

## Dye Solar Cell 3<sup>rd</sup> Generation PV

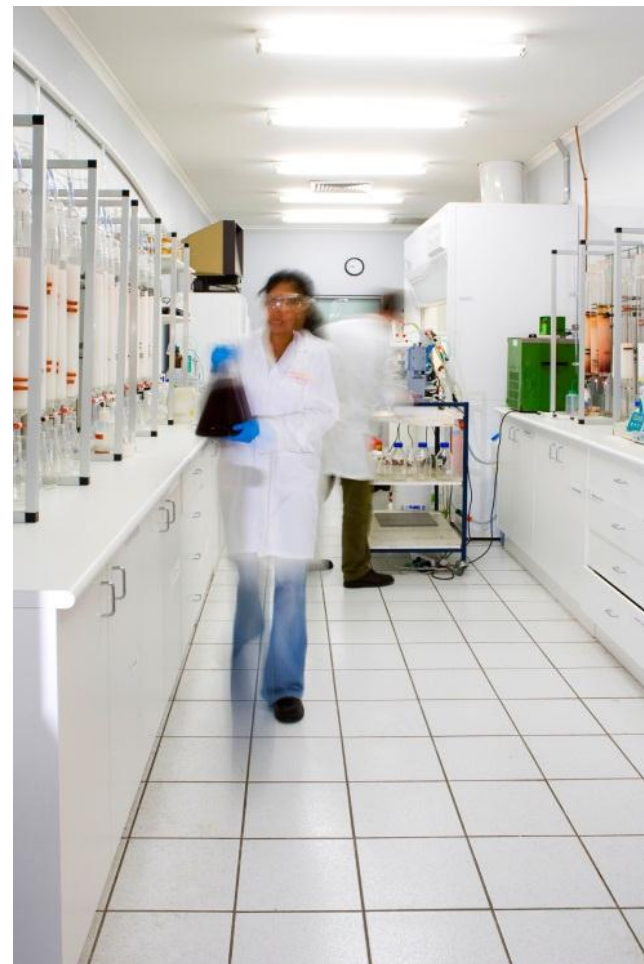
Dr. Damion Milliken, R&D Manager, Dyesol  
Australian Institute of Energy, Canberra Branch Solar Seminar  
Wednesday 6 February 2013

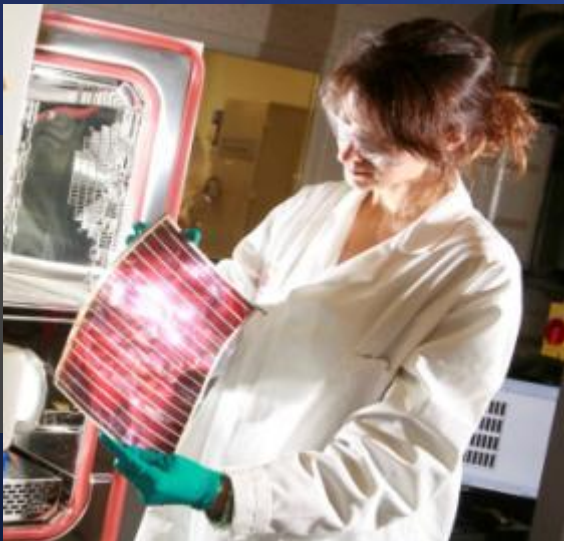
1. Forward Looking Statements
2. Company Profile
3. Technology Introduction
4. Partners & Projects
5. Where to?

# Forward Looking Statements



This presentation includes forward-looking statements that are subject to many risks and uncertainties. These forward-looking statements, such as statements about Dyesol's short-term and long-term growth strategies, can sometimes be identified by use of terms such as "intend," "expect," "plan," "estimate," "future," "strive," and similar words. These statements involve many risks and uncertainties that may cause actual results to differ from what may be expressed or implied in these statements. These risks are discussed in Dyesol's Securities and Exchange Commission filings and reports, including the risks identified under the section captioned "Risk Factors" in its preliminary prospectus relating to its initial public offering filed pursuant to Rule 424(b) under the Securities Act of 1933, with the Securities and Exchange Commission. Dyesol disclaims any obligation to update information contained in these forward-looking statements whether as a result of new information, future events, or otherwise.





## Company Profile

1. Dyesol Snapshot
2. International Footprint
3. Capitalisation & Shareholder Structure
4. Dyesol History
5. Awards & Recognition



## Dyesol's groundbreaking products turn everyday industrial materials into solar cells

### Mission Statement

- Dyesol is a global supplier of Dye Solar Cell (DSC) materials, technology and know-how
- DSC is a photovoltaic technology enabling metal, glass and polymeric based products in the building, transport and electronics sectors to generate energy and improve energy efficiency
- Dyesol partners with leading multinational companies who possess significant market share and established routes-to-market

