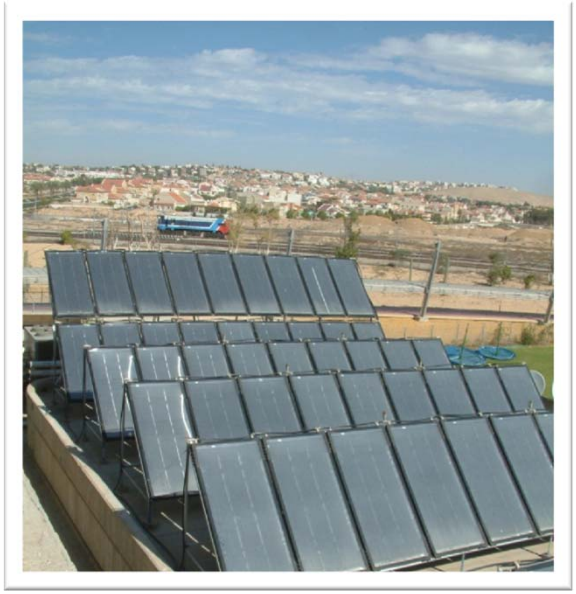
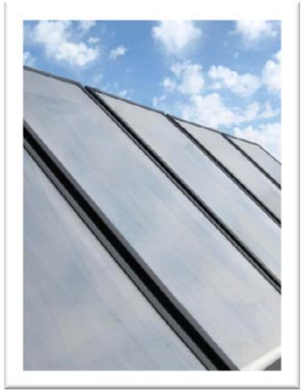
Polymer Solar Collectors





Potential

Challenges

Solutions

ECO FLARE™ PRO

SIMPLY SOLAR

MAGEN eco-energy

SOLARPRAXIS

SMEThermal 2013

29. Januar 2013, Berlin

Magen Eco-Energy

World leader in polymer solar absorbers and polymer heat exchangers

SUNSTAR SOLAR POOL HEATING

HELIOCOL SOLAR POOL HEATING. ENGINEERED FOR LIFE.

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Focus on Direct Thermosiphon systems

Distribution by type of system of the newly installed capacity in 2010

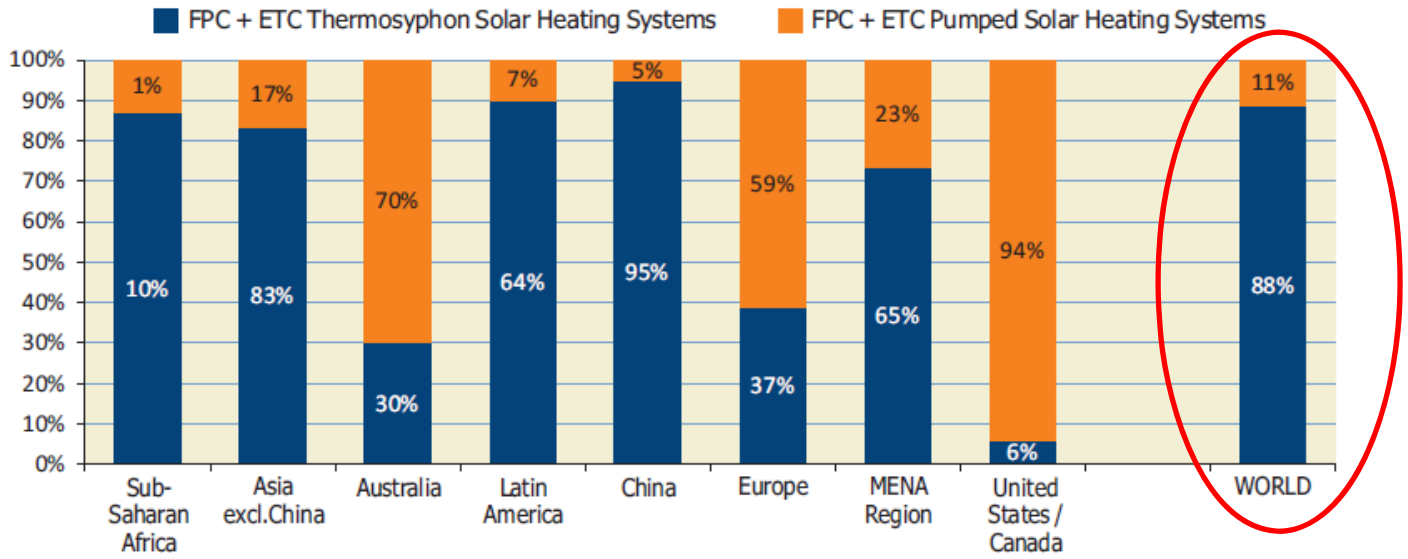


Figure 41: Distribution by type of system for the newly installed water collector capacity in 2010

Asia excluding China:	India, Japan, Korea South, Taiwan	Europe:	Albania, EU 21, Norway, Turkey
Latin America:	Brazil	MENA Region:	Jordan, Israel, Tunisia
Sub-Saharan Africa:	Namibia		

Source: Werner Weiss | Franz Mauthner, Solar Heat Worldwide, Markets and Contribution to the Energy Supply 2010

Challenge 1: Thermal Performance

Maximum Transmittance, Absorptance with minimum thermal losses

Absorber: 

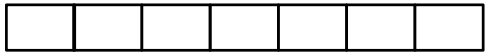
#120 x 6.5mm PP riser tubes,

Weight 2.5 kg/m² vs. Al-Cu ~1.5-2.0 kg/m²

Price: Al= 1.5 €/kg, Cu=6 €/kg, PP= 2 €/kg-

Performance comparison: -10% for PP

Saving potential - None

Glazing: 

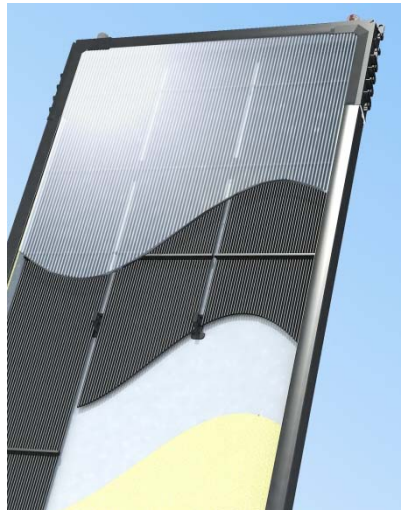
Transmittance: Glass- 90%+, PC Twin Wall- 80%

Weight: 0.8 kg/m² vs. Glass ~8kg/m²

Price: Glass ~0.25 €/kg., PC- ~2 €/kg-

Performance comparison: -10% for PC

Saving potential: 0.4 €/m²



Casing:

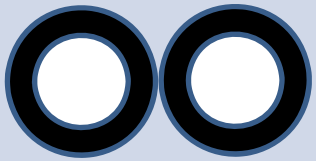
PA 66 +GF Frame profile+ PU Back plate

Weight: Frame- PA 0.6 kg/m vs. Al 1.0 kg/m

Price: Al= 1.5 €/kg, PA=3 €/kg

Saving potential- None

Challenge 2: Pressure & Temperature combination

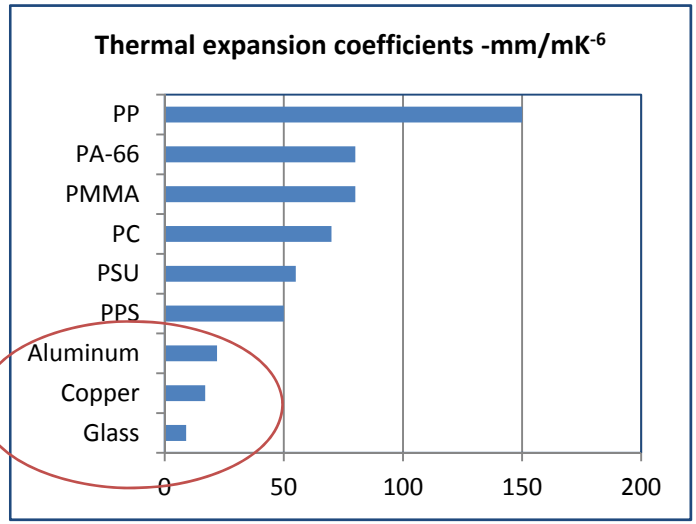
Mode of operation	Conditions	Solution
During Operation	4 Bar 60-70 °C 10-15 years	"Pipe Array Absorber" 
Dry Stagnation	0 Bar 150+ °C ~3 months	Venting, Thermotropic Glazing Protection sheet Patented 
Wet Stagnation	10 Bar 120+ °C ~ 3months	Pressure valve Thermotropic Glazing venting 

