

2004 Midwest CHP Roadmap Report

***U.S. Department of Energy
Midwest Regional Office***

***2004 Midwest CHP Roadmap Workshop
Conducted: March 16 and 17, 2004
Chicago, IL***

Sponsored by:

US Department of Energy Midwest Regional Office

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Executive Summary

Nearly 60 CHP stakeholders from the eight-state Midwest Region participated in the development of the second Midwest CHP Roadmap. The first CHP roadmap document was developed in 1999 and has served as a guide for CHP policy and market development activities in many of the Midwest States. The past several years have seen many changes occur in the energy market place. There have also been significant changes relating to the technical and financial viability of CHP. U.S DOE's Midwest Regional Office decided it was time to re-look at the issues and opportunities for CHP in the Midwest, and embarked on the 2004 Midwest CHP Roadmap Workshop.

The purpose of the 2004 Midwest CHP Roadmap Workshop was:

- Develop a regional action plan that supports the National Roadmap and the DOE CHP Challenge of doubling the CHP installed capacity by 2010 (base year for the challenge was 1998).
- Update and/or replace the initial Midwest Roadmap (developed in 1999) due to the changing market place
- Provide guidance from the regional CHP stakeholders to the Midwest CHP Application Center and Midwest CHP Initiative on key priorities to accelerate development of the CHP market in the Midwest.

Together with the US DOE Midwest Regional Office, three primary organizations have been working to lead the deployment of CHP in the Midwest – the Midwest CHP Application Center (MAC), the Midwest CHP Initiative (coalition), and the Midwest Cogeneration Association (MCA). Together, these entities have performed numerous actions to develop the market in the Midwest, including Regulatory Forums, Industry Specific Education and Outreach (hospitals, schools, ethanol), and project specific technical assistance (that has influenced over 100 MWs of CHP in the ground. In 2003, there is now 9 GW of CHP power installed in a total of 373 sites located in the eight-state Midwest Region, an increase of 50% over the 6 GW of installed CHP capacity recorded in the base year of the DOE CHP Challenge (1998). The goal of the Midwest Region is to reach 12 GW of installed CHP capacity by the year 2010.

Although the Midwest Region appears to be on track to accomplish its goal under the DOE CHP Challenge, it was pointed out at the workshop that the ability to deploy CHP in the Midwest has become much more difficult due in part to a slow economy, uncertainty in energy prices, lack of utility support, lack of customer recognition regarding CHP, and the inability or lack of the industry to quantify the total benefits of CHP.

In preparation for the workshop, a survey was sent to all invitees to develop a characterization of what the stakeholders perceive to be the key issues surrounding the implementation of CHP in the Midwest. The results of the pre-workshop survey revealed the largest barrier to CHP as perceived by the Midwest Stakeholders, was the present difficulty in obtaining an adequate financial return on many CHP applications. The reasons cited included the high price and price volatility of natural gas, and electric utility fees and tariffs regarding interconnection and operation of CHP systems. On the market opportunity side, the survey showed the best applications for CHP included healthcare facilities, educational facilities (both K thru 12 and Colleges/Universities), food processing facilities, pulp and paper facilities, and chemical facilities including the increasing ethanol production market sector. The results of the survey were grouped into five categories and prioritized within those categories, utilizing a weighted scoring system. The five categories were Financial, Utility, Regulatory, Equipment, and

Education. Appendix C provides a complete listing of issues / opportunities as assigned and prioritized within these five categories.

The workshop attendees were divided into three groups, based on each attendee's expertise, with each group participating in concurrent breakout sessions. The three groups were the Market Development Group, the Regulatory Group, and the Project Implementation Group. Each group was assigned three of the five categories developed from the survey and provided the prioritized issues, barriers, and opportunities as a starting point for their breakout session activities.

For each of the three categories assigned to the breakout group, they:

- a) Identified key action items necessary to address the key issues / opportunities in the category,
- b) Voted to prioritize the action items in the category,
- c) Developed an Action plan for the top Prioritized actions: What needs to be done, who needs to do it, what resources are needed, and realistic time frames.

Section 3, and Appendix E of this report provides the detailed results of the breakout sessions. The detailed information gathered in the breakout sessions was reviewed and summarized into key impact areas as follows: (also found in Section 4 of this report):

Financial Results

Quantifying Ancillary Benefits - the non-energy cost benefits of CHP; such as outage avoidance, increased reliability, reduced emissions, increased energy efficiency, preservation of natural resources, energy security, transmission and distribution support, and increased jobs.

Financial Incentives - Third party ownership, providing tax incentives, and financial initiatives (State, local and private - such as bonds and low interest loans) for CHP.

Opportunity Fuels - increased usage of "Opportunity Fuels" as a substitute for natural gas. "Opportunity Fuels" are considered to be those fuels that can be obtained from waste products such as landfill gas, methane from waste water treatment plants, agricultural waste, and wood industry waste. Also included in "Opportunity Fuels" would be the development of power from the installation of steam turbines in lieu of pressure reduction valves.

Regulatory and Utility Results

Interconnect Standards, Rates, Tariffs, and Recycled Energy Portfolio Standards – work with utility commissions to establish interconnect standards, rates, and tariffs that recognize the positive contributions of CHP. Also work with states to set Recycled Energy portfolio standards or goals (similar to RPS) to help drive change and planning activities at the state level.

Environmental Permitting on an Output Basis – to provide environmental credit due to the efficiency savings of CHP systems.

Engaging Utilities – work to create a "win-win" situation with CHP and electric utilities, by providing incentives for electric utilities to utilize and promote CHP, including using CHP as an alternative to T&D build-out.

Equipment Results

Packaged Systems – develop and promote packaged systems that lower the overall costs of a CHP system (installation, operation, design, etc.)

Codes and Standards - The development of model codes and standards, through code officials and industry organizations, towards equipment that could be “pre-certified” so it could be “plug-and-play,” simplifying installation and enhancing utility acceptance.

Education Results

Utilize Recycled Energy Communications Campaign – To educate regulators, key decision makers, and media relations on the benefits of CHP, including job and economic impact.

Target Markets - The results indicated that education should be focused on areas where CHP can address specific key energy issues (such as urban areas and specific vertical markets such as, hospitals, schools, and energy intensive industrials). Also education should be directed to non-engineering entities such as; architects, financial institutions, and end-users.

To close, Section 5 of this report provides the suggested “**Next Steps**”. The first step will be to disseminate the workshop results via this report to those key Midwest CHP stakeholders identified on the invite list to the Roadmap Workshop, regardless of whether or not they were able to attend in order to allow them review and provide feedback on the results. The Roadmap is expected to be the key guideline for activities of the MW CHP Application Center, the MW CHP Initiative, and in many cases, State Energy Office CHP Programs. It will also be provided as input to State Utility Commission / Board activities.

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1. Introduction

1.1 Background / Purpose of Workshop

Expanded use of Combined Heat and Power (CHP) can provide numerous societal benefits including decreased emissions, lower energy costs, reduced fuel consumption, and improved energy security. In spite of these many benefits, deployment of CHP systems continues to face many institutional, economic and regulatory barriers. To overcome the barriers and expand the use of CHP systems, the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) issued the *CHP Challenge* goal in 1998 of doubling CHP in the U.S by the year 2010. In support of this goal, U.S DOE embarked on numerous regional and national CHP Roadmap Workshops to develop action plans to achieve this goal, including, the 1999 Lake Michigan Regional CHP Roadmap Workshop.

The two day 1999 Lake Michigan workshop resulted in a well defined list of issues and opportunities regarding the implementation of CHP in the Midwest. This workshop report has served as one of the principle guides in directing the activities of the Midwest CHP Application Center (MAC), and the Midwest CHP Initiative (Initiative), both created as a result of the 2000 National CHP Roadmap Workshop.