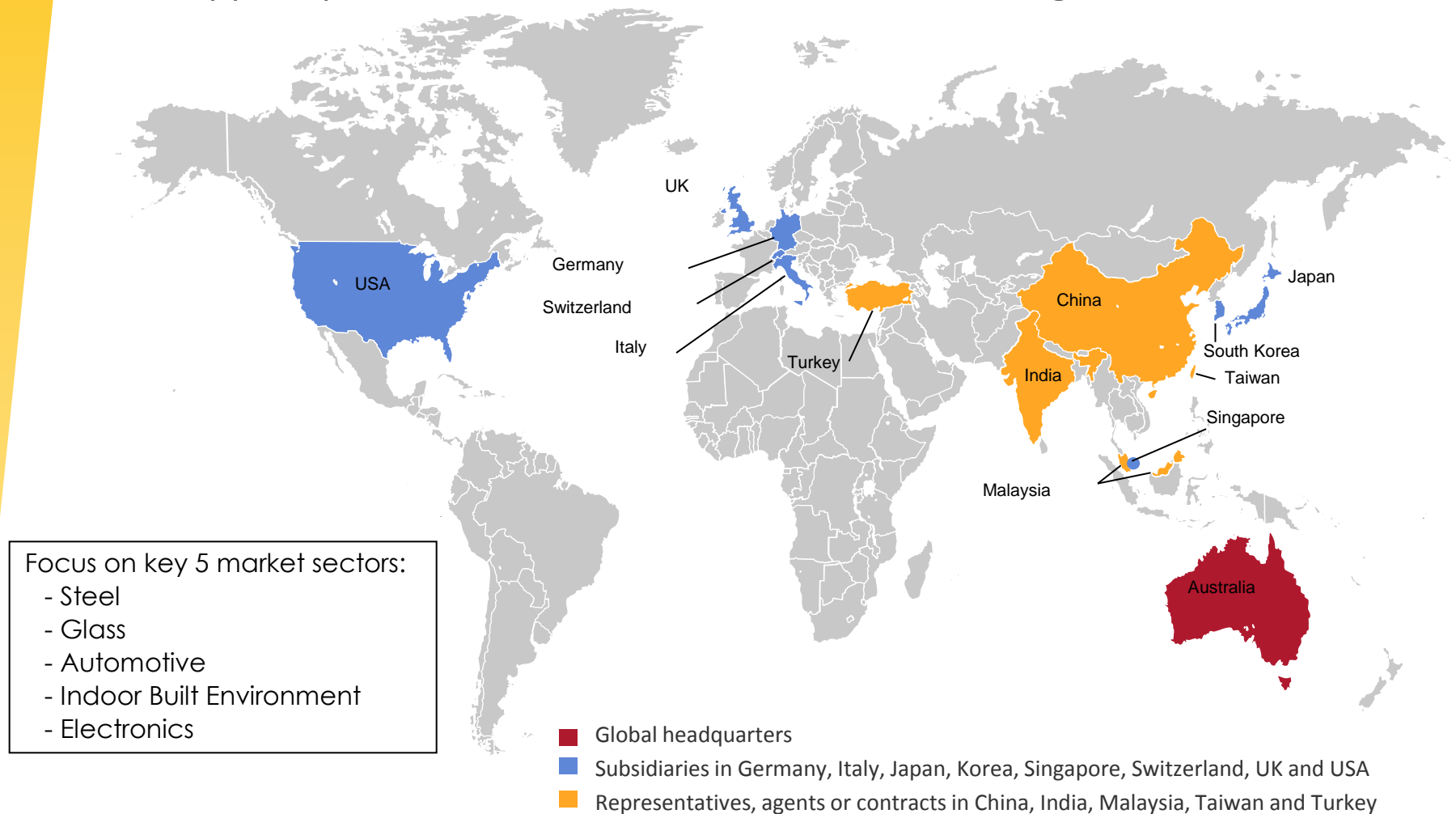
### Vision

- Dyesol's credentials as a global leader in 3<sup>rd</sup> generation solar cell technology are:
  - Demonstrated ability to leverage its R&D and IP portfolio to expand DSC applications
  - The quality of its global partnerships with top tier industrial corporations and research institutions

# International Footprint



Supplies products to more than 30 countries throughout the world



# Capitalisation & Shareholder Structure

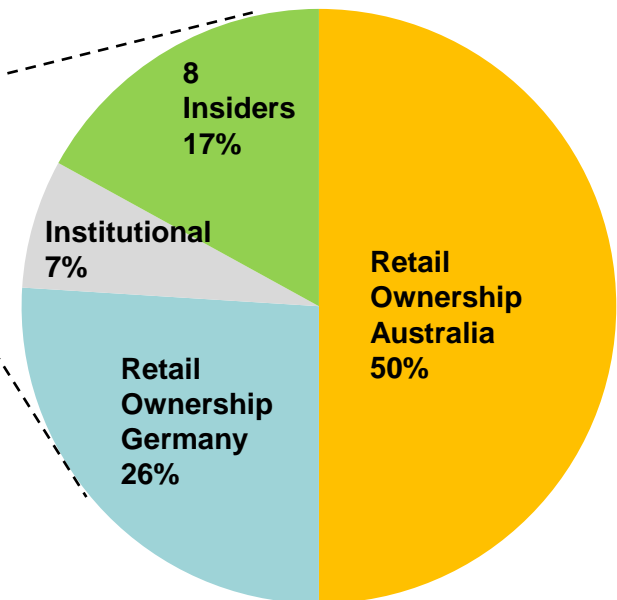


## Current Cap Table

	million
Issued Ordinary Shares	196
Director and Employee Options with various exercise prices & expiry dates	10
Total Diluted Shares	206

\$1.2M convertible note with CSIRO (Australian Government)

