IEA/SolarPACES

Task I: Electric Power Systems

Task III: Solar Technology and Advanced Applications

Task Meeting Summaries:

Hurghada, Egypt **23 September 2000**

Craig E. Tyner
Sandia National Laboratories
Operating Agent, Task I

and

Robert Pitz-Paal
Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR)
Operating Agent, Task III

Sandia National Laboratories

Albuquerque, New Mexico 87185-0703

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IEA/SolarPACES Task I and Task III Participants:

Since the last task meeting summaries published earlier this year, we held combined IEA/SolarPACES Task I: Electric Power Systems and Task III: Solar Technology and Advanced Applications task meetings at the New and Renewable Energy Authority Wind Energy Center in Hurghada, Egypt, on 23 September 2000. Because of the limited time available for the meetings, we focused discussions on topics of particular interest to our Egyptian hosts. Please find enclosed our summaries of this meeting.

Thanks for your active participation in Task I and Task III activities and for helping expand our areas of cooperation.

Sincerely,

Craig E. Tyner
Operating Agent, Task I

Robert Pitz-Paal
Operating Agent, Task III

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IEA/SolarPACES Task I Meeting:
Concentrating Solar Power Systems

23 September 2000
Hurghada, Egypt

Meeting Summary

This Task I meeting was held in conjunction with a Task III meeting, and both were targeted to issues of particular relevance to Egypt. 23 participants attended the meetings, including 9 from Egypt. Key Task I issues covered included the transition of START Mission leadership to Tom Mancini and the updated Task I position paper draft. In Sector 4, we discussed the status of international projects (GEF, Europe, U. S., Australia, Israel, and South Africa) and the web-based project database. We also discussed START Mission issues and covered several relevant Sector 1 activities (DISS, EuroTrough, and TIPP (Thermal Integration with Power Plants), and the Israeli beamdown system). Sector 2 activities were not covered at this meeting..

Meeting Details

Craig Tyner opened the meeting as Task I Operating Agent.

The table on the next page provides a snapshot of Task I at this time, including activities currently underway and defined in our recent Program of Work (November 1999), with minor modifications based on discussions at the meeting in Sydney.

Sami Zannoun opened discussion with a brief introduction of energy programs at NREA, particularly the solar and wind programs. The average availability of the wind systems along the Red Sea is about 85%. There is almost no time of winds >25m/s (only 13% >14m/s). 4-14m/s is available 81% (all wind speeds at 40m height). Overall capacity factor (actual after all outages) is 58%.

Louis Van Heerden discussed the situation in South Africa, especially the SabreGen CSP-Africa Study. The technology screening of 14 options has been completed with 2 selected for further study: molten salt power towers and SEGS troughs with storage. The next evaluations will be completed by Feb 2001. They will start a full feasibility analysis in March 2001 on one technology. They will also start a dish demonstration project with (hopefully) two dishes.

Greg Kolb briefly described the new position paper (which will be available in early 2001) and then led the Sector 4 presentations.

Michael Geyer noted that in India, the consulting contract for preparing terms of reference was signed 30 August, and work is now underway. Phase I is an update of the feasibility study, 2nd phase is the pre-bid conference; 3rd phase is preparing terms of reference. Final phase is evaluation. The Financial Times advertisement is now released, and pre-bid conference is 30 October 2000 (Monday). Project will be pseudo IPP (owned by government company – RSPCL, with power purchase contract). Supplier will offer turnkey plus 5 years operation. KfW has arranged financing and agreed with WB on $50M. Contract closing planned by end of 2001. In Morocco, tender evaluation for consultant was completed end of August. A short list was approved by the Bank, and negotiations with the winner (Fichtner) will start soon. Terms of Reference are expected in June 2001. The site is near the Algerian border, 2km

Task I: Concentrating Solar Power Systems (C. E. Tyner, Operating Agent)

Sector 1. Central Generation Systems (Manuel Romero, Sector Leader)

- DIrect Solar Steam (DISS)
- THESEUS Project
- EuroTrough
- Solar Two Final Evaluation
- 10-MW Solar Thermal Power Plant for Southern Spain (PS10)
- Solar Gas Turbine with Tower Reflector
- Hybrid Power Plant Assessment/TIPP

Sector 2. Distributed Generation Systems (Wolfgang Meike, Sector Leader)

- SAIC USJV Project
- Dish Engine Critical Components Projects
- Remote Dish System Development
- EuroDish
- Reliability Database

Sector 3. START Missions (Tom Mancini, Sector Leader)

- START Missions
- Egypt/WB Support
- Brazil/GEF Support

Sector 4. Market Barriers and Opportunities (Tom Williams, Sector Leader)

- Developing Projects – India, Egypt, Morocco, Mexico, South Africa
- Identification and Evaluation of Market Barriers
- Database of Project and Market Opportunities
- Technology Roadmapping
- STEPS - Expert System for Solar Thermal Power Stations
- SYNTHESIS - Private Support of Solar Thermal Power Projects
- SolWin/RENIP Plan
- Life Cycle Assessment (LCA) of STE Power Stations

from a gas pipeline, underground water, insolation is (guessed) at 2000-2200 kWh/m²/a. DLR contracted for meteo measurement, with a remote system to be install with GSM communications (daily quality control). A rotating shadow band will be used for reliability. There are already 2 stations like this in Spain and one in Crete, all working now. Pilkington sold all special mirror fabrication to Flabeg group (Pilkington managers and investment group (may go public)).