Much has changed at the Federal, Regional, and State levels over the last five years that warranted the planning and implementation of another Midwest Regional CHP Workshop. Therefore, in March of 2004, under the sponsorship of the US DOE Midwest Regional Office, approximately sixty (60) CHP stakeholders from the eight-state Midwest Region (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin) participated in the development of the 2004 Midwest CHP Roadmap.

The purpose of the 2004 Midwest CHP Roadmap Workshop was:

- Develop a regional action plan that supports the National Roadmap and the DOE CHP Challenge of doubling the CHP installed capacity by 2010 (base year for the challenge was 1998).
- Update and/or replace the initial Midwest Roadmap (developed in 1999) due to the changing market place
- Provide guidance from the regional CHP stakeholders to the MAC and Initiative on key priorities to accelerate development of the CHP market in the Midwest.

1.2 CHP Resources and Action in the Midwest

To lead the implementation of the 1999 Roadmap actions in the Midwest, two organizations were established that coordinated efforts with a longstanding organization to work to develop the CHP marketplace in the Midwest as follows:

Midwest CHP Application Center (MAC) : A DOE sponsored outreach program to provide the Midwest with unbiased information, education, and project specific technical assistance regarding the application of CHP Technology to the marketplace.

Midwest CHP Initiative (Initiative): An ad-hoc coalition of over 30 CHP industry stakeholders in the Midwest, working to advance the CHP marketplace. Participants include industry, environmental, government and educational firms (including representatives from all 8 State Energy Offices).

Midwest Cogeneration Association (MCA): A network of CHP practitioners that has been in existence over 15 years. The MCA holds regular meetings with the MAC to provide specific technical input to key regional issues.

Together, these three organizations, with the assistance and direction of U.S. DOE's Midwest Regional Office, have been in action to address Regulatory, Education, Information, and Technical Assistance issues in the Region. A few examples of these activities include:

- Regulatory Forums (Interconnection, Tariffs) and Interface with Commerce Commissions / Utility Boards.
- Industry Specific Outreach Workshops (Hospitals, Schools, Ethanol)
- CHP Educational Courses
- Website Development (www.chpcentermw.org)
- Influencing over 100 MWs of CHP projects.

1.3 Current Status of CHP (MWs) in the Midwest

In 2003, there is 9 GW of CHP power installed in a total of 373 sites located in the eight-state Midwest Region, an increase of 50% over the 6 GW of installed CHP capacity recorded in the base year of the DOE CHP Challenge (1998). The goal of the Midwest Region is to reach 12 GW of installed CHP capacity by the year 2010.

The present mix of fuels utilized in the 373 CHP installations includes:

- Natural Gas 53% of the installations
- Coal 23% of the installations
- Other 24% of the installations

Figure 1 provides a break down of the installed capacity (6 GW) by individual state. Figure 2 provides the number of installations (373) by individual state..

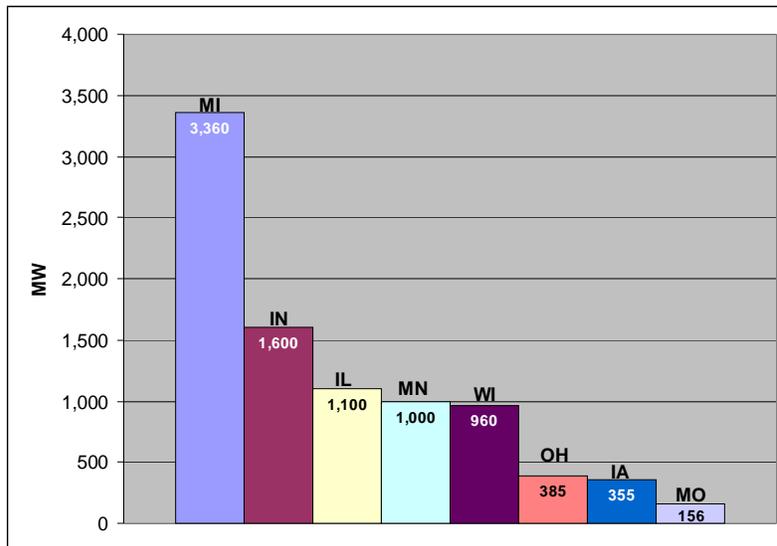


Figure 1 Installed Capacity in the Midwest by State

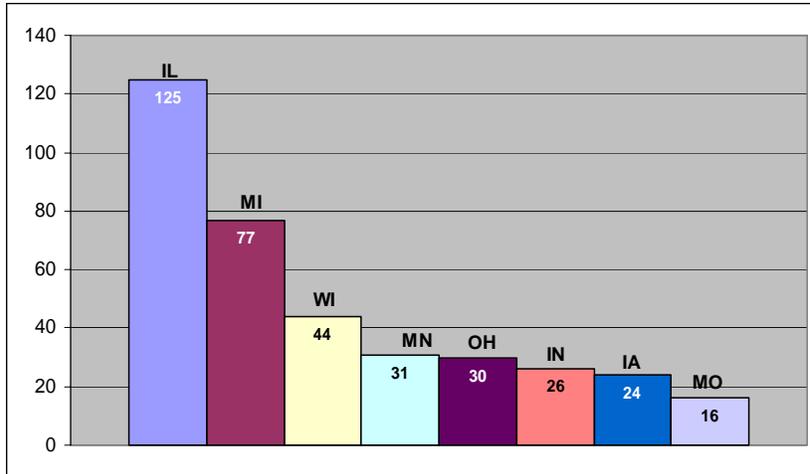


Figure 2 Number of CHP Installations in the Midwest by State

1.4 New Challenges

Although the Midwest Region appears to be on track to accomplish the goal established under the US DOE CHP Challenge, the ability to deploy CHP in the Midwest has become much more difficult due to:

- A Downturn in the Economy
- Uncertainty in Energy Prices (especially natural gas)
- Lack of Utility Support
- Lack of Customer Recognition / Enthusiasm
- Inability or Lack of Quantifying “Other” Operational Benefits of CHP

Due to these new challenges, U.S. DOE’s Midwest Regional Office decided to conduct the 2004 MW CHP Roadmap in March of 2004.

2. Pre-Workshop Survey

2.1 Purpose of Survey

In preparation for the workshop, a survey was sent to all invitees to develop a characterization of what the stakeholders perceived to be the key issues surrounding the implementation of CHP in the Midwest. Data from over 30 completed surveys was compiled.

The purpose of the survey was to:

- Determine stakeholders perception of CHP issues specifically related to the Midwest,
- Save time at the Workshop by pre-evaluating the results of the survey and pre-identifying key issues and,
- Develop an information base on which to focus each breakout session's activities.

A copy of the survey is provided in Appendix A.

2.2 Survey Results – Barriers / Issues

The survey results were compiled by using a weighting system. For the barrier / issue section of the survey, each barrier that was given a response of “high” was given a three, a “medium” a two, and a “low” a one. The weighted results were tallied to give an overall weighted score to each of the barriers / issues identified in the survey.