## Shareholder Structure

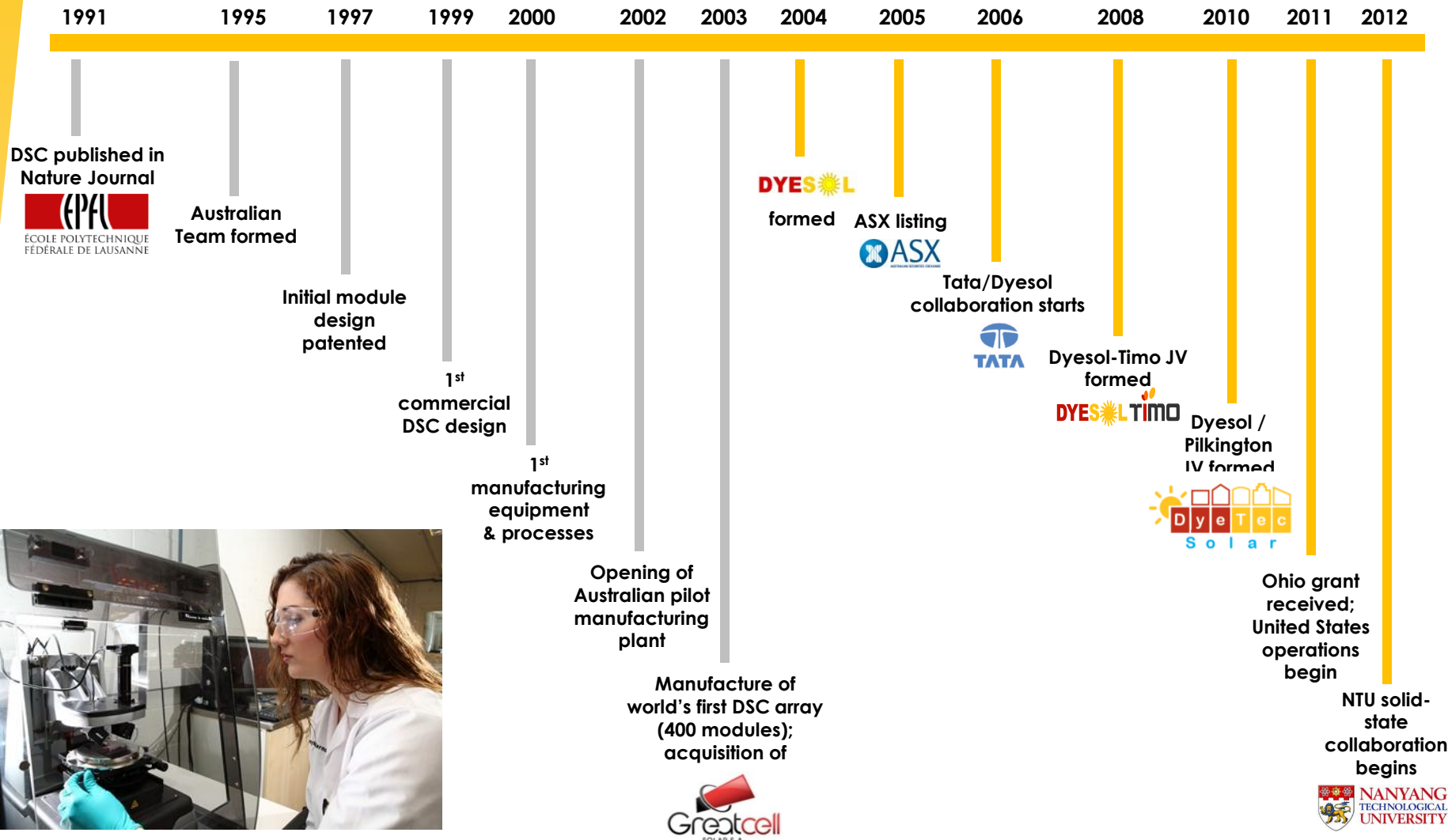


Listed on the Australian ASX: DYE  
Traded on the German Open Market: D5I  
Traded on the US OTCQX: DYSOY





# Dyesol History



# Awards & Recognition



- **Winner Inaugural Innovation Award**  
Clean Energy Council Industry Awards  
2012



- **Dyesol Highly Commended – Most Innovative Manufacturer Category**  
Manufacturer Monthly's Endeavour Awards  
2012

- **Father of DSC, Prof Michael Graetzel Awarded 2012 Albert Einstein World Award of Science**  
Interdisciplinary Committee of the World Cultural Council  
2012



- **New Energy Pioneer Winner**  
Bloomberg New Energy Finance Summit  
2010



- **DSC Inventor, Prof. Michael Graetzel, Wins The Millennium Technology Prize**  
Technology Academy of Finland  
2010



ACT Chief Minister's  
EXPORT AWARDS

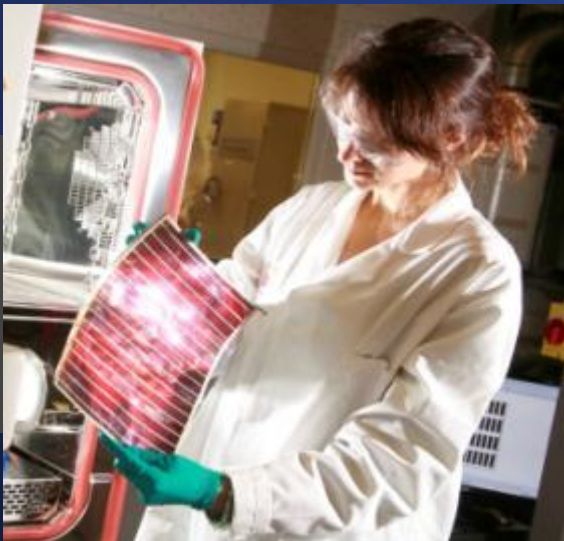
2009 ACT Export Awards Finalist

- **Winner Small to Medium Manufactures Award**  
ACT Chief Minister's Export Awards  
2009



- **Small Company of the Year Award**  
Ethical Investor  
2009





## Technology Introduction

1. What are Dye Solar Cells?
2. Dye Solar Cell Construction
3. Dye Solar Cell Operation
4. Real-World Performance

# Photo-Electro-Chemical Cells



- Dye Solar Cells (DSC) are Photo-Electro-Chemical (PEC) Cells, and like photovoltaic devices, they:
  - absorb photons;
  - generate excitons &/or electron-hole pairs;
  - separate the positive and negative charge carriers; and
  - transport the charge carriers to an external circuit.

