Distributed Generation Improvements in Industrial Applications

Contract 4000005689

Project Review

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PRESENTATION OUTLINE

- **Background on Industrial Center DG Consortium**
- **Summary of Task 1: Market Assessment**
- **Description of Phase II (Task 2 – 4): Demonstrations and DG Applications Manual for Industrial Sites**
- **Current and Future Activities**

Distributed Generation Improvements in Industrial Applications

- **A joint program between *DOE DER* and the Industrial Center *DG Consortium***
- **DOE DER Program Mgr: Ms. Merrill Smith**
- **ORNL Project Manager: Ms. Patti Garland**

Industrial Center DG Consortium Membership Statistics

- **Members:** ***Fourteen utilities***
- **Champions:** ***Henry Mak, SoCal Gas***
  Bob Scott, NiSource
- **Technology Lead:** ***Bob Fegan, MichCon***
  Interconnect Standards
- **Center Coord.:** ***Richard Biljetina***

Overall Joint Program Objective

To accelerate the market acceptance of DG technologies by industrial and institutional customers.

WHAT IS THE SPECIFIC GOAL OF OUR JOINT PROGRAM WITH DOE-DER?

<u>Activity:</u> Assess and screen industrial applications for *replicable systems* that will result in selected *demonstrations of micro-generation devices combined with *innovative heat recovery* schemes.**

<u>Result:</u> *Application manual* for selecting efficient and cost-effective DG packages at industrial and institutional sites.

*** 3 to 5 sites**

Joint Program Tasks

Completed:

- **Task 1. Market Application Assessments**

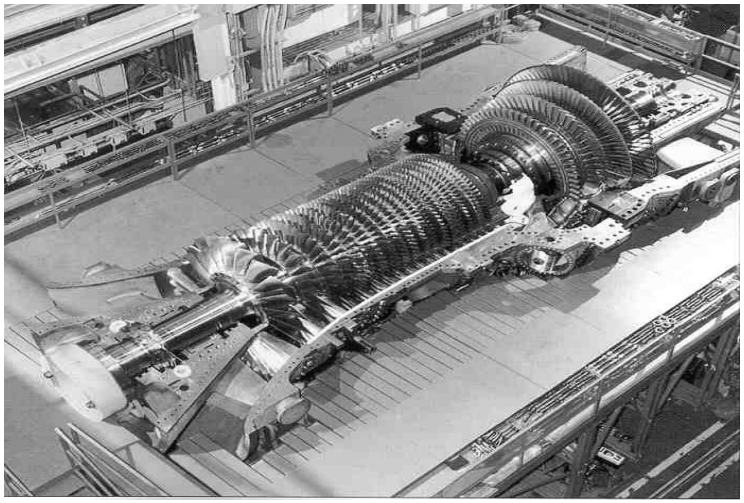
Currently funded for two sites:

- **Task 2. Integrated System Packaging**
- **Task 3. Innovative Demonstrations**
- **Task 4. Market Transformation**

Project Duration: 22 months

Task 1. Replicable Market Application Assessment

Summary



Task 1 Summary

- **Technical support by Resource Dynamics Corporation (Dr. N.R. Friedman) and CSGI (Dr. A. Thekdi)**
- **Project initiated in December, 2000**
- **All work was completed on time and within budget in June of 2001**
- **Provided a market assessment of replicable innovative industrial cogeneration applications**

Top 5 Industrial CHP Systems MW Potential

- **Central boiler systems using turbine exhaust gas as a combustion oxidant: 4,251 MWe**
- **Direct contact water heaters fed directly with engine/turbine exhaust: 2,435 MWe**
- **Indirect air heating using air-to-air heat exchangers fed with engine/turbine exhaust: 2,332 MWe**
- **Indirect liquid heating: 1,010 MWe**
- **Direct process heating: 760 MWe**

11 GW Total Economic Potential for Units up to 1MW

- ✓ **Units between 800 –1000 kW capture more than half of the new load**
- ✓ **Unrecuperated turbines and reciprocating engines are the leading power providers**
- ✓ **Applications that have low thermal system efficiencies and low retrofit costs are favored.**

Phase II (Tasks 2 – 4)

