



# *Distributed Energy Resources Chicago Industrial Energy Plan*

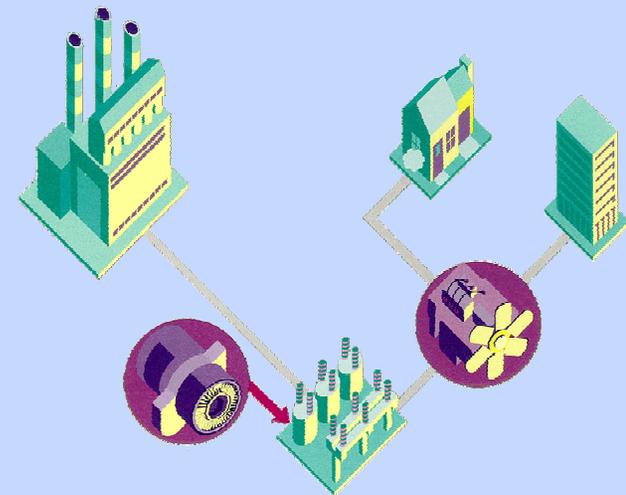
**Gas Technology Institute**

Karen DePodesta, Principal Investigator

**Oak Ridge National Laboratory**

D. Tom Rizy, Technical Project Officer

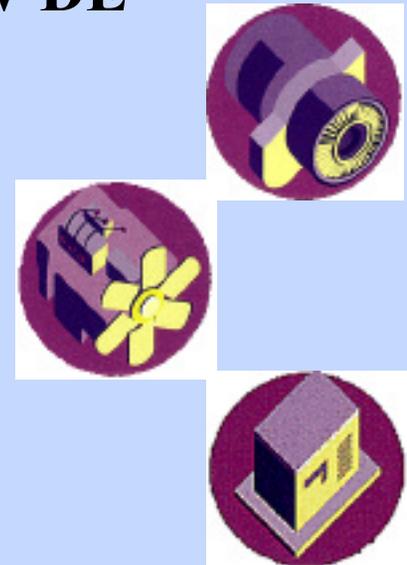
July 10, 2002



# Project Mission

---

- **Demonstrate Distributed Energy's contribution to a Sustainable Urban Environment**
  - Lower Energy Costs and Improve Grid Utilization
  - Improve Overall Air Quality
  - Increase Energy Efficiency
- **Contribute to DOE's Goal to deploy 50GW DE**
- **Establish Technology Partnerships**
  - Department of Energy, ORNL, Manufacturers, Users, States, Cities, Gas and Energy Industries



# Strategic Goals

## DOE DER Program

- **20% of Electric Growth**
- **Address Barriers**
- **Develop Advanced System Solutions**

## GTI Project

- **Identify and develop small scale DE Industrial market**
- **Identify incentives**
- **DE lowers overall emissions**
- **DE relieves constrained electric grid locations**
- **Reduce system costs via standard system design**
- **Improve industrial processes**

## Approach

---

- **Develop standard program to maximize industrial DE in an urban setting**
  - **Can be repeated in other cities**
  - **Relieve constrained grid areas**
  - **Reduce emissions from existing sources**
- **Develop advanced DE systems for 5 to 10 sites**
- **Provide Chicago with a plan for expanding this program to other areas**

# Project Partnership

---

- **Project is being performed in partnership with the following organizations:**
  - **Oak Ridge National Laboratory**
    - **D. Tom Rizy**
  - **Gas Technology Institute**
    - **Karen DePodesta, John Kelly**
  - **City of Chicago, Department of Environment**
    - **Antonia Ornelas, Steve Walter**
  - **University of Illinois at Chicago, Energy Resources Center**
    - **Leslie Farrar, Michael Chimack**