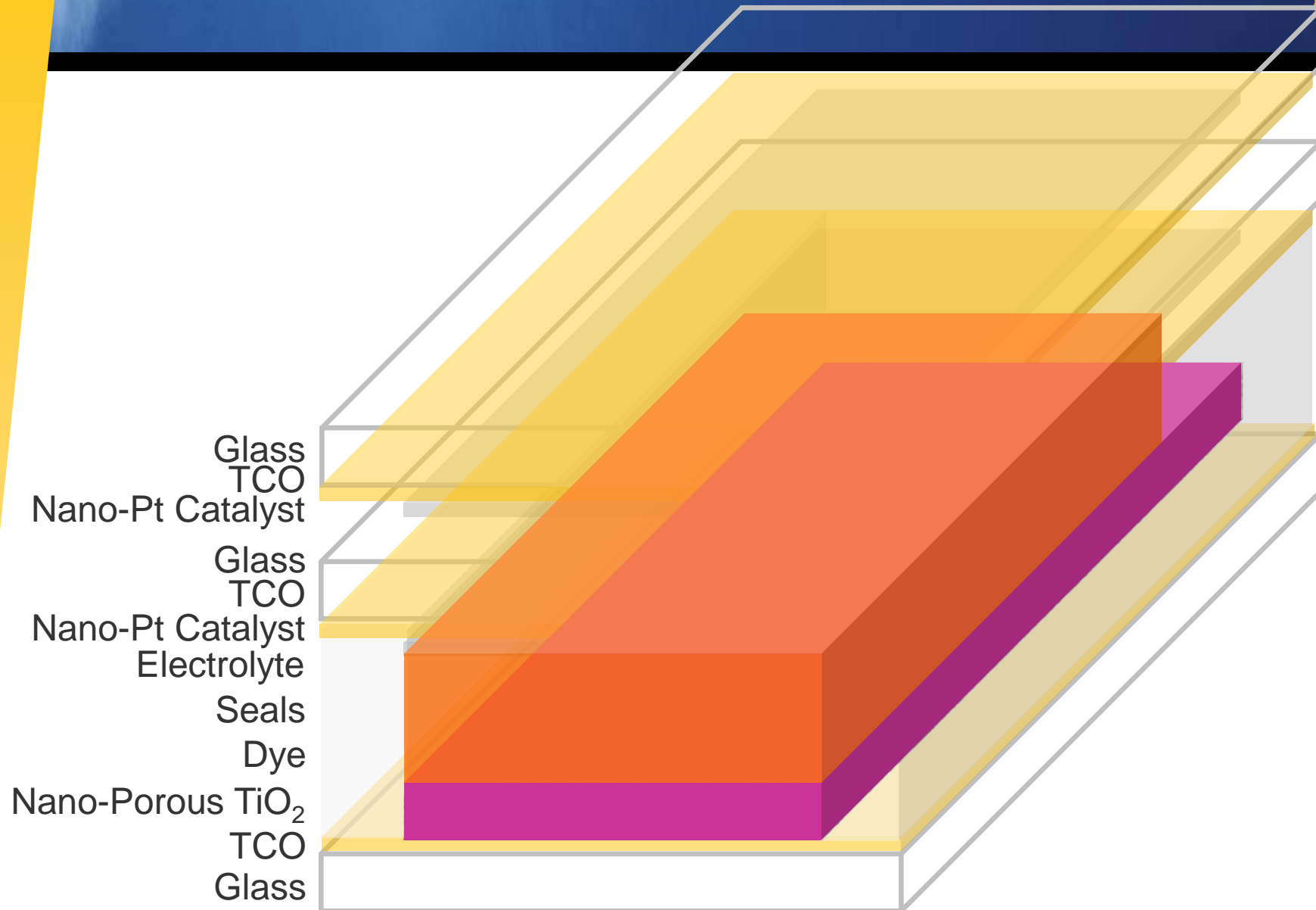


- DSCs share many similarities with conventional PV technologies
- However, they differ fundamentally in their mode of operation, and behave in many ways similarly to photosynthesis

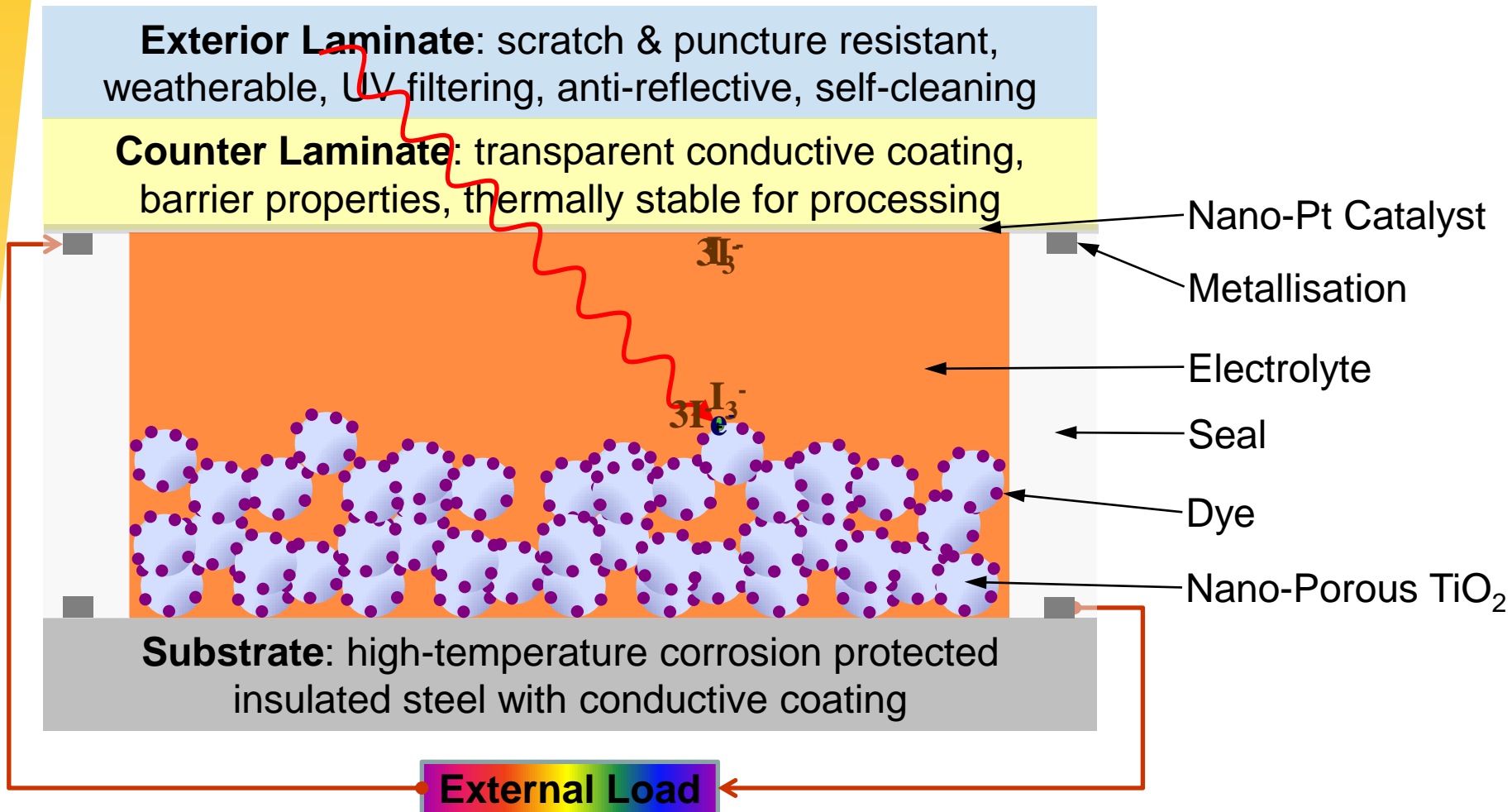




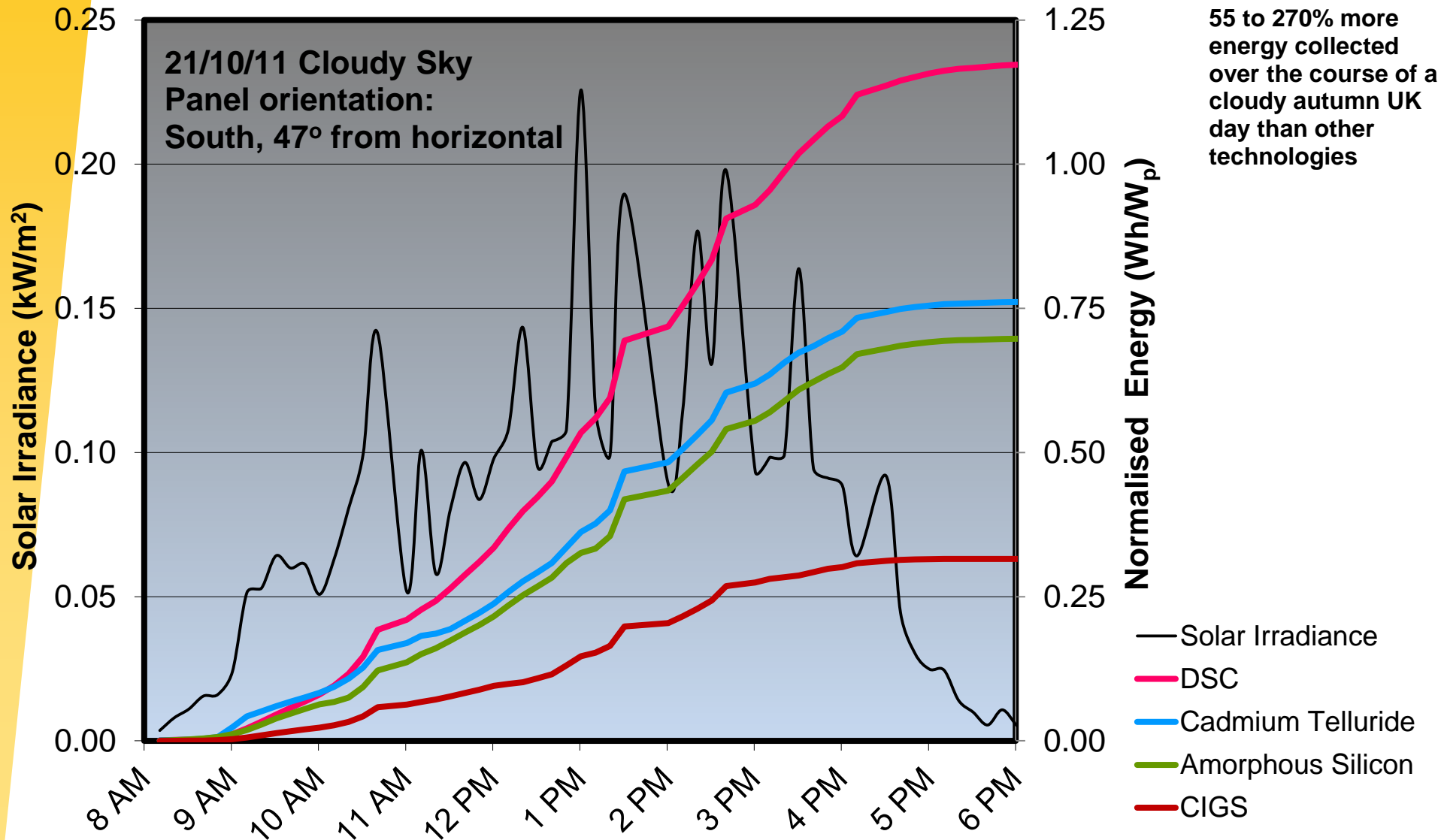
# DSC Construction



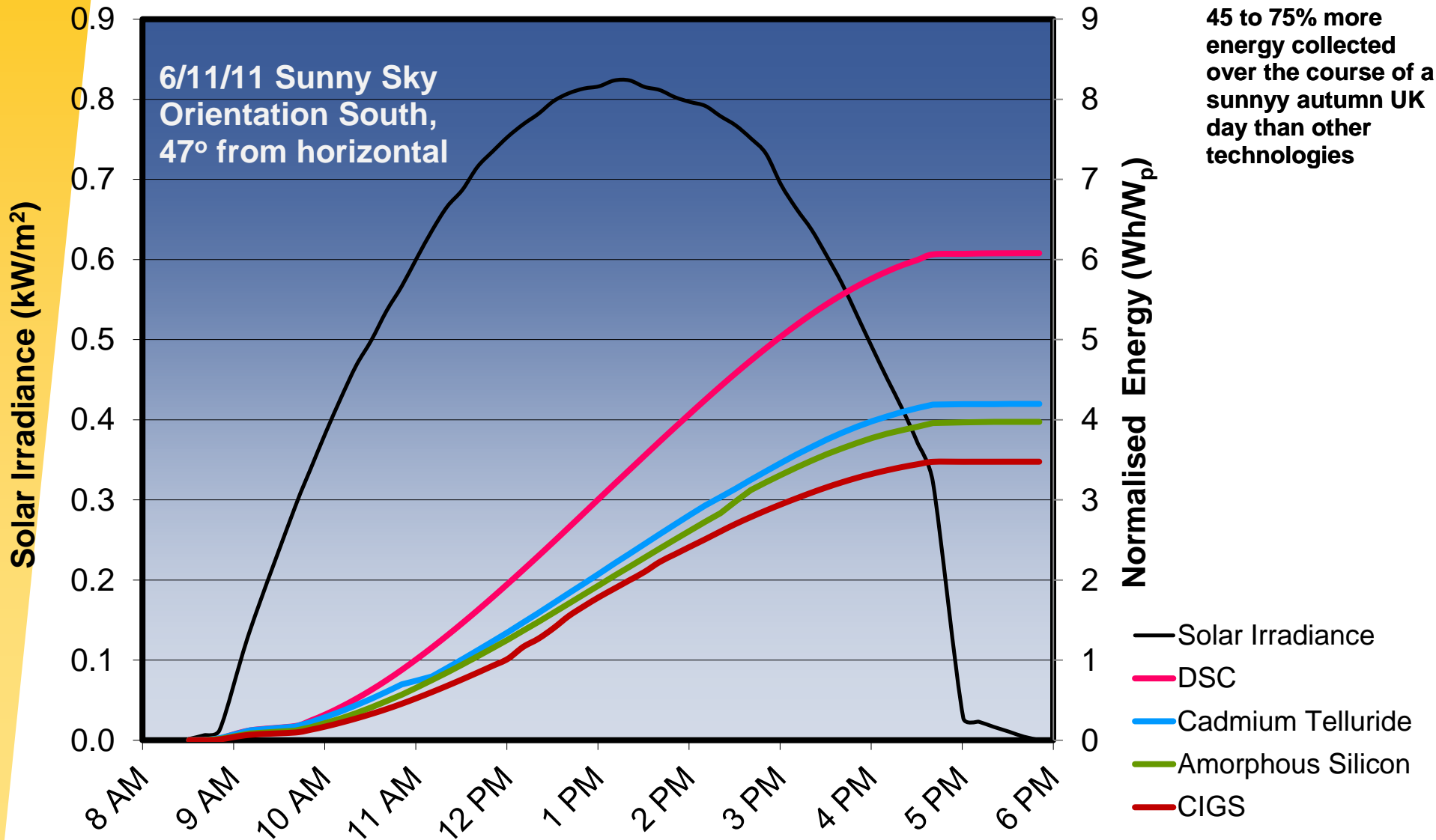
# DSC Operation

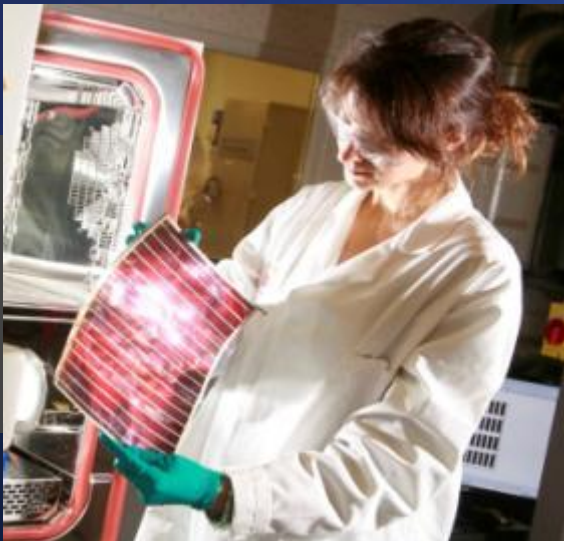


# Real-World Performance



# Real-World Performance





Partners & Projects



## 1. Strategic Partners

## 2. Key Commercial Projects

- Tata
- Pilkington
- Timo

# Strategic Partners



Partner	Market	Region	Details
	Steel / wall & roof applications	UK/Global	<ul style="list-style-type: none"> <li>Fifth largest steel producer in the world</li> <li>Co-develop and commercialise DSC on coil-coated steel</li> <li>£10+ million joint-programme under a Welsh Assembly Government (WAG) contract</li> </ul>
	Materials supply	Germany/Global	<ul style="list-style-type: none"> <li>World leader in development and manufacture of ionic liquids and electrolytes</li> <li>Co-develop electrolytes for use in DSC</li> </ul>
	View and non-view Façade glass applications	US/Global	<ul style="list-style-type: none"> <li>Part of NSG Group, world's 2<sup>nd</sup> largest manufacturers of glass and glazing products for building, automotive and specialty glass markets</li> <li>Commercialise DSC on view and non-view glass, utilising Pilkington's TEC series of transparent conductive oxide (TCO) coated float glass and Dyesol's DSC materials</li> <li>Ohio State Third Frontier Fund – US\$ 1 million Development grant</li> </ul>