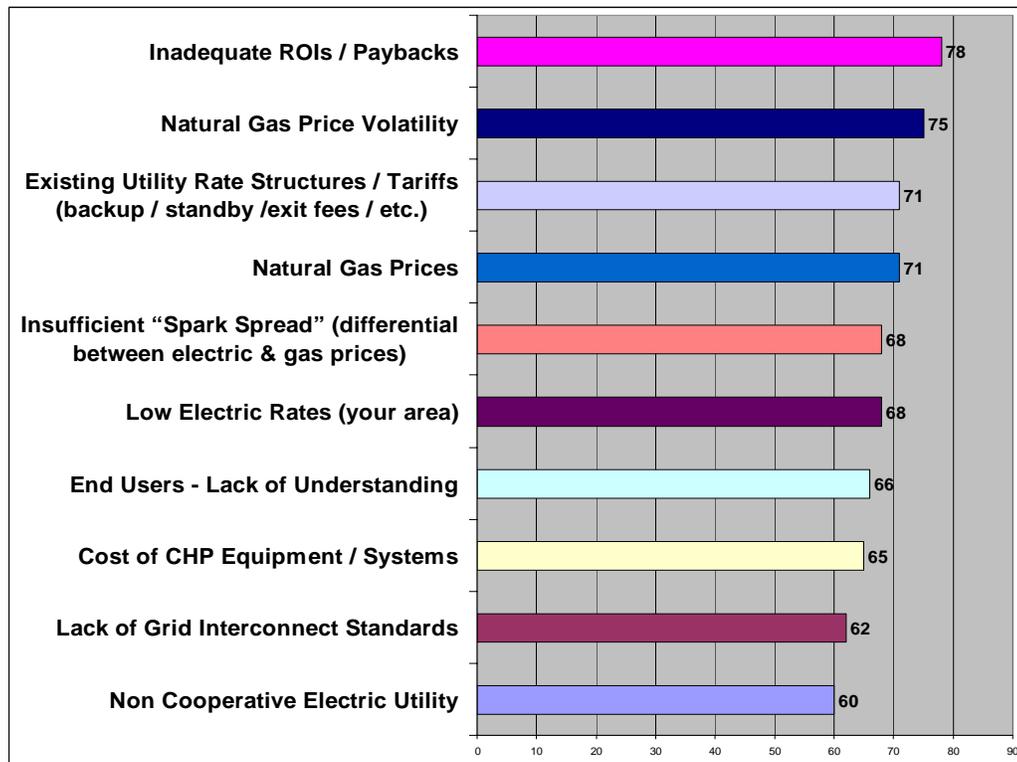


Table 1 Top 10 Barriers

The complete weighted results of the survey are provided in Appendix B.

2.3 Survey Results – Market Analysis

The survey results for the market section of the survey were also compiled utilizing a weighting system. A response of “excellent” was given a three, “good” was given a two, and “poor” was given a one. The weighted results were tallied to give an overall weighted score to each of the three market sectors:

- Commercial
- Institutional / Municipal
- Industrial

Figure 3, Figure 4, and Figure 5 respectively show the weighted results for of each these categories.

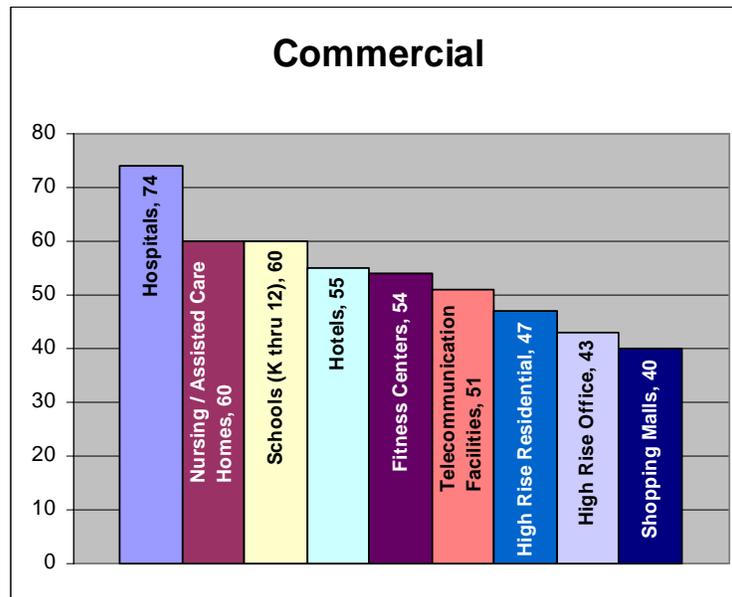


Figure 3 Results of Commercial Market Sector Analysis

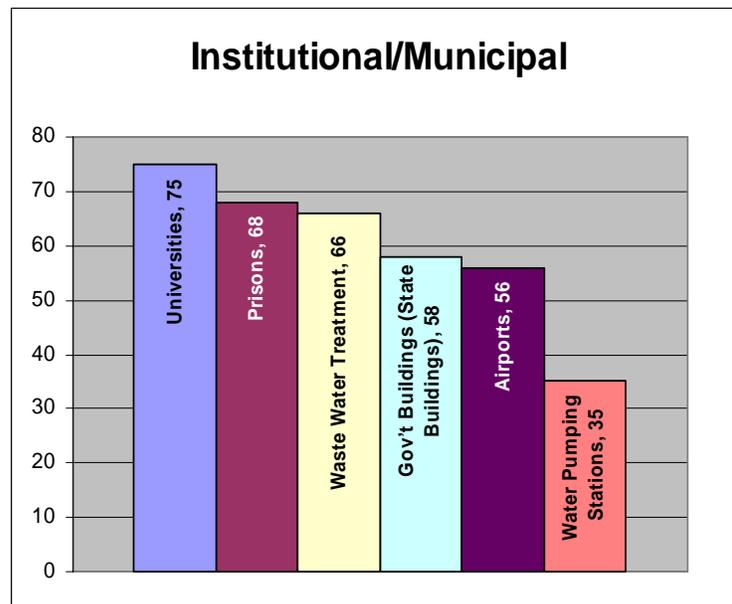


Figure 4 Results of Institutional/Municipal Market Sector Analysis

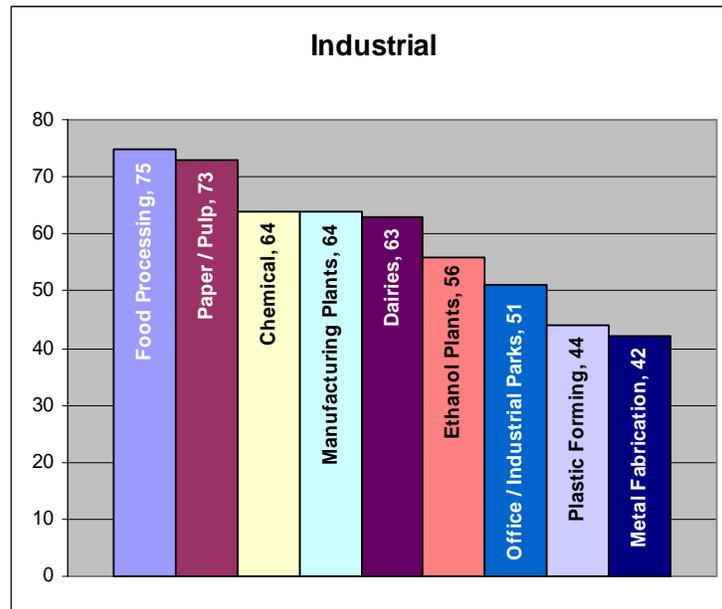


Figure 5 Results of Industrial Market Sector Analysis

2.4 Survey Results – Midwest CHP Fuel Types

The survey requested the stakeholders to provide their opinion on which fuel they believe is best utilized in CHP systems in their location (ability to realistically deploy / site CHP systems). Natural gas led with 36% of the vote. However, Biomass fuels were a relatively close second, receiving 23% of the vote followed by Process Wastes at 16% and Process Steam Reduction (use of backpressure steam turbines) at 14%. Coal was sited as the preferred fuel by only 6% of the respondents.

It should be noted that these percentages are significantly different than the fuel types found in the existing 373 CHP installations in the Midwest today. Today 50% are fueled by Natural Gas, 23% by Coal, and 24% by “Other Fuels.” This new perception by the stakeholders in the Midwest may be a result of the recent price volatility of natural gas.

