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C/1774/DV

2012-12-21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COUNCIL

SUBJECT

Document for NC vote: Proposal for a new technical committee on Grid Integration of Large-capacity Renewable Energy (RE) Generation.

BACKGROUND

The attached proposal from the Chinese NC is submitted to all IEC National Committees (NCs) in accordance with the ISO/IEC Directives Part 1, §1.5.6, and with the IEC Rules of Procedure, for reply within three months.

Sub-Clause 11.2 of the Rules of Procedure reads as follows:

11.2 Setting up of a technical committee

The Standardization Management Board shall create a technical committee if the following conditions are fulfilled:

- a) it is proposed in accordance with the Directives;
- b) all Full Member National Committees have been consulted by the Central Office;
- c) a two-third majority of Full Member National Committees having voted approves the proposal;
- d) at least five Full Member National Committees have expressed their intention to participate actively;
- e) the scope has been clearly defined.

ACTION

IEC National Committees are invited to vote on the establishment of the proposed new technical committee, providing a statement justifying their decision, using the Council voting/commenting system **by 2013-03-22**.

Those NCs intending to participate actively (P-Members) in the new TC, if approved, are invited to advise accordingly using the commenting system by the same date.

Secretariat note: For administrative purposes it is requested that National Committees use the commenting form downloadable [here](#) when commenting on C/1774/DV.

[Attachment](#)



PROPOSAL FOR A NEW FIELD OF TECHNICAL ACTIVITY

Proposer Chinese NC	Date of circulation 2012-12-21
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A proposal for a new field of technical activity shall be submitted to the Central Office, which will assign it a reference number and process the proposal in accordance with ISO/IEC Directives, Part 1, 1.5. The proposer may be a National Committee of the IEC, a technical committee or subcommittee, the Standardization Management Board or one of its advisory committees, the General Secretary, a body responsible for managing a certification system operating under the auspices of IEC, or another international organization. Guidelines for proposing and justifying a new field of activity are given in the ISO/IEC Directives, Part 1, Annex C.

The proposal (to be completed by the proposer)

Subject (the subject shall be described unambiguously and as concisely as possible)

To establish a new TC of "Grid Integration of Large-capacity Renewable Energy (RE) Generation".

Scope (the scope shall define precisely the limits of the proposed new field of activity and shall begin with "Standardization of ..." or "Standardization in the field of ...")

Standardization in the field of grid integration of large-capacity renewable energy (RE) generation.

The scope can be defined as follows:

Terms and definitions, renewable resource evaluation and generation prediction, general requirements of grid connection, planning and design, grid compliance test and evaluation, operation and maintenance, system-wide control and protection, analysis and assessment.

Purpose and justification (the justification shall endeavour to assess the economic and social advantages which would result from the adoption of International Standards in the proposed new field)

RE generation is experiencing rapid development. By the end of 2011, more than 100 countries had started to develop wind power and the global installed capacity reached 238GW. Meanwhile, the installed capacity of photovoltaic power had reached 69.68GW worldwide. The accumulative installed capacity of wind power in mainland of China had reached 62.36GW, which takes the first place all over the world. The capacity of both wind power and photovoltaic power in China is planned to reach 200GW and 30GW respectively by 2020. In Europe, it is planned that RE generation will account for 20% of the total power generation by 2020. In United States, it is expected that 20% of load demand will be supplied by wind power by 2030. In Japan, RE generation is planned to account for 50% of the total power generation by 2050.

Along with the increased total installation of RE generation worldwide, the capacity of single RE station is also increasing. In China, there are many wind farms with the installed capacity over 200~300MW. Furthermore eight wind power bases with the installed capacity over 10GW have been planned and under construction. Constructing a large wind power base with high capacity and connecting it into power grid at a high voltage level are one of typical characteristics of wind power development in the world. At the same time, the rapid development of large-scale RE generation brings many challenges to all sections of power grid including planning, operation, control, etc. Their impacts on power grid are extending from local network to the whole power system. Therefore, the needs for international standards become urgent in order to make sure the safe and reliable operation of power grid integrating with large-scale RE generation.

However, the related standards have not yet been developed and the current standards cannot meet the needs for grid integration of large-capacity RE generation.

In the newly published IEC White Paper "*Grid integration of large-capacity renewable energy sources and use of large-capacity electrical energy storage*", it is clearly stated that large capacity RE integration is different in many respects from distributed RE integration and therefore should be treated very differently. One example is that current standards developed for relatively small-capacity PV power plants may not be applicable to large-capacity desert PV power plants. Another example is that there is clear difference in the LVRT requirements between FERC Order NO. 661-A and IEEE Standard 1547 for distributed resources interconnection.

At present, there is no specific TC in IEC dealing with grid integration of large-capacity RE generation. IEC TC88 has developed certain standards regarding wind power, but has mainly focused on the issues of wind turbine itself. TC82 which works on the field of solar photovoltaic energy systems, mainly formulates standards for systems of photovoltaic conversion of solar energy into electrical energy and also for all the elements in the photovoltaic energy system, in which the entire field from light input to a photovoltaic cell and the interface with the electrical system(s) are included. However, its scope does not cover grid integration of large-capacity RE generation. TC8 works on system aspects of energy supply, with focus on basic issues and system-wide problems (i.e. standard voltage, current, frequency, power quality, power system reliability in the electricity market environment). Its work also does not cover grid integration of large-capacity RE generation.

