Distributed Generation: Thinking Outside the Grid

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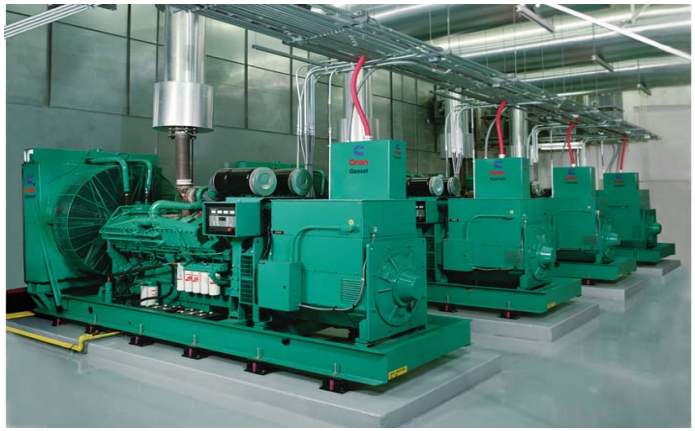
What is Distributed Generation?

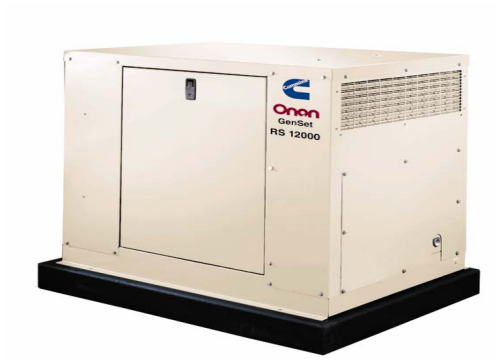
- Power Generation Close to the Point of Use
- Range of Applications
  - Prime power
  - Combined heat and power
  - Peaking
  - Power Quality
  - Standby/Back up
- Variety of Technologies
  - Diesel and natural gas reciprocating engines are dominant
  - Renewables – wind, solar, etc….

Types of Distributed Generation

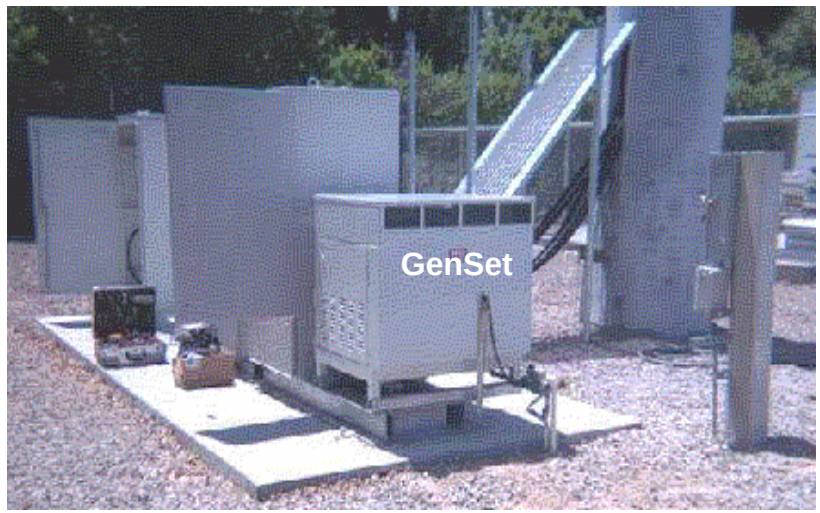


Standby / Peaking

Prime Power



Residential



Small Remote Telecomunications

How Distributed Generation Can Help

- Relieve Congestion on an Overloaded Grid
  - Relieve distribution bottlenecks
  - Low cost
  - Quickly deployed
  - Flexible and portable
- Economic Expansion of Power Availability
  - Avoid or defer large capital investments in central capacity, substations or distribution lines
  - Strategic use of DG by utilities
- Increased Reliability and Power Quality
  - Serve key customers with more demanding requirements
  - Dual use of DG by utilities

How Distributed Generation Can Help

- Critical Infrastructure Protection
  - Emergency response – *2003 blackout, hurricanes*
  - Linkage between infrastructure elements
  - Increasing expectations – beyond safety

- Homeland Security
  - Multiple power sources are harder to target
  - More flexibility (mobile DG)
  - Redundancy for critical infrastructure

Emergency Response

Northeast Blackout 2003

- Buffalo General Hospital
- Mississauga, Ontario Water System
- Verizon Wireless System, upper New York State
- Newark Airport
- New York City Hall
- Statue of Liberty