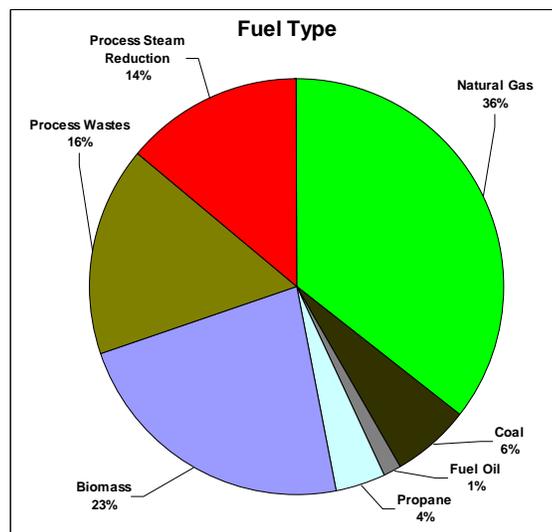


Figure 6 Survey Results of CHP by Fuel Type

2.5 Survey Results – Input to Roadmap Workshop Breakout Sessions

The results of the survey were grouped into five categories and prioritized within those categories by their weighted score. The five categories were:

- 1) Financial
- 2) Utility
- 3) Regulatory
- 4) Equipment
- 5) Education

It should be noted that several of the issues / opportunities were listed in more than one category. A complete listing of issues / opportunities as assigned and prioritized within the five categories is presented in Appendix C.

The above categories were used to focus the efforts of each Workshop Breakout Session. The prioritized issues and opportunities were presented and utilized as a starting point in each Session.

3. Conduct and Summary of Results of the Workshop

The Roadmap Attendees were provided a thorough background to guide their thinking through presentations on the Status of CHP in the Midwest, and the Results of the Pre-Workshop Survey, and the National CHP Branding Campaign. The Attendees, based on their role or expertise, were then assigned to one of the three breakout groups:

- Market Development (MD)
- Regulatory (R)
- Project Implementation (PI)

Each breakout group was assigned and addressed three of the five issue / opportunity categories (Financial, Utility, Equipment, Education, and Regulatory). Table 2 provides the three categories assigned to each of the breakout groups.

Break Out Group Category of Issues / opportunities	Market Development (MD)	Regulatory (R)	Project Implementation (PI)
Financial	✓	✓	✓
Regulatory		✓	
Utility	✓		✓
Equipment			✓
Education	✓	✓	

Table 2 Categories Addressed by Breakout Group

As a starting point, the breakout groups were provided with the prioritized list of issues / opportunities within each category (derived from the pre-workshop survey). For each of the three categories assigned to each breakout group, they:

- a) Identified action items necessary to address the key issues / opportunities in the category,
- b) Voted to prioritize the action items in the category,
- c) Developed an Action plan for the top Prioritized actions: What needs to be done, who needs to do it, what resources are needed, and realistic time frames.

3.1 Defining and Prioritizing Action Items

This first task for the Breakout Session concentrated on listing action items that should be undertaken to best address the top priority issues / opportunities in each of the assigned categories. This was accomplished by having each participant in the breakout sessions write their action items on individual index cards (one action per card). The participants briefly explained each of their proposed action items that were then posted at the front of the room. The session attendees agreed to consolidation of similar action items, removed any duplications, and then each attendee was given five votes (stickers) and asked to place their five votes on the action items that were most important to them. Note they were given the option to place multiple votes on a single action item if they felt the action item was so important that they wanted to place more than one of their five votes on that action item. The results of this effort from each of the breakout groups are provided in Appendix E.. A

listing of the top 3 prioritized action items suggested by each of the breakout groups is provided as follows:

3.1.1 Market Development Breakout Session – Top 3 Items for Assigned Categories

Category: Financial

<u>Action Item</u>	<u>Score</u>
Expand definition of ROI to include: security (outage avoidance), reliability,, and “good corporate citizenship” (ROI & Life Cycle Costing) Target – End Users	17
Identify market opportunities for CHP that avoid natural gas as the fuel source, such as waste heat recovery CHP, biogas, biofuels (alternate fuels). Target – Equipment Manufacturers, ESCOs, Developers.	12
Development and promotion of packaged systems, including installation, operation, service & maintenance that lower the installed kWh cost (like buying a car instead of buying an engine, a chassis, tires, etc).	9

Category: Utility

<u>Action Item</u>	<u>Score</u>
Permit CHP facilities on an output basis. (Emissions)	8
Utilities should own and operate CHP facilities as a portion of their portfolio. Benefits would be: 1. Avoids a portion of the need for large peaker units, 2. Keeps management of generation in their hands, 3. Would eliminate standby interconnection issues for those facilities. (Renewable Energy Portfolio)	8
Establish good interconnect standards and fees. (Interconnect Issues)	6
Exempt CHP from standby charges (like in NY). (Standby Issues)	7

Category: Education

<u>Action Item</u>	<u>Score</u>
Educate Policy Makers and groups that influence policy makers (unions and trade groups) that Recycled Energy means jobs. Quantify supported by more efficient use of fuels, CHP systems require more work from steamfitters, plumbers, etc. (Public Benefits)	13
Public/Media Relations target major urban areas, businesses, and vertical specific (industrial, healthcare, schools). Focus on CHP success in addressing key energy issues: improved profitability, power reliability, social environmental stewardship, and economic development. Misc.)	12
Focus on architecture firms especially those working in markets where CHP is an easy fit: Higher Education, Healthcare, Industrial (Education)	12

NOTE: Complete lists of Action Items are provided in Appendix E.

3.1.2 Regulatory Breakout Session – Top 3 Items for Assigned Categories

Category: Financial

<u>Action Item</u>	<u>Score</u>
Quantify ancillary benefits such as reliability, power quality, voltage support, power outages, and preservation of natural resources. (Value Proposition) [TARGET:	13
Have State and local governments provide financial incentives to CHP such as guaranteed bonds and low interest loans. (Legislative)	8
Provide tax incentives for CHP such as incentive for new boilers, conservations, and reducing first cost. (Legislative) (TARGET: State and Local Offices]	8

Category: Regulatory

<u>Action Item</u>	<u>Score</u>
Build and tell a story that compels utilities and regulators to <u>ACT</u> on CHP; they currently don't <u>VALUE</u> CHP. (Utilities)	7
[Address] natural gas prices and volatility by developing a standard State portfolio for renewable/recycled energy. (Natural Gas Training) [TARGET: Providers and consumers]	7
Waive standby charge for 5 years for CHP (New York State Public Service Commission has set precedence) (Tariffs) [TARGET: PSC]	6

Category: Education

<u>Action Item</u>	<u>Score</u>
Conduct seminar on energy for non-engineers (Financial Institutions, Architects, End-Users, etc.).	9
Develop standard ("ANSI") terminology, specifications and standards for CHP (include pro forma line items).	9
Promote HUGE nationwide campaign for "Recycled Energy"	8

NOTE: Complete lists of Action Items are provided in Appendix E.

3.1.3 Project Implementation Breakout Session– Top 3 Items for Assigned Categories

Category: Financial

<u>Action Item</u>	<u>Score</u>
Promote third party ownership – provides “Day 1” positive cash flow on CHP packages to end-user.	9
Shift/expand the paradigm on acceptable ROI: 5 to 7 years isn't bad (2 years is wishful thinking someone must be willing to take risk), include intangibles and other benefits of CHP to reduce payback, give credit to early adopters (leaders), provide credits for green house gas reductions. [TARGET: CFOs and CEOs]	7
Need contacts and case studies of successful CHP projects stated by the CEO and CFO of industrial sites where they discuss ALL of the benefits of CHP. [TARGET: Manufacturing, Automotive, Steel, and Chemical Processors CEOs, CFOs, and Plant Manager]	7

Category: Utility

<u>Action Item</u>	<u>Score</u>
Establish Distributed Generation rates and incentives. (See nation Fuel Pilot Program.) [TARGET: PUCs]	7
Manufacturers need to get products evaluated and “certified” to published standards like IEEE 1547 and UL 1741. (It will never be accepted if it is never evaluated. If it is good enough for California and New York, it should be close here.)	7
Educate customers on natural gas hedging strategies.	6

Category: Equipment

<u>Action Item</u>	<u>Score</u>
O&M requirements and costs (Case studies) (Installation Issues)	5
Packaged CHP systems families – best price first. Who are they? (Installation Issues) [TARGET: General contractors to use information. Industrial manufactures, automotive, steel, and chemical processors.]	4
250 kW to 5 MW packaged systems. (Cost) [TARGET: Manufacturers]	4

NOTE: Complete lists of Action Items are provided in Appendix E.

