



**IAEA**

International Atomic Energy Agency  
*Atoms for Peace and Development*

# **Technical Meeting on Electric Grid Reliability and Resilience in relation to Nuclear Power Plants**

**Hosted by the  
Government of Sweden**

**through  
Vattenfall and Svenska Kraftnät**

**Stockholm, Sweden**

**15–17 October 2019**

**Ref. No.: EVT1804433**

## **Information Sheet**

### **Introduction**

A reliable electricity supply is an essential resource for nearly all aspects of modern life; in developed countries electricity users have come to expect that electricity will almost always be available wherever and whenever it is needed. Developing countries also aspire to have a reliable electricity supply, as it is a necessary precondition for economic development and energy security. The reliability of the electricity system depends in part on having sufficient dependable generating units that are able to provide reliable generation of electricity to meet demand at all times with a sufficient margin. Nuclear generating units can contribute to the dependability and power quality of the electrical power grid system by providing a predictable and dependable source of baseload power and voltage control. As dependable and predictable electricity generation units with high inertia, they are a strong element of grid reliability. To meet the aspiration of having a reliable electricity supply, many Member States are considering the construction of

nuclear power plants (NPPs) and connecting them to their electricity system in their plans for energy security and reliance, which will help them to attain the low carbon electricity generation goals.

However, the interaction between a nuclear generating unit and the national/regional electrical power system (the electrical power grid system) deserves careful attention, as the electrical power system has an important impact on the operation of an NPP. An unstable and unreliable electrical power grid system may increase the number of reactor trips and the probability and frequency of loss of off-site power and station blackout events — and other grid related events, such as degraded power — directly impacting the safety, operability and availability of an NPP. Conversely, the electrical power grid system can be adversely affected by an unexpected trip or disconnection of an NPP that typically provides a large amount of electricity to the system. Such abrupt major changes in electricity generation can cause significant perturbations of the electrical power grid system. This can lead to grid system instability and failures that, in turn, would affect the NPP; particularly, regarding the availability and the quality of off-site power after the reactor trip to ensure decay heat removal during the shutdown state.

The IAEA's Milestones approach for nuclear power newcomers — documented in the IAEA Nuclear Energy Series publication *Milestones in the Development of a National Infrastructure for Nuclear Power* (IAEA Nuclear Energy Series No. NG-G-3.1, Rev.1) — emphasizes the grid aspect for new nuclear projects as follows: “an early step in considering the introduction of nuclear power is an assessment of the electrical grid's current and planned size and reliability.” For example, it recommends that, during Phase 3, the grid operator, in conjunction with the NPP owner/operator, develop arrangements to ensure coordination of grid operations with NPP operations and to continue to analyse and improve the reliability of the grid.

## Objectives

The purpose of the event is to share operating experience and to provide Member States with an opportunity to formally review and comment on the draft of a proposed new IAEA publication on electric grid reliability and resilience in relation to NPPs.

It will also examine applicable NPP design and operation fundamentals to enhance the reliability and resilience of electrical power grid systems. To do so, it will provide an opportunity for the exchange of information, knowledge and experience among participants. It will also aim to raise awareness of issues and good practices among key stakeholders for NPPs and grid systems, and support the establishment, expansion, re-establishment or sustainability of nuclear power generation in countries with operating NPPs and in countries embarking on or considering nuclear power in the generation mix for the first time.

Specifically, the event will focus on key areas of the operation of electric grid systems and NPPs and on their interface, and will address grid–NPP reliability, stability and stability needs, challenges and solutions in Member States. Taking into account the status of current programmes in Member States and the interests of different parties, this event will deal, in particular, with establishing, maintaining and sustaining a reliable and resilient grid in support of the safe and efficient operation of NPPs and, conversely, the contributions of NPPs to enhancing reliability and resilience of the grid system. The aim is to provide a perspective on improving design, operation and maintenance of both NPPs and electrical power grid systems in four main reliability and resilience goals:

- Reduce the probability of grid events that can adversely impact an NPP;
- Reduce the probability of NPP events that would adversely impact the grid;

- Minimize the consequences of a grid-related event on an NPP; and
- Minimize the consequences of NPP-related events on the grid.