	Engineering and process solutions	Singapore / Global	<ul style="list-style-type: none"> <li>Singapore Aerospace Manufacturing - manufactures Dyesol proprietary equipment</li> <li>Owned by Singapore Government</li> </ul>
	Glass tiles	Korea/Global	<ul style="list-style-type: none"> <li>Dyesol-Timo is 50/50 JV for development and commercialisation of DSC in Korea</li> <li>Timo Technologies is a listed electronics supplier to large MNCs such as LG</li> </ul>
	R&D Materials Supplier	Global	<ul style="list-style-type: none"> <li>Leading supplier of chemicals to academic and corporate researchers</li> <li>Dyesol materials included in the catalogue</li> </ul>
	Remote Sensors	Asia	<ul style="list-style-type: none"> <li>Leading Singapore research university</li> <li>New collaboration focused on next generation, solid state DSC</li> </ul>

# Key Commercial Projects

## Tata: DSC Steel Roofing

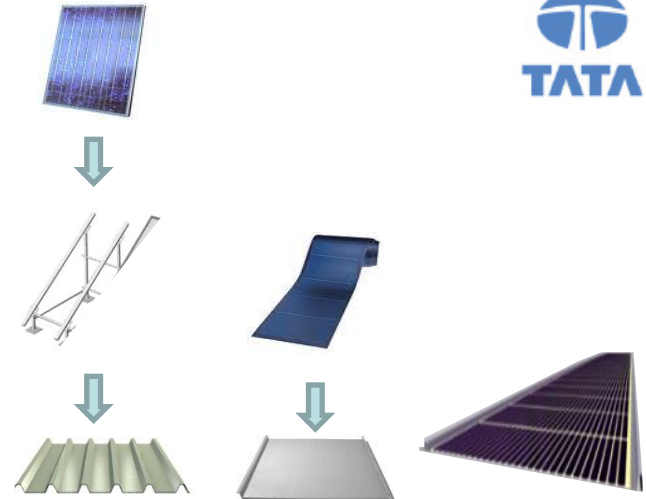


### World Coated Steel Market:

- Over **1 Billion square meters per annum**, growing at 7-8% p.a.
- Represents market of ~\$150 Billion per annum
- Potential for DSC coated steel cladding is 20%, which represents an **addressable market** of:
  - ~200 million square metres p.a.
  - ~\$30 Billion p.a.
- Equivalent to over 10 GW installed per annum, compared to 2007 installations of 2.8 GW



