



TIA Helio100 technology development project
Status and way forward
STERG Symposium 15 July 2015



Agenda

- Background & STERG
- Helio100 & Helioteam
- Our status today
- Our dreams of tomorrow



BACKGROUND

TIA Helio100: 100% SA Heliostat and Tower



Phase 1 (April – Dec 2014) – Tech dev – Complete
Phase 2 (Jan – Sept 2015) – Pilot execution – Ramping
Official site visit: 17 October SolarPACES 2015

About STERG



- Primary funders



visit sterg.sun.ac.za
contact sterg@sun.ac.za

About STERG



- Primary partners and associations



RENEWABLE & SUSTAINABLE
ENERGY STUDIES



visit sterg.sun.ac.za
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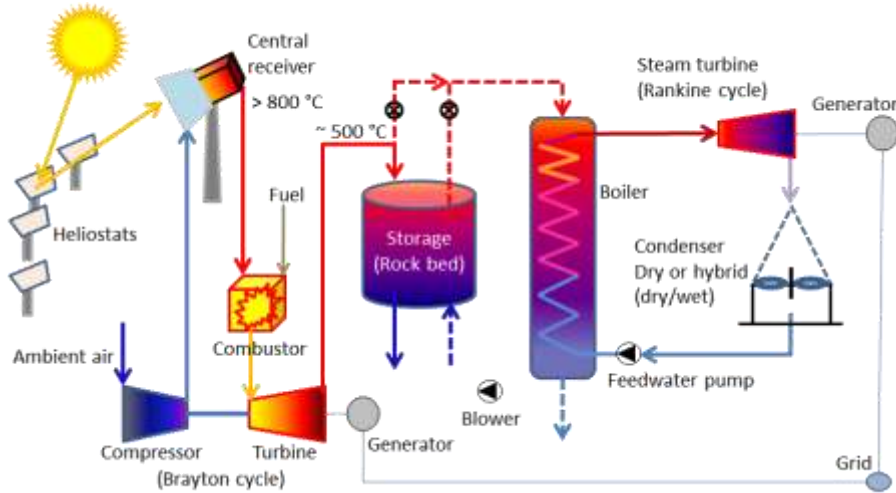
STERG infrastructure & resources



- Staff: 8+ (researchers, administrative, engineering and technical support)
- 1,000 m² solar roof laboratory, staff office, workshop & control room
- Receiver test facility & Helio40 – 40 m² heliostat system
- 600 C, 1.5 m³ packed bed storage rig & 1,200 C kiln
- 25 kWe Eskom McDonnell Douglas Stirling Dish
- Solar and weather resource data linked to www.sauran.net

Key R&D focus

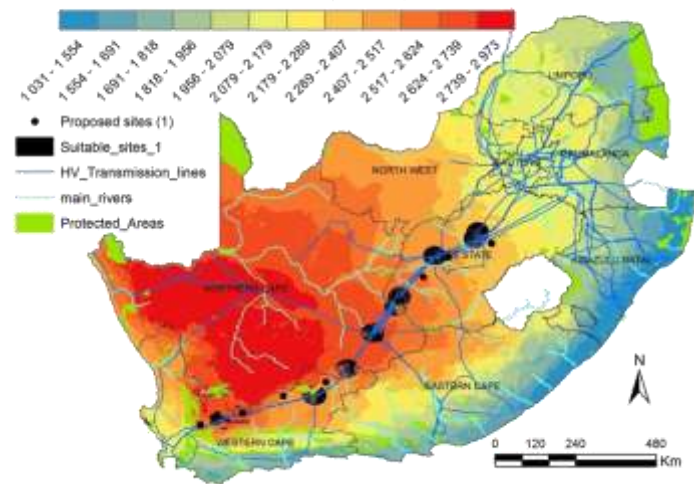
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- ~35 MEng/PhD/Post-docs
- Most involved in these 2 key R&D areas

South Africa


Annual sum of direct normal irradiation (kWh/m²)





HELIO100 & HELIOTEAM

Late 2012 to early 2013...

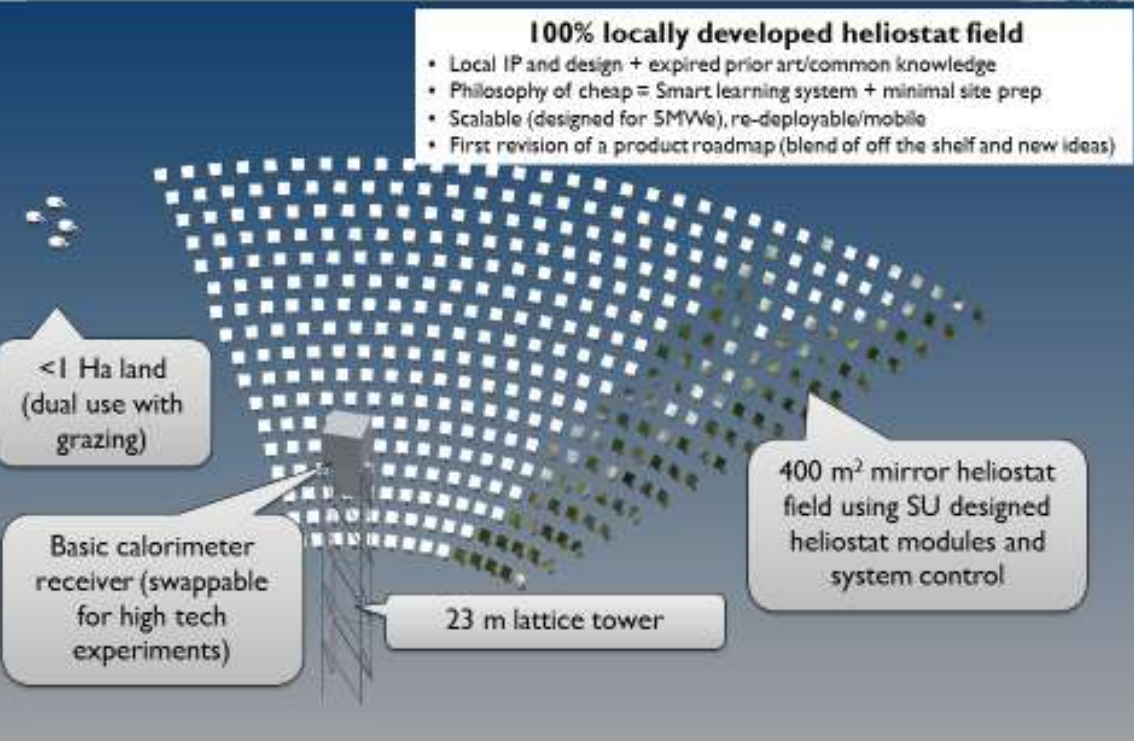


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The idea in concept: 300kWth Heliostat field