3.2 Developing Action Plans

After prioritizing the actions, each breakout group addressed its top action items and worked in groups to develop an action plan for the item, including:

- What needs to be done
- Who needs to do it
- What resources are needed
- Realistic times to get it done

These action plans are listed below:

3.2.1 Action Plan Material Developed by the Market Development Breakout Group

Category: Financial

<p>ACTIVITY: Quantify benefits of CHP other than energy costs that can positively impact the economic analysis of a CHP application:</p> <ul style="list-style-type: none"> • Reliability • Power Quality • Emissions Credit / Control • Power Outages • Jobs • Etc. 			
WHAT TO DO:	WHEN:	WHO:	COST:
Issue an RFP for graduate students / companies to do case studies. The case studies could be used in branding campaign.	Within 3 months.	MAC/Delta/NEMW/USCHPA to issue RFP	Minimal, administrative cost only. Case studies could be done either for student credit or thesis or by companies as “free” communication / advertisement pieces.
<p><i>COMMENT:</i> Could also be given to public officials.</p>			

<p>ACTIVITY: Identify CHP market opportunities that utilize a fuel other than natural gas that can better compete economically; such as waste fuels, biofuels, landfill gas, possibly even coal, etc.</p>		
WHAT TO DO:	WHEN:	WHO:
Identify and develop more low cost biofuel projects.	6 months	CHP vendors
Identify existing networks that already promote these fuels and outreach CHP information into existing groups and vendor information.	6 months	<ul style="list-style-type: none"> • MAC • State Energy Offices • Not-for Profits • Agriculture Agencies
Network State offices into this area.	6 months	<ul style="list-style-type: none"> • Energy Offices • Farm Groups
Develop regional “low cost” fuel database.	6 months	MAC
Create working group.	6 months	MAC
<p><i>COMMENTS:</i></p> <ul style="list-style-type: none"> • Do not refer to “waste fuel,” use other terminology as biofuel. Fuel type may be different (or not exist) in each State. • Metrics: 1 year: Survey CHP vendors as to how many leads generated. • 2 years: Survey CHP vendors as to how many projects developed. 		

ACTIVITY: Development and production of packages CHP systems including installation, operation, service and maintenance that lowers the installed kWh cost (like buying a car verse buying an engine).			
WHAT TO DO:	WHEN:	WHO:	COST:
Website with what is available:	6 months	DOE RFP on Packaged Systems	\$25,000 to \$50,000
<ul style="list-style-type: none"> • Different packages for different sizes. 			
<ul style="list-style-type: none"> • What package includes: <ul style="list-style-type: none"> – Financing – Engineering – Permitting – Maintenance 			
<ul style="list-style-type: none"> • Regions installed 			
<ul style="list-style-type: none"> • Contact information 			
<ul style="list-style-type: none"> • Target Market Sectors 			
<ul style="list-style-type: none"> • Links to case studies 			
<i>COMMENT: MAC will pull together.</i>			

Category: Utility

ACTIVITY: Permit CHP on an output basis / CHP emission credits.		
WHAT TO DO:	WHEN:	WHO:
Push Regulators to go to output based emissions.	Long Term (> 1 year)	Vendors
Make vendors understand concept and importance of output-based emissions to their sales.	6 to 8 months	<ul style="list-style-type: none"> • EPA CHP Partnership • MAC / Initiative
EPA to work with States to change their regulations to support CHP (become CHP Partners).	Ongoing	EPA CHP Partnership

ACTIVITY: Electric utilities to: <ul style="list-style-type: none"> • Own CHP as part of their portfolios • Make allowable returns on CHP investments 		
WHAT TO DO:	WHEN:	WHO:
Meet with Utility Planning “folks” to encourage CHP (like Mayor Daley (Chicago) “encouraged” ComEd to buy green power, so ComEd purchased wind farm).	Short term	<ul style="list-style-type: none"> • MAC / Initiative • State Energy Offices
Change utility mindset / paradigm on peaking facilities; have them locate CHP at (large) industrial facilities (creates double benefit: takes load off of grid and can provide excess power)	Mid to Long term	<ul style="list-style-type: none"> • DOE • US EPA • MAC
Educate regulators / legislators / PSCs that [CHP is an] alternative to central power plants	Ongoing	<ul style="list-style-type: none"> • MAC / Initiative • State Energy Offices
Educate energy policy makers (designated legislators and aides) on how CHP fits into green portfolio (or premium power).	Ongoing	<ul style="list-style-type: none"> • MAC • State Energy Offices
Lobby to give utilities credit on renewable portfolio (or green program or premium power programs) for using CHP.	Ongoing to Long term	<ul style="list-style-type: none"> • US EPA • USCHPA • ACEE
Conduct a forum of current utilities [subsidiaries] that already use / support CHP/DG as part of their portfolio. Then bring the results of that forum [or bring other utilities to forum] to hear why they did [are doing] what did. (Help define the Role of CHP in Utility Planning.)	< 1 year	<ul style="list-style-type: none"> • MAC / Initiative • Utility Groups (IEEE, Power Gen Conference)
Create utility case studies where utilities have used CHP as a portfolio option.	[In preparation for forum or after forum] <1 year	MAC
Change the CHP communities paradigm to be more receptive [encouraging] of CHP on utility side	Short term	<ul style="list-style-type: none"> • MAC • USCHPA

ACTIVITY: Exempt CHP from standby charges (like New York)		
WHAT TO DO:	WHEN:	WHO:
Copy what was done in New York (<i>see note</i>)	6 months to 2 years	MAC
Do a study on what the “correct” charge should be for standby or if based on CHP reliability if it is even and issue. (Would need to be done at the utility level.)	Mid-term	<ul style="list-style-type: none"> • Local • Graduate Student
Ask “question” at utility forum (see What to do” (U5) previous) as to what keeps each utility from “embracing” or “adopting” CHP as an alternative to other upgrades (Seek first to understand.)	Short term	<ul style="list-style-type: none"> • MAC • DOE
COMMENT: Some one questioned whether NY did exempt CHP from standby charges.		

Category: Education

ACTIVITY: Educate policy makers and trade groups (unions) that Recycled Energy (CHP) means more jobs.		
WHAT TO DO:	WHO:	WHEN:
Educate energy policy makers (designated legislators and aides) on how CHP fits into green portfolio (or premium power).	<ul style="list-style-type: none"> • MAC • State Energy Offices 	Ongoing
Develop numbers to show value. (May have already been done as part of ELPC's "Job Jolt")	<ul style="list-style-type: none"> • Graduates Student • MAC (to review "Jobs Jolt") 	<ul style="list-style-type: none"> • Mid-term • Short term
Establish relationship with trade associations /groups / locals. (Could approach large multi-employer organization / group like a local building trade council to partner with them or get union / trade contacts.)	MAC	Ongoing to Mid-term
<i>COMMENT: Do as part of RFP concept previously discussed in "What to Do" in Financial</i>		

ACTIVITY: Seminars / courses for non-engineers (architects, financial, end-users).		
WHAT TO DO:	WHEN:	WHO:
Create a continuing education program	1 – 2 years	MAC
Be "guest speakers" at events promoting the "recycled energy" concept	Short term	<ul style="list-style-type: none"> • DOE • MAC
Create / conduct training on CHP basics.	Ongoing [Done for MN]	MAC
<p>COMMENTS:</p> <ul style="list-style-type: none"> • For architects, you just need to have presentation "certified" by AIA for it to be credited as a continuing education credit. • The MAC is also creating a graduate level course on CHP to be offered this Fall Semester (2004) at UIC. 		

ACTIVITY: Public media relation target major urban areas, businesses and vertical specific markets. Focus on CHP success in addressing key energy issues.			
WHAT TO DO:	WHEN:	WHO:	COST:
Participate in “Recycled Energy” campaign.	Ongoing	[CHP Community]	\$3000 or \$1000 or \$500 [or “already paid for”]
Use IDEA as an outreach / example	Ongoing	[CHP Community]	\$500 as member
Continue [MAC and Recycled Energy Campaign] on hospital sector and expand.	<ul style="list-style-type: none"> • Ongoing • Ongoing • On going (some) 	<ul style="list-style-type: none"> • DOE • MAC • State Energy Offices 	<i>Not discussed</i>
Use billboards to advertise “Recycled Energy”	Short to mid-term	Recycled Energy Campaign	Unknown

3.2.2 Action Plan Material Developed by the Regulatory Breakout Group

Category: Financial

ACTIVITY: Quantify benefits of CHP; reliability, power quality, emissions, power outages, jobs, etc.			
WHAT TO DO:	WHEN:	WHO:	TARGET AUDIENCE:
1. Survey of existing benefit data	6 months	Midwest CHP Application Center, Utilities, and Manufacturers	Sales, regulators, legislators, engineers, and building owners.
2. Gap Analysis	6 months		
3. Develop Macro Analysis Tools	Start 6 months + 6 months		
4. Develop Case studies			

Category: Regulatory

ACTIVITY: Build a “story” that compels Regulators and utilizes to act.			
WHAT TO DO:	WHEN:	WHO:	TARGET AUDIENCE
1. Focus Group of Midwestern Regulators	2 years	Midwest CHP Application Center, NARUC (Andrew Spear?).	Regulators and Utilities
2. Meeting with NARUC	2 months		
3. Build Consensus			
4. Compile Information	Start after 2 months+ 1.5 months		
5. Review	1.5 months after compilation		
6. Final Report	1 month after review		

ACTIVITY: Incentive for Utilities (Electric) to promote CHP.			
WHAT TO DO:	WHEN:	WHO:	TARGET AUDIENCE:
1. Identify Areas – CHP enterprise Zones <ul style="list-style-type: none"> ➤ Defer investments – power plants, distribution (i.e., unload substations)] ➤ Increase reliability ➤ Improve power quality 	3 months	Utilities, Midwest CHP Application Center, and EPRI.	Electric Utilities.
2. Develop Business Case	Start after 1 month + 3 months		
3. Conduct Workshops	Start after business case + 5 months		

Category: Education

Regulatory Breakout Group

ACTIVITY: Campaign for Recycled Energy				
WHAT TO DO:	WHEN:	WHO:	TARGET AUDIENCE:	Resources
1. Resolve Issues Regarding "Brand"	1 month	USCHPA/DOE, Midwest CHP Application Center, Recycled Energy Council.	End Users, Manufacturers, Public, and Policy Makers.	Funding mechanism, campaign package, public agencies (Free use of "Brand"), and Recycled Energy Council
2. Identify Leadership Organization	3 months			
3. Build Coalition	Ongoing			
4. Develop Campaign Strategy	6 months			
5. Dissemination of Information	Ongoing			

3.2.3 Action Material Developed by the Project Implementation Breakout Group

Category: Financial

ACTIVITY: Quantify Non-Energy Cost Benefits to Affect Financial Evaluation (Regional Problem).				
WHAT TO DO:	WHEN:	WHO:	TARGET AUDIANCE:	Resources
<p>1. Understand the particular benefits (from CHP) per market sector (Comment: Difficult, timely, and costly task.)</p> <ul style="list-style-type: none"> • List of specific benefits • Develop / verify list with market sector • Use existing CHP users in market sector to verify their potential benefits • Use Case Studies • Tie issues /benefits to insurance company to cover these issues (i.e.; blackouts) [Source of information]. • Specify issues 	4 market sectors per year (prioritized)	CHP Application Centers, CHP Initiatives, DOE and EPA	Target Market Sectors	<p>Existing CHP Users (National and Regional)</p> <ul style="list-style-type: none"> ➤ MAC ➤ Case Studies ➤ Trade Associations ➤ Equipment (Both CHP & individual equipment suppliers) ➤ Utility representatives ➤ Individual specific engineering/energy firms (Honeywell, etc.)
<p>2. Quantify CHP benefit for their issues:</p> <ul style="list-style-type: none"> • Avoided cost of emergency backup generators (net cost out) – True cost of backup generation. 				
<p>3. Cost of lost production, staff by market sector. From or verified by customer!</p>				

ACTIVITY: Construct Third Party Ownership (Regional) to promote alternative financing options				
WHAT TO DO:	WHEN:	WHO:	TARGET AUDIANCE:	RESOURCES
1. Understand the Issues and What is Needed to Promote the Concept.	<i>Not discussed.</i>	<i>Not discussed</i>	Third Party Finance Group, Design /Builders	<i>Not discussed</i>
2. List of Players: Banks (CHP Cash Flow Stream/Financing) and/or Investment Houses.				
3. Financial resources and alternatives				
4. Shifting financial responsibility from the end use customer to a third party who understands CHP (engineering, ownership, investments, etc.) and has different financial parameters (more favorable).				

Category: Utility

Activity: Change the culture of electric utilities toward CHP. How does the electric utility obtain a return while promoting (or tolerating) CHP?		
WHAT TO DO:	WHO:	TARGET AUDIENCE:
1. Loss revenue model (least cost)	<i>Not discussed</i>	CEO level
2. Distribution, demand, and standby charges		
3. Develop a synergistic operation of CHP in the industrial sector and the electric utility where the CHP system takes away from the peak (peak sharing with the utility) to flatten the demand.		
4. Address non-linear utility costs <ul style="list-style-type: none"> • Peak sharing • Demand responsiveness • Backup power • Avoided costs 		

Category: Equipment

ACTIVITY: Packaged systems already in the pipeline, but are not really available as complete package (equipment plus controls, information technology, and installation).		
WHAT TO DO:	WHO:	Resources
1. Determine package specifications – more information!	<i>Not discussed</i>	DOE, CEC, NYSERDA, and USCHPA
2. Consumption by Customer/Market Electric & Gas		
3. Adopt/support DOE and CEC targets		
4. Find out what other people are doing and what are the gaps		

4. Data Analysis and Conclusions

Section 3 of this report, along with Appendix E provides the complete set of data provided by the participants of the Midwest CHP Roadmap Workshop. This section of the report provides the authors' interpretation of the data.

The following sections provide the key results of the workshop, based on the analysis of the data conducted by the authors:

4.1 Financial Results

4.1.1 Quantifying Benefits

The principal focus of this area is to quantify the non-energy cost benefits of CHP; such as outage avoidance, increased reliability, reduced emission, increased efficiency, preservation of natural resources, energy security, transmission and distribution support, and increased jobs. Primarily this would be done by assigning some dollar value and incorporating the “benefit” into the CHP financial assessment to affect the payback and the return-on-investment (ROI).

4.1.2 Financial Incentives

Third party ownership, providing tax incentives, and financial initiatives (State, local and private - such as bonds and low interest loans) for CHP were at the top of the items for the Financial Incentives area.

4.1.3 Opportunity Fuels

Natural gas price volatility and cost were both top issues in the pre-workshop survey. While there was some discussion in the breakout sessions regarding ways to mitigate the price and volatility in the natural gas market, as a whole the focus of fuel costs turned to increased usage of “Opportunity Fuels” as a substitute for natural gas. “Opportunity Fuels” are considered to be those fuels that can be obtained from waste products such as landfill gas, methane from waste water treatment plants, agricultural waste, and wood industry waste. Also included in “Opportunity Fuels” would be the development of power from the installation of steam turbines in lieu of pressure reduction valves.

4.2 Regulatory and Utility Results

4.2.1 Interconnect Standards, Rates, Tariffs, and Recycled Energy Portfolio Standards

This section sets the platform for working with Utility Commissions - to establish interconnect standards, rates, and tariffs in recognizing the positive contributions of CHP; and to work with states to set Recycled Energy portfolio standards or goals (similar to RPS) to help drive change and planning activities at the state level.

4.2.2 Engaging Utilities

The concept of trying to create an acceptance of CHP by electric utilities came through as a predominate theme; both as it related to “Regulatory Issues” and “Utility Issues.” In the Regulatory area, the most predominate theme was to somehow create a “win-win” situation with CHP and electric utilities, by providing incentives for electric utilities to promote CHP. Another recurring theme throughout the breakout sessions was that electric utilities should consider, either voluntarily or through regulatory requirements, CHP as an alternative to transmission/distribution (T&D) build-out.

4.2.3 Environmental Permitting on an Output Basis

This item was raised to follow national efforts to move towards output based standards that provide environmental credit for CHP due to its efficiency savings.

4.3 Equipment Results

4.3.1 Packaged Systems

Based on the results of this category, the key to packaged systems is to lower the initial cost. The results indicate that this should be a collaborative effort between the power generation and thermal utilization equipment manufacturers, as well as the DOE.

4.3.2 Codes and Standards

The development of model codes and standards, through code officials and industry organizations to pave the way towards equipment that could be “pre-certified” so it could be “plug-and-play,” simplifying installation and enhancing utility acceptance

4.4 Education Results

4.4.1 Utilize Recycled Energy Communications Campaign

To provide for communication and information dissemination through utilization of the “Recycled Energy” campaign to educate regulatory agencies, the media, and targeted “decision making” level managers. The participants agreed that although we already have developed a large amount of information we need to focus our attention on modifying the information for targeted audiences and directing the information to the “right” people.

4.4.2 Target Markets

The results indicated that education should be focused on areas where CHP can address specific key energy issues (such as urban areas and targeted vertical markets like hospitals, schools, and energy intensive industrials). Also education should be directed to non-engineering entities such as; architects, financial institutions, and en-users.

5. Next Steps

The Roadmap was developed to provide information to direct the activities to advance the CHP marketplace in the Midwest Region. To this means the Roadmap Workshop Report will be:

1. Distributed widely throughout the Midwest, seeking comments and input on the report;
2. Distributed to meeting attendees and invitees (key Midwest Region CHP stakeholders) so that they will have information that they can use to focus their activities;
3. Utilized by the Midwest CHP Application Center and the Midwest CHP Initiative to guide and focus their activities; and to coordinate Regional Activities
4. Provided to the Midwest Regional Office of the Department of Energy for their use in developing their CHP strategy for the Region;
5. Offered to each of the eight Midwest State energy offices (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin); and
6. Offered to key municipal energy offices to help them understand how CHP can support their energy needs and to encourage them to integrate CHP into their city's energy policies and plans.

APPENDIX A Survey

Midwest CHP Roadmap Workshop Pre-Meeting Survey

To better prepare for the Workshop, we would request all interested parties (whether you are planning on attending the workshop or not) to PLEASE TAKE A FEW MINUTES AND FILL OUT THIS SURVEY AND RETURN IT BY FRIDAY, FEBRUARY 27.

Please Return To: e-mail: reginfo@tech-res.com Make the subject line: CHP Roadmap Survey

Fax: (301) 897-7403 Attention: CHP Roadmap Survey

- 1) Please provide the “Barriers” to marketing, selling, installing, investing in, and/or operating CHP systems in your area of the Midwest. Please add to the list provided and rank the Barriers in terms of their significance as either:
High; Medium; Low; Not a Barrier / Issue; Don’t Know

Barrier / Issue	High	Med.	Low	Not A Barrier	Don't Know
Lack of Grid Interconnect Standards					
Existing Utility Rate Structures / Tariffs (backup / standby /exit fees / etc.					
Low Electric Rates (your area)					
Non Cooperative Electric Utility					
Inability to Hook to Network System					
Natural Gas Prices					
Natural Gas Price Volatility					
Natural Gas Availability					
Non Cooperative Gas Utility					
Insufficient “Spark Spread” (differential between electric & gas prices)					
Environmental Permitting (complex)					
Envir. Permitting (lengthy)					
Envir. Permitting (to costly)					
Lack of State Incentives (financial or others)					
Local Code Issues					
Lack of Case Studies					
Lack of Screening Tools					
Lack of Accurate Financial Analysis Tools					
Cost of CHP Equipment / Systems					
Lack of Certified CHP Systems					
Lack of Packaged CHP Systems					
Difficult to Install CHP Systems					
Reliability of CHP Systems (once installed)					

Equipment not Environmentally Friendly					
Lack of Technical Data on CHP Equipment					
Lack of Qualified Engineering Firms (knowledgeable in CHP)					
Lack of Engineering Firms Willing to Specify CHP systems					
Difficult to Obtain Project Financing					
Inadequate ROIs / Paybacks					
Lack of Understanding of CHP By:					
Architects					
Engineering Companies					
End Users					
Professional / End User Associations					
Local Energy Providers					
State Energy Offices					
State Regulators					
Local EPA					
Local Code Officials					
Financial Institutions					
Please Add Others Not Included Above:					

- 1) What markets do you see as potential markets for CHP **in your area today**, given what you know about the pros / cons of CHP and the above barriers. Please add to the list provided and rank the markets as either:
 Excellent; Good; Poor; Don't Know

Market Sector	Excellent	Good	Poor	Don't Know
Hospitals				
Universities				
Schools (K thru 12)				
High Rise Residential				
High Rise Office				
Gov't Buildings (State Buildings)				

Hotels				
Nursing / Assisted Care Homes				
Fitness Centers				
Prisons				
Ethanol Plants				
Waste Water Treatment				
Water Pumping Stations				
Chemical				
Manufacturing Plants				
Food Processing				
Paper / Pulp				
Metal Fabrication				
Plastic Forming				
Air Ports				
Shopping Malls				
Dairies				
Office / Industrial Parks				
Telecommunication Facilities				
Please Specify Others In Your Area				

1) What do you see as the best fuel to utilize for CHP systems in your area (ability to realistically sell / site CHP systems). YOU CAN CHECK MORE THAN ONE FUEL

Fuel Type	
Natural Gas	
Coal	
Fuel Oil	
Propane	
Biomass	
Process Wastes	
Process Steam Reduction	
Others (Specify)	

2) Do you participate in the Midwest CHP Initiative?

Yes	No

3) Are you satisfied with the format / activities of the Midwest CHP Initiative?

Yes	No

Comments / Suggestions for Improvements:

1) Are you familiar with the Midwest CHP Application Center?

Yes	No

2) Do you utilize any of the Midwest CHP Application Center Material / Services?

Yes	No

Comments / Suggestions for Improvement:

3) Are there any specific activities that you would like to see the Midwest CHP Application Center or the Midwest CHP Initiative undertake? Please be specific.

4) Any other comments / suggestions / thoughts?

Thank you for taking the time to fill out this survey. We will use the information to guide our breakout sessions at the Workshop!!