## Project Methods

---

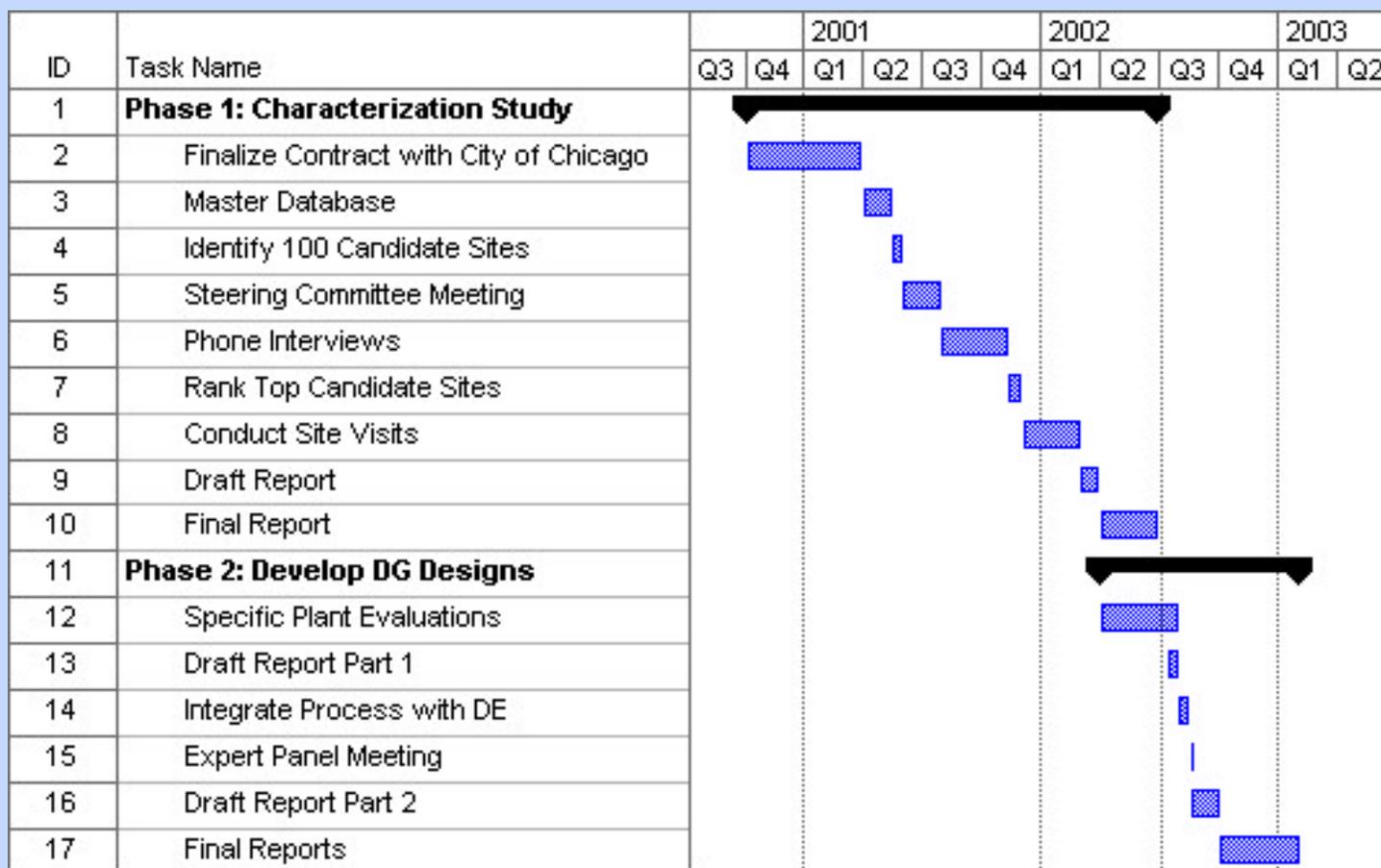
- **PHASE 1 (Complete)**
  - **Industrial Characterization Study**
  - **Steering Committee Meeting**
  - **Final Site Selections**
  - **Industrial Energy Plan**
  - **Chicago Industrial Characterization Report**
    - **Issued end of March 2002 as a draft**
    - **Will be issued as final upon receipt of comments**