100% locally developed heliostat field

- Local IP and design + expired prior art/common knowledge
- Philosophy of cheap = Smart learning system + minimal site prep
- Scalable (designed for 5MWth), re-deployable/mobile
- First revision of a product roadmap (blend of off the shelf and new ideas)



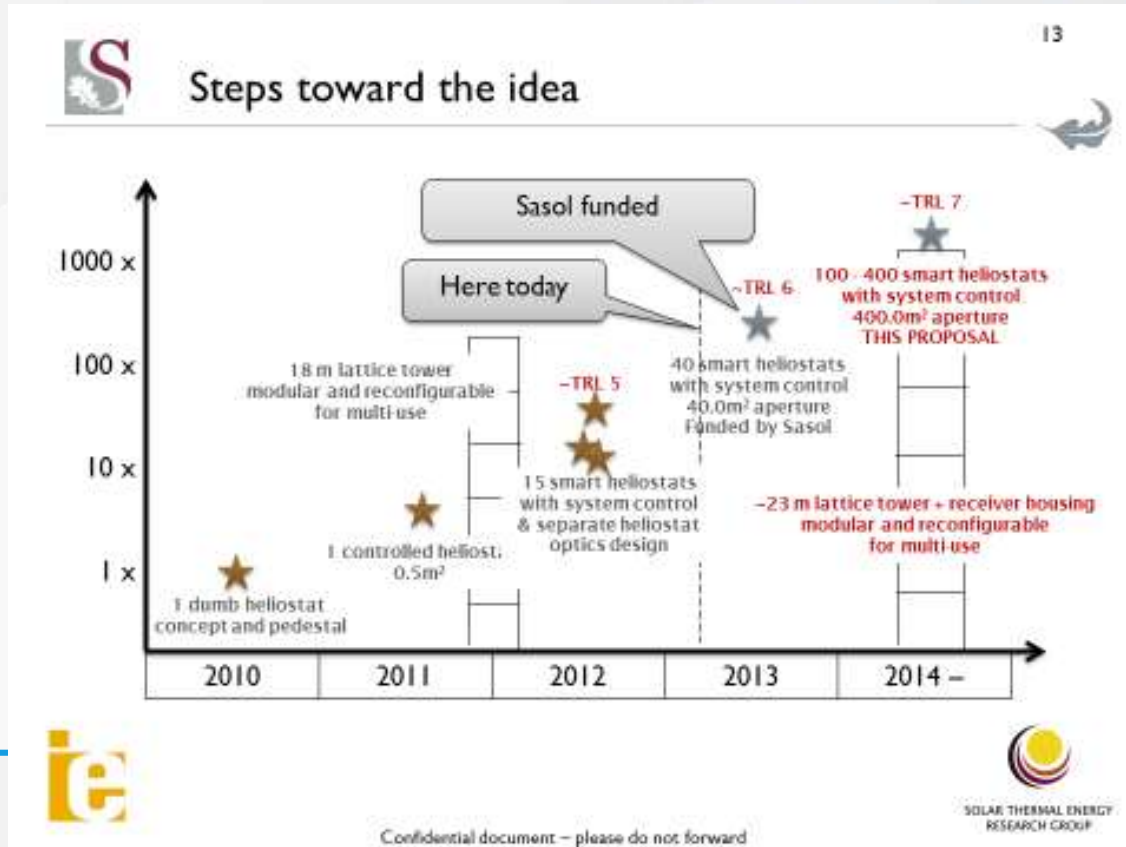
<1 Ha land
(dual use with
grazing)

Basic calorimeter
receiver (swappable
for high tech
experiments)

23 m lattice tower

400 m² mirror heliostat
field using SU designed
heliostat modules and
system control

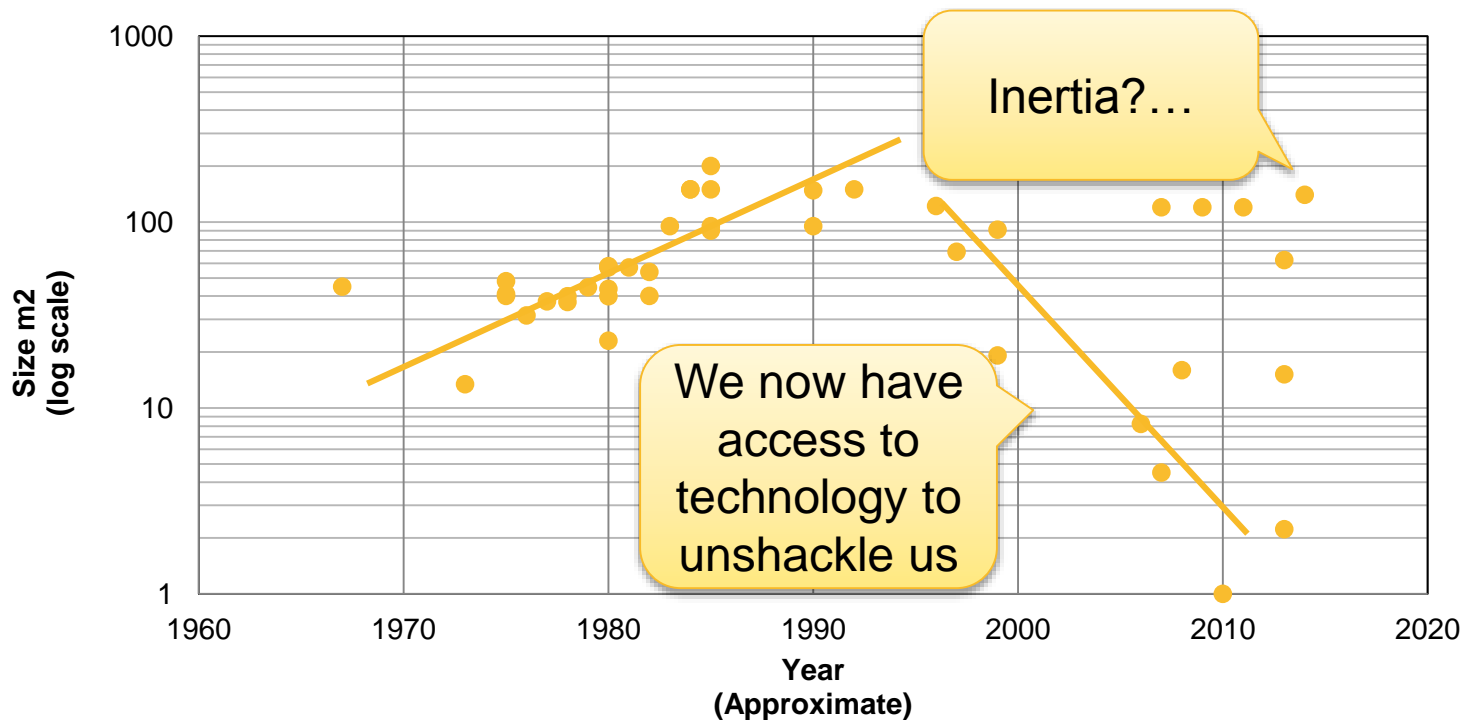
Late 2012 to early 2013...



