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TECHNICAL REPORT

colour inside

Renewable energy power forecasting technology

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CONTENTS

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RENEWABLE ENERGY POWER FORECASTING TECHNOLOGY

FOREWORD

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IEC 63043 has been prepared by subcommittee 8A: Grid Integration of Renewable Energy Generation, of IEC technical committee 8: Systems aspects of electrical energy supply. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
8A/71/DTR	8A/73/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

The purpose of this IEC Technical Report (TR) is to describe common practices and the state of the art for renewable energy power forecasting, which includes general data requirements, methods for renewable energy power forecasting and forecast error evaluation.

Various stakeholders, including transmission system operators, transmission system owners, utilities, renewable energy generation plant developers, academic units, research institutions, certifying bodies and standardization groups, require a common understanding of renewable energy power forecasting methods, data and evaluation techniques so they can incorporate them in their operations.

Renewable energy power forecasting finds a broad application in many areas of electrical engineering related to design, analysis, market trading, and optimisation of the power system. Among others, forecasting could be as an input to the operation and management of the renewable energy generation plants and can improve the economic efficiency and reliability of the power system.

Renewable energy power forecasting is increasingly important in multi-stakeholder systems where renewable plant manufacturers, renewable energy generation plant developers and operators, as well as the power system operators, need to have a common understanding about the capabilities and methods associated with renewable energy power forecasting.

RENEWABLE ENERGY POWER FORECASTING TECHNOLOGY

1 Scope

This Technical Report, which is informative in its nature, describes common practices and state of the art for renewable energy power forecasting technology, including general data demands, renewable energy power forecasting methods and forecasting error evaluation. For the purposes of this document, renewable energy refers to variable renewable energy, which mainly comprises wind power and photovoltaic (PV) power – these are the focus of the document. Other variable renewable energies, like concentrating solar power, wave power and tidal power, etc., are not presented in this document, since their capacity is small, while hydro power forecasting is a significantly different field, and so not covered here.

The objects of renewable energy power forecasting can be wind turbines, or a wind farm, or a region with lots of wind farms (respectively PV systems, PV power stations and regions with high PV penetration). This document focuses on providing technical guidance concerning forecasting technologies of multiple spatial and temporal scales, probabilistic forecasting, and ramp event forecasting for wind power and PV power.

This document outlines the basic aspects of renewable energy power forecasting technology. This is the first IEC document related to renewable energy power forecasting. The contents of this document will find an application in the following potential areas:

- support the development and future research for renewable energy power forecasting technology, by showing current state of the art;
- evaluation of the forecasting performance during the design and operation of renewable energy power forecasting system;
- provide information for benchmarking renewable forecasting technologies, including methods used, data required and evaluation techniques.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61400-12-2, *Wind turbines – Part 12-2: Power performance of electricity-producing wind turbines based on nacelle anemometry*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp