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HelioPod

HelioStat System for MGT CSP

Willem Landman

STERG Symposium - July 2016



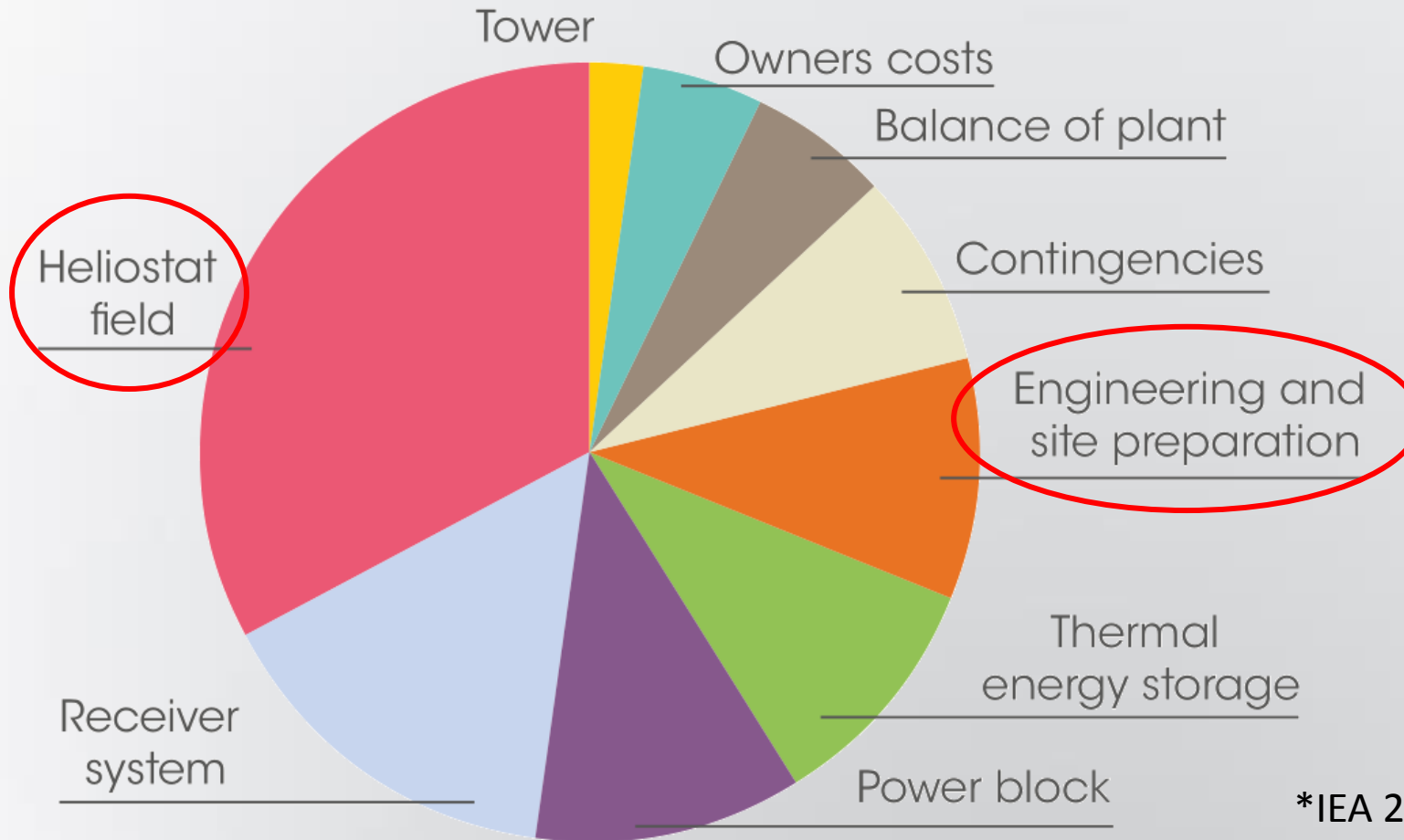
Content

- Background to Stellenergy (Pty) Ltd and Helio100
- The value proposition of MGT CSP
- Overview of the heliostat technology
- Our current status

Helio40



Typical central receiver CSP CAPEX split



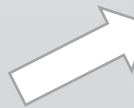
**Together ~50% =
USD 2.15 trillion***

*IEA 2014 Solar Roadmap for cumulative value of CSP at 11% of world electricity

Background



RENEWABLE & SUSTAINABLE
ENERGY STUDIES



Key facts

- Startup out of Stellenbosch University in 2013
- From STERG – One of biggest CSP university groups
- Key leadership
 - Paul Gauché: 20 years in tech-dev, mostly semiconductor industry in USA. Founder and first Director of STERG. Advisor for CSP and solar energy to government, industry and IEA. Founding ExCo – SASTELA.
 - Multiple PhD and Master grads
 - Senior advisors and partners for management and business development

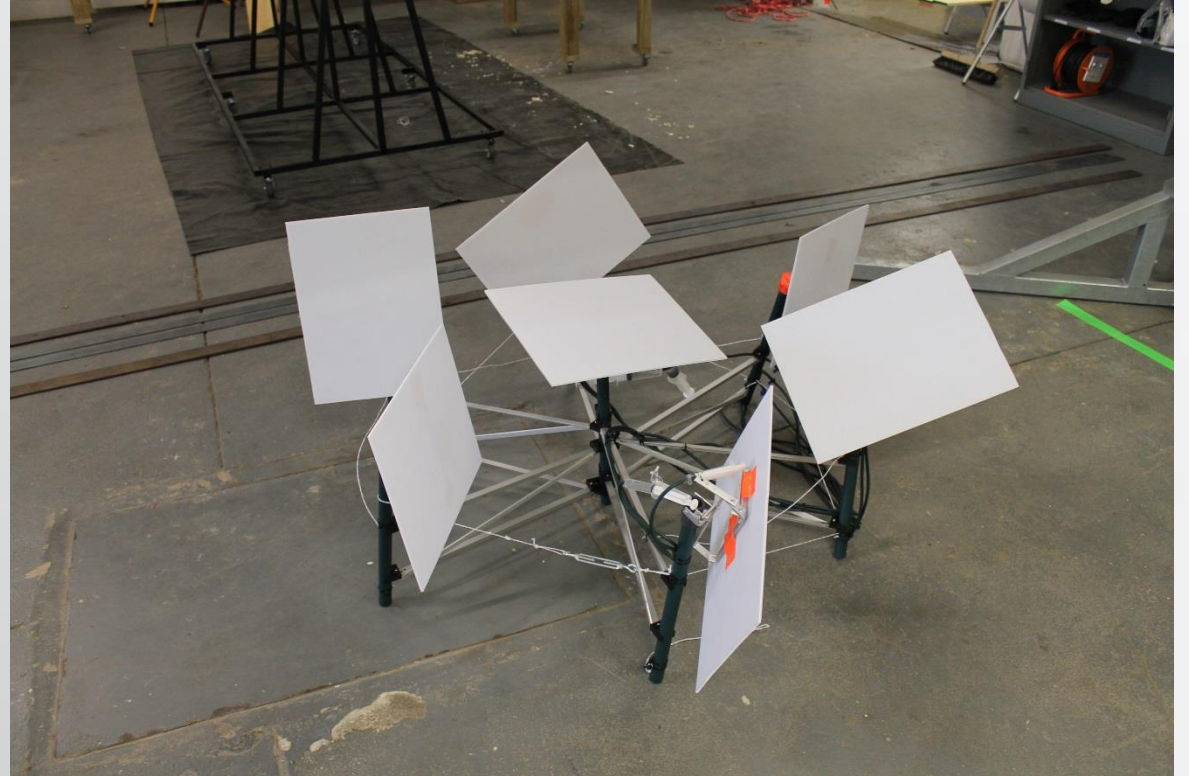
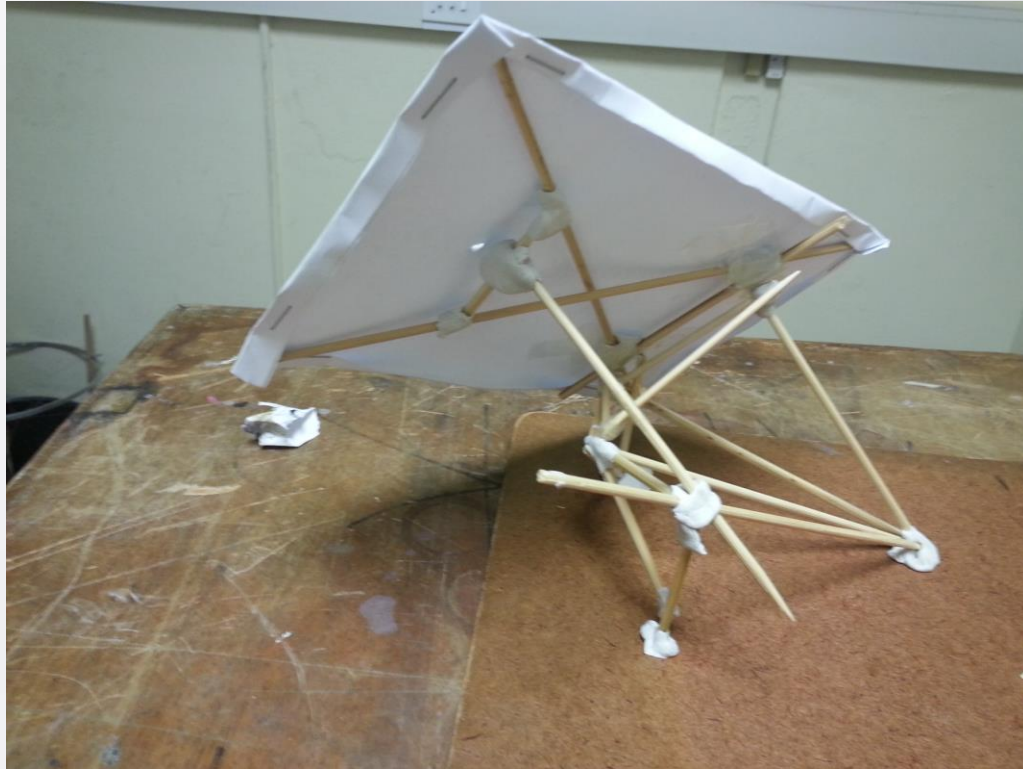
Helioteam (Key technical staff)