Late 2012 to early 2013...

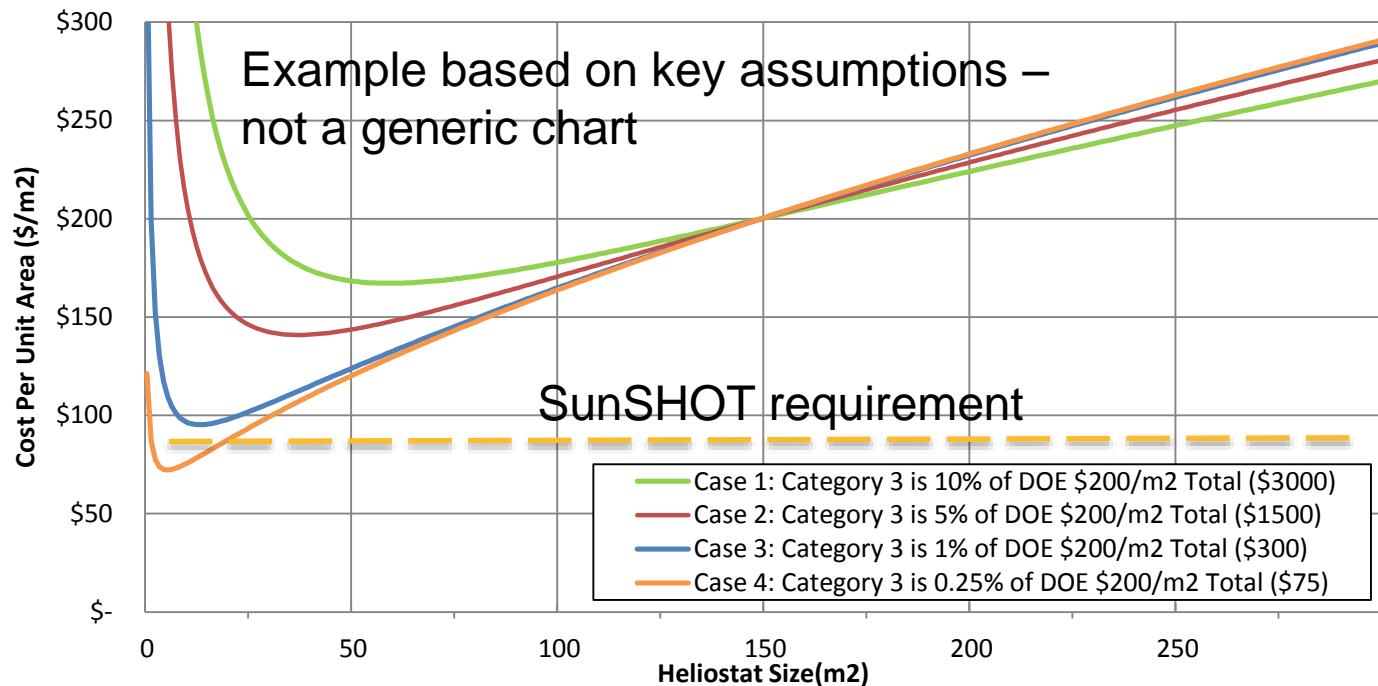


Heliostat size evolution (why the change?)



Sources: Larmuth, Landman

Helioostat cost limits



Sources: Larmuth, Landman, Blackmon

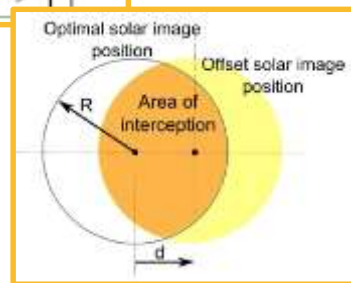
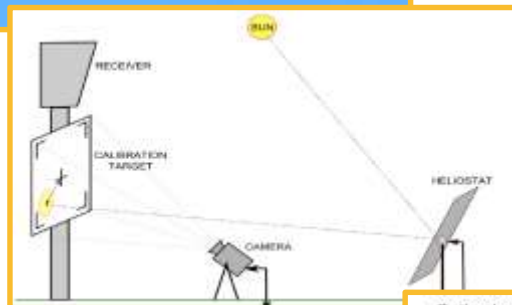
Our recipe



Radical ideas

Evolutionary thinking

Uncompromised performance



Floppy won't work...
RMS goal < 3 mrad

Helio100 status



- Cost reduction is holistic
 - Local controller → 10X to 40X cheaper
 - No cabling, trenching, wiring
 - No foundations, minimal ground prep
 - Factory to installed from 2 people +
- Performance
 - “Free” optical benefit of small size (2 – 3 m²)
 - Designed for gas turbine but applicable to all

Value Prop & IP

Team

- Systems design, integration & component capabilities
- Developing “insource” capabilities to grow the industrialization capabilities fast
- Young team highly motivated + seasoned tech dev leader (from Silicon Valley)
- SA’s biggest RE research group developing the pipeline behind us