Challenge 3- Header connection

Solution

Patented

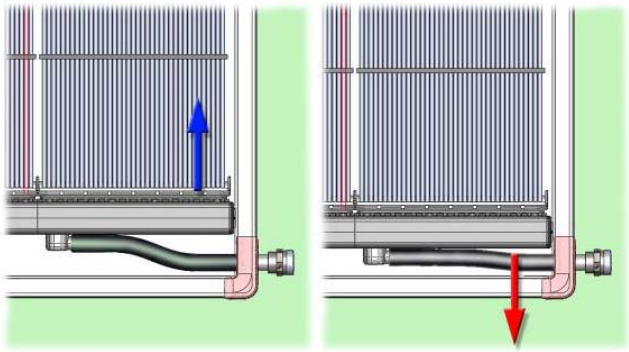
Challenge 4: Thermal Expansion



Solution 1:
Absorber and pipe ports attached to top frame side

Patented

Solution 2:
Flexible connection of Absorber to Frame



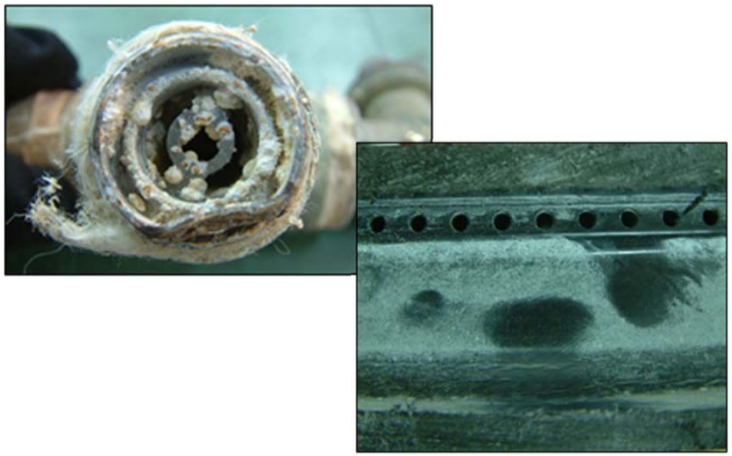
Patented

Main Advantages of Polymer Collector

Weight

Corrosion Resistance

No Scale accumulation



Main Advantages of Polymer Collector

Mild Freeze Resistance

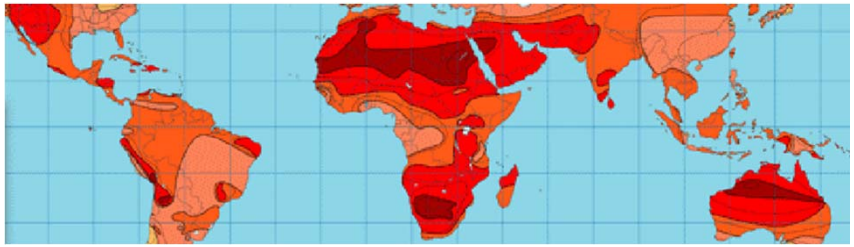
Transportation and Conveying

Pipe and roof Connections

Summary and conclusions

Polymer Solar collectors- Short term focus:

- Lower cost vs. high efficiency- focus on emerging markets with hot climate
- Simple & easy installation
- Direct systems for poor quality/ hard water/ High Chlorine content water areas
- Direct systems for mild freezing areas



Customer Benefits:

- Performance difference is negligible in those areas
- No need for specially qualified installers
- No need for special closed loop tanks, pumps and control systems

Growth:

EU-0.5%, US-2.2%

ASIA: 7.5% ,Africa:5+%

Latin America:3.9%

Long Term Focus:

New Materials/ composite materials:

- Price < 2.5 €/kg
- Heat Deflection Temperature> 180 °C
- Long Term Stress/creep Resistance > 3 Mpa @ 80 °C
- Short Term Stress Resistance > 5Mpa @ 140 °C
- Long term weathering stability
- Low Thermal expansion coefficient
- Easy Processing- Extrusion, Injection

