

# MIDWEST CHP APPLICATION CENTER “The MAC”



*Leslie E. Farrar (UIC/ERC)*



*Michigan Clean Technologies Cluster Meeting  
Grand Rapids, MI  
July 11, 2002*

# 75 Years of Thinking to Change

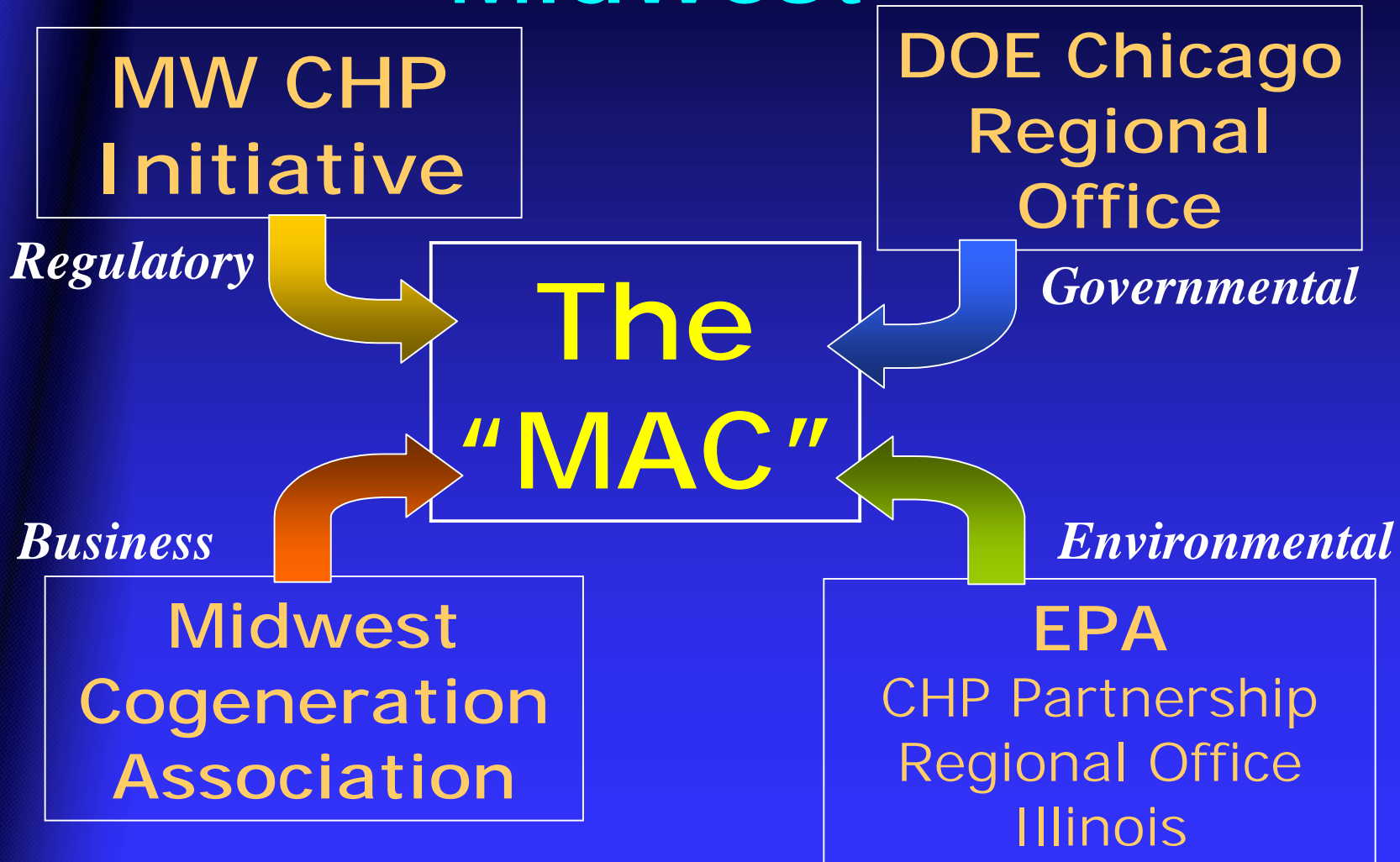
## ➤ Old

- ❖ Electric and Heating/Cooling Separate
- ❖ Based on Improving Component Efficiency

## ➤ New

- ❖ Integrated Energy Systems
- ❖ Focus on Increasing Overall Efficiency

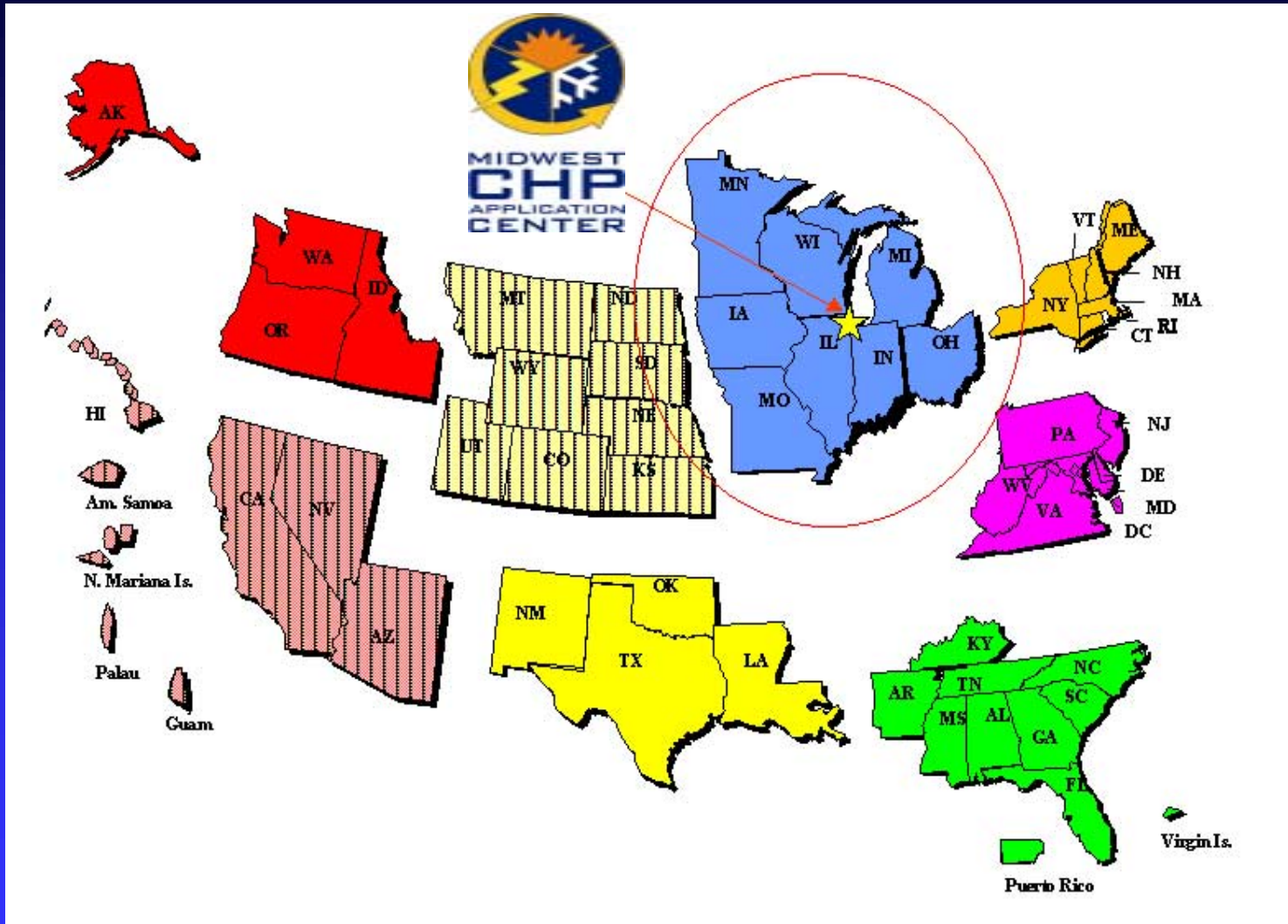
# Working Together in the Midwest



*Promote the Use of CHP in the Midwest*



# Midwest Regional Application Center





# Midwest Application Center

## ➤ Vision:

“By the year 2020, CHP for Buildings Will Be the Preferred Method of Energy Utilization In Commercial and Institutional Buildings.”