Task 2. Integrated Systems Packaging

- provides site selections, site assessments, host site agreements, data plans, and data acquisition support

Task 3. Innovative Demonstrations

- provides data analysis support, case histories, and an applications manual

Task 4. Market Transformation

- In a joint effort with the DG consortium, provides end-user awareness, market identification, information and decision tools

Phase II: Demonstrations and Market Transformation

- **Initiated in September, 2001**
- **Subcontracts issued to Energy Nexus Group and Exergy Partners**
- **DG Consortium assisted with the initial screening**
- **Two sites selected**

Consortium member effort identifies industrial projects for Phase II

- **DOE/Center provides for**
  - ✓ **CHP integration and design engineering**
  - ✓ **data acquisition for minimum of 6 months**
  - ✓ **case studies and market transformation tools**
- **DOE/Center obtains data rights**
- **Host site finances, owns and operates total system**

DG Consortium Site Identification: 26 Projects

- ✓**Power Generation:** **Fuel Cells, Ind. Turbines, Micro-Turbines, Recips, Stirling Engines, Power Turbines**
- ✓**Capacity Range:** **25 kW to several MW**
- ✓**Heat Rec. System:** **CCHP, Direct and Indirect Liquid Heating, Drying, Heating, & Steam,**
- ✓**Capital Investments:** **$55K to $2.5 million**

Two of Five Sites Selected for Phase II

<u>Meat Processing</u>:

DG: 2 – 1125 kW Waukesha Engines

Nicor Gas Site

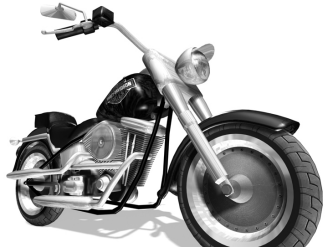
HR: boiler feed-water heating (base case)

<u>Plating Shop:</u>

DG: 4 - 30 kW Capstone Microturbines

SoCal Gas Site

HR: plating tank heating & sludge drying

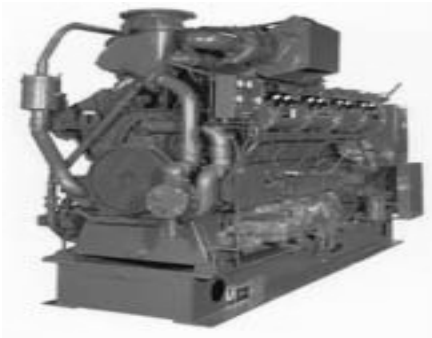


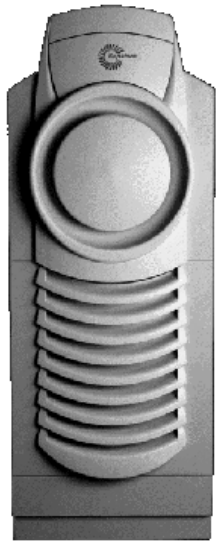
Site Support by Energy Nexus and Exergy

Market Transformation
(Coordinated DG Consortium Effort)

- **Reliability Database**
- **Screening Tools (d-gen Pro)**
- **Training & Guidebooks**
- **Sales Channel Management (in cooperation with Eq. Mfgs.)**

What's next?





1. **Complete site assessments and data plans**
2. **Define, design, and install additional data acquisition items**
3. **Initiate data collection activities**

Appendix

- Industrial Center Description
- DG Consortium Members
- Schedule

Industrial Center

- **Provides commercialization & market development support for natural gas technologies in the industrial sector**
  - **Established in 1991(spin-off from AGA)**
  - **501(c)6 trade association of 28 companies**
  - **Located in Washington, DC**
  - **Executive Director: David Weiss**
  - **Consortium approach to products and services**
  - **More details at www.industrialcenter.org**

DG CONSORTIUM MEMBER COMPANIES

Dominion Energy

Enbridge Consumers Gas

Exelon Corp. (PECO)

KeySpan Energy

Michigan Consolidated Gas

National Fuel Gas

Nicor Gas

NiSource Inc.

