
Universal Interconnection Technology Technology Roadmap Workshop

Associated Barriers to Distributed Generation

7/25-26/2002

Distributed Generation Barriers

- DG System Topics
 - System Coordination Issues
 - Present Day UIT System Issues
 - Power Quality Concerns
 - Utility/Regulating Body Paradigm Shift

Distributed Generation Barriers

- System Coordination Issues
 - Fault Current Considerations (Site by Site)
 - ↳ Equipment must be sized properly
 - Proper Coordination (Site by Site)
 - ↳ Breaker Trip Units
 - ↳ Relay Settings
 - Voltage & Frequency
 - Reverse Power, Negative & Positive Sequence
 - Synch Check & Others
 - ↳ Alarm Settings
 - ↳ Recloser Coordination

Distributed Generation Barriers

- Possible Solutions
 - Study US power grid
 - ✦ Determine if a general Fault Current Distribution exists
 - 70% of System < 65kA
 - 90% of System < 100kA
 - 100% of System < 200kA
 - ✦ Determine if there are common related factors
 - Application voltage, primary transformer size, other

Distributed Generation Barriers

- Present Day UIT System Issues
 - Advantages
 - ✦ Lower Cost than Traditional Systems
 - ✦ Greater Functionality
 - Disadvantages
 - ✦ Complexity
 - Higher level startup engineer required
 - Customer service personnel not PC savvy
 - ✦ Customer Education (direct & indirect)
 - ✦ Customer lack of knowledge of Utility Programs

Distributed Generation Barriers

- Possible Solutions
 - Increase Plug & Play Capabilities
 - ✦ Provide Governor & Voltage Regulator list
 - ✦ Provide Prime Mover list
 - Friendly On-Board Assistance
 - ✦ Select system defaults based on above selection
 - ✦ Develop application troubleshooting database
 - Develop customer friendly software
 - ✦ Lead customer to system issue

Distributed Generation Barriers

- Possible Solutions
 - DG Customer Education
 - ✦ What is DG?
 - ✦ What system considerations must be addressed?
 - Positive & negative examples
 - ✦ What are the available Utility Programs?
 - ✦ Forms of DG: Pros & Cons
 - Prime Movers, Microturbines, Fuel Cells, etc.
 - ✦ Information readily available: All State web sites

Distributed Generation Barriers

- Power Quality Concerns
 - Harmonics
 - ↳ Loads can cause harmonic issues
 - ↳ Magnitudes change with source impedance
 - Higher source impedance yields higher harmonics
 - ↳ Flicker
 - Ferroresonance
 - ↳ Equipment damage
 - Overvoltages and Core Saturation

Distributed Generation Barriers

- Possible Solutions
 - Develop customer incentive programs
 - ▼ Specify quality of drive inverters (6, 12 & 18 pulse)
 - ▼ Educate customers on Application Issues
 - Paralleled sources provide lowest impedance

Distributed Generation Barriers

- Utility/Regulating Body Paradigm Shift
 - No incentive for Utilities to use DG
 - ↳ Distribution only Utilities
 - Not permitted to Dispatch Power
 - Required to serve all customers
 - ↳ Generation only Utilities
 - Not interested in small DG systems
 - ↳ Transmission only Utilities
 - Too many dispatching decisions to make w/o DG

Distributed Generation Barriers

- Possible Solutions
 - Determine who should have incentive to use DG
 - Determine how DG should be used
 - ▼ Support peak power requirements
 - ▼ Defer Transmission line cost
 - ▼ Pass value back to utility customers
 - Buying power from DG customers
 - Lowering non-DG customer bills

Distributed Generation Barriers

- Utility/Regulating Body Paradigm Shift
 - Distribution Utility Issues
 - ↳ Not designed for bi-directional power flow
 - ↳ Current Stability Models show negative impact
 - ↳ Build distribution & transmission to meet 100% load
 - Includes Peak & Safety Margin Power

Distributed Generation Barriers

- Possible Solutions
 - Develop bi-directional distribution system model
 - Synchronism Check Relays
 - Create new Stability model using DG

Distributed Generation Barriers

- Possible Solutions
 - Create new power flow models using DG
 - ✦ May increase Distribution cost
 - ✦ Should decrease Transmission cost
 - ✦ Should decrease central plant cost
 - ✦ Should decrease overall energy cost
 - Create new tariff structures to support DG versus building T&D