Technology

- **Smart autonomous heliostats:** fully wireless or wired or both
- **“Plonk down”, modular, scalable:** designed from the start with lowest installed cost in mind. Can serve 1kW to 200 MW. Patented structure
- **Lowest cost potential:** Designed from the start with <\$100/m2 in mind looking at radical cost reduction in key areas like control systems (40X lower than state of the art) Current design is already below \$150/m2 installed
- **Designed for “waterless” CSP:** Gas turbine specs from the start
- **Tower, field and system control:** Not just a heliostat but a full central receiver collector system including receiver
- **Approaching 100% local content** + designed to be installed by 2 people
- One of very few “unattached” heliostat technologies worldwide

Business

- 10+ bet-able existing business opportunities/models

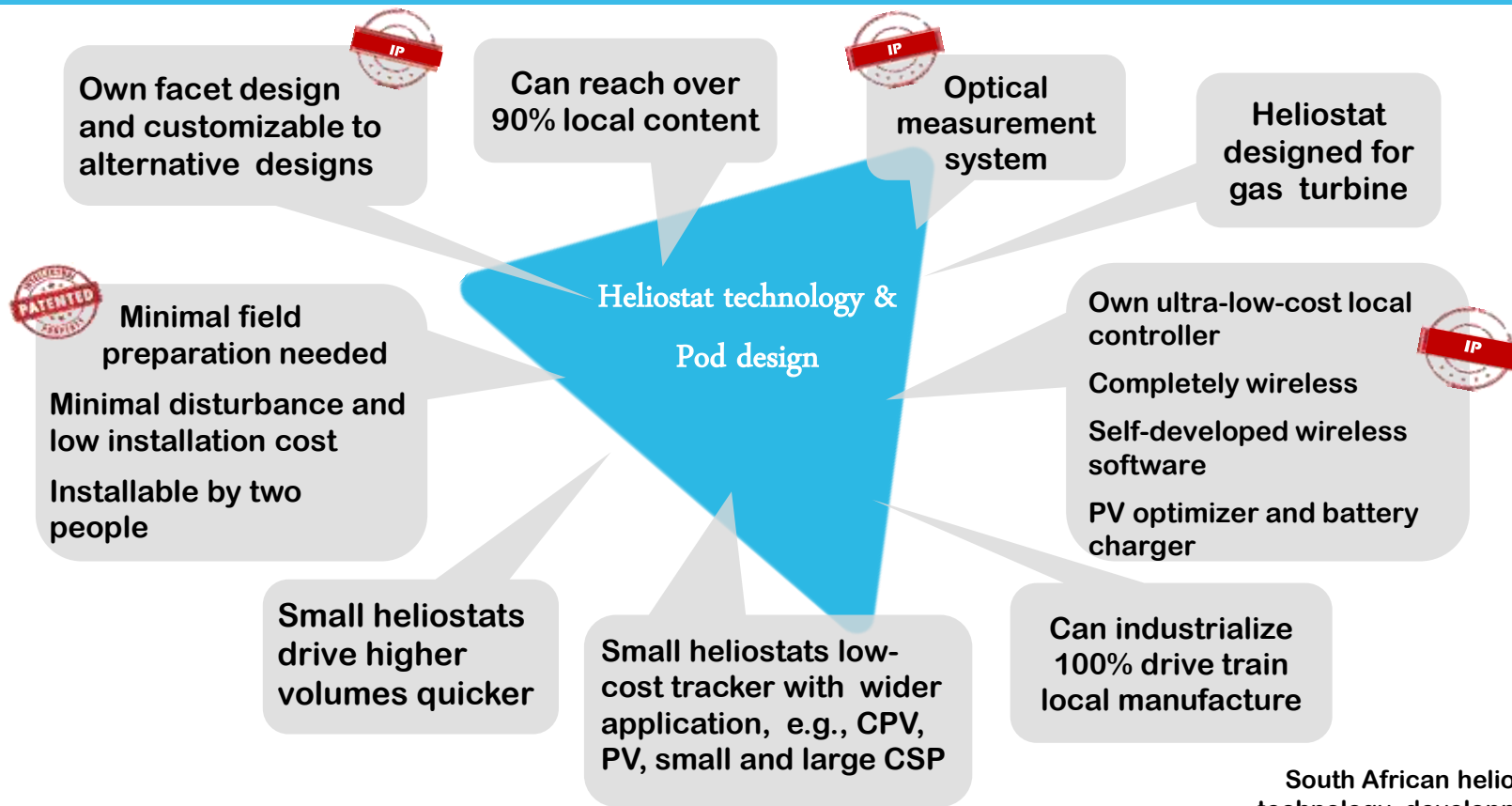
Partners

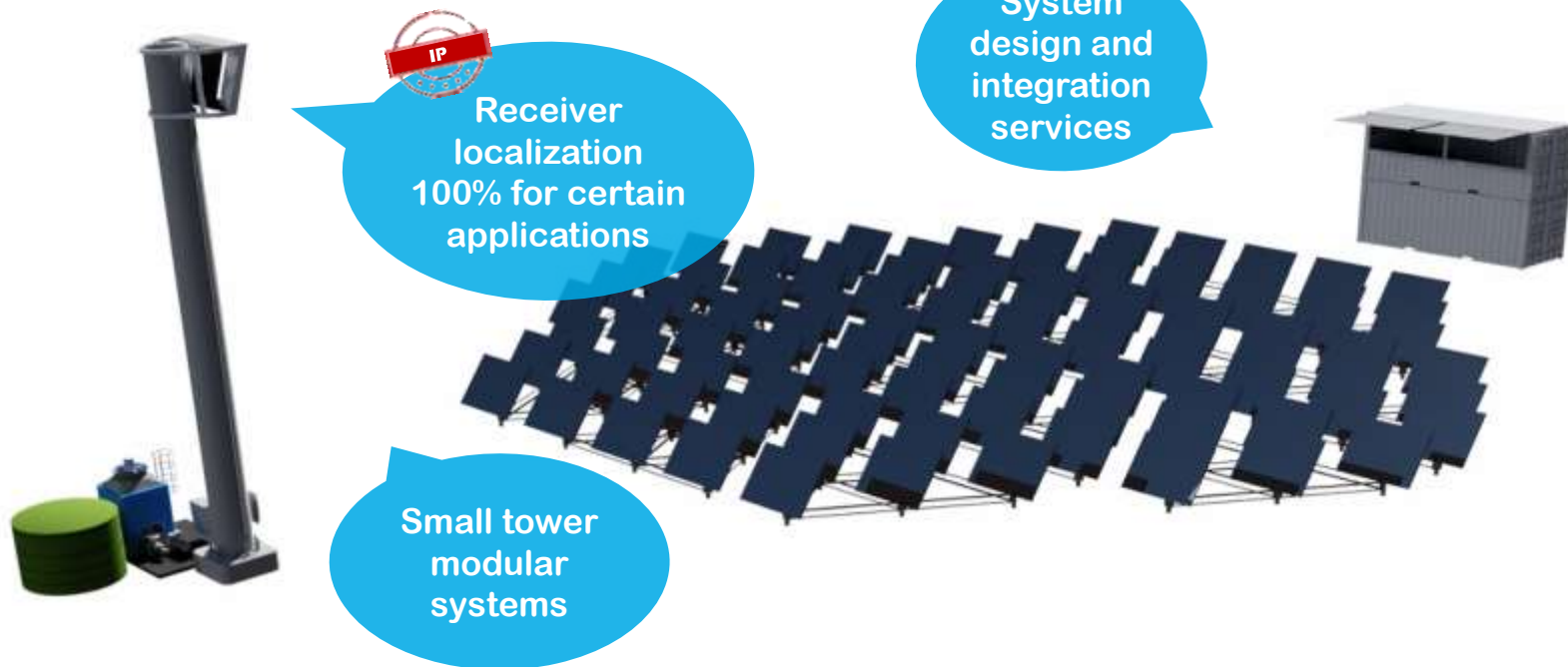
- EPCs, component suppliers, contractors all lined up

