

Solar Polygeneration Collector for Combined Heat, Power, Hydrogen Fuel and Wastewater Treatment



First SPECTRUM Workshop

Prepared by:
MG Sustainable Engineering AB

March 2026



**Funded by
the European Union**

SPECTRUM has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement no. 101172891.

Disclaimer

This document is issued within the frame and for the purpose of the SPECTRUM project. This project has been funded by the European Union under grant agreement no. 101172891. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor CINEA can be held responsible for them.

Neither Project Coordinator, nor any signatory party of the SPECTRUM Project Consortium Agreement (SPECTRUM Consortium), nor any person acting on behalf of any of them:

- (a) makes any warranty or representation whatsoever, expressed or implied,
 - i. with respect to the use of any information, apparatus, method, process, or similar item disclosed in this document, including merchantability and fitness for a particular purpose, or
 - ii. that such use does not infringe on or interfere with privately owned rights, including any party's intellectual property, or
 - iii. that this document is suitable to any particular user's circumstance;
- (b) assumes responsibility for any damages or other liability whatsoever (including any consequential damages, even if the Project Coordinator or any representative of a signatory party of the SPECTRUM Consortium has been informed of the possibility of such damages) resulting from your selection or use of this document or any information, apparatus, method, process, or similar item disclosed in this document.

Copyright Notice

This document and its content are the property of the SPECTRUM Consortium. This document or its contents are not to be used or treated in any manner inconsistent with the rights or interests of the SPECTRUM Consortium or the Partners detriment and are not to be disclosed externally without prior written consent from the SPECTRUM Partners. Access to this document is restricted and does not grant any right or license on the document or its contents. Each SPECTRUM Partner may use this document in conformity with the SPECTRUM Grant Agreement and the Consortium Agreement provisions.

First SPECTRUM workshop

Project Acronym	SPECTRUM
Project Title	Solar Polygeneration Collector for Combined Heat, Power, Hydrogen Fuel and Wastewater Treatment
Grant Agreement no.	101172891
Milestone no.	MS18
Dissemination Level	PU
Deliverable type	Report
Delivery date	March 2026
Lead beneficiary	MG Sustainable Engineering AB
Author(s)	Shalaby, Maryam (MG)
Reviewer(s)	Esteves, Alexandra (LNEG)
Suggested citation	Shalaby, M. First SPECTRUM workshop. Milestone 17, SPECTRUM Project Consortium, 2026

Document history:

Version	Date	Status
V0.8	15/03/2026	Draft for review
V0.9	20/03/2026	Final draft after implementing comments, ready for editing
V0.9.1	24/03/2026	Final draft after editing, ready for approval
V1.0	31/03/2026	Final report

Table of contents

List of figures	4
Executive Summary	5
1. Introduction	6
2. Workshop Organisation	7
3. Promotion and Dissemination of the Workshop	8
4. Workshop Programme and Content	9
4.1. Welcome and Project Introduction	9
4.2. Sacrificial agents for fuels and chemical production	9
4.3. Development and testing of novel photocatalysts	9
4.4. Photoreactor Design and Testing	10
4.5. Technical Visit to LNEG Laboratories	10
5. Participation and Audience	11
6. Outcomes and Discussion	13
7. Conclusion	14
Annex 1 – Participants list	15

List of figures

Figure 1 SPECTRUM Workshop	11
Figure 2 SPECTRUM Workshop audience	12

Executive Summary

The first SPECTRUM workshop entitled “Materials for Solar Photochemistry Applications” was successfully organised on 9th October 2025 and hosted by Laboratório Nacional de Energia e Geologia (LNEG) in Lisbon, Portugal. The event was organised jointly by the SPECTRUM project and IEA SHC TCP Task 72 – Solar Photoreactors for the Production of Fuels and Chemicals and was conducted in a hybrid format, allowing both in-person and online participation via Microsoft Teams.

The workshop brought together 38 participants from universities, research organisations, industry stakeholders and project partners from across Europe and beyond. The event served as an important dissemination and knowledge-exchange activity for the SPECTRUM project, contributing to awareness raising around the project’s research themes, particularly solar photochemistry, photocatalytic hydrogen production, hybrid solar collectors and industrial wastewater treatment.

The workshop programme included presentations from leading researchers working on solar photochemistry and related materials, discussions on photocatalyst development and testing, and insights into the integration of solar-driven technologies for hydrogen generation and wastewater treatment. The event also included networking opportunities and a technical visit to LNEG laboratories, allowing participants to gain insight into relevant research facilities and ongoing experimental work.

