Organisation for Economic Co-operation and Development

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Annual workshop on the thermal hydraulic code validation benchmark for high temperature gas-cooled reactors using HTTF data (HTGR T/H-2025)

30 June – 1 July 2025
Department of Engineering of the University of Cambridge, Trumpington Street, CB2 1PZ, Cambridge, United Kingdom

The workshop will be held in Cambridge, UK, as part of the Benchmarks Workshops of the Working Party on Scientific Issues and Uncertainty of Reactor Systems (WPRS). The WPRS Benchmarks Workshops event with three parallel tracks combines benchmarking efforts in common areas such as neutronics, thermal-hydraulics, and multi-physics modelling and uncertainty analysis.

wprs@oecd-nea.org

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Annual workshop on the thermal hydraulic code validation benchmark for high temperature gas-cooled reactors using HTTF data (HTGR T/H-2025)

Sponsorship

The annual workshop on the thermal hydraulic code validation benchmark for high temperature gas-cooled reactors using HTTF data (HTGR T/H) will be held on June 30 and July 1, 2025 in Cambridge, UK, as part of the Benchmarks Workshops Event of the Working Party on Scientific Issues and Uncertainty of Reactor Systems (WPRS). This event with three parallel tracks combines benchmarking efforts in common areas such as neutronics, thermal-hydraulics, and multi-physics modelling and uncertainty analysis. The full schedule for the incoming WPRS Workshops, SINUS-3 school and CTF-11 Meeting and Training is given on the public meeting web page: https://www.oecd-nea.org/jcms/pl_98752/wprs-benchmarks-workshops-2025

Executive Summary

Accurate modelling and simulation tools for thermal-hydraulic calculations are a key element needed to efficiently develop and deploy new advanced reactors, including small modular reactors (SMRs) and microreactors. Uncertainties in modelling and simulation can have significant safety and economic implications. Well-defined benchmark problems that include code-to-code comparisons as well as comparisons to measured data are an efficient means to quantify accuracy and identify sources of uncertainties in thermal-hydraulic calculations. This benchmark activity consists of a multi-stage code-to-data thermal hydraulics code validation benchmark based on data measured at the High Temperature Test Facility (HTTF) at Oregon State University (OSU). Three benchmark problems are proposed, each capturing different physical phenomena. These problems are intended to be solved with systems codes, computational fluid dynamics (CFD) codes, and/or coupled systems codes/CFD models.
Problem 1 - Lower Plenum Mixing
Problem 2 - DCC: The DCC is a transient that occurs when the coolant pressure boundary is ruptured.
Problem 3 - PCC: The PCC is a transient that occurs when forced flow of coolant stops but the pressure boundary remains intact.
The information about the OECD/NEA HTGR T/H benchmark is provided at:

https://www.oecd-nea.org/jcms/pl_71708/thermal-hydraulic-code-validation-benchmark-for-high-temperature-gas-cooled-reactors-using-httf-data-htgr-t/h#:~:text=This%20benchmark%20consists%20of%20a%20multi-staged%20code-to-code-to-data%20thermal,Test%20Facility%20%28HTTF%29%20at%20Oregon%20State%20University%20%28OSU%29.

Scope and Technical Content of the Meeting

The topics to be addressed at the meeting include:

- Review and discussion of the current version of specifications, including templates for submitting participants' results.
- Participants' presentations on their modelling and results so far (All problems, Ex 1 and 2).
- Dedicated session with Q/A for Ex 3.

- Presentations on other related activities linked with the benchmark,

The proposed meeting program is attached as Annex 1.

Organization of the Meeting

The meeting is organized around the discussion of the HTGR T/H benchmark specifications, preliminary results, participants' concerns, and benchmark-related activities. The participants are requested to present their expertise and experience in benchmark-related modelling, verification and validation, uncertainty quantification, and applications.

Participation in the Meeting:

Meeting participation is not restricted. Benchmark participation is restricted to individuals from OECD/NEA member country institutions who agree to the benchmark non-disclosure agreement (NDA). Participants are asked to sign and send the corresponding NDA form to wprs@oecd-nea.org.
Benchmark HTGR T/H conditions to release form can be found at:
https://www.oecd-nea.org/jcms/pl_75410/htgr-th-benchmark-participation-conditions-form

Organization and Program Committee of the Meeting

An Organization and Program Committee has been nominated to make the necessary arrangements for the HTGR T/H benchmark and to draw up the final program, etc.

The members of the Program Committee are:
Aaron Epiney – Chair and Coordinator
Idaho National Laboratory (INL), USA

Izabela Gutowska – Co-Chair and Co-Coordinator for Problem 1 (Lower Plenum Mixing)
Oregon State University, USA

Robert Kile - Co-Chair and Co-Coordinator for Problem 2 (DCC)
INL, USA

Thanh Hua - **Co-Chair and Co-Coordinator for Problem 3 (PCC)**
Argonne National Laboratory, United States

NEA Technical Secretariat: **Oliver Buss**
OECD/Nuclear Energy Agency, France

Proposed Program of the Meeting

The proposed program was drawn up by the Program Committee and is enclosed as Annex 1.

Language of the Benchmark Workshop

The official language of the workshop is English.

Proceedings of the Meeting

The program committee and the session Chairs will prepare a summary report on the main results of the meeting. Presentations will be available free of charge to the benchmark participants to download from participants' restricted area of the benchmark website after the workshop.

Contacts and Registrations

Link to the registration page for the WPRS-related workshops and meetings and the overall program: https://www.oecd-nea.org/jcms/pl_98752/wprs-benchmarks-workshops-2025

Workshop Location

The meeting place/venue for the meetings/workshops during the week of 30 June to 4 July 2025 is the Department of Engineering of the University of Cambridge:

Trumpington Street, CB2 1PZ, Cambridge, United Kingdom.

Annex 1:

Annual Meeting of the OECD/NEA HTGR T/H Benchmark

Host Organization

Department of Engineering of the University of Cambridge, in collaboration with the Cambridge Nuclear Energy Centre, University of Cambridge, United Kingdom

30 June 2025 Track 2 (Afternoon)

1 July 2025 Track 2 (Morning)

PROPOSED PROGRAM

H01-07: HTGR T/H

H01. Introduction and opening remarks

H02. Review and discussion of the current version of specifications, including templates for submitting participants' results.

H03. Participants' presentations on their modelling and results so far (All problems, Ex 1 and 2).

H04. Dedicated session with Q/A for Ex 3.

H05. Presentations on other related activities linked with the benchmark

H06. Action items and schedule of benchmark activities - next workshop and plans

H07. Conclusions and closing remarks.