### Benefits of Rooftop Building Integrated PV



Installation	PV		
	Frame	PV	
	Roof	Roof	PV Roof

Materials	Glass/Glass PV	Metal Carrier PV	PV Metal Roof
	Support Frame	Metal Roof	
	Metal Roof		

# Key Commercial Projects

## Pilkington: DSC Glass Façades



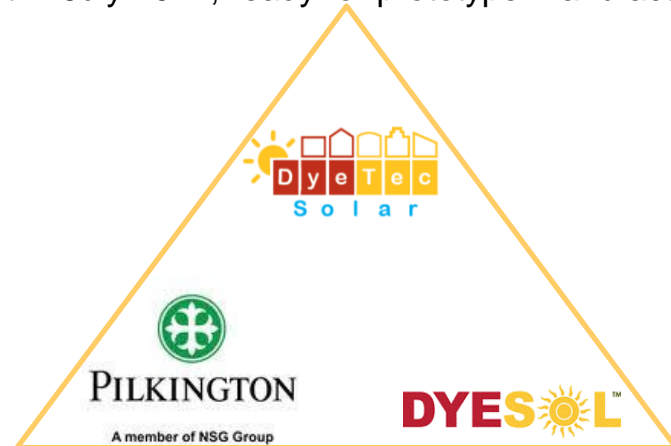
### World Flat Glass Market:

- Over **6 Billion square metres per annum**, growing at 5% p.a.
- Building applications are roughly 70% of market, or 4.2 billion square metres per annum
- Breakdown of 60% / 40% for view and non-view; DSC addressing non-view market at this stage
- Represents an **addressable market** of:
  - ~1.7 Billion square metres p.a.
  - ~\$25 Billion per annum



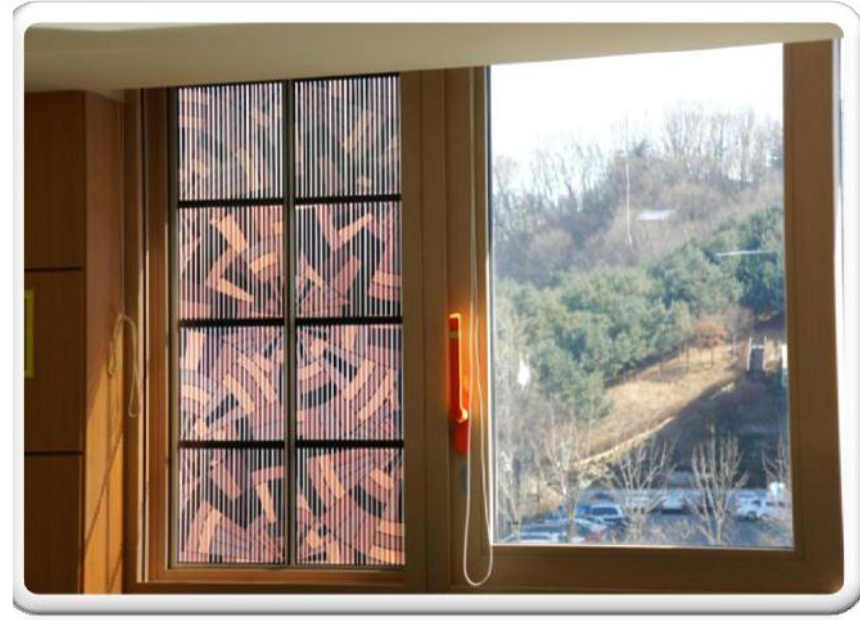
### Dyesol-Pilkington Joint Venture:

- Formed **Dytec Solar®**, a 50/50 JV with Pilkington North America, a leading multinational glass company
- Objective is to **industrialise technology for mass manufacture of glass-based DSC BIPV**, building-applied photovoltaic (BAPV) and automotive-integrated photovoltaic (AIPV) products
- Received US\$1 million grant from Ohio Third Frontier Fund to commence first phase of Toledo based large panel glass project and possibilities for ongoing funding
- **Completed equipment installation** at Toledo, Ohio, USA project in July 2011, ready for prototype manufacture



# Key Commercial Projects

## Dyesol-Timo: DSC Glass Tiles

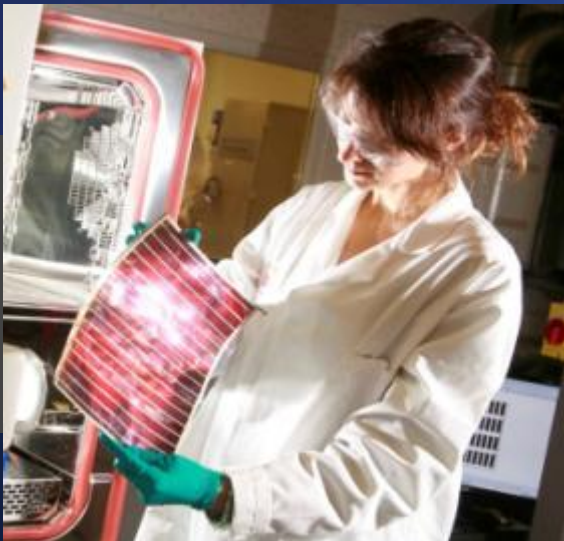


2008: Dyesol + Timo Technologies = **DYESOLTIMO** JV

2009: Pilot Production Plant opens in Korea

2012: Next generation **DSC windows installed** at Human Resource Centre of Seoul, Korea