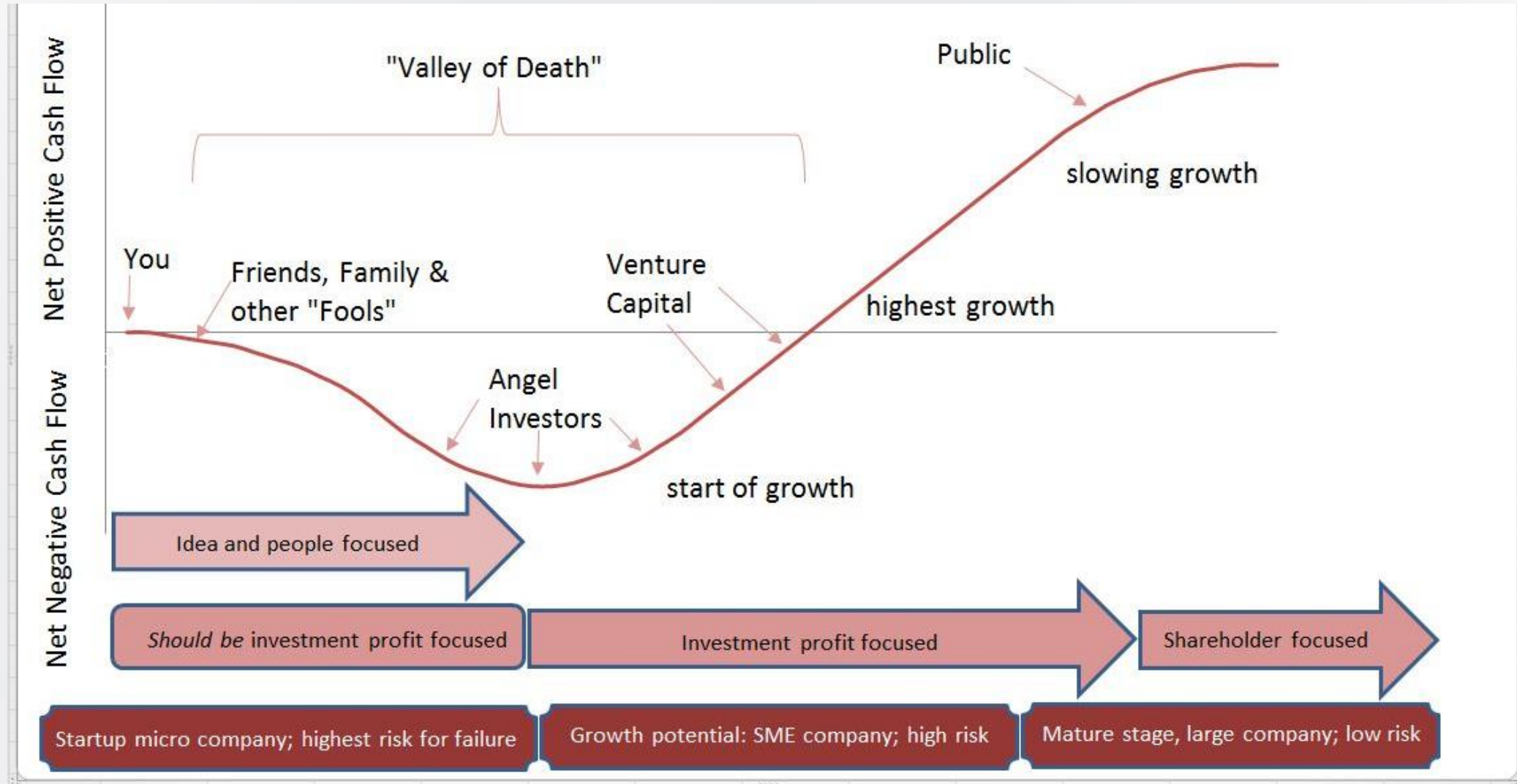
DST/TIA flagship project



Thinking Different



Valley of Death



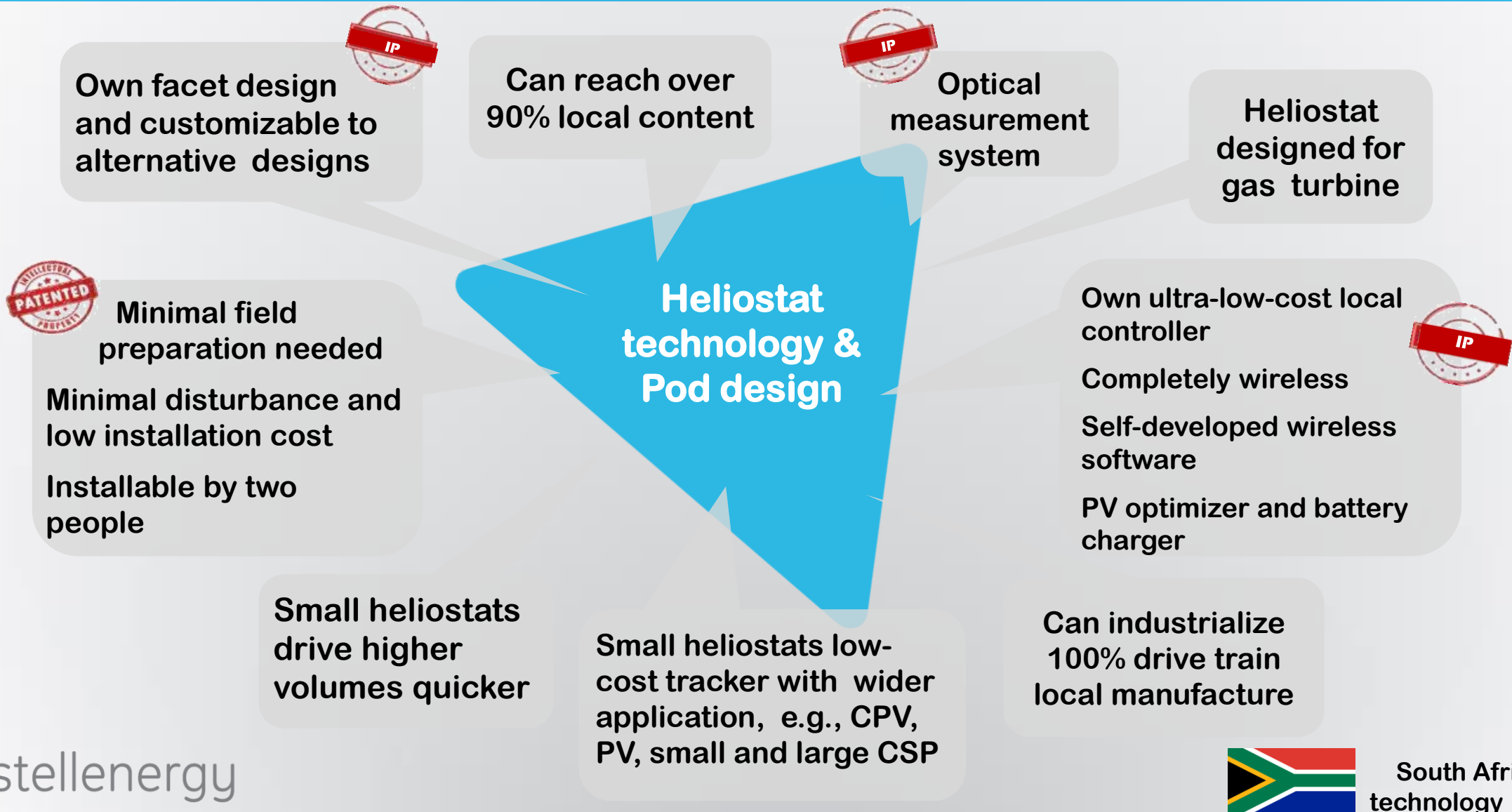
The value proposition of MGT CSP

- Lowering of perceived financing risks through staggered market entry
- Small modular units => production economics
- Distributed power generation
- Independent of water and grid access constraints
- Reduced footprint constraints
- Hybridisation
- High temp Brayton cycles => high efficiency

