

# **Industrial Distributed Generation Program**

**Joe Galdo**

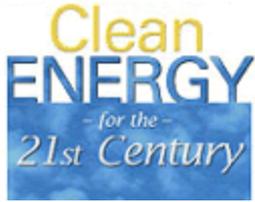
**Program Manager, Industrial DG Program**

**U.S. Department of Energy  
Office of Power Technologies**

**The Power to Choose – Creating an Expanded DER Industry**

**Washington, DC**

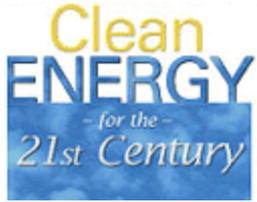
**November 28-30, 2001**



# Mission



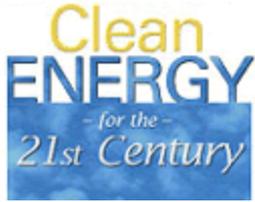
The Industrial DG Program conducts RD&D on high value commercial and industry applications of DER, demonstrating the benefits of DER in the market place.



# Strategy



- Goal: Overcome institutional market barriers and stimulate deployment of DER in industrial and commercial applications.
- Approach: Develop decision and design tools, conduct feasibility studies and demonstrate high value applications.



# Program Background



- Funded under Interior Appropriations as part of “DER End Use Systems Integration and Interface” elements
- Program began in FY1999 in OIT by addressing Highly Varying Industrial Loads for the steel industry
- Now part of the new OPT DER program addressing DER for industrial end use applications
- Completed competitive solicitation for new projects in FY2000
- Projects managed by Oak Ridge and coordinated with OIT and FEMP

# Participants

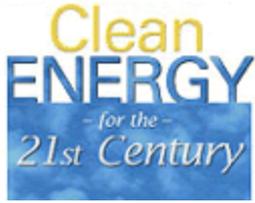


- Gas Technology Institute
- Ballard Engineering
- University of Illinois at Chicago
- Industrial Center, Inc.
- CSGI Inc.
- Resource Dynamics Corp.
- CDH Energy Corp
- Exergy Partners Corp,
- NYSERDA
- Pace Energy Project
- Onsite Sycom
- Primen
- Salt River Project
- Intel
- Sematech
- Center for Energy and Climate Solutions
- Southern California Gas
- Dana Technologies
- Paramount Petroleum Corp.
- US Marine Corps Air Ground Combat Center
- Naval Facilities Engineering Command
- Solar Turbines
- Syska Hennessy
- Team Energy
- Bell Atlantic
- International Fuel Cells
- Keyspan

# Applications



- Combined Heat and Power
- Sensitive loads
- Highly varying loads
- High Reliability
- Data centers and server hotels
- Urban planning and redevelopment
- Power Parks



# Combined Heat and Power



- Integration of industrial fluid heating processes with CHP--Southern California Gas Co
- CHP at Marine Air Combat Center--Southern California Gas Co.
- Integration of CHP in Industrial Applications--Industrial Center

# Sensitive Loads



## Semiconductor Industry

- Investigate and design multipurpose DG for both power providers and semiconductor industry
- Strong participation by both Intel and Sematech
- Focus on large 10 to 50 MW semiconductor fabrication plants
- Evaluate economic, reliability, availability, and environmental issues and opportunities
- Evaluate potential multiple uses of distributed generation to justify the investment

## ■ Power Quality Issues

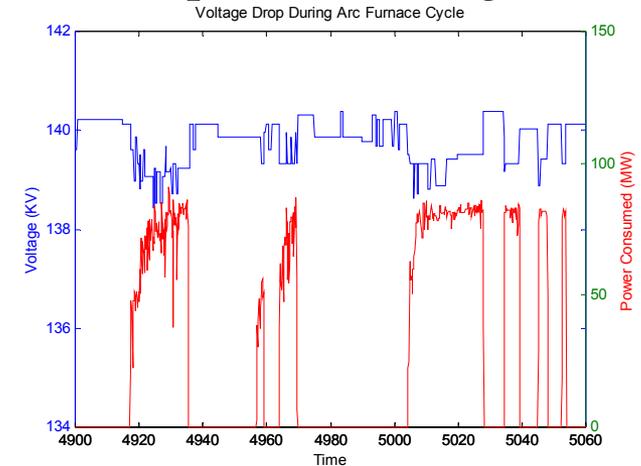
- Voltage drops
- Frequency deviations
- Power factor depression
- Increased total harmonic distortion
- Impact on area control error

## ■ Electric System Issues

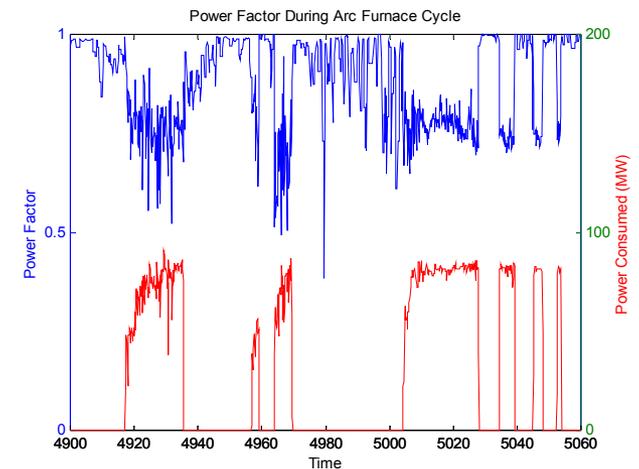
## ■ Approach

- Automatic generation control
- Startup coordination
- Control allocation
- economic optimization
- Fuzzy Logic Control System

### Impact on Voltage



### Major Impact on Load Factor

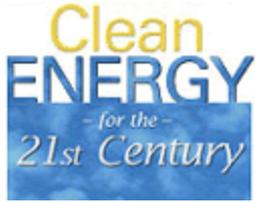


# High Reliability



## Telecommunications Facilities

- Application of premium power high-reliability DG at Bell Atlantic Zeckendorf Central Office Switching Facility on Long Island, NY
- Controls communications traffic for 4 million households and 125,000 businesses
- DG consists of ten 200 kW fuel cell power plants and CHP building integration
- Estimated cost of \$15,000,000 with 5-year payback



# Chicago Industrial Energy Plan



- Creates government/industry cooperative to develop and deploy industrial DG at strategic locations in major metropolitan areas
- Conduct two-phase program to characterize and develop industrial DG in Chicago
  - Overlay industrial energy usage and emissions source maps on electric grid and natural gas distribution maps to identify and prioritize target sites
  - Detailed analysis of 5 to 10 of the high priority sites
- Develop a standardized approach to be utilized by urban areas to identify industrial sites that can maximize benefits of DG