THE TEAM

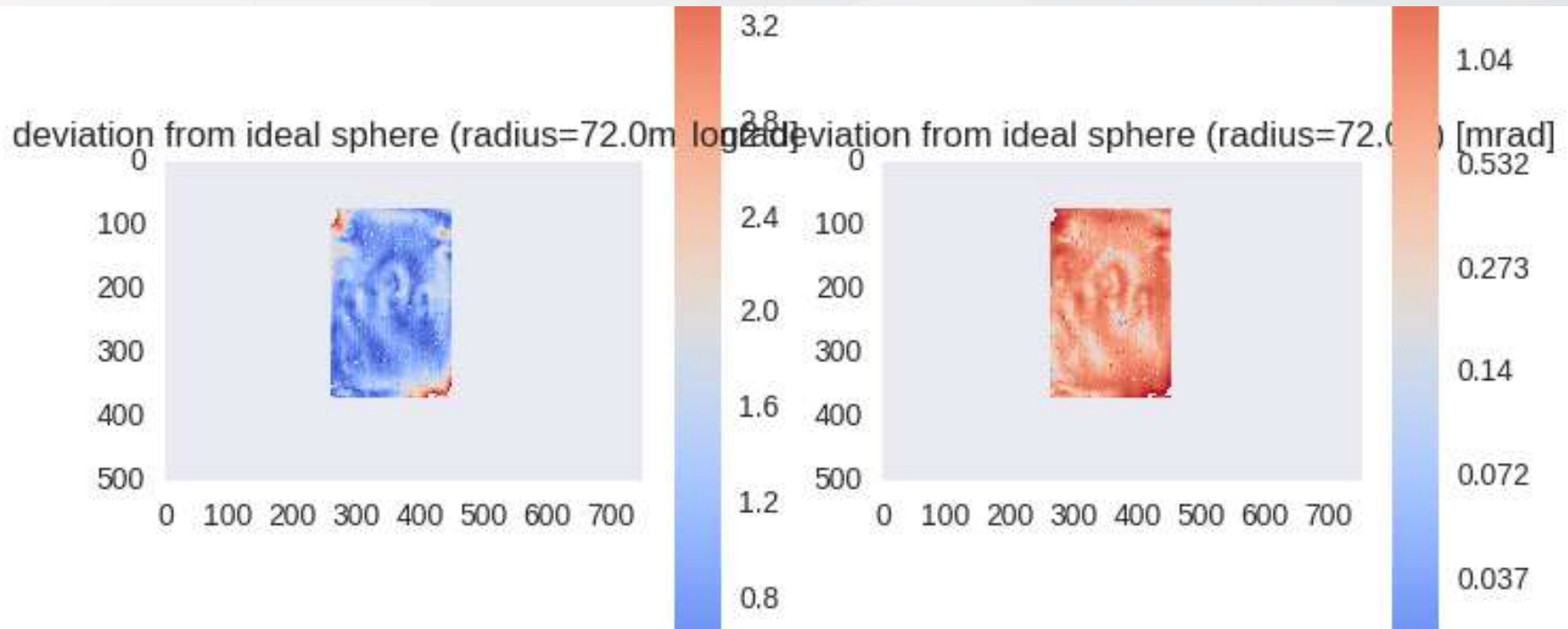


Our primary investment and what this is all about
*Holistic belief that a 100% SA design for 100% local content
and employment slingshots us to be world beaters...*