--- BCHP Initiative Roadmap

## ➤ Market Scenario:

The Economic, Reliability, and Emission Drivers are Emerging Whereby CHP for Buildings and Industry Can Be Successful in the Midwest.



# Midwest Application Center

## ➤ **Mission:**

Develop Technology Application Knowledge and the Educational Infrastructure Necessary to:

- ❖ Reduce Perceived Risks
- ❖ Foster CHP as a Viable Option
  - ◆ Technical and Financial
  - ◆ Energy and Environmental

## ➤ **Focus:**

- ❖ Technology Transfer
- ❖ Education
- ❖ Information
- ❖ Project Assistance



# Midwest Application Center

## ➤ Partnership:

- ❖ University of Illinois at Chicago  
Energy Resources Center --- UIC/ERC
- and*
- ❖ Gas Technology Institute --- GTI

## ➤ Sponsorship:

- ❖ DOE Office of Power Technologies  
Office of Distributed Energy Resources

## ➤ Technical/Program Guidance:

- ❖ Oak Ridge National Laboratory --- ORNL



# MAC Target Audience

- Architects/Engineers
- Building/Facility Owners/Operators
- State/Local Officials
  - ❖ Energy Offices
  - ❖ Utility Commissions
  - ❖ Regulators (General Assembly)



# Project Support

- Technology Education
- Case Studies
- Viable Site Assessment Visits
- Initial Screening Assessments
- Feasibility Assessments
- Assist in Project Justification
- Partnership Assistance
- SWAT Team Assistance



# Project Support

Apply “Expert” Assistance (SWAT Teams)  
to CHP Favorable Projects to ...

- ❖ “Remove Perceived Risk”
- ❖ “Identify Technical Solutions”



# Technical Assistance Program

- Project Support by Stages
  - ❖ Standard Outreach - *Information*
  - ❖ Investigation – *Viability Assessment*
  - ❖ Design Bid – *Detailed Assessment and SWAT*
  - ❖ Post Commission – *Case Study*
  
- Screening Criteria for Each Stage
  - ❖ Target Audience
  - ❖ Electric/Thermal Compatibility
  - ❖ Financial Viability
  - ❖ Financial Availability



# Current Areas of Project Involvement

## Commercial

Retail

Multifamily

Health Club

Museums

Hospitals

## Institutional

High Schools

Colleges

Universities

## Light Industry

Plating and Film Coatings

Metal Gear

Meat Packing

Paper

Brewery

Refrigeration Coil

Chocolate



# [www.CHPCenterMW.org](http://www.CHPCenterMW.org)

- Audience Focused
- Regional and 8 State Specific Information
- Integrated with National CHP Site
  - ❖ Interactive Database of Site Installations and Contacts
  - ❖ Technology Animations
  - ❖ Interactive Virtual Tours of Test Site





# Website – Home Page



## Cooling, Heating and Power for Buildings

Reduce energy cost • Improve power reliability • Increase energy efficiency • Improve environmental quality

- News & Events
- Technical Professionals
- Building Owners
- Policy Makers/Planners
- Financial Institutions
- General Public
- Region/State
- MAC Outreach
- MAC Partners
- Library
- Links

Search this site:

[Sitemap](#) • [Home](#)



OAK RIDGE NATIONAL LABORATORY



### A New Perspective on Energy

Integrated systems for cooling heating and power (CHP) for buildings, incorporate multiple technologies for providing energy services to a single building or to a campus of buildings. Electricity to such buildings is provided by on-site or near-site power generators using one or more of the many options: internal combustion (IC) engines, combustion turbines, mini- or micro-turbines, and fuel cells. In CHP systems, waste heat from power generation equipment is recovered for operating equipment for cooling, heating, or controlling humidity in buildings, by using absorption chillers, desiccant dehumidifiers, or heat recovery equipment for producing steam or hot water. These integrated systems are known by a variety of acronyms: CHP, CHPB (Cooling, Heating and Power for Buildings), CCHP (Combined Cooling Heating and Power), BCHP (Buildings Cooling, Heating and Power), and IES (Integrated Energy Systems).