Hurricanes, 2004

- Approximately 200MW in FL, GA, Al, NC, SC

DG Projects

Application:
Standby

Size:
2 Megawatts

Purpose:
Protect life safety, critical circuits, equipment circuits

Hancock Memorial Hospital, Indiana

DG Projects

Verizon Wireless, Upstate, NY

Application:
Standby

Size:
> 300 40KW units

Purpose:
Standby power to prevent loss of cellular service

DG Projects

Application:
Combined heat and power

Size:
1.75 Megawatts

Purpose:
Power, heating, cooling, hot water

Chicago Museum of Science and Industry

DG Projects

Application:
Standby

Size:
6 Megawatts

Purpose:
Power Quality and load management

Cirent Semiconductor, Orlando, FL

DG Projects

Application:
Peaking Power

Size:
103 Megawatts

Purpose:
Summer peak and relieve grid congestion

FirstEnergy Corporation, USA

DG Projects

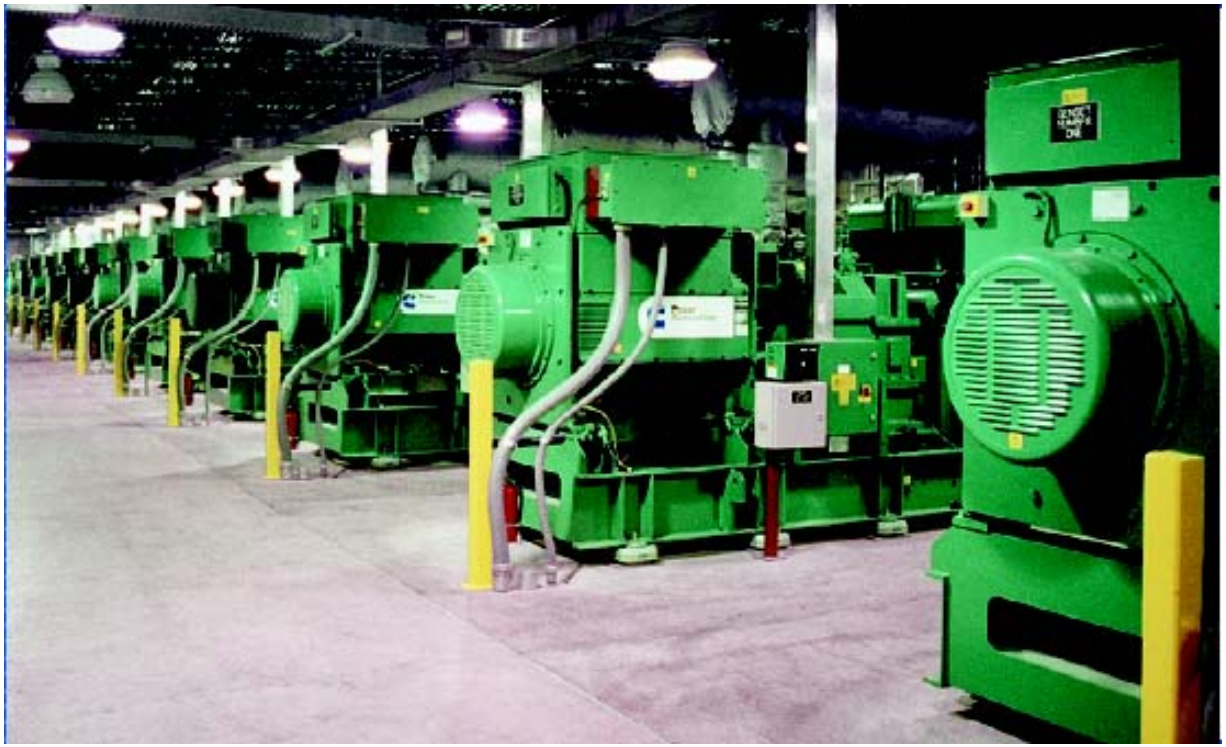
Application:
Temporary Power

Size:
34 Megawatts

Purpose:
Summer peak
and grid support

Wisconsin Public Service

DG Projects



Application:
Peaking Power

Size:
20 Megawatts

Purpose:
Summer peak and emergency back up

McMinnville Electric System, TN

Barriers to DG

- Lack of Uniform Interconnection Standards
  - Technical work is done
  - Variability adds cost and time without increased safety
- Environmental Regulations
  - Environmental regulations have driven significant improvement in emissions
  - Diesel is now a competitive source particularly for DG
  - Myriad of proposed state regulations are costly and may exclude even the cleanest DG projects
- Incorrect Economic Signals
  - Rate policies encourage large, infrequent, capital investments in central plants and transmission lines

Barriers to Capitalizing on DG

- Utilities' Perspective on DG
  - Competition vs. strategic tool
  - Limitations on owning generation assets
- Funding for Critical Infrastructure Protection
  - Good plans in place
  - Minimal progress on funding and implementing the plans

How to support DG development

- Clarify standards for interconnection
  - Objective
  - Low cost
  - Work together to encourage uniformity
- Get rate structure right
- Work with companies to get environmental regs right
- Recognize importance of power when funding homeland security projects