

# Trip Report SolarPACES –September 2011

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## Introduction

The 2011 SolarPACES conference was held in the town of Granada, in Spain, this year. The conference dealt with solar power and chemical energy systems. There was a large attendance of 1043 people from 44 countries and the general consensus was that it was a successful conference.

The STERG attendees were:

- Prof Wikus van Niekerk
- Paul Gauche
- Riaan Meyer
- Andrew De Wet
- Johan Kotze
- Willem Landman

Four papers from the STERG group were presented at SolarPACES namely:

- Gauché, P., von Backström, T. and Brent, A.C, Modelling Methodology for Macro Decision Making – Emphasis on the Central Receiver Type, SolarPACES 2011 Conference, Concentrating Solar Power and Chemical Energy Systems, Granada, Spain, September 20-23, 2011.
- de Wet, A. L. and Gauché P. Domestic Solar Water Heater Testing Facility for Southern Africa, SolarPACES 2011 Conference, Concentrating Solar Power and Chemical Energy Systems, Granada, Spain, September 20-23, 2011.
- Kotze, J.P. von Backstrom, T.W. and Erens, P., A Combined Latent Thermal Energy Storage and Steam Generator Concept using Metallic Phase Change Materials and Metallic Heat Transfer Fluids for Concentrated Solar Power, SolarPACES 2011 Conference, Concentrating Solar Power and Chemical Energy Systems, Granada, Spain, September 20-23, 2011.
- Meyer, A. J. and van Niekerk, J. L., Roadmap for the Deployment of Concentrating Solar Power in South Africa, SolarPACES 2011 Conference, Concentrating Solar Power and Chemical Energy Systems, Granada, Spain, September 20-23, 2011.

## Comments

The following were comments from the attendees sum up some of the conference highlights:

Paul Gauche

- Spain, Germany, USA and China had the biggest contingents.
- SA representation was essentially: Stellenbosch University (6), Sasol (3) and CSIR (3). No other SA universities had any representation as far as we could tell. Total registered SA contingent was 14 people but we don't know who the other few were.
- Pancho Ndebele, Founding chairman of SASTELA presented on the first day in a session called Global CSP Market. He updated the audience on the tender process and the status of CSP beginning in SA. He also made mention of Stellenbosch University as the entity to assist Eskom in planning for renewables.
- Key messages from SolarPACES 2011

- Dispatch ability is the CSP value proposition. The generally acknowledged long term model is that wind and PV provide an intermittent base and that CSP provides all the power balance needed to meet the demand.
- Cost: With the US DOE SunShot program as a cornerstone, cost needs to drop in order to satisfy the value proposition. The SunShot program seeks to get CSP to \$0.06 / kWh by 2020. The proposed roadmap is to go with central receiver technology and incorporate supercritical CO<sub>2</sub> as the working fluid.
- Thermal storage: As a large cost contributor (both storage and oversized solar field), storage R&D is critical to the success of CSP.
- The Chinese are coming: From an observer point of view, it is interesting to note the very high interest by the Chinese contingent, including the relentless pursuit of information during presentations and tours. It is quite well known that China is active in CSP technology.
- Bringing plants into operation: On the large trough plants in Spain that have storage as well as the new Gemasolar central receiver plant (see below), there is a lot of learning still on-going about how to operate these plants. They do run successfully, but it takes over a year with the first plants to learn how to get the most out of them. One of the aspects of the “devil in the details”.

#### Riaan Meyer

- Very good exposure to what is happening internationally on the CSP front. Both on new projects and new concepts
- It was great to attend the solar resource sessions and speak to the three companies that provide measurement services. I found that we are on-par with our work.
- Great networking opportunity

#### Andrew De Wet

- Progress that Spain has made in CSP plant design and operation with German help is inspirational and SA can learn from it.
- Progress on mirror design (quality and toughness) for parabolic through plants has come a long way to get the technology to maturity.
- Compared to other novel storage methods, Johan's proposal has real potential.
- We have some work to do in the CSP field and I would love to see some power generated on S2.

#### Johan Kotze

- To see the state of CSP and to note that key aspects of development are related to Thermal storage and heat transfer fluids.
- To see why the industry explored the avenues that it has and what the steps are to improving current technology, the future of CSP and emerging technologies, the current state of both industry and economy regarding CSP.
- Meeting people.
- The Alhambra

#### Willem Landman

- Gave a very good overview of what is currently happening in the industry and what the problems are that the industry is facing.
- Highlighted topics of concern were the threat from PV cells.
- Great to meet the people whose papers you read.

- Tours gave an indication of how serious the Europeans are about this technology.
- There are still lots of different ideas out there, and industry has not yet settled on a standardised way of doing things. At the same time large industries very carefully protect their IP and won't openly share research resulting in everybody doing the same work.
- An overview of the situation in South Africa was given by Pancho Ndebele (SASTELA). He was very positive about the future of solar thermal in SA which is encouraging.

## Tours

Two technical tours were available on the Saturday after the conference:

### Tour A

Tour A included site visits to both the new Andasol 3 (parabolic trough) plant and Plataforma Solar de Almeria (centre for the exploration of the solar energy).

- There are three Andasol plants that each produce 50MW. Andasol 3 was in the commissioning phases during the tour.



Figure 1: Andasol 2 in Operation



Figure 3: Mirror Washing Truck



Figure 2: Mirror Washing Truck



Figure 4: Plant



Figure 5: Andasol 3



Figure 7: Linear Fresnel



Figure 6: Plataforma Solar (Field 1 of 2)

## Tour B

Tour B included a site visit to the new Gemasolar plant (Power Tower) which is the first plant to produce electricity 24hr a day.

- Tour of the Torresol Energy Gemasolar plant in Seville
- Pictures below
- The newest central receiver in the world
- 120 MWth
- 19.9MWe
- Salt receiver and storage with superheated Rankine cycle and wet cooling (as water is available).
- 75% capacity factor meaning that it can run 24 hour per day during summer months and will average 20 hours per day over a year. The plant was brought into service during this last winter and has already successfully demonstrated continuous full load operation during its first summer.
- Photos of the plant were permitted except near the storage and heat exchanger section of the plant. This did not really deter some people.

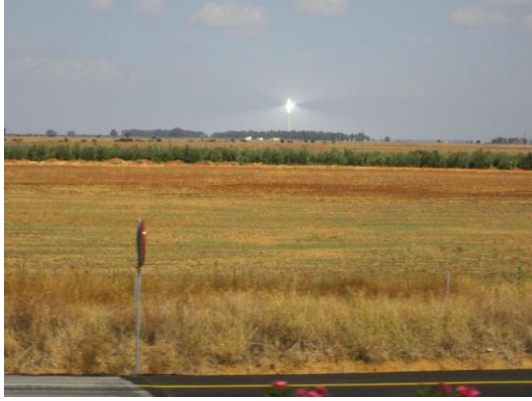


Figure 8: Gemasolar plant in operation from a distance. Note the hourglass reflected beams below and above the receiver



Figure 11: Plant from the perimeter fence. The scale is hard to tell until you see the other tour bus in the photo



Figure 9: Approaching the plant where the heliostats can be seen the first time



Figure 12: The closest point for a visitor outside the bus. We were not permitted to approach the first heliostats



Figure 10: First unobstructed view



Figure 13: Heliostats



Figure 14: more heliostats



Figure 16: Wet cooling system up close



Figure 15: Plant