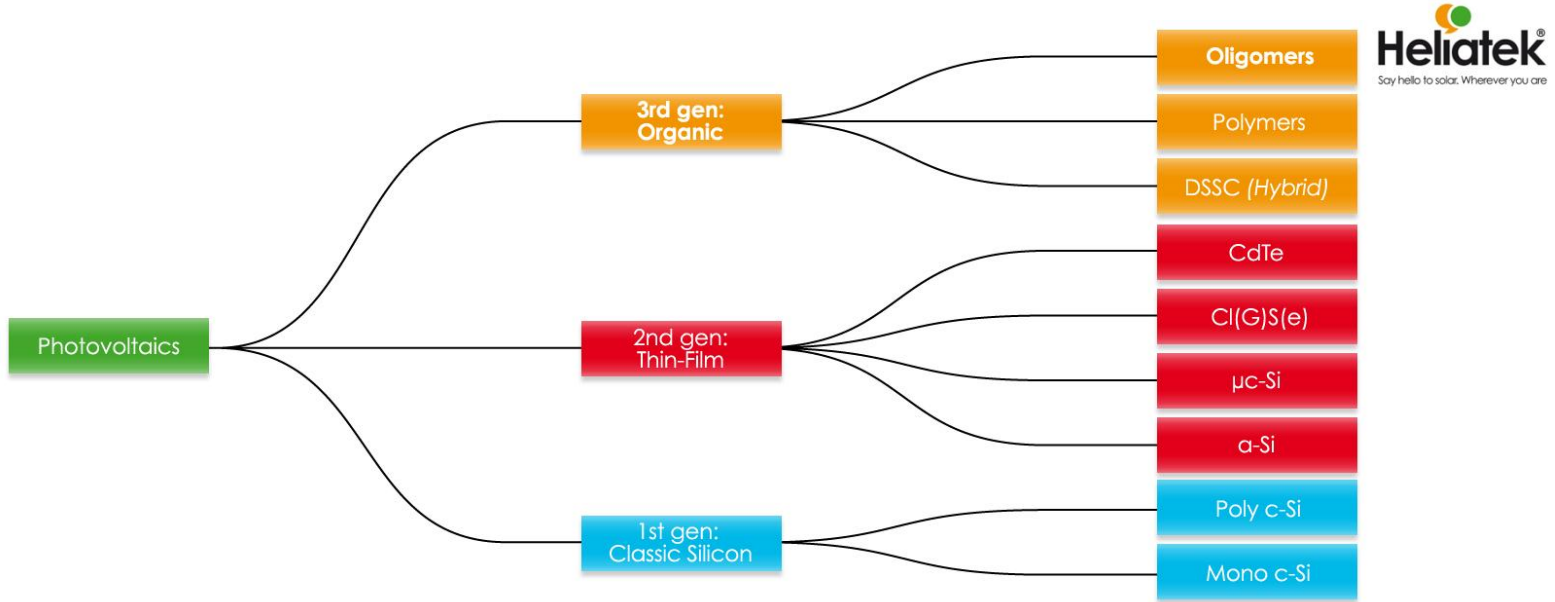
Achievements (12/2011)

- **World leading** OPV efficiency **9.8%** and extrapolated lifetime – ahead of milestones
- Successful **proof of concept** reached by its first R2R production unit in Dresden
- **Commercial ramp-up by mid 2012**
- Backed by leading industry (**Bosch, BASF, RWE Innogy**) and venture (**Wellington Partners**)
 - **Raised €28m to date plus > €10m public funding** and subsidies granted

Objectives

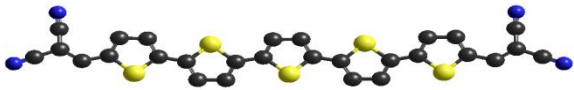
- **Raise €60m** in round C by Q3/Q4 2012 to **expand capacity**
- Objective: Invest in 1 R2R line with **1 m width** and **75 MW_p** capacity
 - Fab-2 invest starting **in Jan 2013**

