

### PANEL SESSION

## RENEWABLE MICROGRID APPLICATIONS – STATUS AND PROSPECTS

Date: Oct. 25, 2007 (4:40PM – 6:30PM)

Location: IEEE EPC 2007 venue, Holiday Inn Select, Montreal, Quebec

Panel Session Title: **Renewable Microgrid Applications – Status and Prospects**

Conf. website: [www.ieee.ca/epc07](http://www.ieee.ca/epc07)

#### **Background:**

As the penetration rate of renewable energy sources connected to urban and rural distribution feeders increases, new planning approaches and control strategies are required to design and operate the future grids. Microgrids and remote mini-grid architectures are suggested as potential solutions with several demonstration projects already undertaken internationally to explore the technology requirements. A Microgrid is defined as an integrated power delivery system consisting of interconnected loads and distributed generation units which as an integrated system can operate in grid-connected mode, autonomous (islanded) mode, and ride-through between these two modes. Enhanced security and reliability of power supply as well as customized power quality levels are the major advantages of Microgrids. The principal aim of this technical panel is to provide an overview of Microgrid research and demonstration activities at the national and international level. This includes research on Microgrid management and operation strategies that consider the use of: renewable and environmentally preferred distributed energy resources; peak-load management strategies; and automated distribution and protection system architecture. The participants will benefit from discussion on key technical issues, the identification of gaps in research, and current barriers in the implementation of Microgrids in Canada. This panel provides an ideal opportunity to encourage discussion and expand collaborations between the research community and industry. The panel session is organized by Natural Resources Canada's CANMET Energy Technology Center in Varennes, Quebec, Canada.

The panel comprises of four presentations, each of which maximum 25-minute, followed by a 30 minute facilitated discussion session.

#### **Program Agenda:**

	<b>Talk</b>	<b>Speaker/Moderator</b>	<b>Affiliation</b>
4:40 – 4:45 pm	Opening remarks	<i>Geza Joos</i>	McGill Univ. - Canada
4:45 – 5:10 pm	Presentation 1	<i>Farid Katiraei</i>	NRCan, CETC-V - Canada
5:10 – 5:35 pm	Presentation 2	<i>Stan Blazewicz</i>	Navigant Consulting - USA
5:35 – 6:00 pm	Presentation 3	<i>Janos Rajda</i>	SatCon Power Systems Canada Ltd. - Canada
6:00 – 6:30 pm	Open discussion	<i>Geza Joos</i>	McGill Univ. - Canada

## **Program Details:**

### **PRESENTATION 1 (25 minutes):**

#### **R&D overview - Microgrid activities in Canada**

*Farid Katiraei - T&D Research Engineer, NRCan CANMET Energy Technology Center-Varenes*

**Summary:** In Canada, research on Microgrid management and operation strategies that consider the use of: renewable and environmentally preferred distributed energy resources; peak-load management strategies; and automated distribution and protection system architecture, have been initiated as part of the decentralized energy production (DEP) program activities managed by the CANMET Energy Technology Center in Varenes (CETC-V). Several strategic areas of interest in the context of Microgrids are identified and typical networks operated by the Canadian Utility companies are investigated. The goal is to introduce a Microgrid development and research plan that is best meet the current and near future interests of the utilities and customer expectations. The Microgrid research and development activities are mainly focused in three areas that provide knowledge base and utility oriented experience with various aspects of Microgrid planning and operation. The main areas are:

- 1) Remote Microgrid applications
- 2) Planned islanding applications
- 3) Utility Microgrid applications.

The following topics will be discussed in this presentation:

- Microgrid applications and benefits (reliability, power quality, efficiency)
- Modeling, simulation and benchmarking needs
- International Microgrid cooperation and progress report on demonstration projects in US, Japan, and EU
- Demonstration project co-funding opportunities through public-private sector collaboration.

### **PRESENTATION 2 (25 minutes):**

#### **Microgrid value propositions and how they drive R&D and technology development needs**

*Stan Blazewicz – Director, Navigant Consulting*

#### **Summary:**

The objective of this presentation is to discuss the Microgrid Value Proposition and market potential:

- Difficulty in predicting technology value
  - “Miracles You Will See in the Next 50 Years”
- Microgrid Definition
  - Key Characteristics
  - Scope, Size and Ownership
- Microgrid Value Proposition
  - Key Attributes
  - Value Proposition Components
- Microgrid Market Potential
  - Size
  - Timing
  - Development
- Barriers

PRESENTATION 3 (25 minutes):

**Energy Storage and Power Conditioning System for Utility-Grid Interactive and Micro-Grid Load Following Operations**

*Janos Rajda – Application Engineering Manager, SatCon Power Systems Canada Ltd.*

**Summary:** With the increasing penetration and interconnection of distributed generation into the electric grid, either hydrocarbon fueled or using renewable energy sources, it has become increasingly important to realize the full potential and economic value of these resources to improve the availability and quality of electric power service. When local generating capability can be grouped with corresponding local loads served by a single feeder, the opportunity exists for an energy management scheme to be applied to the local grid segment. This situation might presently exist in a facility such as a hospital, a data center, or an industrial complex, where some level of local or emergency generation is often provided. In a future scenario, grid segments including groupings of load with renewable or other local generation might be planned and organized by the utilities. The power drawn from the utility by such a micro-grid can be optimally regulated including time shifting of the load to achieve such features as peak shaving, and continuity of power to local loads can be ensured, even during grid outages. The presentation addresses the challenge of enabling both new and existing grid-connected Photovoltaic Array (PV), Fuel Cell (FC), or Wind Turbine (WT) based generating plants to operate as part of the micro-grid, and with the addition of other key elements to provide an uninterruptible power service for on-site facilities during utility grid power outages. Issues addressed include operation in grid-interactive mode, the need for a static disconnect switch to ensure minimum disturbance in the local voltage when separating from the grid, the importance of load-following capability for maintaining power balance in stand-alone mode with the utility grid disconnected, and the procedures for synchronizing and reconnecting to the grid when it is restored.

**Facilitated discussion session (30 minutes)**

Focus:

- Answering a series of key questions (to be identified by the panel members)
- Technology development - Integrating renewable generation technologies in Microgrids
- R&D areas and field trial
- RFP for Demo projects
- Potential participants for the forth International Microgrid symposium – Greece 2008
- Next steps