

Ciemat

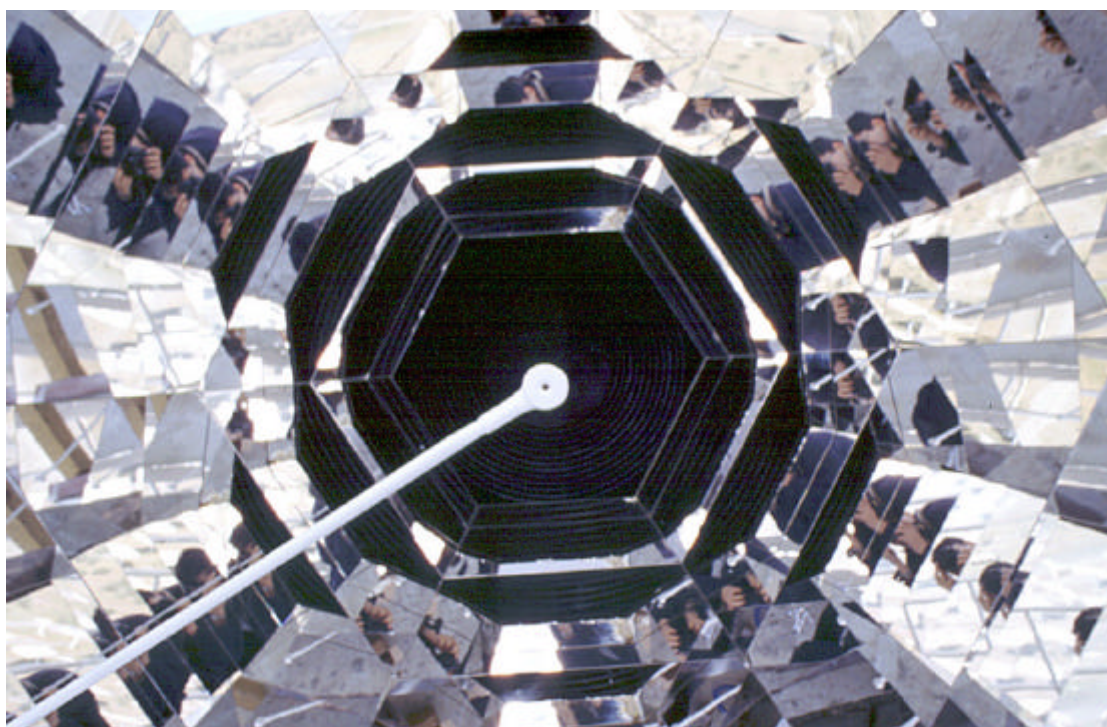


PLATAFORMA SOLAR DE ALMERÍA

ANNUAL TECHNICAL REPORT

1998

(Ref. PSA-TR01/99 MB)



PLATAFORMA SOLAR DE ALMERÍA

ANNUAL TECHNICAL REPORT

1998

Prepared by

Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas
Instituto de Energías Renovables
Plataforme Solar de Almería
Apartado 22, E-04200 Tabernas (Almería), Spain

Deutsches Zentrum für Luft- und Raumfahrt e.V.
Plataforma Solar de Almería
Apartado 649, E-04080 Almería, Spain

Edited by
Manuel Blanco Muriel

With the collaboration of
Deborah Fuldauer



August, 1999

ACKNOWLEDGMENTS

On behalf of the PSA, the editors would like to thank:

Dr. F. Ynduráin, General Director of *CIEMAT*, and Dr. W. Kröll, Chairman of the Board of *DLR*, for their support of the German-Spanish Cooperation Agreement,

the Steering Committee members for their consistent support and involvement in the solution of financial, technical and organizational difficulties,

the PSA staff who have made the PSA what it is today,

and all the institutions and private enterprises which have funded and collaborated in our 1998 Program of Work, especially the

German *Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie (BMBF)*, funding the PSA as its "Plataforma Solar de Almería" project under contract number 0328823C,

Spanish *Ministerio de Industria y Energía (MINER)*, which funds the PSA within the Spanish national budget,

Commission of European Communities

DGXII for funding under the following programs:

Training and Mobility of Researchers (TMR), providing research and training grants to PSA user groups from all over Europe (Contract No. ERBFMGECT950023)

Joule, which supports the DISS (Contract No. JOR3-CT95-0058), HYHPIRE (Contract No. JOR3-CT95-0085) EuroDish (Contract No. JOR-CT98-0242), and EuroTrough (Contract No. JOR-CT98-0231) projects and

Brite Euram, which supports the SOLARDETOX project (Contract No. BRPR-CT97-0424)

FAIR for the LAGAR (Contract No. FAIR-CT-98-3807 DGXII-SSMI) project

And CEC-DGXVII for funding under the *THERMIE* program for the MEDUCA (Contract No. BU/1006/96) and THESEUS (Contract No. TE-235-96-DE-HE) projects

and to Angel Soler who took most of the photographs included in this report.