CHP systems provide many benefits, including:

- Reduced energy costs
- Improved power reliability
- Increased energy efficiency
- Improved environmental quality



Click map to check status in your state

The Midwest CHP Application Center was established in March 2001 for the U.S. Department of Energy (DOE) at the University of Illinois at Chicago (UIC) Energy Resources Center (ERC). The Center is a partnership between UIC/ERC and the Gas Technology Institute (GTI). Its mission is to provide application assistance, technology information, and educational support in the eight Midwest states of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin.

The objective of this site is to provide you with information on CHP for buildings to facilitate your decisions relating to these systems. Information on the site has been organized to address anticipated needs of various user groups. Click on a link of your choice to learn about some of the basics, benefits, success stories and much more. The site incorporates an interactive database of CHP installations, along with animations, [multimedia videos](#) and a [virtual tour of a CHP System facility](#).

As you move through the site, your current location will be identified by "bread crumbs" along the top of all pages. Available sub-topics will appear in the list of links, on the left of the page, below the link for the major category currently open. The footer for each page also contains links to all the major sections of this Website and the major organizations providing support for it.

### Vision, Mission and Focus of the Midwest CHP Application Center

#### Vision

Vision of the U.S. Department of Energy and its partners in CHP for buildings is that by the year 2020, CHP for buildings will be the preferred method of energy utilization in

### News & Events

The Midwest CHP Application Center presented an update at the First Annual DER Conference and Seminar, organized by the U.S. Department of Energy's Distributed Energy Resource Group (DOE-DER).



The presentation by Ted Stratton was well received, with many positive comments regarding how the activities of the MAC and the MW CHP Initiative are "model CHP activities, leading the country in regional CHP efforts."

[More](#)



# Website – Site Search

**Midwest CHP Application Center**  
Cooling, Heating and Power for Buildings  
Reduce energy cost • Improve power reliability • Increase energy efficiency • Improve environmental quality

**Library - Installation Database**

**Site Search**

Please Note: If no search criteria is specified all sites will be returned.

State:

City:

Building Type:

Generation Type:

Thermal Recovery System Type:

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[News & Events](#) • [Technical Professionals](#) • [Building Owners](#) • [Policy Makers/Planners](#) • [Financial Institutions](#) • [General Public](#) • [Region/State](#) • [MAC Outreach](#) • [MAC Partners](#) • [Library](#) • [Links](#)

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**ERC**  
**gti**

OAK RIDGE NATIONAL LABORATORY

# Website – Contact Search





## Cooling, Heating and Power for Buildings


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### Library - Contact Database

**MW CHP Application Center Contact On-Line Database**  
No formal evaluation of the companies or organizations identified in this database has been performed by the Midwest CHP Application Center (MAC), therefore there is no endorsement, implied or otherwise, made by the MAC by the identification of a company or organization in this database list. As is normal prior to entering into any contract or conducting significant business with any company or organization, it is recommended that a prudent investigation of that company or organization be made.

#### Contact Search

Please Note: If no search criteria is specified all contacts will be returned.

State:

Last Name:

Company Name:

Contact Type:

Firm Type:

[Top](#)

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# Baseline Characterizations