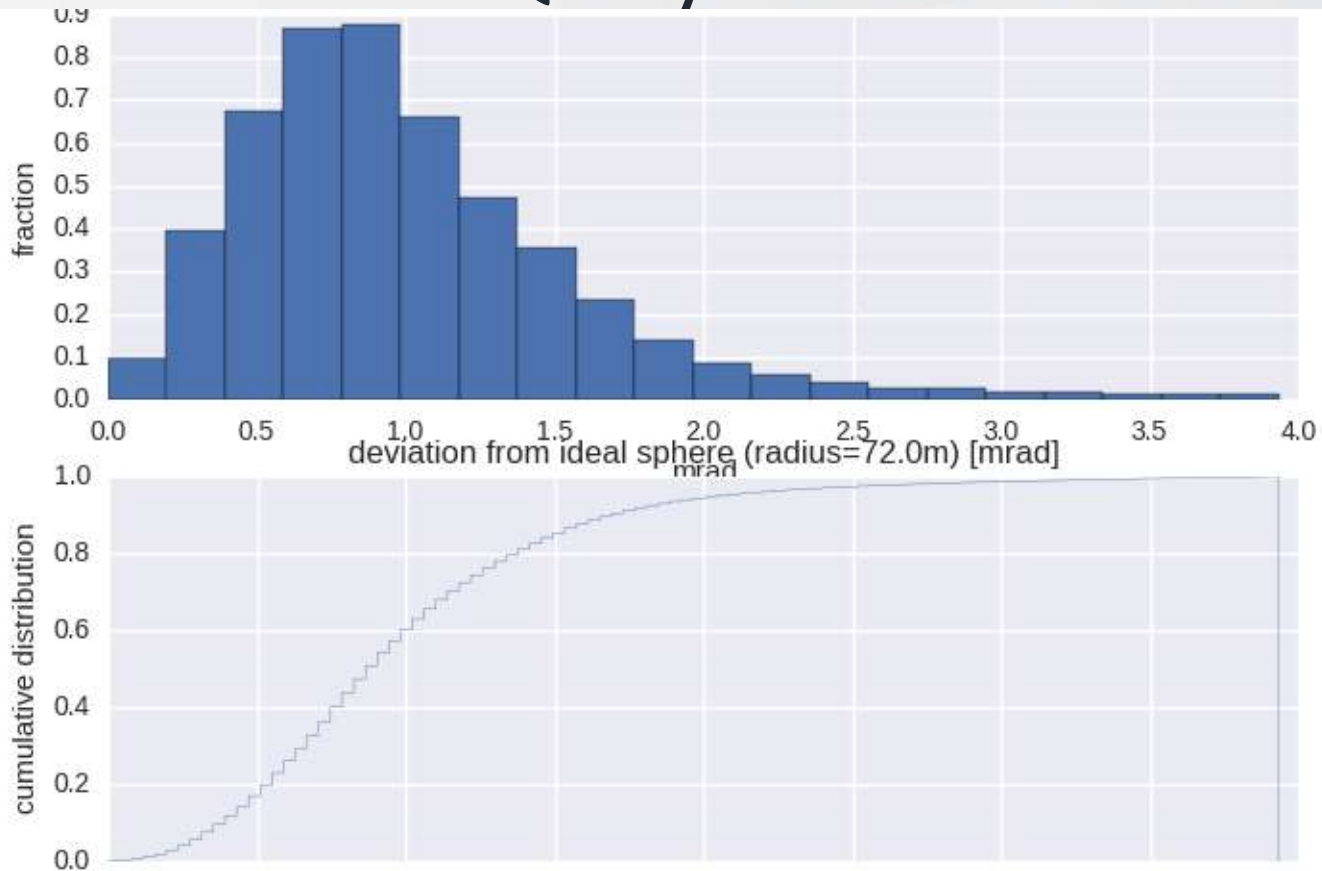




QA System



QA System











< 20 min





Today



Today



Today



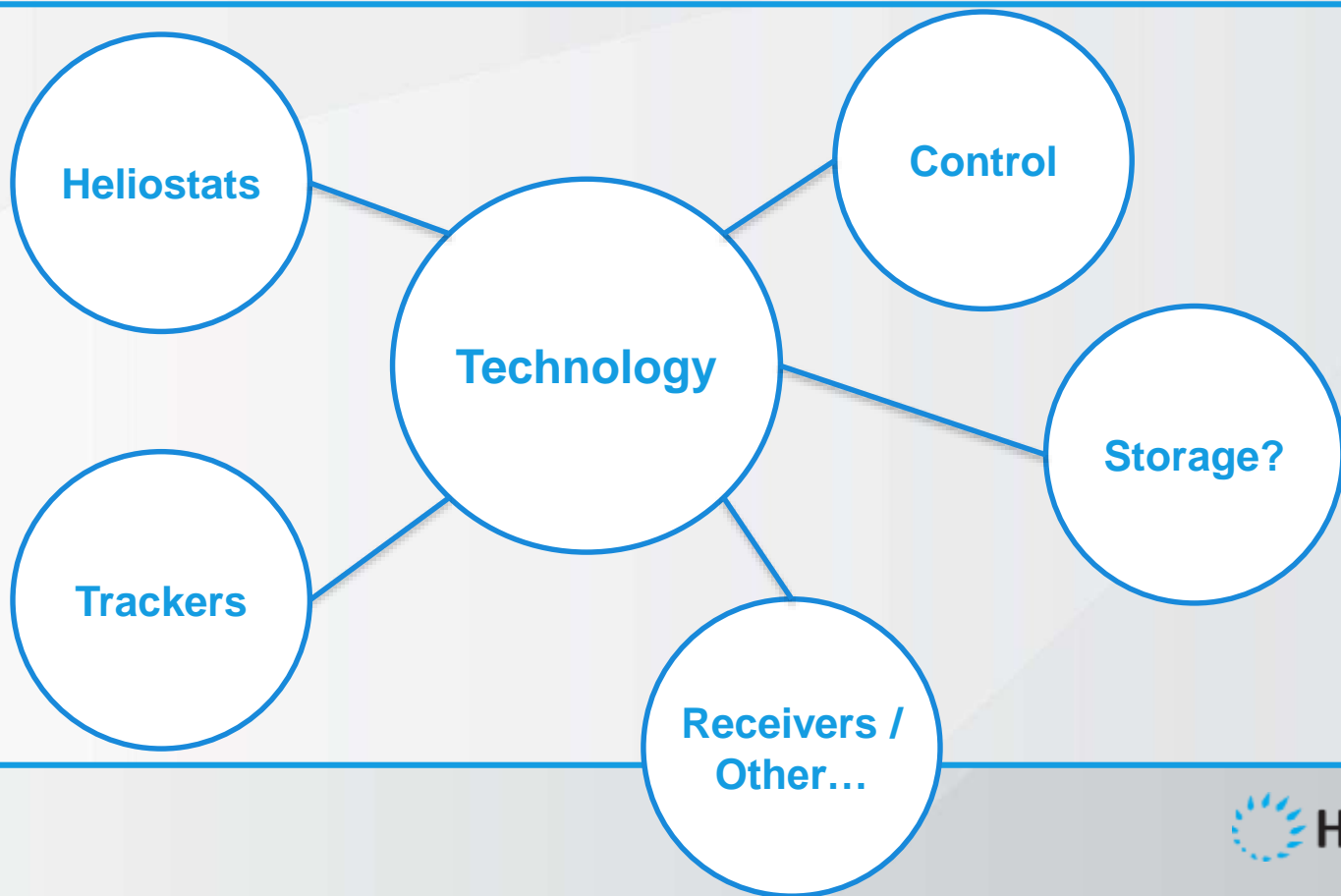


TOMORROW?