Overall, the workshop successfully achieved its objectives of fostering dialogue between research and industry stakeholders, promoting the SPECTRUM project within the scientific community, and strengthening collaboration within the broader solar energy and photochemistry research ecosystem.

1. Introduction

The SPECTRUM project aims to develop and validate an innovative solar concentrating collector capable of converting the full solar spectrum into three valuable energy vectors -heat, electricity, and green hydrogen- while simultaneously contributing to industrial wastewater remediation through photocatalytic processes. By integrating optical, thermal, and electrical subsystems with a photocatalytic IWW remediation process that also co-generates hydrogen using low cost and sustainable photocatalysts, the project seeks to demonstrate a novel approach to solar energy utilisation and sustainable resource recovery.

Dissemination, stakeholder engagement, and knowledge exchange are essential components of the project's strategy to maximise its impact and ensure that the developed technologies are visible to the broader research and innovation community. Within this framework, Work Package 6 (WP6) focuses on communication, dissemination, and exploitation activities aimed at sharing project progress, fostering collaboration with external stakeholders and building a strong community around the SPECTRUM concept.

The first SPECTRUM workshop, corresponding to Milestone MS18, was organised to contribute to these objectives. The event aimed to:

- raise awareness of the SPECTRUM project and its technological approach;
- facilitate knowledge exchange among researchers working on solar photochemistry and hydrogen production;
- engage stakeholders from academia and industry;
- provide a platform for discussion on materials and systems for solar-driven chemical processes.

The workshop also contributed to strengthening links between the SPECTRUM project and international research initiatives such as **IEA SHC Task 72**, which focuses on solar photoreactors for the production of fuels and chemicals (see <https://task72.iea-shc.org/>).

By organising a hybrid workshop format, the project ensured broad accessibility and participation from stakeholders across different geographical locations.

This report explains the efforts undertaken to organise the workshop as well as to promote and disseminate it. The report also details the content and programme of the workshop, the workshop's participants, and the conclusions and outcomes of the workshop.

2. Workshop Organisation

The workshop took place on Thursday, 9 October 2025, from 09:30 to 16:00, at the premises of LNEG in Lisbon, Portugal.

The event was:

- Hosted by: LNEG;
- Co-organised by: IEA SHC TCP Task 72 – Solar Photoreactors for the Production of Fuels and Chemicals;
- Format: Hybrid (in-person and online participation).

Online participation was facilitated via Microsoft Teams, allowing participants who could not attend physically to join the sessions remotely.

The workshop was organised as a joint event with IEA SHC Task 72 and included in its 3rd expert meeting. This collaboration helped broaden the reach of the event and attract participants from the international research community working on related topics.

The workshop included:

- scientific presentations;
- networking opportunities;
- interactive discussions;
- a technical visit to LNEG laboratories.

The hybrid format ensured accessibility and inclusiveness while enabling participants present at LNEG to benefit from in-person networking and discussions.

3. Promotion and Dissemination of the Workshop

To ensure broad visibility and participation, the workshop was actively promoted through several dissemination channels.

The promotion campaign was primarily conducted through LinkedIn, where the SPECTRUM project maintains an active presence. A series of announcements and promotional posts were published ahead of the event to inform the research and innovation community about the workshop and encourage participation.

Promotion activities included:

- the creation of a LinkedIn event page;
- multiple promotional posts in the weeks leading up to the workshop;
- a follow-up post after the event summarising the outcomes.

The LinkedIn [event page](#) provided key information about the workshop programme, speakers and participation details. Additional posts were shared to highlight speakers and workshop topics, thereby increasing engagement with the target audience:

1. <https://www.linkedin.com/feed/update/urn:li:activity:7380889509401559040;>
2. <https://www.linkedin.com/feed/update/urn:li:activity:7381252029307863040;>
3. <https://www.linkedin.com/feed/update/urn:li:activity:7381593294507786241;>
4. <https://www.linkedin.com/feed/update/urn:li:activity:7381689924032294912;>
5. <https://www.linkedin.com/feed/update/urn:li:activity:7381951618612629507;>
6. [https://www.linkedin.com/feed/update/urn:li:activity:7385887520464482304.](https://www.linkedin.com/feed/update/urn:li:activity:7385887520464482304;)

These activities contributed to raising awareness about the event among researchers, industry stakeholders and members of the broader solar energy community.

Following the workshop, the recording of the event was made publicly available on the project website, ensuring continued accessibility and enabling those who were unable to attend to benefit from the presentations. The workshop materials and recording are available on the SPECTRUM website under the Project Results / SPECTRUM Workshops [section](#).