The specific objectives of the event are as follows:

- To exchange information and to facilitate the management and coordination of grid reliability, security and availability as these relate to current or potential nuclear generation;
- To present and discuss case studies, good practices, problems identified, and lessons learned in relation to the NPP–grid interface, maintenance of a reliable and resilient grid and relation between/among organizations that are responsible for grid systems and current or potential nuclear generation;
- To provide a forum at which participants can discuss common challenges, opportunities for cooperation, concerns and issues that their countries/organizations are facing, or are likely to face, in the area of grid reliability for the safe and efficient operation of NPPs; and
- To collect feedback and input from Member States on the draft IAEA publication with the provisional title *Reliability and Resilience of Electrical Power Grid System for and with Nuclear Power Plant Operation*.

## **Target Audience**

The event is aimed at current and future nuclear industry and grid system stakeholders, particularly NPP and grid owner/operator organizations, grid and energy planners, as well as designers, technology owners, service and equipment suppliers/vendors responsible for providing goods and services for grid systems and NPPs. The participants should have a thorough understanding of energy and electricity sector development issues, as well as previous experience in energy and electricity sector planning and policy analysis. The target audience also includes leaders and experts engaged in the development, implementation and maintenance of NPPs and grid systems, with a view to achieving reliable and resilient grids in their countries.

Depending on the number of designations that are received, the event may be open to up to three participants from each invited Member State. Participants will be asked to give a presentation on their personal/organizational/national/international experience and to take part in the discussions organized during the breakout sessions. This will ensure a common understanding of issues from each organization's perspective in an integrated manner.

## **Working Language(s)**

English.

## Topics

The topics to be covered during the event will consist of specific information on the experience, benefits, risks, difficulties and challenges involved in grid reliability for safe and efficient operation of NPPs. The topics include the following:

- Design and operational elements of grid and NPP equipment and design to improve reliability and resilience;
- Integrated work among stakeholders building and maintaining a reliable and resilient grid, NPP and related interfaces;
- Reliability and resilience to hazards (natural and man-made);
- Operation of a reliable grid with nuclear generation being an important share and/or co-existence with other carbon-free generation sources, such as intermittent renewables;
- Grid structure evaluation and reliability requirements for connecting the first NPP or additional NPPs; and
- Newcomer, expanding and established Member State operating experience and strategies for maintaining and continuously improving reliability and resilience, including upgrade, maintenance and planning of an electric grid to support (or supported by) nuclear generation in the context of evolving factors, such as changes in energy plans and policies, electricity market structures and regulations, economics, and demographics, as well as changing natural and man-made hazards related to climate change and other threats.

## Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State, participants are requested to send the **Participation Form (Form A)** to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) for onward transmission to the IAEA by **15 July 2019**. Participants who are members of an organization invited to attend are requested to send the **Participation Form (Form A)** through their organization to the IAEA by the above deadline.

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and financial matters.

## 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. Upon specific request, such assistance may be offered to normally one or two participants per country, provided that, in the IAEA's view, the participant(s) will make an important contribution to the event and

that, where assistance is requested for two participants, they represent different national organizations.

The application for financial support should be made using the **Grant Application Form (Form C)**, which has to be stamped, signed and submitted by the competent national authority to the IAEA together with the **Participation Form (Form A)** by **15 July 2019**.

## Venue

The event will be held in Stockholm, Sweden and will start at 09:30 on Tuesday, 15 October 2019, and end at 15:30 on Thursday, 17 October 2019. Participants are kindly requested to arrive at the Vattenfall Headquarters in Evenemangsgatan 13, Solna, Stockholm, Sweden at least one hour before the start of the event on the first day in order to allow for timely registration. Participants must bring some form of personal identification, such as a passport, in order to identify themselves.

The event agenda, together with information on local arrangements, will be sent to the designated participants in due course.

## Visas

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

## IAEA Contacts

### Scientific Secretaries:

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Subsequent correspondence on any matters related to the event should be sent to the Scientific Secretary, Mr Arif Nesimi Kilic, with a copy to the Administrative Secretary.

## **Event Web Page**

Please visit the following IAEA web page regularly for new information regarding this event:

[www.iaea.org/events/EVT1804433](http://www.iaea.org/events/EVT1804433)