# Project Methods

---

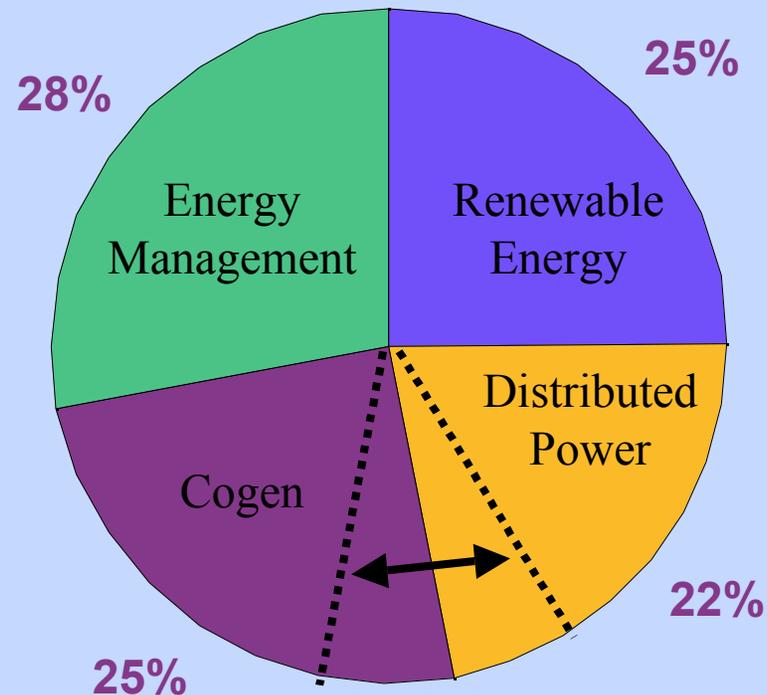
- **PHASE 2 (Underway)**
  - **Plant Evaluation/Data Gathering**
  - **DE Integration**
  - **Expert Panel Meeting**
  - **Final Report**
    - **System Designs**
    - **Urban Industrial Energy Plan Process**
    - **Grid Power Quality Effect**
    - **Industrial Energy Load Profiles**

# Project Schedule



## Results

- **Chicago Energy Plan Goal by 2010 – 5 Billion kWh Growth  
1 Billion kWh Existing**
- **Industrial Program to contribute 15% of goal**



