CIGRE Study Committee N° C1

WG C1.27	**Name of Convenor :** Jeff Palermo

Title of the Group: The future of reliability
"Definition of reliability in light of new developments in various devices and services which offer customers and system operators new levels of flexibility"

Background

Reliability has had a fairly well established definition which is understood worldwide. The specific application and details vary from country to country, and sometimes, even among utilities within a large country. For example, the level of adequacy chosen is influenced by economic factors specific to each country. This is driven by considerations of local influences such as affordability or different requirements of users (i.e. agricultural compared to industrial). Nevertheless, the general definition is understood. Reliability consists of two fundamental concepts—*adequacy* and *security*:

> "*Adequacy* is the ability of the electric system to supply the aggregate electric power and energy requirements of the electricity consumers at all times, taking into account scheduled and unscheduled outages of system facilities." (*Cigre Glossary of Terms Used in the Electricity Supply Industry, Technical Brochure 198, Study Committees 37, 38 and 39, February 2002)*
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> "*Security* is the ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system facilities." (*Cigre Glossary of Terms Used in the Electricity Supply Industry, Technical Brochure 198, Study Committees 37, 38 and 39, February 2002)*

The new levels of flexibility offered to customers and system operators by evolving technologies challenge existing concepts of adequacy. These technologies include energy storage, customer time-of-day and real-time retail rates, controllable customer load, controllable individual customer load components (refrigerators, water heaters, etc.), intermittent generation (wind, tidal etc) and distributed generation.

While security is important, it is proposed that this be considered when the adequacy issue has been resolved. Adequacy is therefore the focus of this WG. Specific items for consideration include:

1. Identify the new services and devices that may affect system planning and operation in regard to the definition of adequacy.
2. Categorise the identified services and devices in terms of their potential impact on the definition of adequacy.
3. Select those that are most likely to have an impact on system planning and operation that may affect the definition of adequacy.
4. Describe the way in which the devices and services may impact (and those that may not impact) adequacy.
5. Determine if the definition of adequacy needs to be revised.
6. Propose a revised definition for adequacy.

Deliverables

Determine if there is a need for a modified or expanded definition of adequacy in light of the expected new devices and services.

Time Schedule :

1. April 2011–Initial WG meeting in Recifé to expand and clarify scope as necessary.
2. Paris 2012–report on interim findings for Tasks 1-3.
3. Paris 2012–WG meeting to complete Tasks 4 and 5.
4. 2013 C1 meeting–Present results.

Final Report: Paris 2014–present results in technical paper or *Electra* article.

Comments from Chairmen of SCs concerned: Responses to comments/queries of SCs listed below:

SC B1: In the introductory paragraph in the ToR has been amended to include reference to considerations of local influences for reliability standards.

SC B2: References for official Cigre definitions made clear to avoid confusion.

SC C2: Adequacy will be considered from a system planning perspective, but needs to be acceptable to customer and system operators in order to be valid. Proposals will be tested with customers and system operators to be validated. A SC2 member can be appointed for liaison purposes to ensure that system operation issues are considered.

SC C5: This working group will consider the value of energy to the customer at different times of the day when exploring the required adequacy. The tools needed to influence consumer reactions in terms of market signals, penalties and end tariffs will not be covered. This may be work that C5 would like to explore.

Approval by Technical Committee Chairman : Klaus Fröhlich **Date**: 17/03/2011