



Technical Meeting on Thermal Performance Monitoring and Optimization in Nuclear Power Plants

Hosted by the

Government of the Republic of Korea

through the

Korea Hydro and Nuclear Power Company (KHNP)

Gyeongju, Republic of Korea

23–26 October 2018

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Information Sheet

A. Background

Achieving economic competitiveness with other energy sources and maintaining high safety and reliability are the main goals of nuclear power plant (NPP) operation. Thermal performance is one of the most important key indicators for measuring NPP performance and efficiency. Rising operating and maintenance costs and increased competition from other generating sources have increased the need to improve thermal performance for efficient electricity generation. Thermal performance improvements can help NPP operators to gain this demand by lowering operation costs and increasing NPP output.

Thermal performance is the overall evaluation of an NPP's electrical production with respect to its energy consumption expressed in heat rate (BTU/kWh). An improved heat rate will result in more electricity being provided to the grid and increased revenue to the NPP operation.

Evaluation of thermal performance includes the assessment of: the steam conversion system (main steam/main feedwater system); the flow capacity and efficiency of the turbine; the condenser; the moisture separator reheaters (MSRs) system; and the heater regenerative system and pumps (e.g. circulating pumps, feed pumps, condensate pumps).

Thermal performance of NPPs will naturally decrease due to the heat loss and the ageing of the balance of plant (BOP) system such as the turbine, MSRs, feedwater system and condenser unless thermal performance is continuously monitored and improved under a structured programme to identify issues and review the design for thermal efficiency.

The basis of a thermal performance improvement programme is to periodically conduct field performance diagnostics that support:

- Early identification of performance decrease and reliability issues;
- Early performance degradation recovery;
- Improved plant efficiency;
- Improved plant electrical output — additional revenue;
- Short payback period;
- Maximize use of original capital investment; and
- Application of state of the art technology — increased asset value.

The efforts behind improving thermal performance require a broad understanding of power plant design, operation, maintenance, ambient conditions and thermal sciences. For these efforts to be successful, a holistic view must be taken to ensure that the results are cost effective and do not create problems elsewhere in the plant.

B. Objectives

The purpose of the event is to explore and provide practical guidance on various aspects of thermal performance management in nuclear power plant operation, and to share good practices in this area among the participating Member States. The event will highlight the importance of having an appropriate thermal performance programme, especially considering the limited operation and maintenance cost to maximize its revenue.

Specifically, the event will aim to:

- Discuss and share the recent best practices, good practices, case studies, problems identified and lessons learned in thermal performance monitoring and optimization in NPPs to enhance efficiency and reliability; and

- Collect comments from Member States on a draft IAEA technical document (TECDOC) on thermal performance monitoring and optimization in NPP operation.

C. Topics

The event will include presentations by participants from Member States, international organizations and the IAEA Secretariat. The following topics will be presented to share experiences and lessons learned with respect to thermal performance monitoring and optimization in NPP operation:

- Thermal performance programme
- Cycle isolation
- Plant reconciliation
- Tools, software and techniques used for thermal performance management
- Calorimetric reactor power measurement
- On-line thermal performance monitoring system
- Thermal performance evaluation methods and test facilities
- Instrument and control system modification for performance monitoring and improvement
- Work control related to thermal performance
- Recovery or improved efficiency and generation output (MWe)
- Refurbishment of large equipment to maintain or increase thermal performance
- Specific practices for thermal performance monitoring and optimization
- Recommended good practices.

D. Target Audience

The event is targeted at Member State representatives who are involved in the thermal performance engineering or operation of NPPs. These might include individuals engaged in engineering of heat balance optimization and heat reject optimization, including the development of BOP and use of performance curves based on thermodynamic models.

Suppliers of tools applicable to thermal performance testing and monitoring in NPP operation, and members of academia who focus on thermal performance management of NPPs are also encouraged to participate.

E. Working Language

English.

F. Application Procedure

Designations should be submitted using the attached **Participation Form (Form A)**. Completed requests should be endorsed by the competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA, or National Atomic Energy Authority), or by an organization invited to participate, and returned through the established official channels. They must be received by the IAEA not later than **20 August 2018**. Designations received after that date or applications sent directly by individuals or by private institutions cannot be considered. The designation of a participant will be accepted only if forwarded by the Government of an IAEA Member State or by an organization invited to participate. Designating Governments and invited organizations will be informed in due course of the names of the selected candidates and at that time full details will be given of the procedures to be followed with regard to administrative and financial matters.

G. Papers

No formal papers will be required for this event. However, participants will be expected to:

- Give a summary presentation on best practices, experiences and case studies related to thermal performance monitoring and optimization in NPP operation;
- Actively participate in the dialogue at the event; and
- Provide any other input useful to the IAEA's activities on this topic.

H. Expenditures and Grants

No registration fee is charged to participants. The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Such assistance may be offered upon specific request to **up to two** participants per country, provided that, in the IAEA's view, the participant(s) on whose behalf assistance is requested will make an important contribution to the event. The application for financial support should be made at the time of designating the participant(s). If Governments wish to apply for a grant on behalf of one of their experts, they should address specific requests to the IAEA to this effect. Governments should ensure that applications for grants are submitted by **20 August 2018** using a signed **Grant Application Form (Form C)**. Approved grants will be issued in the form of a lump sum payment that usually covers **only part of the cost of attendance**.

I. Visas

Participants who require a visa to enter the Republic of Korea should submit the necessary application to the nearest diplomatic or consular representative of the Republic of Korea as soon as possible.

J. Local Arrangements

The event will be held in Gyeongju, Republic of Korea, and will start at 9.30 a.m. on Tuesday, 23 October 2018, and end at 2 p.m. on Friday, 26 October 2018.

The event agenda and local details, together with information on local arrangements, will be sent to participants at a later stage.

K. Organization

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Subsequent correspondence on scientific matters should be sent to the Scientific Secretary and correspondence on other matters related to the event to the Administrative Secretary.