Reference: City of Chicago Mayor's Energy Plan

## Project Results since January

---

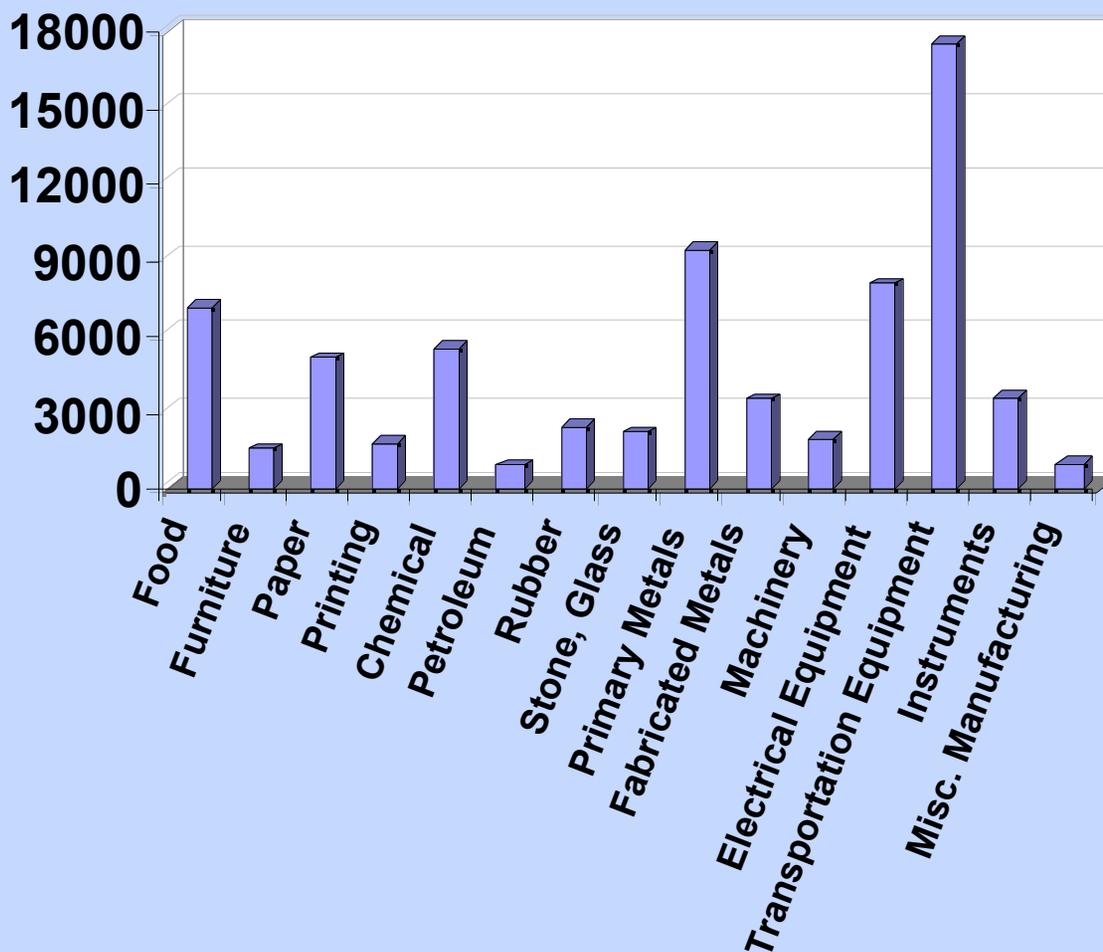
- **Completed Initial Site Visits**
- **Identified 10 Candidate Sites**
- **Selected from Wide Range of:**
  - **Industry Types**
  - **Heat Recovery Applications**
  - **System Sizes**
  - **Locations in Chicago**
- **Issued Draft Report**

## Project Results – Site Selection

<b>INDUSTRY</b>	<b>PK kW</b>	<b>PK kWh/yr</b>	<b>SAVINGS</b>
<b>Concrete</b>	<b>7300</b>	<b>10,800,000</b>	<b>33-71%</b>
<b>Confection</b>	<b>3500</b>	<b>9,000,000</b>	<b>45-61%</b>
<b>Chemical</b>	<b>2400</b>	<b>5,000,000</b>	<b>53-61%</b>
<b>Plastics</b>	<b>1400</b>	<b>3,400,000</b>	<b>42-62%</b>
<b>Metals</b>	<b>1200</b>	<b>2,700,000</b>	<b>26-65%</b>
<b>Plating</b>	<b>700</b>	<b>1,500,000</b>	<b>40-75%</b>
<b>Varnishes</b>	<b>350</b>	<b>1,200,000</b>	<b>41-74%</b>
<b>Sterilization</b>	<b>250</b>	<b>540,000</b>	<b>36-72%</b>
<b>Meat Packing</b>	<b>200</b>	<b>420,000</b>	<b>28-65%</b>
<b>Coatings</b>	<b>100</b>	<b>240,000</b>	<b>37-55%</b>
<b>TOTALS</b>	<b>17,400</b>	<b>34,800,000</b>	