NW Natural

Southern Natural Gas

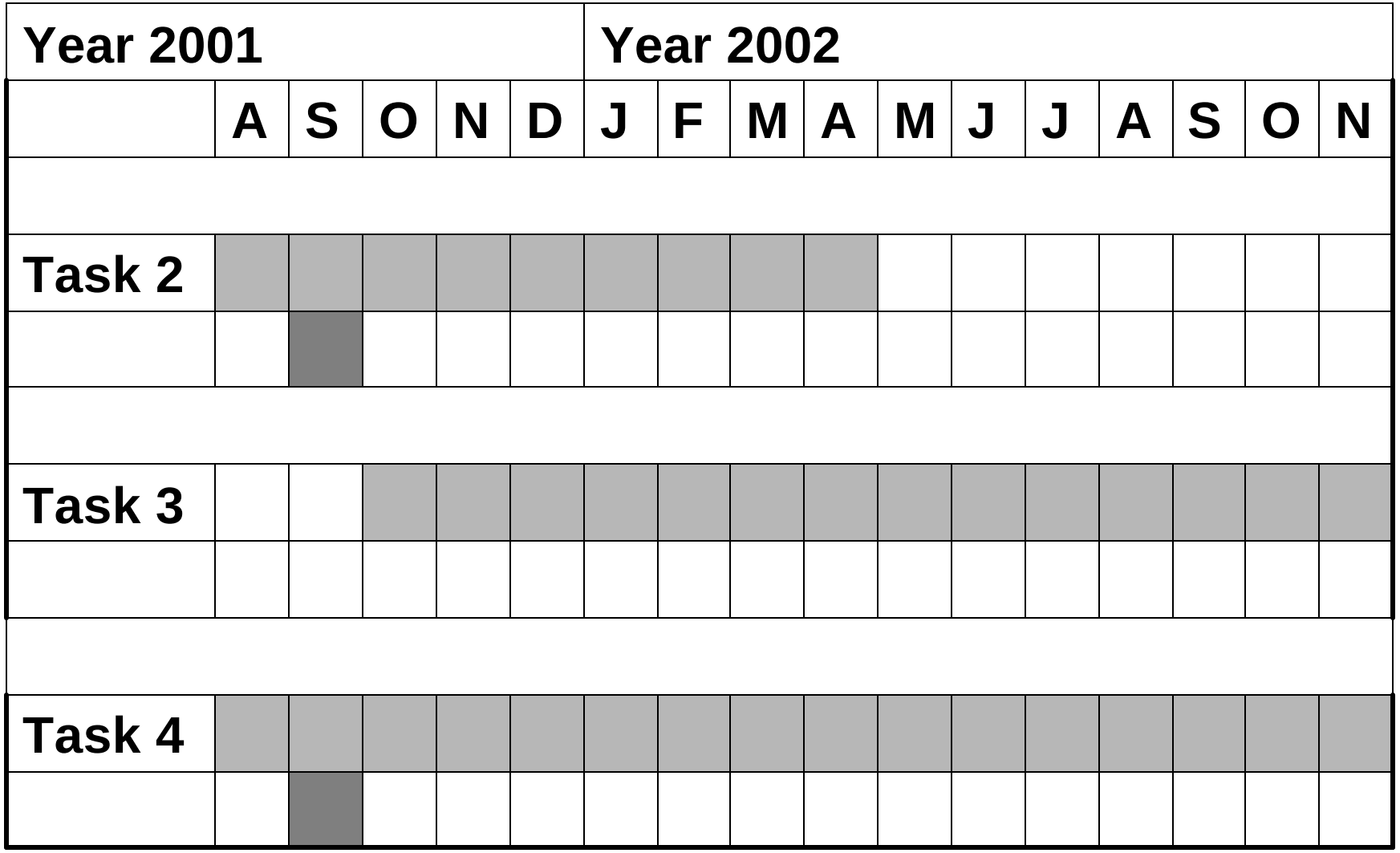
Southern California Gas Co.

TXU Electric and Gas

Wisconsin Gas Co.

Yankee Gas Services Co.

SCHEDULE


Year 2001
Year 2002
A S O N D J F M A M J J A S O N
Task 2
Task 3
Task 4
scheduled
actual