In Spain, the oil situation will have opposite than expected effect – to control inflation because of high oil prices, no new premium that might help renewables but contribute to inflation will start. A new plan with solar thermal has been approved by parliament (200MW at specified locations). It would apply same tariff as wind (11pts) plus 70% grant for market introduction; 70% of these from EU programs (except that energy has so far not yet been included – energy is no longer business of government). Ghersa/Bechtel is most optimistic, with good political relations, to get a project to happen. The Gamesa group (Andusol project with EuroTrough and DISS) is less optimistic about grants (too much luck involved – not basis of commercial business) and are negotiating with hotels, etc. (private clients) for high payments. They expect wind to saturate in 5 years, with solar after that (3-4 years). The project will be pursued; a site is identified; and some engineering has been done. PS10 is in the middle, permits in place, grant from EU in place, other grants being pursued. Inabensa will not invest more in

engineering until funding is in place. In December, the Spanish situation could be clarified for CSP regarding 36pts (or some other payment) in Royal decree (no court action to avoid bad feelings). [Post-Meeting Note: a new premium of 36pts was approved in December.] THESEUS is in a problematic situation in Greece, with government stalling permits because of improper procedures; private sector support is very low because there are too many government employees without support; cost of solar in Crete is 15¢/kWh, with fossil at 20¢/kWh (except payment is 8¢/kWh (80% of customer rate)); needs 40% subsidized grant (or truly competitive market). Generally, Michael thinks industry support is growing and positive, and that CSP has best chance after wind to become commercial.

Greg Kolb described the Mexico project. There has been little change since Sydney. Project will be IPP, with (probably) troughs. They hope for an RFP in 2001, with operation in 2004. Solar is 39.6MW, out of 290MW, with 4% annual solar share. Output doesn't match late evening peak, and bottom firing may be needed (and will require new carbon savings calculations). WB and CFE received results in February, and updates are underway (including peak coverage). The situation currently is awaiting results from election, and parties expect confirmation of project and bid documents in few months. CFE is planning to buy the electricity (perhaps some for sale as green power in San Diego). Carlos Ramos said they will try to invite someone from CFE for the next ExCo meeting. Zannoun said Mexico had gotten next level of approval from GEF.

Wolfgang Meike discussed the Australian situation. Wes Stein now works for CSIRO. The CLFR project has started some construction, with completion in 2001 delayed somewhat (first 5% demo expected by mid 2001, all by end 2001). Mirrors may be manufactured by leading hot water system manufacturer in Australia. Stanwell would be distributor of systems (very interested in expanding into renewables). For big dish (now called Power Dish), ANUTech and Transfield were asked to provide guarantees for operation (power and availability) which doubled costs to $7.6M (way too much). They are now forming a startup company (Transfield will provide hardware at cost); ANUTech is now meeting to decide what to do. In the mean time, everything is on hold, although they are still hoping to proceed. An extra 2% renewables will be required by 2010. The renewable remote power generation program (RRPGP) is underway for 4-6 years to include $40-60M (Aus)/yr to fund remote renewable power in non-grid locations in the north central part of Australia. There are good options for mine sites for CSP (5-20MW) if someone will take on a project (maybe David Mills). It doesn't have to be Australian technology.

Craig Tyner described Solar Tres and the Nevada project. The Ghersa/Nexant partnership for Solar Tres continues to actively pursue the project, currently applying for grants, selling equity and securing loans. Financial closure could come as early as the 2nd quarter of 2001. The 15-MW plant is planned to have a 3.8 solar multiple and 16 hours of storage. As a result, it will run 24 hours/day through much of the year. Details are in the attached presentation. The "Nevada Project" is a proposed activity to demonstrate 40 25-kW dish/Stirling systems operating as an IPP power plant near Las Vegas, Nevada, in the U. S. Deployment could begin as early as the end of 2001.

Michael Epstein described a student study of commercialization of towers in Lebanon, Syria, Israel and Egypt, some technology overview for region, how to assess risk for financing, with annexes with examples of risk and financing. He is now negotiating with the student to adapt successes with PV and wind to CSP.