Heliostat Requirements for MGT CSP

- Higher flux requirements
- Small scale deployment
- Low cost
- High accuracy optics

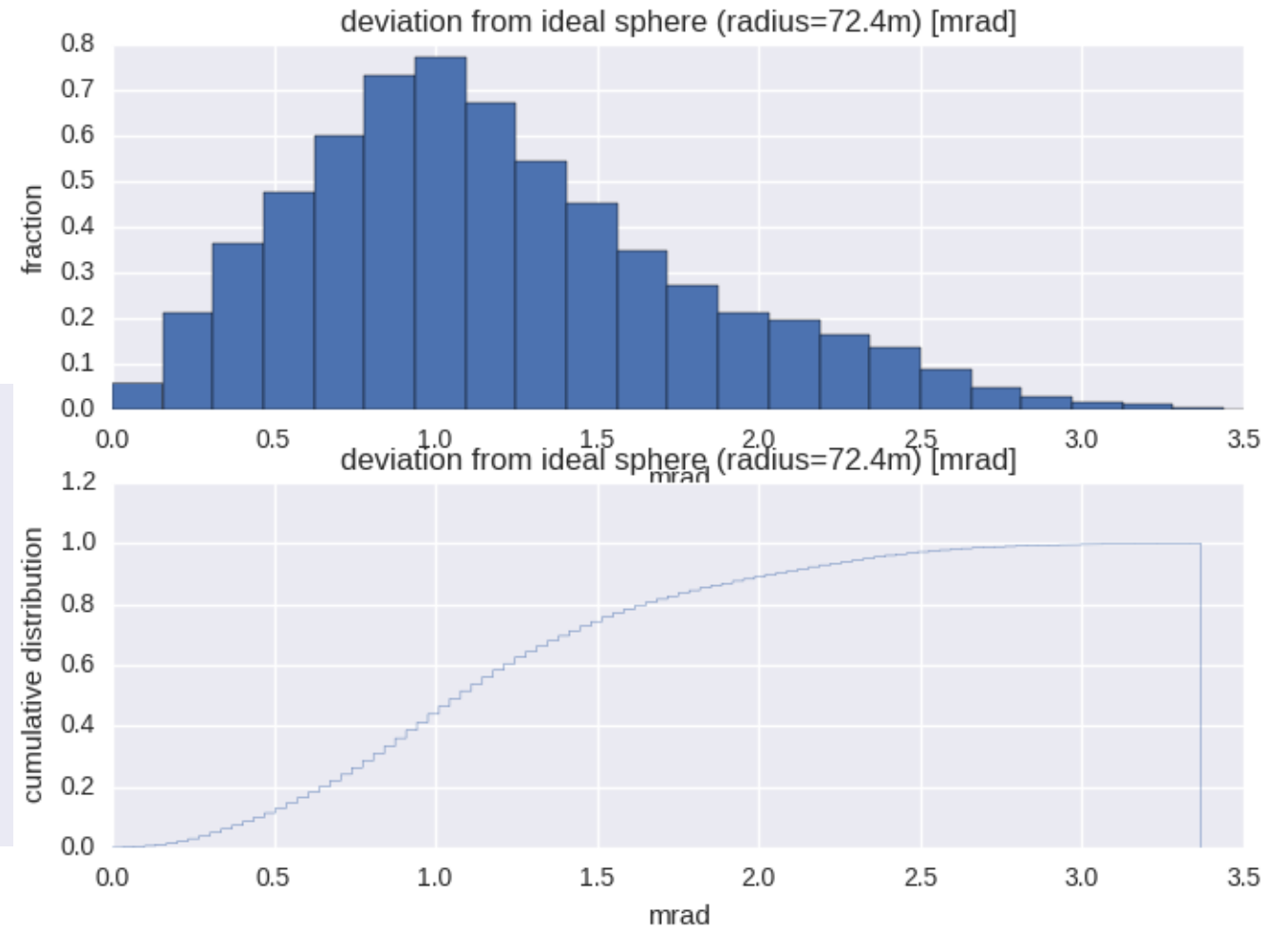








QA system: Zebra



Pre-field assembly (Jun 2015)



Pod assembly



Field assembly (Jul 2015)



Field assembled (Jun 2015)



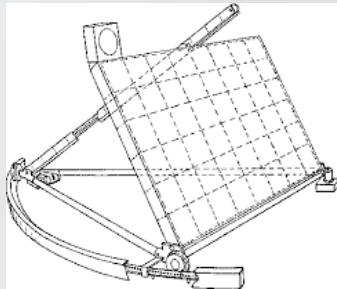
Helio100 System in Operation





Small, Low-cost, Accurate.

