



Conference Programme

Venue: Hotel Kenzi Farah, 40 000 Marrakech, Morocco

Moderation:

*El Ghali Bennouna, IRESEN, Morocco (MinWaterCSP project) /
Anna Heimsath, Fraunhofer ISE, Germany (MinWaterCSP project)*

DAY 1 - 24th April 2018

08:30 *Registration and welcome coffee*

09:30 **Welcome**

*Mr. Badr Ikken, General Director, IRESEN, Morocco (MinWaterCSP project)
Dr. Falk Mohasseb, Kelvion Holding, Germany (Project coordinator MinWaterCSP project)*

10:00 **Key notes**

*Mr. Ahmed Ghzaoui, Head of solar energy service
Ministry of Energy, Mines and sustainable development, Morocco
Mr. Karim Saoud, Director of Water and Energy
Executive Direction of Industrial Operation - OCP Group, Morocco*

11:00 *Break*

11:15 **PLENARY SESSION (Room – Atlas 3)**

12:15 **Session 1: Introduction to MinWaterCSP – technology overview**

The MinWaterCSP consortium addresses the challenge of significantly reducing the water consumption of CSP plants while maintaining the overall cycle efficiency. Its objective is to reduce evaporation losses and mirror cleaning water consumption for small- and large-scale CSP plants through a holistic combination of next generation technologies. This session will introduce the CSP technologies further developed in the project.

Presentations:

- **Water supply, treatment and reuse**
Ron Gerards, Waterleau, Belgium (MinWaterCSP project)
- **Direct hybrid cooling – a plausible cooling compromise for an arid world**
Dr. Francois Louw, Kelvion Thermal Solutions (Pty) Ltd., South Africa (MinWaterCSP project)
- **Water savings in mirror cleaning – strategies, monitoring and new procedures**
Javier Garcia, ECILIMP TERMOSOLAR S.L., Spain (MinWaterCSP project)

Session chairs:

*Dr. Falk Mohasseb, Kelvion Holding GmbH, Germany (Project coordinator MinWaterCSP project)
Dr. Albert Zapke, ENEXIO Management GmbH, Germany (Technical coordinator MinWaterCSP project)*

12:15 *Lunch break*

13:30 **PARALLEL SESSIONS**

13:30 **Session 2a: Cleaning Activities and Cleaning Systems for Heliostats and Parabolic Troughs (Atlas 3)**
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14:45

The session gives insights into advances and the current state of development in cleaning systems within the MinWaterCSP project. A special focus is placed on the on-site tests performed and the main results.

Presentations:

- **Truck-based cleaning of Heliostats and Parabolic Trough**
Javier García, ECILIMP TERMOSOLAR S.L., Spain (MinWaterCSP project)
- **Robot-based cleaning of Linear Fresnel**
Vittorio Orioli, SOLTIGUA, Italy (MinWaterCSP project)
- **Mirror cleaning strategies in Morocco**
Dr. Ahmed Alami Merrouni, IRESEN, Morocco (MinWaterCSP project)

Session chair:

Javier García, ECILIMP TERMOSOLAR (MinWaterCSP project)

Session 2b: Innovative developments for Air Cooled Condensers and Cooling Towers (Atlas 2)

This session addresses innovations for cooling systems with compact heat exchanger concepts for air side heat transfer enhancement, the integration of deluge cooling into conventional air-cooled condensing systems, and a fundamental study on fouling experienced during deluge cooling.

Presentations:

- **Wire structure heat exchangers: Compact designs for efficient heat transport**
Hannes Fugmann, Fraunhofer ISE, Germany (MinWaterCSP project)
- **Hybrid Cooling Systems for reduced water consumption in CSP applications**
Dr. Riaan Terblanche, Kelvion Thermal Solutions (Pty) Ltd., South Africa (MinWaterCSP project)
- **Fouling of condenser components – origin, behavior and impact**
Afaf Zaza, IRESEN, Morocco (MinWaterCSP project)

Session chair:

Hannes Fugmann, Fraunhofer ISE, Germany (MinWaterCSP project)

14:45 *Break*

15:15 **Session 3a: Axial Flow Fan Development for MinWaterCSP project (Atlas 3)**
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16:30

This session addresses the axial flow fan development in MinWaterCSP with a special focus on the development process of large diameter fans, innovative fan drive aspects, fan noise and manufacturing.

Presentations:

- **Large diameter fan development process**
Prof. Johan van der Spuy, Stellenbosch University, South Africa (MinWaterCSP project)
- **Innovative fan drive aspects for large cooling fans**
Dr. Danie Els, Stellenbosch University, South Africa (MinWaterCSP project)

Session 3b: Simulation-based Analysis of Water Consumption in CSP plants (Atlas 2)

This session deals with the simulation of water consumption during cooling and mirror cleaning as well as the evaluation of the water saving technologies. In addition, it illustrates the impact of the advanced methodologies on the annual performance of CSP plants.