TABLE OF CONTENTS

1	Overview	1.1
1.1	Introduction	1.1
1.2	Spanish-German Cooperation after 1998	1.2
1.3	Organization	1.3
1.4	The 1998 Budget.....	1.6
1.5	The Test Facilities.....	1.6
1.5.1	7 MW _t CESA-I Central Receiver Test Facility.....	1.6
1.5.2	2.7MW _t SSPS-CRS Central Receiver Test Facility	1.8
1.5.3	1.2-MW _t SSPS-DCS Parabolic-Trough Test Facility with Storage and Desalination.....	1.8
1.5.4	174 kW LS-3 Test Facility.....	1.9
1.5.5	1.8 MW _t DISS Test Facility	1.9
1.5.6	3x 40 kW _t DISTAL I Dish/Stirling Systems.....	1.10
1.5.7	3x50 kW _t DISTAL II Dish/Stirling Systems	1.10
1.5.8	60-KW _t High-Flux Solar Furnace.....	1.11
1.5.9	Solar Detox Facility.....	1.11
1.6	Milestone Achievements 1998	1.12
1.7	PSA Education, Training and Scientific Cooperation	1.13
2	Research Activities	2.1
2.1	Low Temperature Applications	2.1
2.1.1	The LECE	2.1
2.1.2	Infrastructure.....	2.2
2.1.3	Ongoing Projects	2.3
2.1.3.1	Projects within the U.E. DG XII JOULE program.....	2.3
2.1.3.2	Activities in the Framework of Agreements	2.5
2.1.3.3	Accreditation activities.....	2.6
2.1.3.4	Other European Programs	2.7
2.2	Parabolic Trough Technology	2.9
2.2.1	Direct Solar Steam (DISS).....	2.9
2.2.2	PAREX Project.....	2.14
2.2.3	EUROTROUGH Project.....	2.15
2.2.4	THESEUS Project	2.18
2.2.5	TMR Control Project.....	2.20
2.2.6	TMR Desalination Project.....	2.23
2.3	Dish/Stirling Systems	2.25
2.3.1	Distal I.....	2.25
2.3.1	HYHPIRE	2.25
2.3.2	DISTAL II/EuroDish	2.27
2.4	Central Receivers	2.31
2.4.1	The Colon Solar Heliostat	2.31
2.4.2	The Autonomous Heliostat.....	2.32
2.4.3	REFOS	2.33
2.4.4	Computer Design Tools.....	2.36
2.4.5	TSA	2.40

2.4.6 Volumetric Receiver	2.40
2.4.7 Cold Finger Test.....	2.42
2.5 Solar Chemistry	2.43
2.5.1 Participation in the EC DGXII TMR Program (Solar Detoxification)	2.45
2.5.2 Recovery of Olive Mill Waste Water by Photocatalytic Detoxification and Disinfection (LAGAR).....	2.51
2.5.3 Solar Detoxification Technology in the Treatment of Industrial non- Biodegradable Persistent Chlorinated Water Contaminants (SOLARDETOX) ...	2.55
2.5.4 Collaboration within the European Commission TMR Program (TMR-SOLFIN).	2.63
2.6 Materials treatment	2.69
2.6.1 High Flux Concentration Facility (Solar Furnace).....	2.69
3 Supporting Services.....	3.1
3.1 Operation & Maintenance.....	3.1
3.1.1 Summary of Hours of Operation.....	3.1
3.1.2 Maintenance	3.6
3.2 Engineering Activities.....	3.9
3.2.1 Computer and Information Services.....	3.10
3.2.2 Design, Control and Instrumentation.....	3.12
3.2.3 Flux measurement activities.....	3.14
3.2.4 Infrastructure.....	3.15
4 Education, Training and Scientific Cooperation	4.1
4.1 Scholarships and Grants.....	4.1
4.2 Training and Mobility of Researchers Program	4.3
5 Summary of 1998 Meteorological Data.....	
5.1 Introduction	
5.2 Evaluation of Meteo Data 1998.....	
5.2.1 Direct radiation conditions	5.1
5.2.2 Global radiation conditions	5.2
5.2.3 Temperature data	5.3
5.2.4 Distribution of Relative Humidity	5.4
5.2.5 Wind distribution.....	5.4
Appendix 1 Project Descriptions.....	A1.1
Appendix 2 List of Collaborating Institutions and Companies	A2.1
Appendix 3 Publications 1998.....	A3.1
Appendix 4 Project Contact Persons	A4.1