Photovoltaic Technology Development

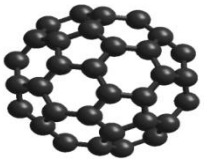


Heliatek's Key Technology: p-i-n Tandem Cells

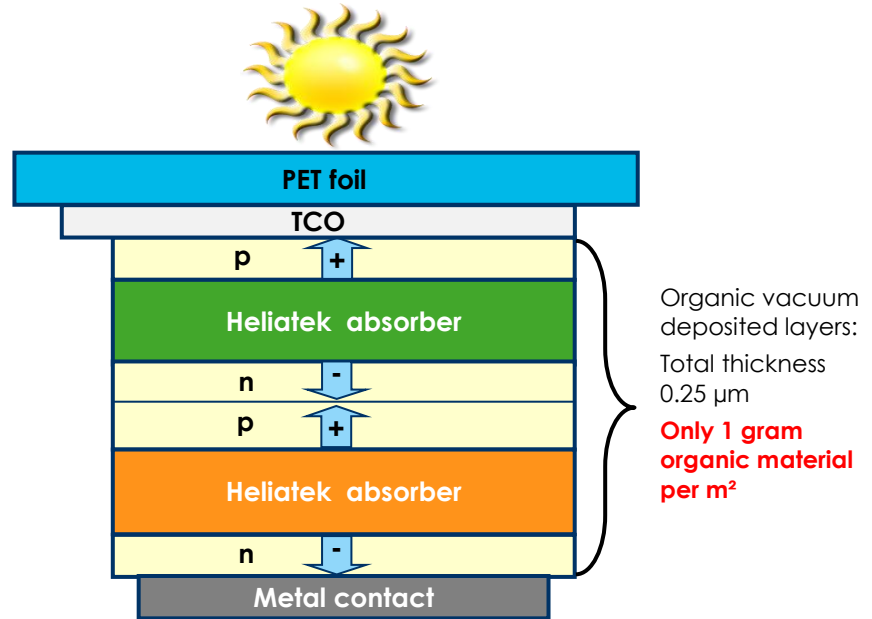
- Optimum harvesting of the complete sun spectrum
- Doubled photovoltage
- No electrical losses upon current extraction