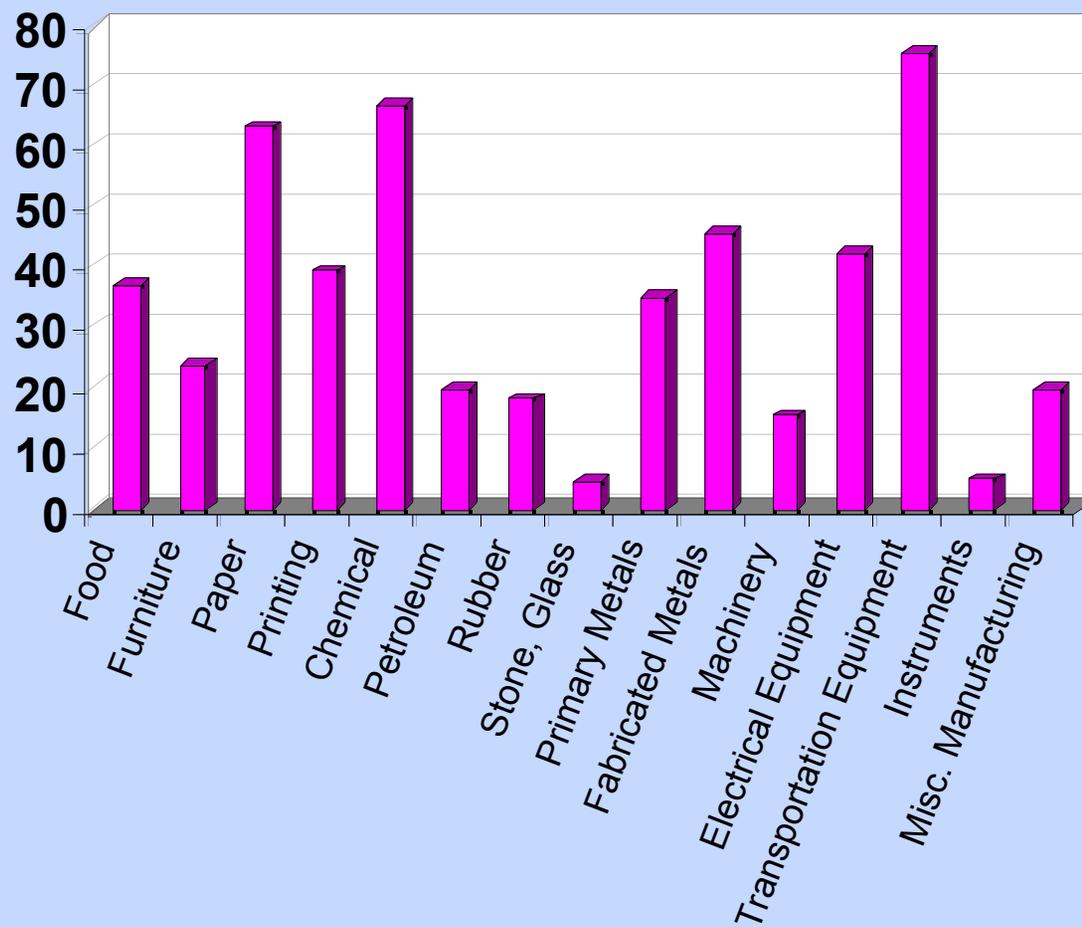
# Project Results – Characterization Study

## Average Electric Usage (MWh/yr)



# Characterization Study Results

## Average Total Emissions (tons/yr)



## Energy Plan Initiatives

---

- **Demand Charges**
  - **Expand on-peak demand charge to reflect true cost**
- **Standby Charges**
  - **Waive standby fee for on-peak clean energy (DE)**
- **Utility Incentives**
  - **Cost savings from avoided distribution upgrades**
- **Eliminate self-generation displacement rates**

# Energy Plan Incentives

---

- **Interconnect Fees**
  - **Establish reasonable fixed cost interconnect fee**
- **Emissions Credits**
  - **Expand emissions credits and trading programs**
- **Low interest loans**
  - **0% to 3% loans for on-peak clean energy projects**
- **Reduce Technology Risk**
  - **Identify turnkey energy suppliers for the City**

## Phase 2 Findings

---

- **City of Chicago unable to provide \$200K for Phase 2**
- **Additional funding from GTI (\$180K)**
- **Revised milestone schedule - Part 1 and 2 Reports**
  - **Issue studies when completed rather than at end**
  - **Conduct Expert Panel Meeting after first report**
  - **Complete both draft reports by Sep '02**
  - **Final reports by Jan '03**