Presentations:

- **Evaluation of water saving technologies developed by the MinWaterCSP consortium**
Shahab Rohani, Fraunhofer ISE, Germany (MinWaterCSP project)
- **CSP plants combined with thermal desalination at inland locations**
Dr.-Ing. Joachim Went, Fraunhofer ISE, Germany (MinWaterCSP project)

- **Consideration of fan noise for large diameter fan development**
Dr. Giovanni Delibra, Sapienza University of Rome, Italy (MinWaterCSP project)
- **Fan manufacturing for the MinWaterCSP project**
Prof. Johan van der Spuy, Stellenbosch University on behalf of Notus Fan Engineering, South Africa (MinWaterCSP project)

Session chair:
Prof. Alessandro Corsini, Sapienza University of Rome, Italy (MinWaterCSP project)

- **Simulation study of water saving potential of PV/CSP hybrid plants**
Lukas Haack, Suntrace GmbH, Germany
- **A toolbox to assess the economic and environmental impact of WASCOP solutions: Simulation of the water use of CSP plants**
Dr. Peter King, Cranfield University, United Kingdom (WASCOP project)

Session chair:
Anna Heimsath, Fraunhofer ISE, Germany (MinWaterCSP project)

16:30 *Break*

16:45 - 18:00 **Session 4a: Availability, Sources and Managing Strategies of Water (Atlas 3)**

In this session, methods of assessing water availability are presented. Experiences with different water sources and with multi-source operation are shown. Efforts in the direction of a zero-liquid discharge operation, experiences with evaporation ponds and zero-blowdown cooling system operation are introduced.

Presentations:

- **The need for strategic management of CSP fleet development and water resources**
Frank Duvenhage, Stellenbosch University, South Africa
- **Water saving strategies and GIS analysis for CSP**
Julian Fleischmann, Fraunhofer ISE, Germany (MinWaterCSP project)
- **Water supply, treatment and reuse, by applying the technology train concept for near Zero Liquid Discharge**
Ron Gerards, Waterleau, Belgium (MinWaterCSP project)

Session chair:
Dr.-Ing. Joachim Went, Fraunhofer ISE, Germany (MinWaterCSP project)

Session 4b: Measurement and Analysis of Soiling and its Impact on Degradation (Atlas 2)

The session is about the characterisation and prediction of soiling and focuses mainly on the topics measurement and site assessment, degradation due to soiling and anti-soiling methods.

Presentations:

- **Soiling characterisation of solar mirrors - best practice for solar field and laboratory tests**
Anna Heimsath, Fraunhofer ISE, Germany (MinWaterCSP and Raiselife project)
- **Monitoring of soiling for site characterisation and plant operation**
Dr. Richard Meyer, CTO, Suntrace GmbH, Germany
- **Soiling dynamics and cleaning of CSP reflectors**
Dr. Sahar Bouaddi, Masen, Morocco (WASCOP project)
- **Soiling measurement campaign in Morocco – analysis and outcome**
Dr. Ahmed Alami Merrouni, IRESEN, Morocco (MinWaterCSP project)

Session chair:
Shahab Rohani, Fraunhofer ISE, Germany (MinWaterCSP project)

DAY 2 - 25th April 2018

09:00 *Registration and welcome coffee*

10:00 **Welcome and Introduction to the Day**

Summaries of Parallel Sessions of Day 1

10:30 **PLENARY SESSION (Atlas 3)**

12:00 **Session 5: Best Practice towards Water Consumption Reduction in CSP plants**

In this panel, industry partners from different CSP projects funded under the EU Horizon 2020 framework programme present and discuss about their best practices with a special focus on different aspects of water saving in CSP plants.

Panel discussion:

- **Water saving potential in cooling**
Dr. Riaan Terblanche, Kelvion Thermal Solutions (Pty) Ltd., South Africa (MinWaterCSP project)
- **Water saving by water treatment in CSP plants**
Ron Gerards, Waterleau, Belgium (MinWaterCSP project)
- **Cleaning practices and water reduction, specialisation of cleaning services**
Javier García, ECILIMP TERMOSOLAR, Spain (MinWaterCSP project)
- **Water savings by antisoiling coatings**
Gema Pérez, Rioglass Solar S.A, Spain (WASCOP project)
- **Lessons learned in commercial plant mirrors cleaning**
Juan Ignacio Burgaleta, ABACO Estudios y Proyectos, Spain (Advisory Board Member MinWaterCSP project)

Session chair: *Anna Heimsath, Fraunhofer ISE, Germany (MinWaterCSP project)*

12:00 **Conclusions of overall conference**

12:10 *Lunch break*

13:00 **Site visit at Green Energy Park**

- Meeting point for bus transfer: entrance Hotel Kenzi Farah (at 13:00)

17:00

17:00 *End of conference*



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