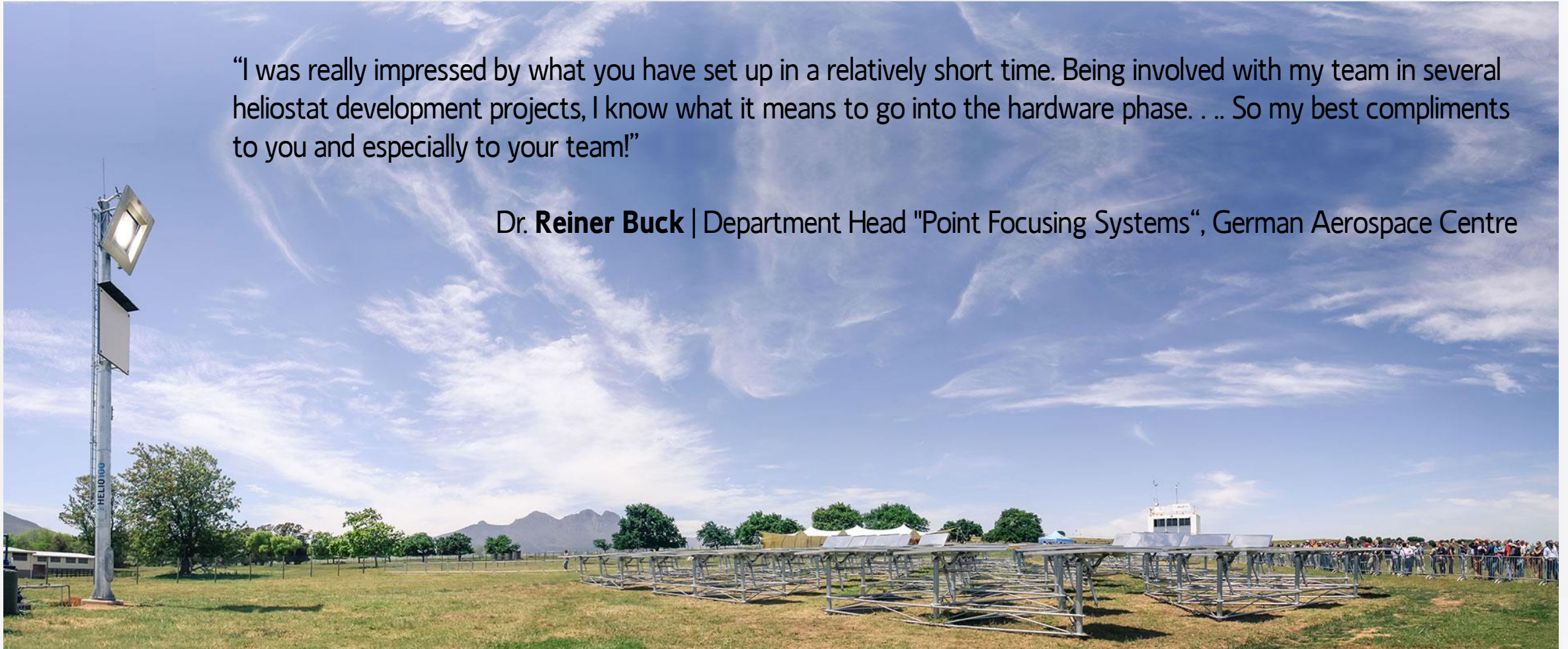
- Glass inherently has 0.7mrad error...we are achieving 1mrad
- It's a non-trivial problem which no one is able to get right (with all heliostats) let alone for MGT CSP





SolarPACES 2015

“I was really impressed by what you have set up in a relatively short time. Being involved with my team in several heliostat development projects, I know what it means to go into the hardware phase. . . So my best compliments to you and especially to your team!”