New CSP company (for and in SA)

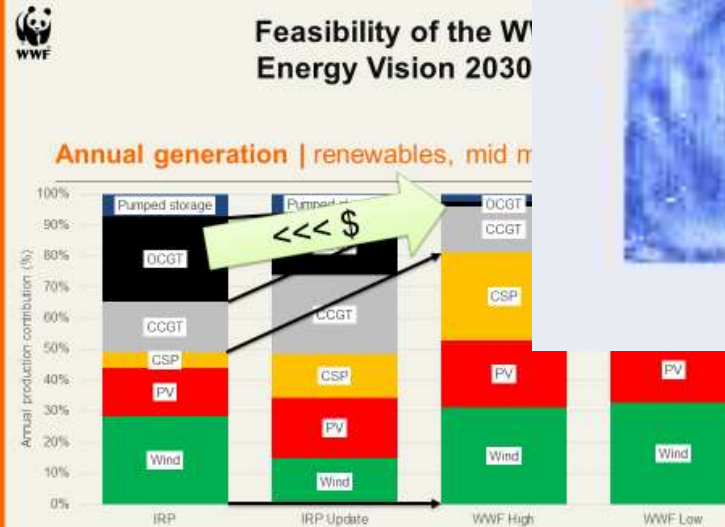
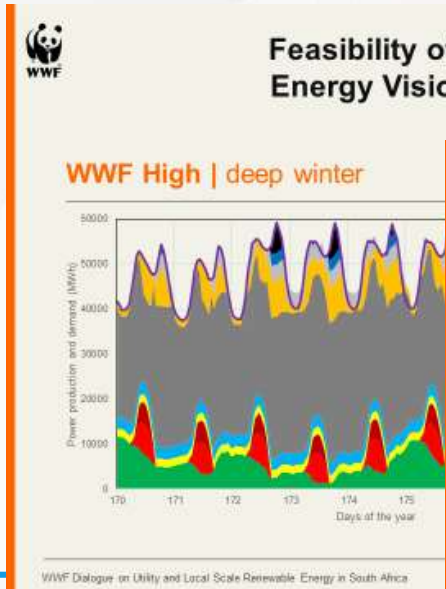


Products / Technology

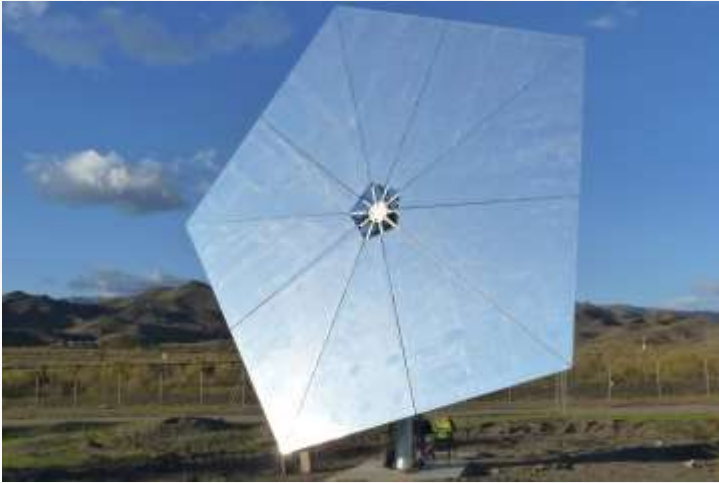


Services

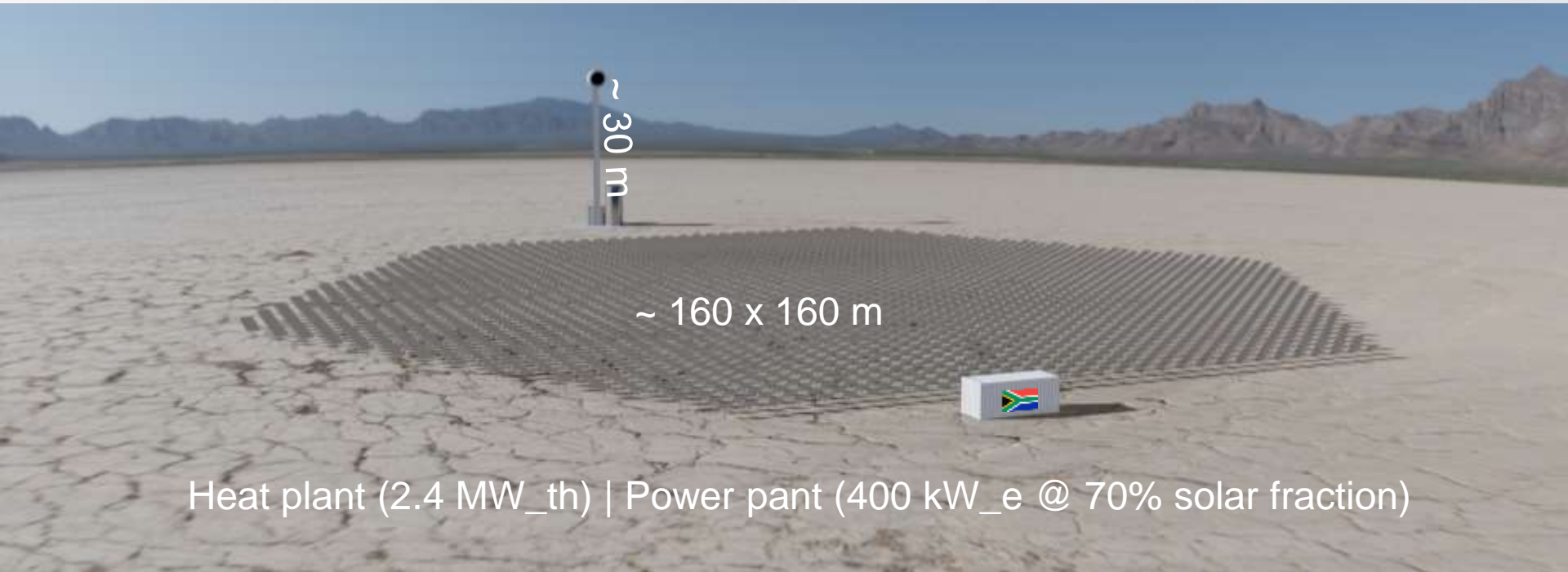
Energy systems | Optics | QA | Thermal | Cycles | Technoeconomics |
Testing | Monitoring | Optimization | etc.



