

Development and Deployment of Innovative Distributed Energy Applications in Industrial Process

by

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GTI Project No. 40446



GTI Distributed Energy Group

Focused on development and deployment of DE Technologies:

- **DOE Working Group on BCHP: DOE ODER, ORNL**
- **Regional BCHP Application Center: DOE ODER, ORNL, UIC**
- **BCHP Packaged Systems (Waukesha, Capstone, United Technologies)**
- **Distributed Energy Technology Development Center**
- **MW CHP Initiative**
- **Energy and Environmental Planning**
 - **Energizing America's Cities**

Project Partnership

- **Project is being performed in partnership with the following organizations:**
 - **Gas Technology Institute (Prime)**
 - **Oak Ridge National Laboratory**
 - **City of Chicago, Department of Environment**
 - **University of Illinois at Chicago, Energy Resources Center**
 - **Ballard Engineering**

Project Objectives

The objectives of this project are three fold:

1. **Develop a standardized approach to be utilized by urban areas to identify industrial sites that can maximize benefits of Distributed Generation (DG) through**
 - Lowering emissions
 - Improving grid reliability
 - Improving energy efficiency
 - Improving industrial processes

Project Objectives (cont'd)

- 2. Develop advanced DG technology designs for 10 sites and have sites proceed with implementation of designs**
- 3. Provide the City of Chicago with a plan that can be used to identify other targets for installations maximizing DG benefits**

Project Organization

- **City of Chicago, Department of Environment**
 - **Bill Abolt, Commissioner**
 - **Steve Walters, Deputy**
 - **Antonia Ornelas, Project Lead**
- **GTI**
 - **John Kelly, Managing Director**
 - **Ted Bronson, Project Manager**
 - **Karen DePodesta, Principal Investigator**

Project Organization

- **UIC Energy Resources Center**
 - **Bill Worek, Director**
 - **Mike Chimack, Principal Investigator**
 - **John Cuttica, Co-Investigator**
- **Oak Ridge National Laboratory**
 - **Tom Rizy, Project Manager**

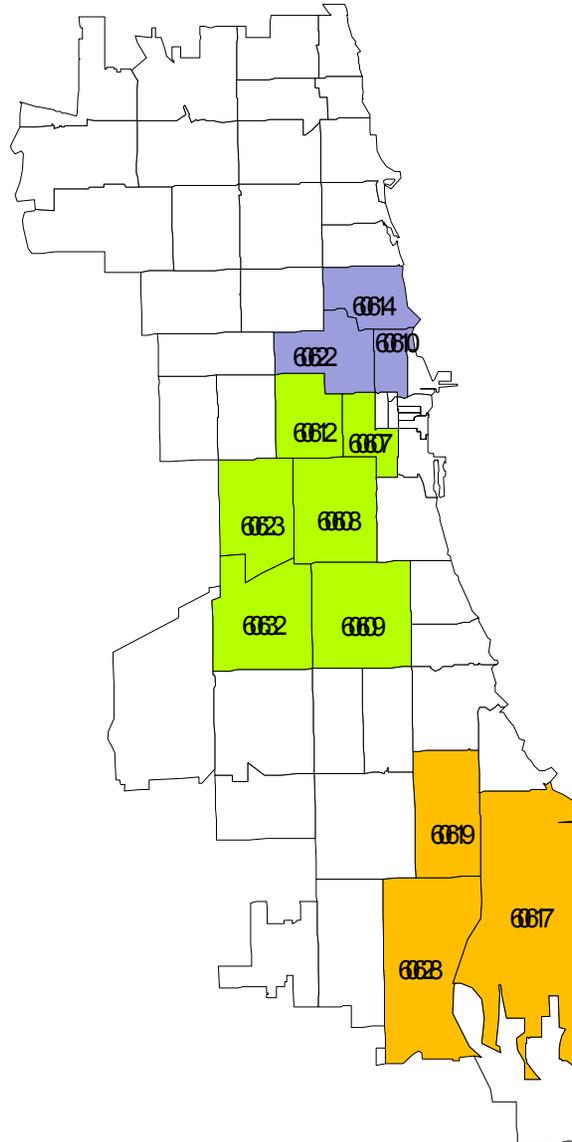
Project Steering Committee

Ballard Engineering	Eisenmann, Inc.
Cummins- Onan	Delta Institute
Peoples Energy	Exelon (ComEd) *
IL Dept of Commerce and Community Affairs (IL DCCA)	US Department of Energy, Chicago Regional Office
IL EPA	US EPA
Environmental Law and Policy Center (ELPC)	Chicago Area Energy Users Group (CAEU)
Center for Neighborhood Technology	Illinois Commerce Commission (ICC)
Oak Ridge National Lab	City of Chicago, DOE
UIC ERC	GTI