Dr. **Reiner Buck** | Department Head "Point Focusing Systems", German Aerospace Centre



SolarPACES 2015 in Cape Town

Solar Power And Chemical Energy Systems
An Implementing Agreement of the
International Energy Agency

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> 21st SolarPACES Conference, 13 - 16 October 2015, Cape Town, South Africa

21st SolarPACES Conference, 13 - 16 October 2015, Cape Town, South Africa

Showcasing Helio100 to the World

17 Oct 2015

Invitation to join TIA and SU in the official tour of the SolarPACES 2015 in Cape Town



A 100% South African heliostat technology is being developed for the fast growing Concentrating Solar Power (CSP) industry. The unique design uses smaller, smarter and modular heliostats to overcome cost challenges. A pilot facility is being built within the TIA Helio100 technology development project and will be unveiled at the leading international CSP conference in Cape Town next year. Partner with us or sponsor this exciting event to gain exposure to the important leaders and decision makers in the CSP industry.


















The TIA Helio100 technology development project

The Solar Thermal Energy Research Group at Stellenbosch University has been developing a unique South African CSP technology. CSP is able to provide dispatchable, clean energy at utility scale, with the added benefit of high localisation potential and socio-economic beneficiation. In early 2014 the team won a grant from the Technology Innovation Agency to showcase the technology in a 100kW pilot facility. The technology takes a simple and fresh approach to overcome the challenges that are currently faced in heliostat fields. The heliostat technology boasts:

- High localisation potential
- Simplicity allows for in-field assembly and job creation
- Smaller heliostats leverage economies of scale reaching production volumes similar to the automotive industry
- Low cost design reduces the upfront capital cost required, which is currently the biggest boundary to market entry
- Integrated heliostat support system negates the need for any earth works or foundations and has a low impact on the natural vegetation allowing for dual land use
- An intelligent self-calibrating heliostat with a modular design ensures that the heliostat remains flexible and internationally relevant

The construction of the pilot facility will be completed by September 2015 and will be unveiled to the CSP world at SolarPACES as the official tour of the leading international CSP conference.



Partner with us

The TIA Helio100 pilot facility has been chosen as the official site tour for the international SolarPACES conference. In October 2015 the CSP world will come to Cape Town for the biggest event on the CSP calendar which attracts important leaders, executives, consultants, financiers and decision makers from all spheres of this rapidly growing industry.

Sponsor the Helio100 tour and take advantage of this unique opportunity to showcase South African ingenuity in the solar thermal industry.

CONFERENCE DATES:
Tuesday 13th of October to Friday 16th of October 2015

TOUR DATE:
Saturday 17th of October 2015

For further information please contact:

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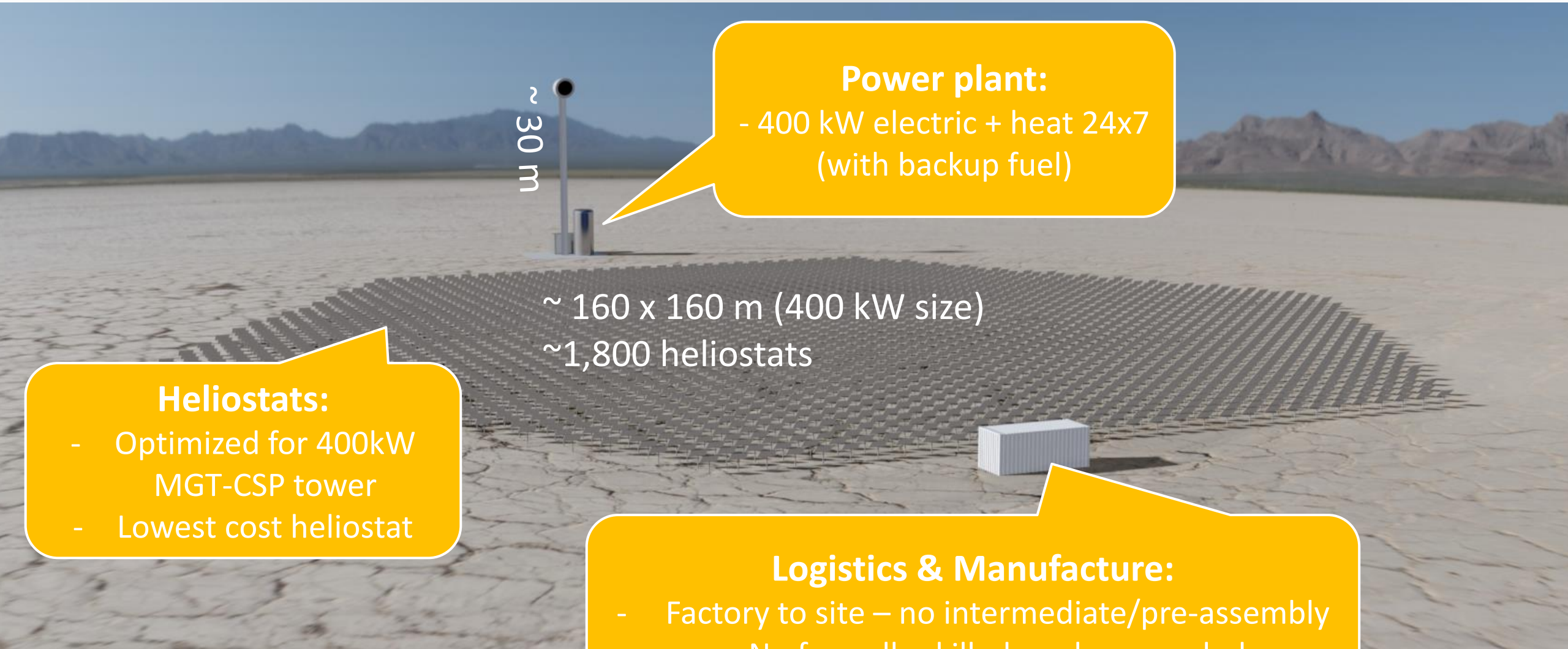
SBP Stellio

- SolarPACES 2015 Technology Award
- Certified by CIEMAT and CSP Services as best performing heliostat ever tested.
- Would like to incorporate the Stellenergy control system – we are invited to consortium

Image used with permission from sbp gmbh.



Stellenergy view of a 247Solar unit



~ 30 m

Power plant:

- 400 kW electric + heat 24x7 (with backup fuel)

~ 160 x 160 m (400 kW size)
~1,800 heliostats

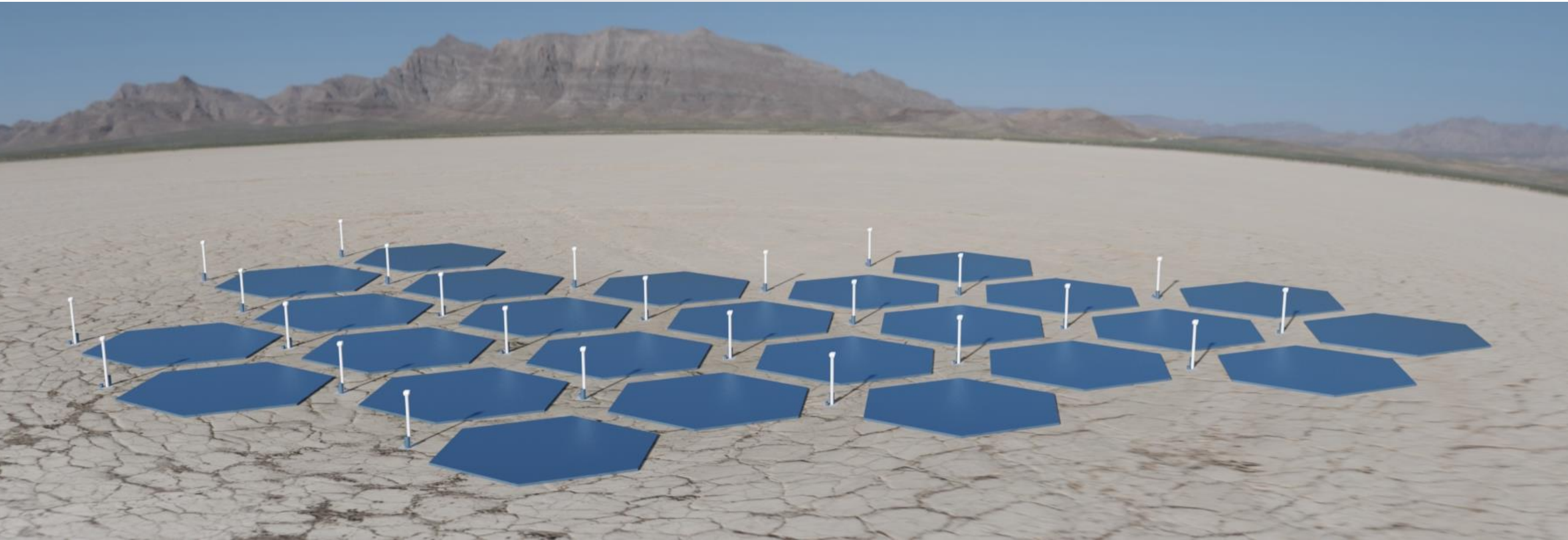
Heliostats:

- Optimized for 400kW MGT-CSP tower
- Lowest cost heliostat

Logistics & Manufacture:

- Factory to site – no intermediate/pre-assembly
 - No formally skilled workers needed

Modular rollout: 10MW example



Thank you/Questions

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