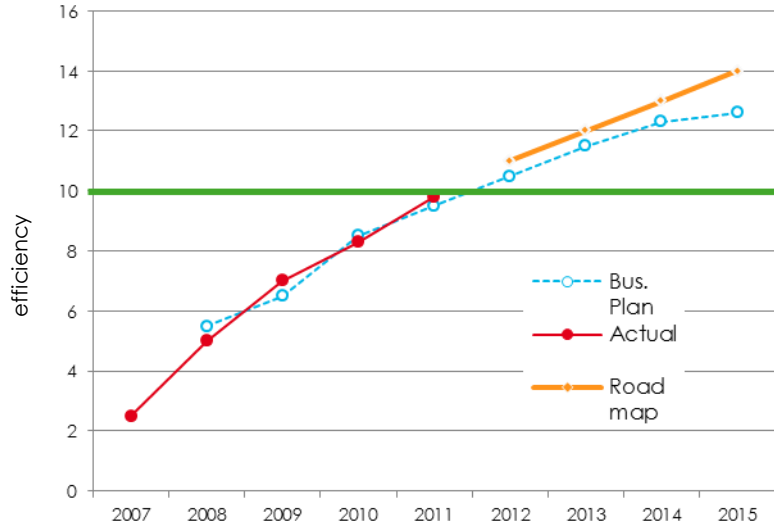
Thiophenes



Fullerene



Efficiency Development for Cells >1 cm²

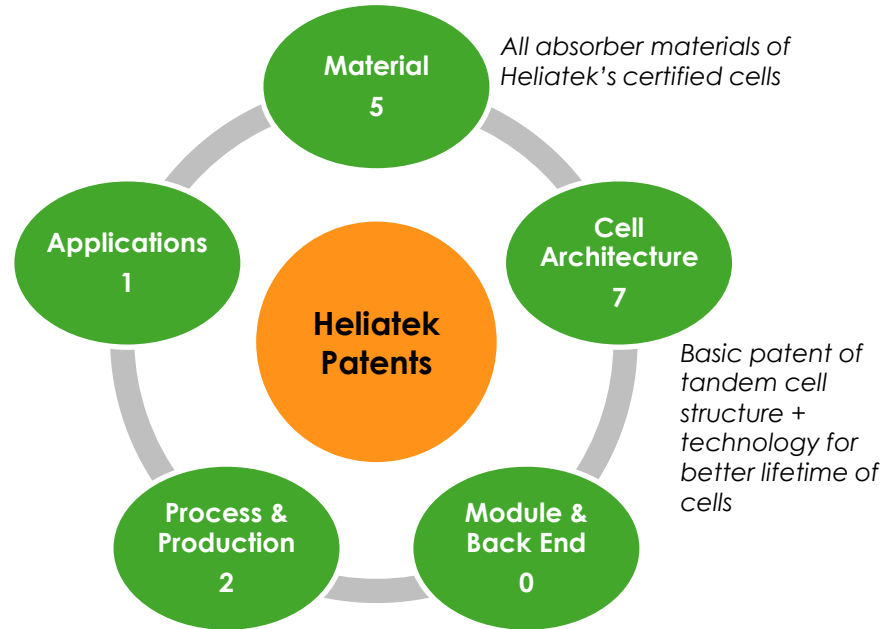


- Three efficiency world records in a row
- All business plan milestones have been met or overachieved
- Efficiency level of a-Si thin film has been achieved within only a few years
- Rapid progress in transferring technology from glass to PET-foil: 8.7% Eff.
- Record cell stacks can be transferred into production
- Marginal loss at module size: only 0.6% loss with an upscaling factor of >120 for modules produced in our lab

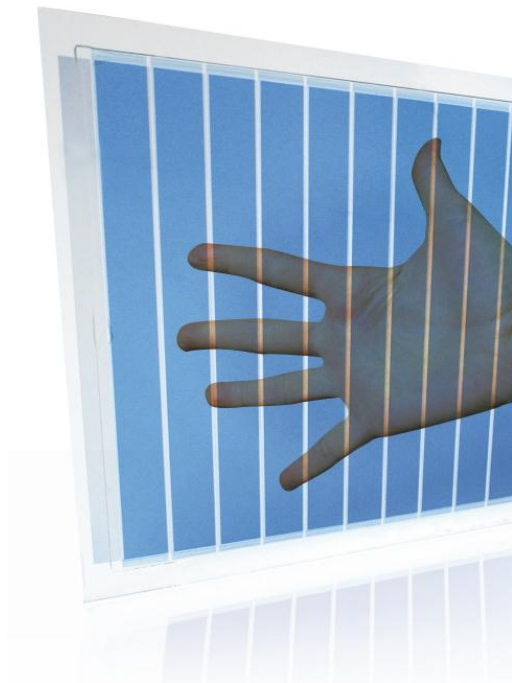
* 9.8% record efficiency certified by independent and accredited Fraunhofer ISE Callab

Heliatek Patent Portfolio

- The current patent landscape corresponds to the focus and core competences of Heliatek
- Focus will remain on materials and special cell architecture features for better life time and performance of cells
- More patents on module (Backend) and production will follow



Heliatek OPV Modules



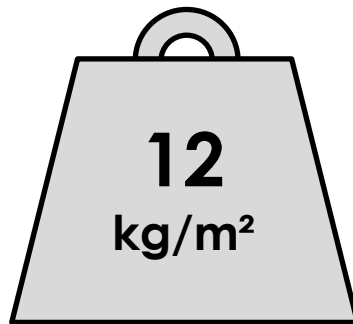
Key Benefit #1: The future is light – PET modules for flexibility

Thanks to the low process temperature, simple plastic foil can be used as substrate material:

- Light weight
- Ultra-thin
- Robust



Heliatek modules



Thin film modules



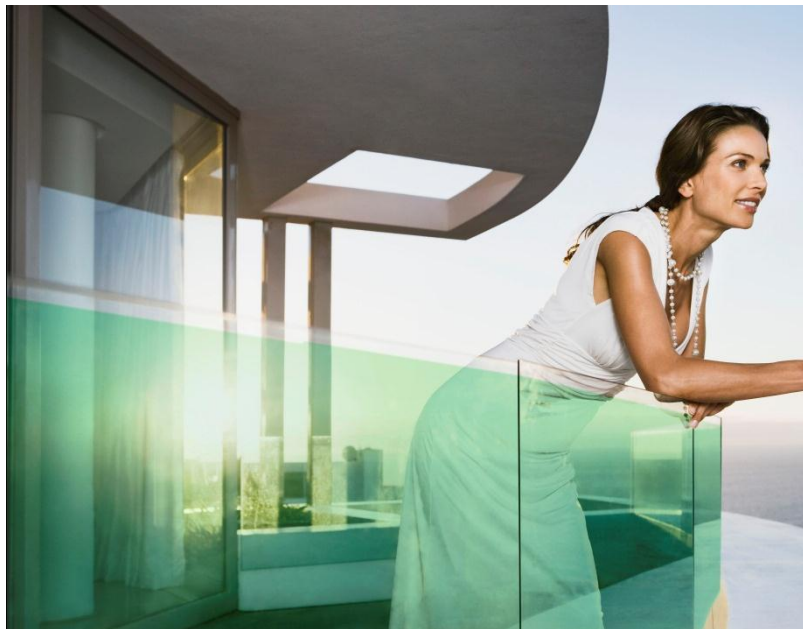
Classic crystalline modules

Listed weight values are average values of leading suppliers for each technology

Key Benefit #2: Aesthetic for new solar applications

- 🌱 Various colors
- 🌱 Various dimensions
- 🌱 Various **transparency** levels
- 🌱 Homogeneous surface
- 🌱 Less than 1 mm thick modules

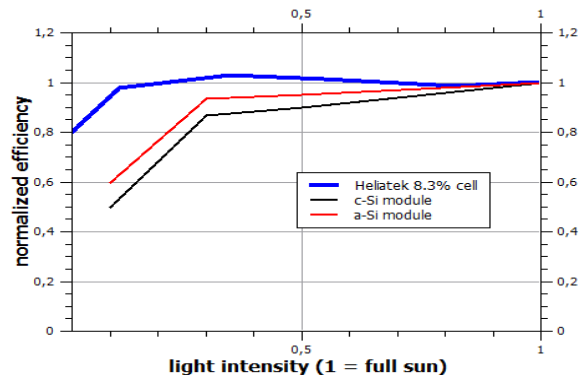
➤ Architectural Freedom



Key Benefit #3: Top real-life performances

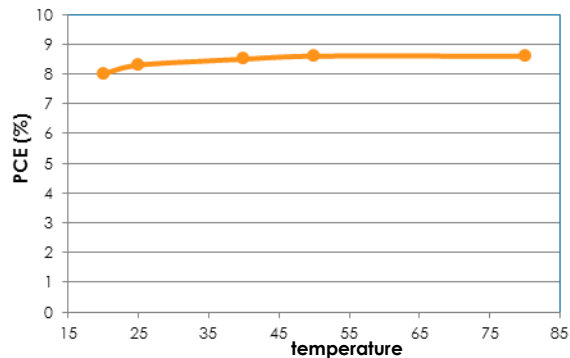
Heliatek's OPV modules do not lose in efficiency when they hit the real world:

Superior low light performance:



- › Perfectly suitable for Northern countries with less irradiation, for facades or applications with poor orientation

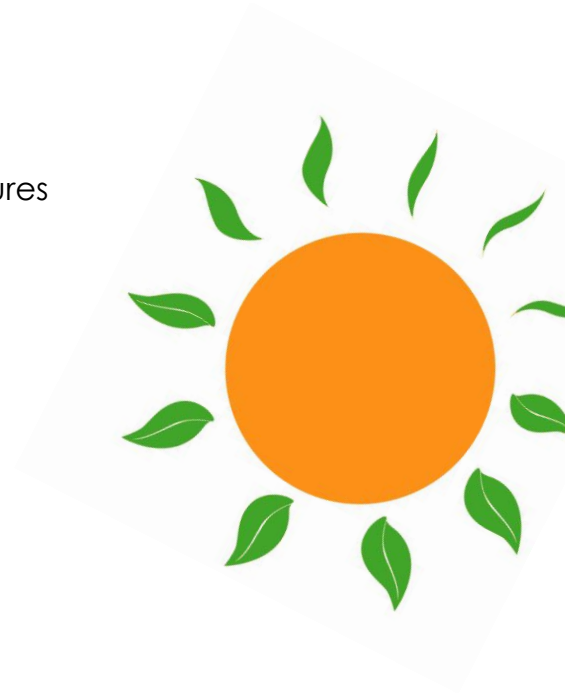
High temperature stability:









- › Perfectly suitable for hot, sunny regions and for applications with little module ventilation

Key Benefit #4: The only TRULY green solar technology

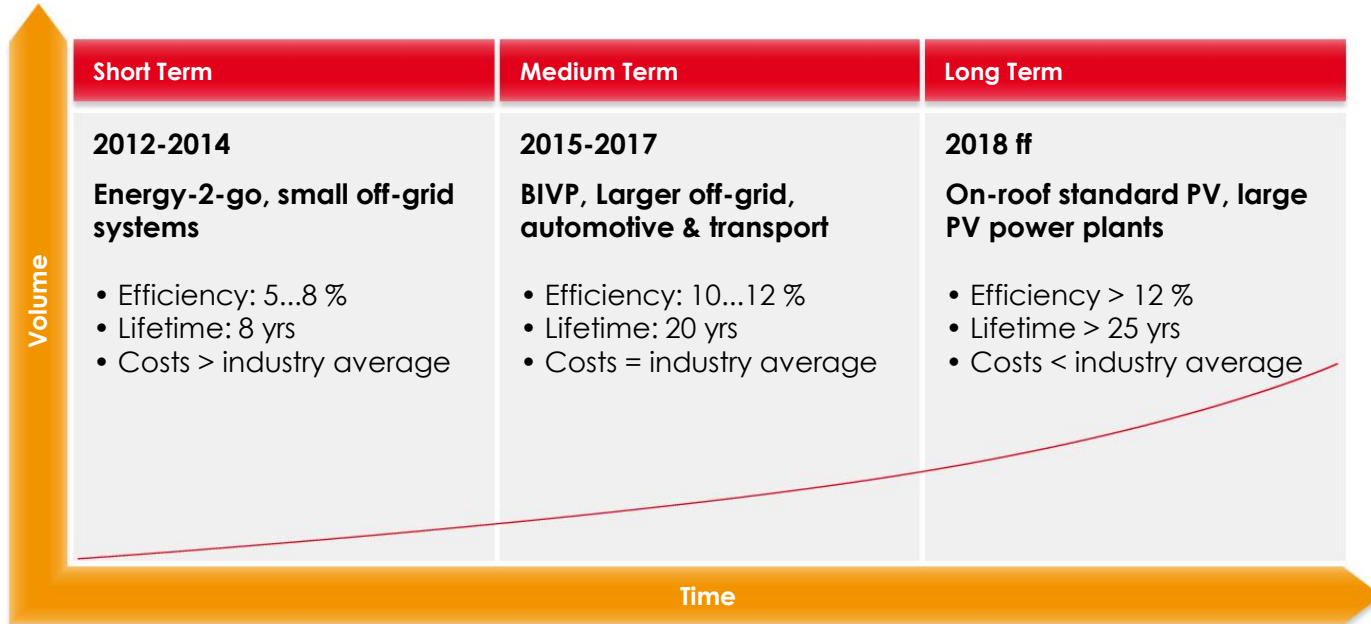
- ☘ Extremely **short energy payback** time
- ☘ Only **1 gram** organic material per m²
- ☘ **Low energy** used in production thanks to low process temperatures
- ☘ **Toxic-free** manufacturing process
- ☘ Only organic materials, **no heavy metals** in cells
- ☘ Produced with **available materials**, without risk of shortages
- ☘ **Easy disposal** at end of life cycle



Heliatek Market Segment Overview

Mobile Electronics	Leisure & Comfort	Automotive	RIPV	BIPV	Power Plants
					
<p>Small starting and learning market</p>	<p>Small to medium market</p>	<p>Medium volume market as of 2015</p>	<p>Large market with limited competitors</p>	<p>Small market, but high growth potential</p>	<p>Large market and strong market growth</p>
<p>Customer interest: differentiation</p>	<p>Customer interest: independent energy supply</p>	<p>Customer interest: fuel saving and green image</p>	<p>Customer interest: utilization of roofs and reduction of LCOE</p>	<p>Customer interest: Net-Zero-Energy-Building</p>	<p>Customer interest: reduction of LCOE</p>
<p>Small Opportunity Market</p>	<p>Business Entry Market</p>	<p>Mid- and Longterm Market</p>	<p>Volume Opportunity Market</p>	<p>Key Focus and Volume Market</p>	<p>Long term Opportunity Market</p>

Heliatek Development Scenario





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**Thank you
for your attention.**

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