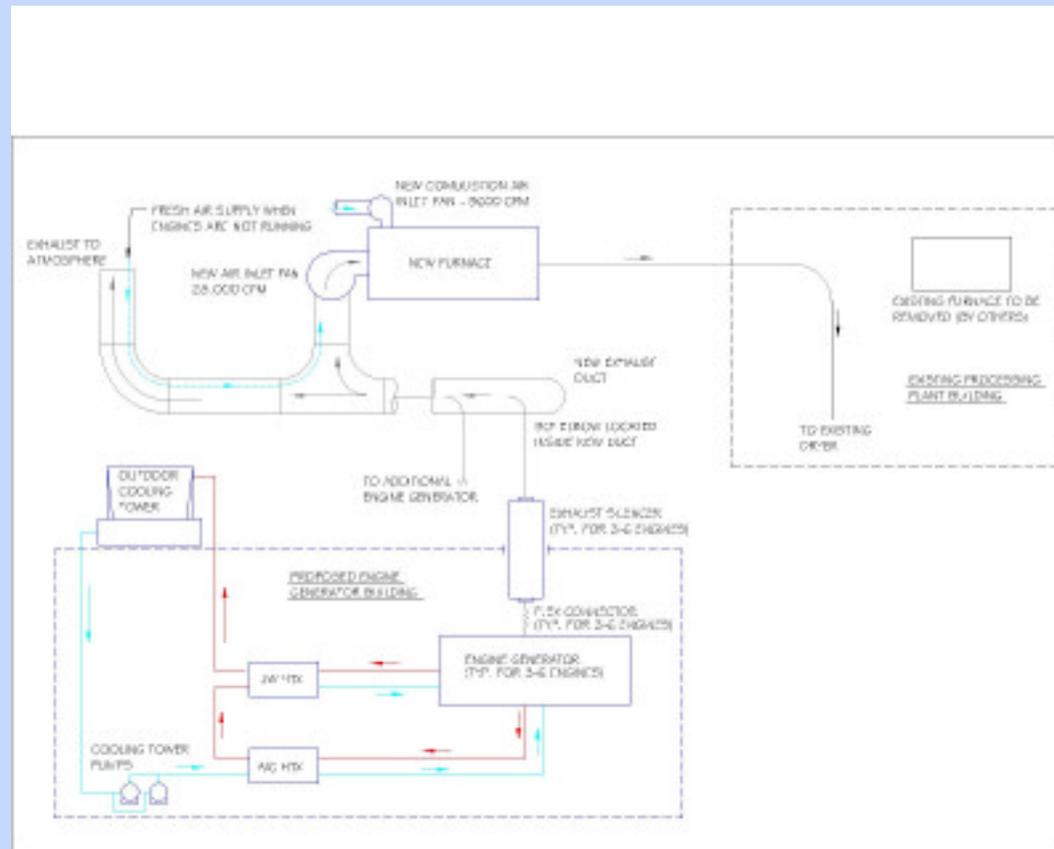
## Phase 2 Progress

---

- **Began Detailed Feasibility Studies**
- **Concrete Plant Study - Complete**
  - **5 Options - 7 MW to 8.5 MW system capacities**
  - **Engine applications - with and without HR**
  - **Annual Savings - \$1.1M to \$1.4M**
  - **Heat Recovery - Exhaust to supplement dryer**
  - **Present study to plant management July 15**
- **Confectionery Study is underway**



# Conceptual Design – Concrete Plant



## Next Project Actions

---

- **Feasibility Studies**
  - **Confectionery (to be completed in July)**
  - **Plating (to begin in July)**
- **Complete Draft Report Part 1**
- **Conduct Expert Panel Meeting**
  - **Prime Mover manufacturers**
  - **Emission Control experts**
  - **Burner and Boiler specialists**
  - **Project Developers**

# Summary

---

- **Accomplishments**
  - **Identified Significant Potential for**
    - **Reducing Consumer Energy Costs**
    - **Reducing Emissions**
    - **Relieving the Grid during On Peak Hours**
  - **Identified Target SIC Industries for Technology Applications**
  - **Initiating research to develop solutions**
- **Future Actions**
  - **Perform further research to close identified technology gaps**
  - **GTI expanding program to other cities**
    - **Recently awarded contract with NYSERDA**