Such dissemination efforts support the overall communication strategy of the SPECTRUM project by promoting transparency, knowledge sharing and community engagement.

4. Workshop Programme and Content

The workshop programme was designed to provide participants with an overview of current research developments in solar photochemistry and materials for solar-driven chemical processes.

The agenda consisted of several thematic sessions covering key aspects relevant to the SPECTRUM project.

4.1. Welcome and Project Introduction

The workshop opened with welcome remarks and introductory presentations.

The first presentation introduced IEA SHC Task 72, being delivered by Bettina Muster (AEE INTEC). The presentation provided an overview of the international initiative focused on advancing materials for solar photochemistry applications.

This was followed by a presentation from João Cardoso (LNEG) introducing the SPECTRUM project, its objectives, technological approach and expected impacts.

These introductory presentations helped frame the workshop within the broader context of solar-driven chemical processes and highlighted the relevance of the SPECTRUM research activities.

4.2. Sacrificial agents for fuels and chemical production

The first technical presentation addressed the role of industrial wastewater as a source of sacrificial agents for solar hydrogen production.

Carla Pinheiro (Instituto Superior Técnico) presented research carried out in the SPECTRUM project on the selection of industrial wastewaters suitable for solar photocatalytic hydrogen generation. The presentation focused on how industrial wastewater streams can be valorised in photocatalytic remediation processes, where pollutant degradation is associated with renewable hydrogen production.

4.3. Development and testing of novel photocatalysts

The next session focused on the development and evaluation of advanced photocatalytic materials. Several experts presented their research on materials and technologies for solar photochemistry applications.

Adriana Zaleska-Medynska (University of Gdansk) presented work on metal-organic frameworks as photocatalysts for CO₂ conversion, discussing both opportunities and current limitations of these materials.

Victor de la Peña (IMDEA Energy) addressed the role of multifunctional materials in solar chemistry technologies, highlighting advances in catalyst design and material optimisation.

4.4. Photoreactor Design and Testing

The final scientific session focused on photoreactor technologies and experimental testing of solar chemical processes.

Sarah Meitz (AEE INTEC) presented research on a solar photoreactor for hydrogen production from wastewater, demonstrating how solar-driven systems can simultaneously support energy generation and environmental remediation.

Michael Wullenkord (DLR) presented work on testing photoreactors under practical conditions using DLR's solar testing facilities, providing insights into experimental methodologies and validation of solar chemical technologies.

These presentations highlighted the importance of experimental validation and infrastructure in advancing solar-driven chemical systems.

4.5. Technical Visit to LNEG Laboratories

Following the presentations, participants attending in person were invited to take part in a technical visit to LNEG laboratories.

This visit provided participants with an opportunity to observe relevant research infrastructure and discuss ongoing work related to solar energy technologies and materials research.

The technical visit also facilitated informal networking and technical discussions among participants, further strengthening collaboration opportunities.

5. Participation and Audience

The workshop gathered a total of 38 participants representing a diverse range of organisations including research institutes, universities and industry stakeholders. (Figure 1).



Figure 1 SPECTRUM Workshop

Participants attended either in person or remotely, demonstrating the effectiveness of the hybrid event format in enabling broad participation.

Institutions represented included:

- LNEG;
- MG Sustainable Engineering;
- AEE INTEC;
- DLR;
- IMDEA Energy;
- TU Wien;
- Technical University of Denmark;
- University of Bologna;

- University of Gdansk;
- Kingston University;
- University of Évora;
- Stellenbosch University;
- Instituto Superior Técnico.

This diverse participation reflects the strong international interest in solar photochemistry and related technologies.

The presence of researchers from multiple institutions enabled fruitful discussions and exchange of perspectives on materials development, reactor technologies and applications of solar-driven chemical processes (see figure 2).



Figure 2 SPECTRUM Workshop audience

The hybrid format allowed participants who could not travel to Lisbon to join the workshop remotely, thereby increasing accessibility and inclusiveness.

6. Outcomes and Discussion

The workshop successfully created a platform for dialogue between experts working on materials, photocatalysis, solar energy systems and hydrogen production technologies.

Key discussion points included:

- advances in photocatalyst materials for solar chemical processes;
- the potential application of industrial wastewater streams as sacrificial agents in photocatalytic hydrogen production;
- experimental validation of solar photoreactor technologies;
- challenges and opportunities in scaling up solar photochemistry systems.