Michael Geyer reported on TIPP, DISS, and EuroTrough. TIPP is proceeding well, and remains on schedule after the meeting in Las Vegas at Energex in July 2001. The final report is expected by the end of 2000. DISS is now testing sunrise to sunset. Industry is becoming more interested in commercialization of the steam system technology as progress is made and they become confident that the technology can be applied in real situations. The EuroTrough consortium is meeting 10/19 after the prototype is installed (Inabensa providing the structure, with assembly starting in October).

Michael Epstein discussed the beamdown system at the WIS. Optics have been completed and adjusted (10 days for canting of secondary); now measuring heliostat flux. White ceramic balls are being used for receiver plane flux measurements. Images look good for each heliostat and groups (not all 47 yet tested because the target is uncooled). Piping is finished; the receiver is in place; wiring and instrumentation are now underway. Cold static pressure tests will begin in 3 weeks. After testing, the turbine will be included after necessary piping changes. Overall delays were mostly from piping issues (including any forces on turbine). The whole project is to be finished by June 2001.

Tyner closed the meeting with a few business items, including the project database now available on the SunLab web site. It was generally agreed that in future meetings, we will start with Sector 4 activities.

Additional Information: Appendix D to this summary includes copies of presentations made by Sami Zannoun and Fawzia Abou-Neima at the ExCo meeting in Cairo. Appendix E contains the Long-Term R&D materials presented by Robert Pitz-Paal to the REWP.

Next Meetings:

The next meeting will be held (subject to final confirmation of dates) in Cologne on Wednesday, June 20, 2001. A Task III meeting will be held the day before, and a Task II meeting will run in parallel with the Task I meeting. A 1-day solar symposium honoring Manfred Becker will be held on June 21, 2001.

Appendix A: Meeting Agenda

IEA/SolarPACES Task I: Electric Power Systems
Task Meeting

Hurghada, Egypt
Saturday, 23 September 2000

Agenda

Revised Post-Meeting

09:00	**Introduction and Opening Remarks (Craig Tyner, Operating Agent)**	
	• Task I Issues/Updates	Tyner
	• Sector 3: START Mission leader – Mancini will assume role	
	• Updated SolarPACES Position Paper	Kolb
09:10	**SECTOR 4: Market Barriers/Opportunities (Greg Kolb for Tom Williams)**	
	• GEF Projects Status: Egypt, India, Morocco, Mexico	Geyer, Kolb
	• European Projects Status: Spain, Germany, Greece, EU	Geyer
	• Other Projects Status: South Africa, Brazil, Australia, US	Van Heerden, Codeceira, Meike, Tyner
	• Commercializing Towers in the Mediterranean Area	Epstein
	• Adapting Wind and PV Success to CSP	Epstein
	• Project Database	Tyner for Williams
10:20	**SECTOR 3: START Missions (Greg Kolb)**	
	• Energex 2000	Kolb
	• Future START Mission options	All
10:40	BREAK	
11:00	**SECTOR 1: Central Generation Systems (Tyner for Manuel Romero)**	
	• Hybrid Plant Assessments / TIPP	Geyer
	• Tower Reflector	Epstein
	• EuroTrough/DISS Update	Geyer
11:20	**SECTOR 2: Distributed Generation Systems (Wolfgang Meike)**	
	• No critical issues. Skipped for this meeting	
11:30	**Task III Meeting**	
	• Task III issues relevant to Egypt	Agenda by Pitz-Paal
12:30	LUNCH	
13:30	Bus to Tour of Hurghada wind farm	NREA
19:15	Air Flight back to Cairo	

Appendix B: Meeting Participants

(attendance list attached also)

Australia	Wolfgang Meike, NTCER
Belgium	Philippe Schild, European Commission
Brazil	Alcides Codeceira Neto, CHESF
Egypt	Amina E-Zalabany (Zannoun's replacement), NREA
	Ehab Esmael, NREA
	Ayman Faiek, NREA
	Khaled Fikry, NREA
	Ragy Farid Ragy, NREA
	Sami Zannoun, NREA
	Bothina Rashed, NREA
	Amr Mohsen, Lotus Solar Technologies
Germany	Robert Pitz-Paal, DLR
	Manfred Becker, DLR
	Michael Geyer, DLR/PSA
	Wilfried Grasse, SolarPACES
Israel	Michael Epstein, WIS
Mexico	Carlos Ramos Berumen
South Africa	Louis Van Heerden, Eskom
Switzerland	Paul Kesselring, PSI (retired)
United States	Craig Tyner, Sandia
	Greg Kolb, Sandia
	Gary Burch, DOE/EE-11

Appendix C: Presentation Summaries

Appendix D: Zannoun and Abou-Neima Presentations from ExCo Meeting

Appendix E: Long-Term R&D Needs

SolarPACES Task I Distribution List