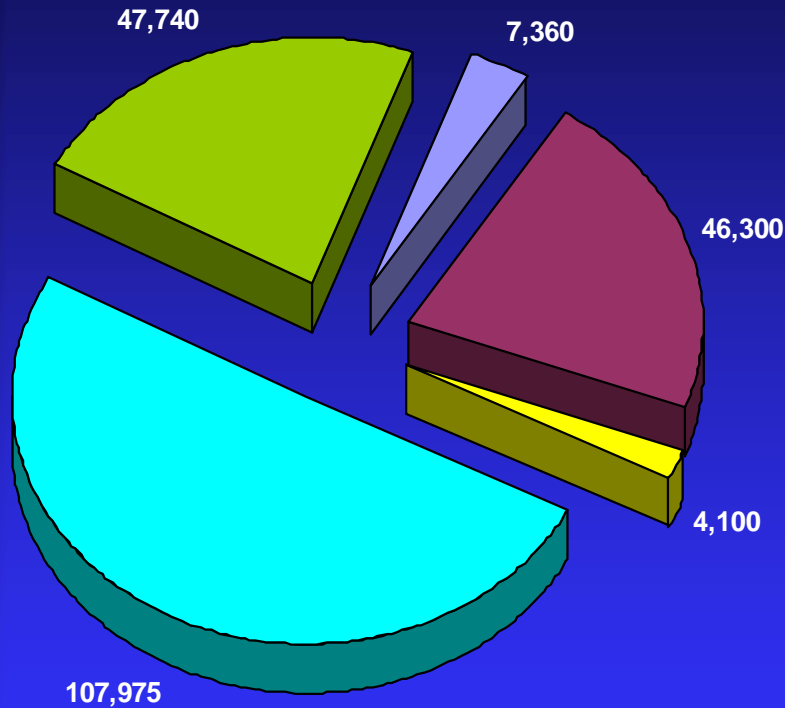
- Identify and Assess
  - ❖ Current Installations
  - ❖ Market Potential
  - ❖ Current Energy Policy and Pricing
    - ◆ Electricity
    - ◆ Natural Gas
  - ❖ CHP Partners
  - ❖ Status of Deregulation
  - ❖ Barriers/Opportunities
- Help Focus Application Center Activities



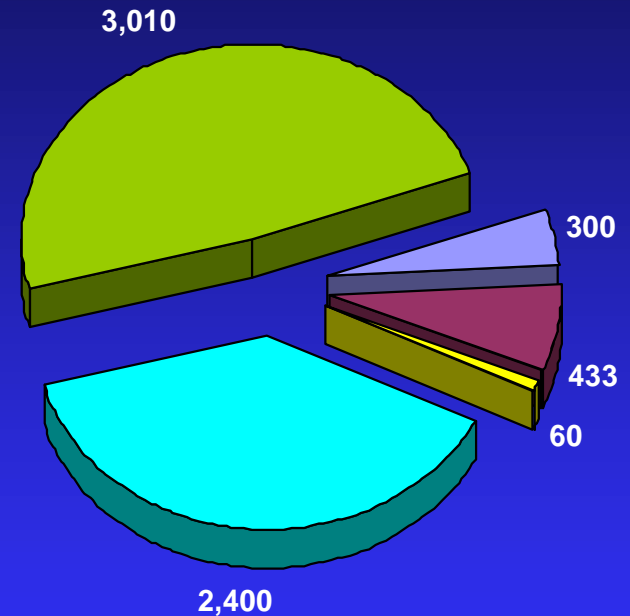


# Baseline Characterization

Installed Generation  
(213,475 kWe)



Installed Generation  
w/ Heat Recovery  
(6,203 kWe)



- Hospitals
- Municipal Water/Resource Recovery
- Hotels/Offices
- Schools/Universities
- Landfill Gas/Others

Estimated Theoretical Potential  
2,410 to 7,480 MWE





# "Spark Spread"

Electricity*	per MBTU
Commercial	\$23.19
Industrial	\$14.73
Rank ( <i>Most Expensive in Nation</i> )	14 <sup>th</sup>

*minus*

\* EIA Energy Pricing Data 1999 (Latest Published Electric Prices).  
Includes Demand Charges.

Natural Gas**	Per MBTU
Commercial - Delivered	\$5.88
Industrial - Delivered	\$5.01
Wholesale - City Gate	\$4.45

> \$12 ?

\*\*EIA State Average Prices February 2002



# Baseline Characterizations Conclusions

- Most Effective Deployment
  - ❖ State and Local Levels
- Reaffirmed Barriers
  - ❖ Lack of Interconnection Standards and Fees
  - ❖ Standby Charges and Rates
  - ❖ Operating Costs
  - ❖ Capital Costs and Payback
- Identified Some Favorable Characteristics
  - ❖ Open Access
  - ❖ Favorable Alliances
  - ❖ Reasonable Market Potential

# Baseline Characterizations Recommendations

- Work with Industry Partners to Increase Interest In Market Penetration
- Work with Governmental Entities and Associations to Influence the Removal of Regulatory Barriers
- Build Strong Alliances with CHP Partners