Phase 1: Characterization Study

- **Go through structured process to select 50 candidate sites through:**
 - **Mapping electric grid feeder data**
 - **Obtain and map emissions data**
 - **Select target zip code areas based on grid needs and emissions output**

Zip Code Selection – Emissions and Grid Criteria Results



Phase 1: Characterization Study (Cont'd)

- **Determine 50 candidate sites:**
 - emissions output
 - site energy usage
 - potential duplication of facilities (by industry)
- **Investigate site electric and natural gas supplies**

Phase 1: Characterization Study (Cont'd)

- **Conduct Steering Committee Meeting**
 - **Comments on Project Plan and Approach**
 - **Comments on Candidate Site Selections**
 - **Identify Project Incentives and Barriers**
- **Develop site interview questionnaire**
- **Interview 25 sites**
- **Select top 10 sites**
- **Present to Steering Committee**

Phase 2: Development and Deployment of DG

- **Conduct detailed plant inspections:**
 - Identify specific energy usage profiles (electric and steam)
 - Identify potential process improvements
 - Determine cost of power disturbances
 - Develop plant reports
- **Evaluate Financial Incentives (peak load and emissions credits)**

Phase 2: Development and Deployment of DG

- **Integrate Industrial Process Improvement with DG:**
 - **Conduct Expert Panel Meeting with technology specialists**
 - **Evaluate plant information and devise methods to integrate DG with plant process improvements**
 - **Develop conceptual designs and finalize with plant personnel**
 - **Develop TIC estimates, environmental and economic evaluations including incentives**

Phase 2: Development and Deployment of DG

- **Ideal Plant:**
 - **'Zero or negative emissions'**
 - **Grid strengthened**
 - **Processes improved**
 - **Repeatable applications**

Final Reports

- **Project process document**
- **Chicago Industrial Energy Plan**
- **Economic effects of power outages**
- **Industrial energy load profiles**

Project Schedule

TASK	DURATION
Phase 1 Characterization Study	3/01 – 9/01
Phase 1 Reports	9/01 – 10/01
Phase 2 Development and Deployment	11/01 – 6/02
Phase 2 Reports	6/02 – 7/02

Project Status

- **Database Information Compiled**
 - Emissions & Energy Data Uploaded
 - Grid information reviewed
- **Targeted zip codes based on grid and emissions**
- **50 Candidate Sites selected**
- **Conducted Steering Committee June 5, 2001**
- **Broadened criteria and expanded Candidate Site list based on Steering Committee results**
- **Prioritizing Sites based on Steering Committee input**

Steering Committee Feedback

- **Project Plan Comments**
 - Determine permitting status (1118kW limit)
 - Obtain additional plant information from IL EPA
 - Expand Candidate Site List by broadening criteria
- **Site Selection Comments**
 - Significant Site insights gained for prioritization process
 - Financial Status
 - Emissions enforcement issues
 - Potential for waste heat use

Steering Committee Feedback

- **Incentives**
 - IL DCCA funding for installations
 - Peoples Energy gas pricing incentives
 - Senate Bill 606 providing interest free loans for energy efficiency and peak shaving projects
 - City of Chicago VOC Trading Program implementation
 - Determine grid relief and peak shaving credits
- **Barriers**
 - ComEd's costs for interconnection, standby charges, exit fees, studies and labor
 - Willingness of plants to participate and invest capital

Next Actions

- **Meet with ComEd to discuss prioritization of sites and determine costs, barriers and incentives**
- **Obtain specific plant information from IL EPA (boiler data, thermal loads, emission rates)**
- **Prioritize Candidate Site list**
- **Develop Questionnaire**
- **Interview Sites**
- **Select Top 10 Sites**
- **Date for Next Steering Committee Meeting**

Summary

- **Project on Track; at key stage**
 - Plant interviews
 - ComEd meeting
- **Measures of Success:**
 - **Number of Final Installations of DG per project**
 - Emissions reductions identified
 - Grid utilization improvement
 - **Projects could be duplicated for multiple sites**
 - **Innovative incentives identified and quantified**
 - **Successful implementation in other cities**