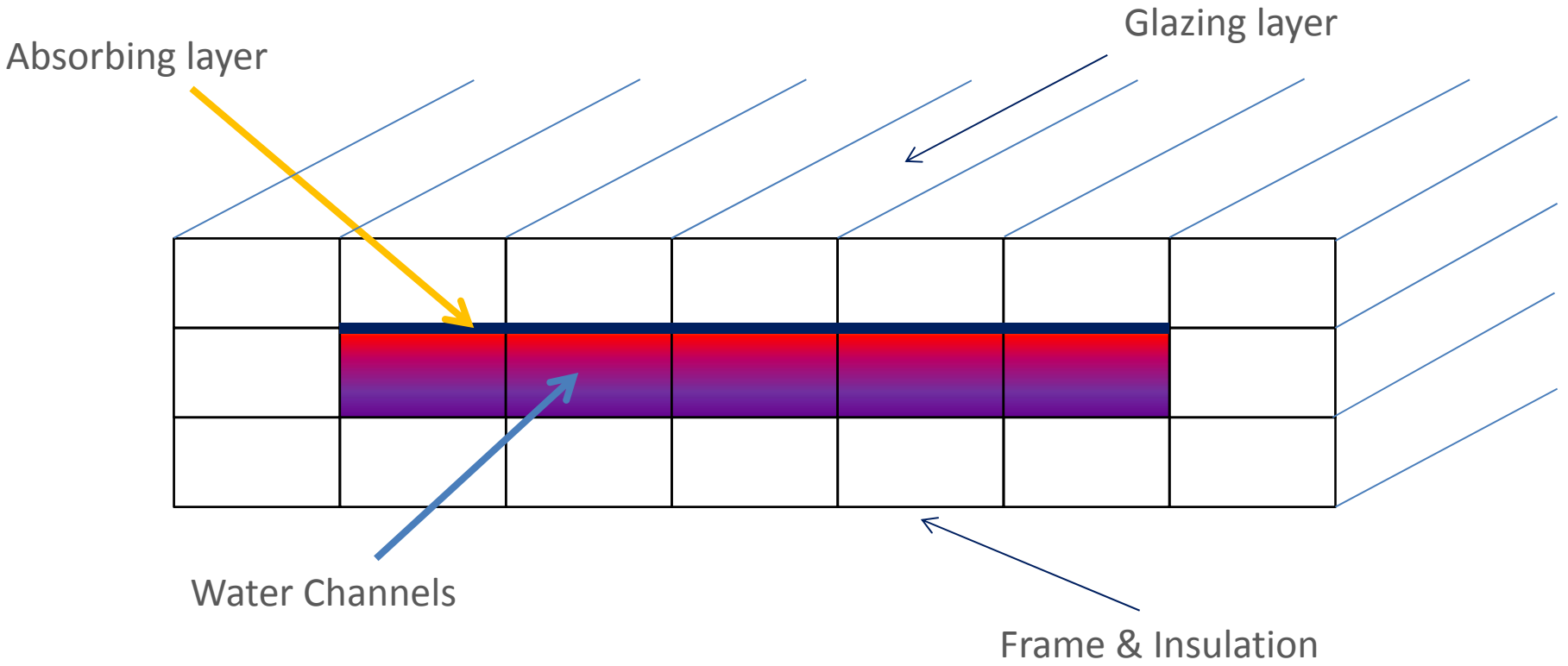
New Standards/ Modify existing standards

Combined solution for collector and tank

Building integrated polymer solar panels

Optional Solution 2:

Multiwall Polymer Sheet



Thank you

Challenge 1: Thermal Performance

Maximum Transmittance, Absorptance with minimum thermal losses

Requirements

Glazing:

- **Transmittance** (Over time- UV, Abrasion resistance, dust collection)
- **Strength-** Bend, Impact, positive and negative pressure
- **Low thermal losses** (IR reflectance, Low Conductivity)

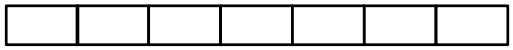
Absorber:

- α vs. ε
- Good conductivity between absorber and riser tubes or "multi risers absorber"
- Even flow

Casing:

- Maximum Insulation
- Minimum Non-effective area

Magen's Solution:



Glazing:

4mm Double wall PC Glazing with upper UV blocking layer

Absorber:

"Multi-Riser" PP absorber

Casing:

PA 66 +GF Frame profile, PU back insulation

Challenge 5: Wind (Negative Pressure)

500 Pa

2000 Pa

5.9.2 Negative pressure test of the collector

The test pressure shall be increased in steps of 250 Pa until a failure occurs or up the value specified by the manufacturer. The test pressure shall be at least 1000 Pa. A failure can be the destruction of the cover and also the permanent deformation of the collector box or the fixings.

Source: EN 12975- Thermal solar system and components- solar collectors- test methods

Challenge 6: Long term weather impacts

UV Radiation

Dust collection

Glazing Abrasion

Water ingress

Challenge 2: Pressure & Temperature combination