Participants also discussed the importance of interdisciplinary collaboration between materials scientists, chemical engineers, and energy system researchers in advancing solar-driven technologies.

The workshop strengthened connections between the SPECTRUM consortium and the broader research community working on solar photochemistry, particularly through the collaboration with IEA SHC Task 72.

Feedback from participants indicated strong interest in continued collaboration and knowledge exchange in this research area.

7. Conclusion

The first SPECTRUM workshop successfully fulfilled the objectives associated with Milestone MS18 by organising a dedicated dissemination and knowledge-exchange event focused on materials for solar photochemistry applications.

The workshop provided an effective platform for presenting relevant research, engaging stakeholders, and strengthening collaboration within the solar photochemistry community.

Through scientific presentations, discussions, and a laboratory visit, the event fostered meaningful interactions among participants and contributed to raising awareness of the SPECTRUM project and its technological approach.

The hybrid format ensured broad accessibility and participation, while the dissemination activities surrounding the workshop extended its reach to a wider audience through online promotion and publicly available recordings.

Overall, the event represented an important step in building the research and stakeholder network around the SPECTRUM project and will support future dissemination and collaboration activities as the project progresses.

Annex 1 – Participants list

Name	Entity	Contact	Mode
Maryam Shalaby	MG Sustainable	maryam@mgsust.com	Virtual
Magor Demeter Bassant Mousa	DTU	magde@kt.dtu.dk	Virtual
Suruchi Kolhatkar	MG Sustainable	suruchi@mgsust.com	Virtual
Reuben Barker	EstraHub	Reuben@estrahub.org	Virtual
Fatima Teixeira	LNEG	fatima.teixeira@lneg.pt	Virtual
Roba Hunaif	MG Sustainable	roba@mgsust.com	Virtual
Gintare Vilke	MG Sustainable	gintare@mgsust.com	Virtual
Georgiana Maries	MG Sustainable	georgiana@mgsust.com	Virtual
João Resende	IST/UL	joao.m.c.resende@tecnico.ulisboa.pt	Virtual
Raiyan Hossain	Kingston University	k2440236@kingston.ac.uk	Virtual
Juan Keegan	MG Sustainable	juan@mgsust.com	Virtual
Filipe Mendes	IST-ID	filipe.mendes@tecnico.ulisboa.pt	Virtual
Richard Kujar	Net-Zero Technologies	-	Virtual
Helena Novais	University of Évora	-	Virtual
Waqas Khan	MG Sustainable	waqas@mgsust.com	Virtual
Novianto Nugroho	MG Sustainable	-	Virtual

Name	Entity	Contact	Mode
José Castanheiro	University of Évora	-	Virtual
Paula Alexandra Costa	LNEG	paula.alexandracosta@lneg.pt	Virtual
Paulo Mourão	University of Évora	pamm@uevora.pt	Virtual
Umoh Edem	NorthFox Facilities Services	UMOEDE@northfoxfs.com	Virtual
Justina Catarino	LNEG	justina.catarino@lneg.pt	Virtual
Martina Reichert	DLR	martina.reichert@DLR.de	Presenti al
Victor de la Peña O'Shea	IMDEA Energy	victor.delapenya@imdea.org	Presenti al
Dogukan Apaydin	TU Wien	dogukan.apaydin@tuwien.ac.at	Presenti al
Alois Resch	University of Applied Sciences Upper Austria	aloes.resch@fh-ooe.at	Presenti al
Maria João Brites	LNEG	alexandra.esteves@lneg.pt	Presenti al
Alexandra Esteves	LNEG	mjoao.brites@lneg.pt	Presenti al
Adriana Zaleska-Medynska	University of Gdansk	adriana.zaleska-medynska@ug.edu.pl	Presenti al
Bettina Muster-Slawitsch	AEE INTEC	b.muster@aee.at	Presenti al
Sarah Meitz	AEE INTEC	s.meitz@aee.at	Presenti al
Michael Wullenkord	DLR	michael.wullenkord@dlr.de	Presenti al

Name	Entity	Contact	Mode
João Cardoso	LNEG	joao.cardoso@lneg.pt	Presenti al
Craig McGregor	Stellenbosch University	craigm@sun.ac.za	Presenti al
Marco Pellegrini	University of Bologna	marco.pellegrini3@unibo.it	Presenti al
Clarisse Nunes	LNEG	clarisse.nunes@lneg.pt	Presenti al
Miguel Miranda	LNEG	miguel.miranda@lneg.pt	Presenti al
Anabela Capelo	LNEG	anabela.capelo@lneg.pt	Presenti al