Distributed Generation’s Role in the Distribution Circuit of the Future

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Introduction

“Engineering, technical and business excellence to achieve perfect safety and reliability at less than today’s delivery cost.”

-E&TS Vision
Overview

• Overview Distribution Circuit of the Future
• Technology
• Uses of technology
• Perception of technology
• Items to Overcome
• Steps taken to overcome obstacles
• Summary
Overview of Distribution
Circuit of The Future

• Why are we building the Circuit?
• What’s New?
  • Topology
  • Technology
• When will it be constructed?
Edison’s Circuit of the Future
Technology

- Two technologies
  - Fuel Cell
  - Inverter
- Inverter based on power electronics
  - Responds at sub cycle speeds
- A fuel cell coupled with an inverter can provide:
  - Watts
  - VARs
  - Combination of both
Technology (Continued)

- Fuel cells are based on a chemical process other than combustion
  - The chemical process can be reversed to allow fuel cells to act as energy storage devices
Uses of Technology

- Power Producer (Watts)
  - Thermal limits
    - Medium term maximum output to prevent circuits from overheating (ramping up to above 100% of nominal output for several hours at a time)
    - Prevent overloading of the line during peak demand
    - Increase line ratings due to power being supplied by DG.
    - Flatten load curves through the use of reversible fuel cells
Uses of Technology (cont.)

- System Stability
  - Quick ramping up or ramping down of power to keep areas in the same phase for successful reclosing of breaker

- HVDC Operation
WECC Map
Uses of Technology (cont.)

• Reactive Power Support (VAR)
  • Voltage Regulation
  • VAR Support
  • Voltage Stability
Q-V Stability Curve
Perception of Technology

• Viewed as a technology that must be accommodated, not viewed as an asset
  • Circuits were not built to incorporate DG
  • IEEE 1547 – states that any disturbance on the circuit requires DG to disconnect
    • Protect power system if fault occurs

• From Nuisance to Asset
Items to Overcome

• Technological Barriers
  • Control
  • Communication

• Business Barriers
  • Complexities of Investor Own Utility Business Model
  • Win / win model for both utility and DG integrator
  • New business model for DG integration into utility
What is being done to overcome obstacles

- Circuit of the future as test bed for DG with connection point

- Need standardization to minimize cost of interconnecting new generation
Summary

• Using the full capabilities of fuel cells and inverters presents some attractive qualities for utility use
• Programs such as Circuit of the Future offer opportunity to advance this potential. SCE is interested in appropriate partnering.
• A number of technological and business issues need to be resolved
Questions?