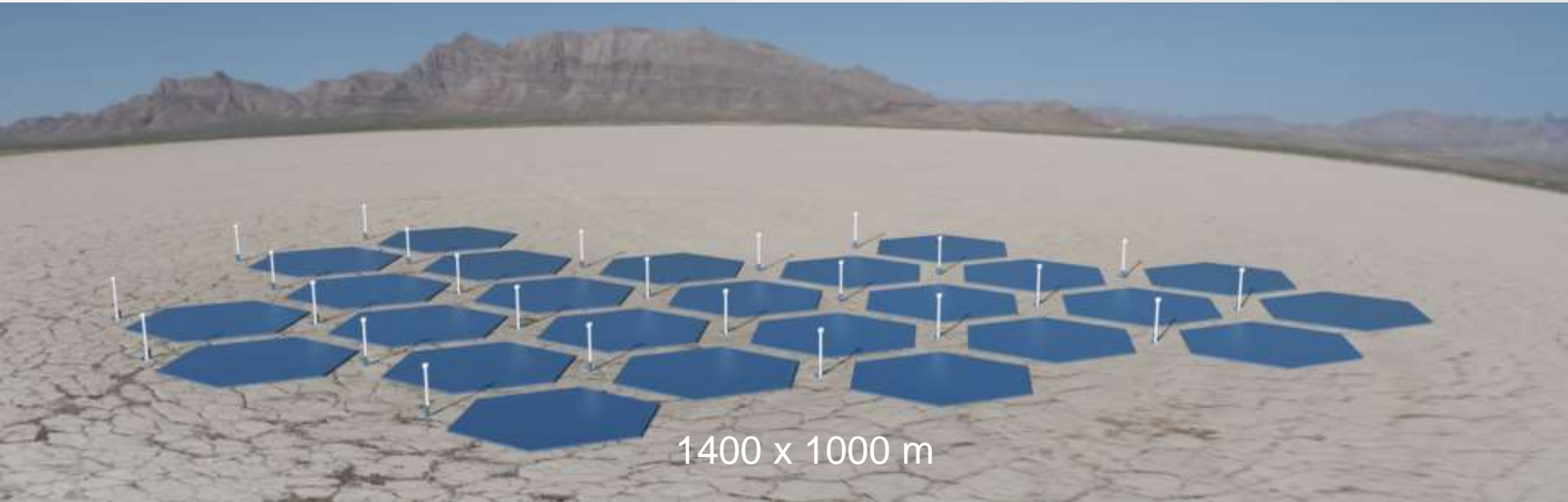
Partnerships



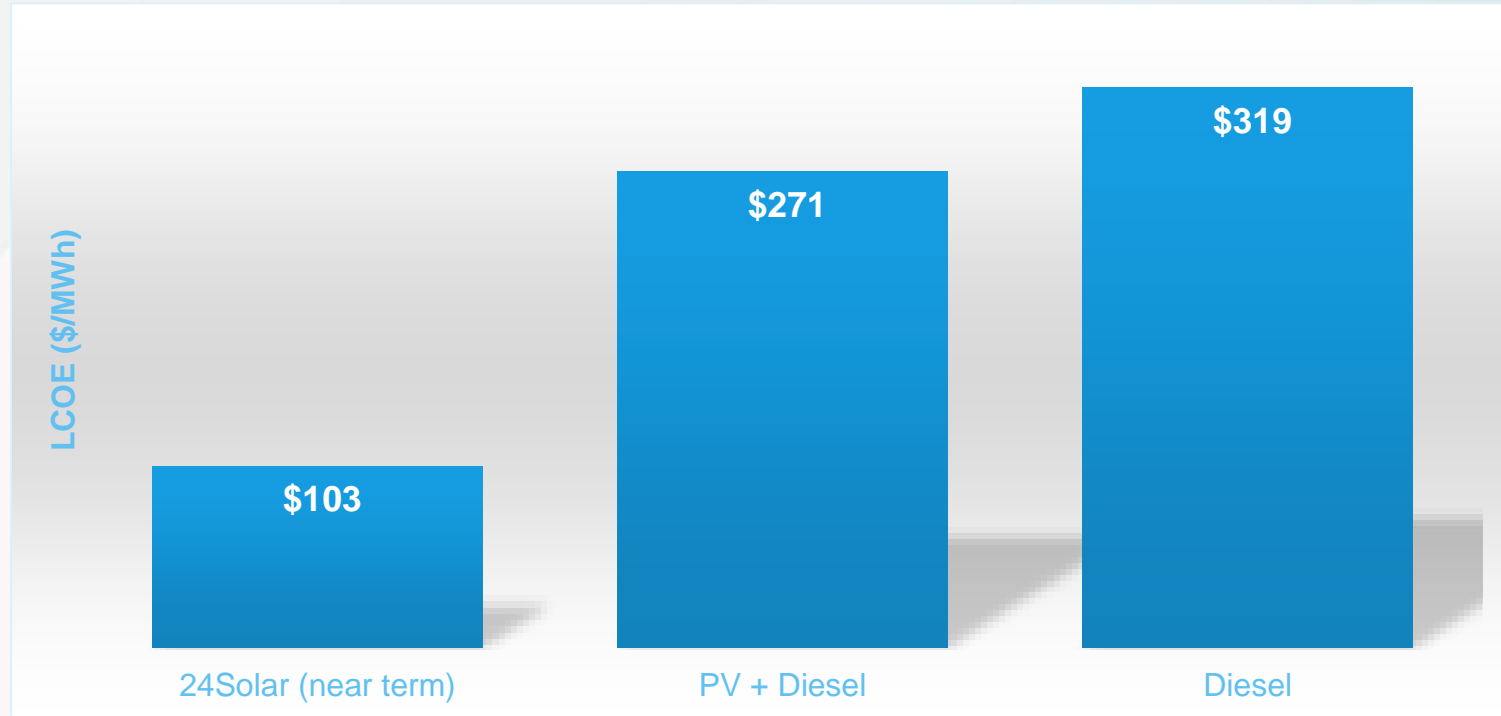
Projects



10 MW baseload power



LCOE Case: Mine at 80% Cf



See Helio100 on 17 October



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Technical Tour

Date: Saturday, October 17, 2015

Time: 8:30 am - 6:00 pm (estimated time)

Fee: 85 Euro, pre-registration is required
Registration during the registration process for the conference ticket

Meeting Point: The bus for the technical tour will depart from Cape Town International Convention Centre (CTICC). It will also return there again in the evening.

In closing

- Helio100 is complete in 2015
- 2016 is our hopeful next step
 - We have a great team
 - And a very big research group to fall back on!
 - We almost have a project! (or 3)
- Our success will be good for IPPs, local industry and the provision of electricity!

CONTACT

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