# Technical Market Potential

- Commercial/Institutional Sector - Michigan
  - ❖ 2,560 Installations
  - ❖ 2,410 – 7,480 MWe
- Industrial Market Potential - National
  - ❖ 88,341 MWe Remaining Potential
  - ❖ Biggest Opportunities
    - ◆ Paper Products      26,168 MWe
    - ◆ Chemicals            9,440 MWe
    - ◆ Food                    8,086 MWe

*Reference: January 2000 Onsite (Nexus) Study*



# Economically Favorable

- Office Buildings  $\approx 10$  GWe
  - ❖ 50% Heating Only
  - ❖ 50% Heating and Cooling
- Colleges and Hospitals  $\approx 7$  GWe Each
  - ❖ 70% Heating Only
  - ❖ 30% Heating and Cooling
- “Spark Spread”  $> 6\text{¢}$  Desirable
  - ❖ “Spark Spread”  $\equiv$ 
    - $\Delta$  Grid Provider Electric – Fuel for Electric Generation
  - ❖ Michigan 4¢ to 6¢

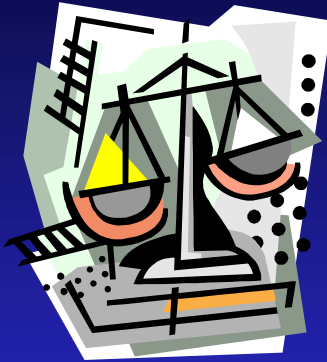
*Reference: Resource Dynamics Corporation May 2002*





# Barriers $\Leftrightarrow$ Solutions?

## Deregulation



- ❖ Creates Financial Uncertainties in Future Gas and Electric Prices
- ❖ Educate on Savings and Benefits
- ❖ Persistence

# Barriers $\Leftrightarrow$ Solutions?

Poor Economy



- ❖ Creates Uncertainties Companies Cash Flow
- ❖ Drives Focus to Core Business
- ❖ Educate on Savings and Benefits
- ❖ Persistence

# Barriers $\Leftrightarrow$ Solutions?

## Payback Too Long

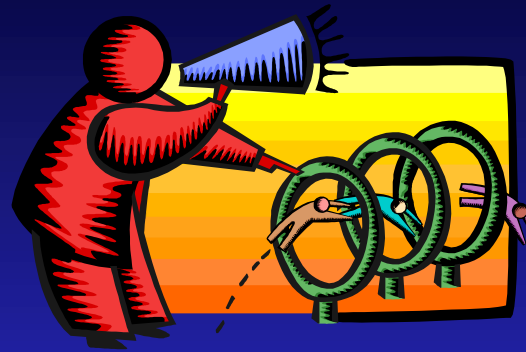


- ❖ 2 – 3 Year  
Payback Desired

- ❖ Governmental  
Support
- ❖ Special Applications
- ❖ Packaged Units

# Barriers $\Leftrightarrow$ Solutions?

## Who Decides?



- ❖ Getting to “Right”  
Persons

- ❖ Partnerships and  
Alliances
- ❖ Project Support
- ❖ Persistence

# Where Do we Go From Here?

## Building Strong Alliances and Leverage Activities with CHP Partners ...

- ❖ Influence the Removal of Regulatory Barriers
- ❖ Educate Decision Makers on the Benefits and Feasibility of CHP
- ❖ Provide Technical and Financial Assessments
- ❖ Provide Technical Project Assistance
- ❖ Establish New Installations





# For Further Information

## Midwest CHP Application Center

[www.CHPCenterMW.org](http://www.CHPCenterMW.org)

Leslie Farrar (UIC/ERC): (312) 413-5448

## Midwest CHP Initiative

[www.nemw.org/uschpa/regional.htm](http://www.nemw.org/uschpa/regional.htm)

Ted Bronson (GTI): (847) 768-0637

## DOE – Chicago Regional Office

[www.eren.doe.gov/cro/](http://www.eren.doe.gov/cro/)

Gary Nowakowski (DOE Chicago Office): (312)  
886-8561

## Midwest Cogeneration Association

[www.Cogeneration.org](http://www.Cogeneration.org)

Voice Mail (630) 323-7909