Considering the technical development and market requirements of grid integration of large-capacity RE generation, a series of standards are needed regarding resource evaluation and generation prediction, general requirements of RE grid connection, planning and design, grid compliance test and evaluation, operation and maintenance, control and protection, analysis and assessment, etc.

Therefore, it is urgent required for IEC to establish a new TC dealing with above mentioned issues for grid integration of large-capacity RE generation. The proposed TC will work out a standard system about grid integration of large-capacity RE generation, and develop relevant standards independently or with cooperation of other existing TCs, to meet the current requirements for safe and stable operation of power grid integrating with large-capacity RE generation.

The new TC will be composed of international experts working on large-capacity RE generation in various fields and aspects including resource evaluation and generation prediction, planning and design, grid compliance test and evaluation, operation and maintenance, control and protection, analysis and assessment, etc. A series of standards will be studied and developed from the viewpoint of grid integration of large-capacity RE generation. It is expected that the new TC will promote the international standardization in this field, which is important to ensure the safe and stable operation of large-capacity RE generation, and facilitate the development of large-capacity RE generation, and eventually bring huge social and economic benefits.

Programme of work (list of principal questions which the proposer wishes to be included within the limits given in the proposed scope, indicating what aspects of the subject should be dealt with, e.g. terminology, test methods, dimensions and tolerances, performance requirements, technical specifications, etc.)

Firstly, the proposed TC will establish a standardization framework for grid integration of large-capacity RE generation. Secondly, it will develop standards according to importance. So far, Chinese NC thinks that following standards are urgently needed to be developed based on the market demand.

1、 Section 1: Terms and definitions

Terms and definitions for grid integration of RE generation.

2、 Section 2: Renewable resource evaluation and generation prediction

RE resource evaluation;
Application of numerical simulation technology;
RE generation prediction;
Correlation evaluation of RE generation characteristics.

3、 Section 3: General requirements for grid integration of RE power plant

General technical requirements for grid integration;
Reactive power and voltage control;
Active power and frequency control;
Fault response characteristics.

4、 Section 4: Planning and design

Assessment of capacity credit of RE generation;
Planning and layout of RE power plant;

Design of RE power plant;
Design of voltage control system and main connection of RE power plant;
Design of collecting system of RE power plant;
RE generation transmission.

5、 Section 5: Grid compliance test and evaluation

Power regulation performance of RE power plant;
Plant-level voltage control performance of RE power plant;
Grid compliance and fault response performance of RE power plant;
Assessment of low voltage ride through capability of RE generation.

6、 Section 6: Operation and maintenance

Operation and maintenance of RE power plant;
Condition monitoring and fault diagnosis of RE power plant;
Assessment of curtailment of RE power.

7、 Section 7: System-wide control and protection

Protection of RE generation;
Plant-level voltage control of RE power plant;
"Virtual power plant" control of RE generation;
Damping control of RE power plant.

8、 Section 8: Analysis and evaluation

Definition and calculation of capacity credit of RE generation;
Validation of RE generation model for simulation;
Short-circuit current calculation of RE generation;
Analysis of RE generation stability;
Evaluation of RE generation reliability.

Survey of similar work undertaken in other bodies (relevant documents to be considered: national standards or other normative documents)

Up to now, a number of TCs of IEC, such as TC82, TC88, TC8, have already developed some standards associated with RE generation. However, these standards do not cover grid integration of large-capacity RE generation. Renewable Energy Generation Standardization Technical Committee of Energy Industry of China has developed a series of standards regarding grid integration of large-capacity RE generation, which include the measurement and evaluation of resources, planning and design, grid interconnection, testing and certification, etc. Some other countries have also developed related standards, such as the United States, Germany, Denmark, etc. Other organizations such as ISO and IEEE have also developed some standards regarding RE generation facilities. However, these standards are still far from satisfying the requirements for development of large-capacity RE generation.

Liaison organizations (list of organizations or external or internal bodies with which co-operation and liaison should be established)

IEC TCs related to the grid integration of large-capacity RE generation: TC8, TC82, TC88, etc.

Organizations related to the grid integration of large-capacity RE generation: CIGRE, IEEE, CEC (China Electricity Council), etc.

Other comments (if any)

Recommendations to SMB:

Chinese NC would like and be very happy to undertake the secretariat of the new TC. So far, many researches and standardization works have been done in China. Moreover, eight 10GW-level wind power bases are planned to be built in China, and some of them have already been under construction or put into operation. All of them have provided a good base and start point for Chinese NC to carry out this important work.

Name: Guo Chenguang

Signature of the proposer: Guo Chenguang

Comments of the General Secretary (to be completed by the Central Office)

This proposal for a new technical committee is in line with the recommendations in the MSB White Paper, *Grid integration of large-capacity Renewable Energy sources and use of large-capacity Electrical Energy Storage*, available at: <http://www.iec.ch/whitepaper/pdf/iecWP-gridintegrationlargecapacity-LR-en.pdf>

Signature: F.W.P. Vreeswijk