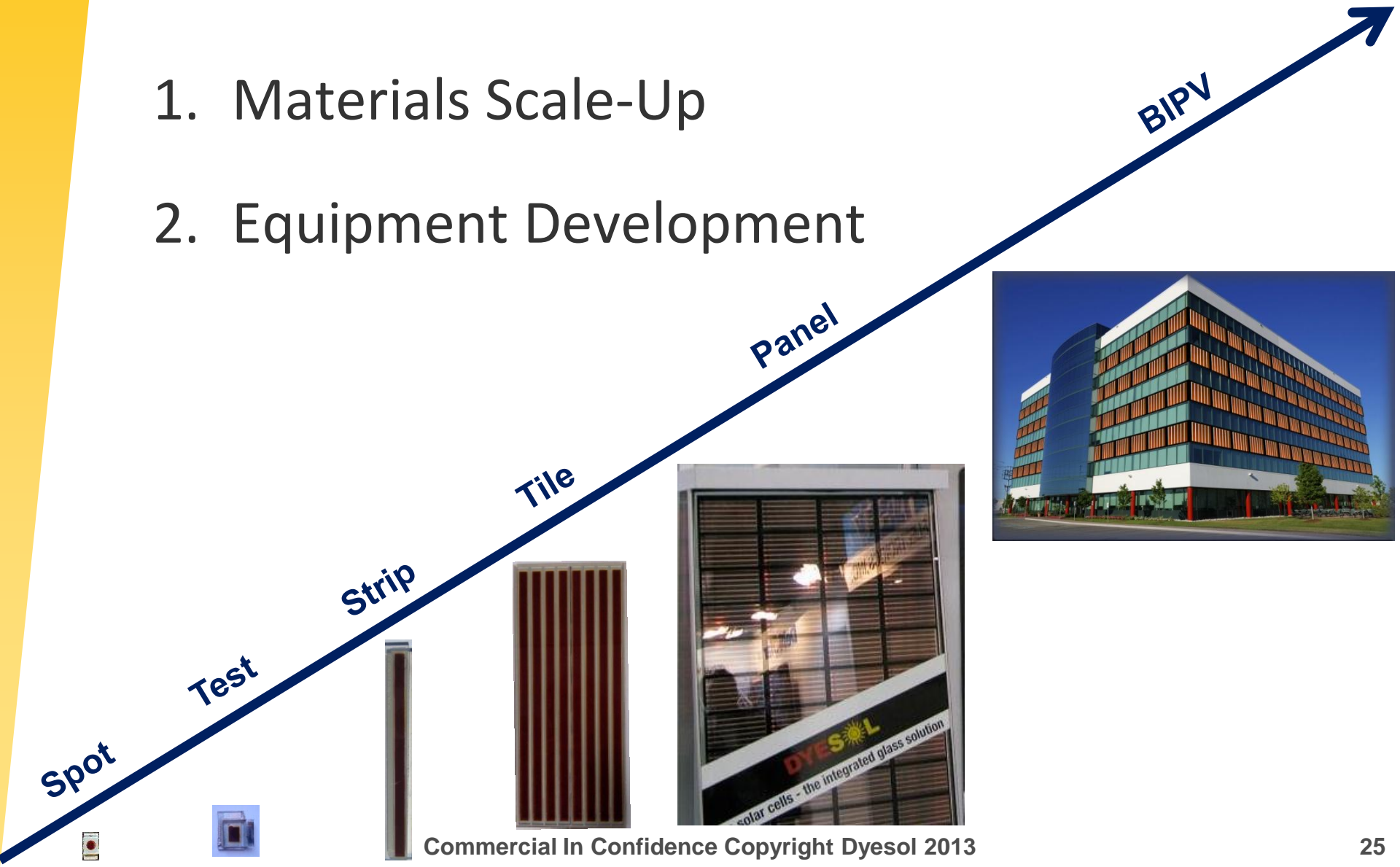


Where To?

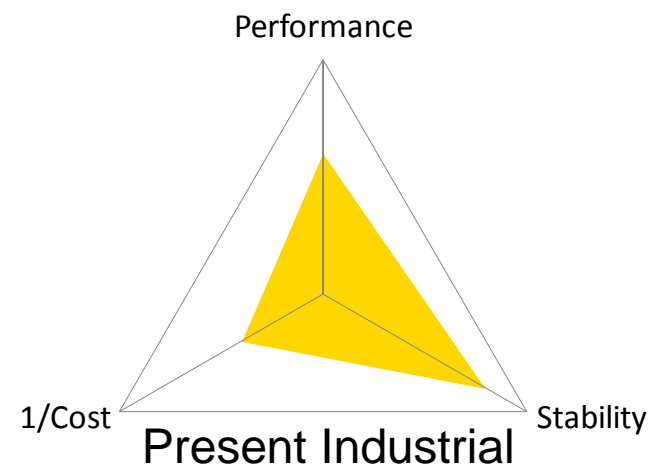
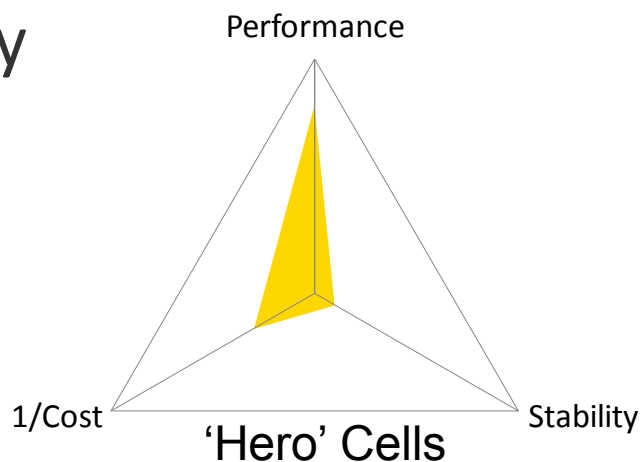
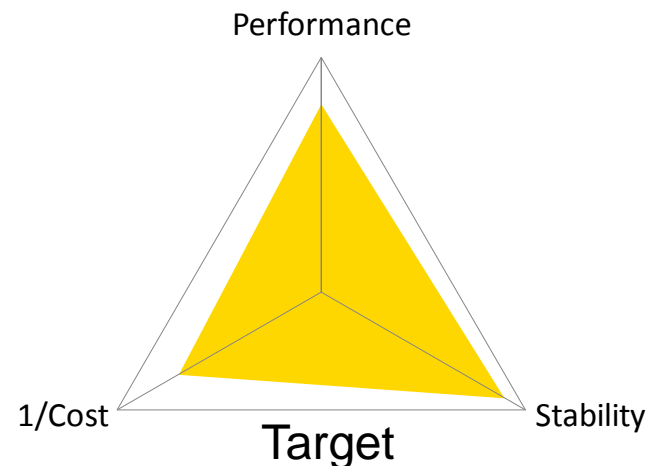
# From Spot Cells to Solar Cities



1. Materials Scale-Up
2. Equipment Development



- Focus: optimising LCOE  
(levelised cost of energy)
- The 'Golden Triangle':
  - Performance
  - Stability
  - Cost





# Thank You!

**DYESOL**



Photographer - Thomas Bloch