What is your role in the CHP Industry? (Equipment Supplier, Engineering Co, Gov't Worker, etc etc) _____

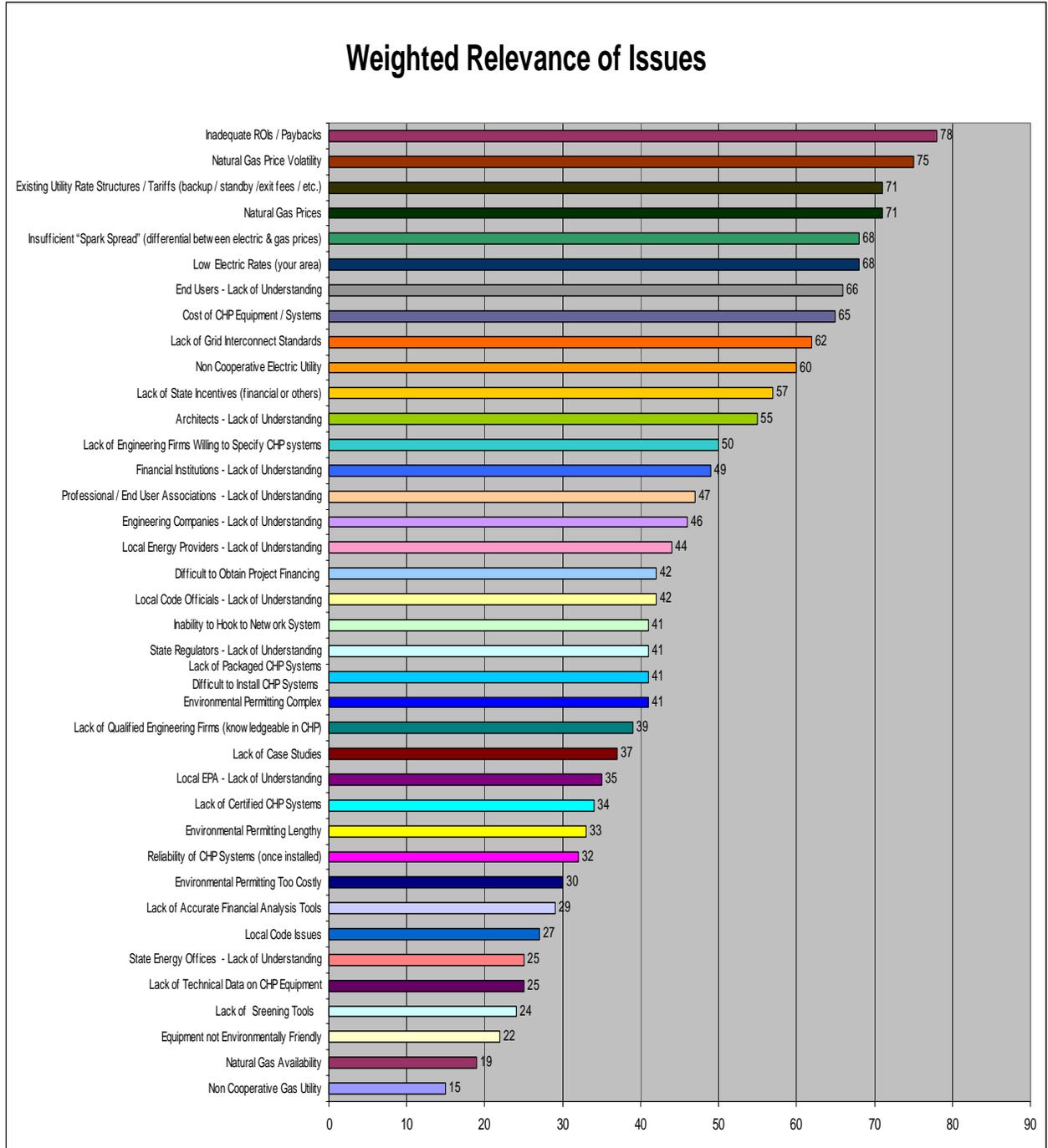
Contact Information: (Optional):

Name:

Company:

Phone # and e-mail address:

APPENDIX B Weighted Relevance of Issues



APPENDIX C Survey Results

Issues

The Financial category had the most significant issues¹; with 7 of the 10 issues being considered “significant” as highlighted in Table 3.

Issue	Score
Inadequate ROIs / Paybacks	78
Natural Gas Price Volatility	75
Existing Utility Rate Structures / Tariffs	71
Natural Gas Prices	71
Insufficient “Spark Spread”	68
Low Local Electric Rates	68
Cost of CHP Equipment / Systems	65
Lack of State Incentives (Financial or Other)	57
Difficult to Obtain Project Financing	42
Environmental Permitting Too Costly	30

Table 3 Financial Issues

The Regulatory category had 5 issues of its 12 identified as being “significant” as highlighted in Table 4.

Issue	Score
Natural Gas Price Volatility	75
Natural Gas Prices	71
Existing Utility Rate Structures / Tariffs	71
Lack of Grid Interconnect Standards	62
Non-Cooperative Electric Utility	60
Lack of State Incentives (Financial or Other)	57
Inability to Hook to Network System	41
Environmental Permitting Complex	41
Environmental Permitting Lengthy	33
Environmental Permitting Too Costly	30
Local Code Issues	27
Natural Gas Availability	19

Table 4 Regulatory Issues

¹ Issues that scored 60 or more were considered to be “significant.”

Electric Utilities had the highest percentage of “Utility” issues with 4 of the 5 issues assigned to this category being considered “significant.” Two of four issues assigned to Gas Utilities were considered to be “significant,” however both of these issues stem from the recent price and volatility in the natural gas market. The results are shown in Table 5.

		Issue	Score
Electric Utilities		Existing Utility Rate Structures / Tariffs	71
		Low Local Electric Rates	68
		Lack of Grid Interconnect Standards	62
		Non Cooperative Electric Utility	60
		Inability to Hook to Network System	41
Gas Utilities		Natural Gas Price Volatility	75
		Natural Gas Prices	71
		Natural Gas Availability	19
		Non Cooperative Gas Utility	15

Table 5 Utility Issues

There were many issues on the survey that related to Education and the issues scored relatively high, 11 of 14 issues received a score of 35 or over; one of these issues, “End Users – Lack of Understanding” was considered “significant.” Overall this indicates that Education was considered to be an important issue to overcome, but that it also covered a rather broad target audience. Table 6 shows how the issues in the Education category scored out this way.

Issue	Score
End Users - Lack of Understanding	66
Architects - Lack of Understanding	55
Lack of Engineering Firms Willing to Specify CHP Systems	50
Financial Institutions - Lack of Understanding	49
Professional / End User Associations - Lack of Understanding	47
Engineering Companies - Lack of Understanding	46
Local Energy Providers - Lack of Understanding	44
Local Code Officials - Lack of Understanding	42
State Regulators - Lack of Understanding	41
Lack of Qualified Engineering Firms (Knowledgeable in CHP)	39
Lack of Case Studies	37
Local EPA - Lack of Understanding	35
Lack of Accurate Financial Analysis Tools	29
State Energy Offices - Lack of Understanding	25
Lack of Screening Tools	24

Table 6 Education Issues

Equipment Issues scored relatively positive, with the exception of the cost of the equipment / systems. The only other issue that appeared to be important was the “Lack of Packaged Systems / Difficult to Install System” which scored 41. Table 7 shows how the issues in the Equipment category scored out.

Issue	Score
Cost of CHP Equipment / Systems	65
Lack of Packaged CHP Systems Difficult to Install CHP Systems	41
Lack of Certified CHP Systems	34
Reliability of CHP Systems	32
Lack of Technical Data on CHP Equipment	25
Equipment Not Environmentally Friendly	22

Table 7 Equipment Issues

APPENDIX D Workshop Agenda
Midwest CHP Roadmap Workshop
March 16th and 17th, 2004
Hotel InterContinental Chicago
505 North Michigan Avenue
Chicago, Illinois 60611-3807
www.chicago.intercontinental.com

Tuesday, March 16th

8:30 am	Registration & Continental Breakfast	
9:00 am	Welcoming Remarks	Peter Dreyfuss DOE Chicago Regional Office
9:20 am	Introductions / Meeting Purpose / Roadmap Process	Gary Nowakowski DOE Chicago Regional Office
9:40 am	Status of CHP In The Midwest	John Cuttica, UIC/ERC & Ted Bronson, PEA
10:30 am	Survey Results / Laying Out the Issues <ul style="list-style-type: none"> • Regulatory • Market Development • Project Implementation 	Ted Bronson, PEA Leslie Farrar, UIC/ERC John Cuttica, UIC/ERC
11:30 am	Lunch	
12:15 pm	Luncheon Speaker CHP National Communications Campaign "Recycling Energy"	John Kelly, GTI & Mary Scheibel
1:00 pm	Concurrent Breakout Sessions "Prioritizing Issues & Developing Strategies" <ul style="list-style-type: none"> • Session 1: Regulatory • Session 2: Market Development • Session 3: Project Implementation 	Facilitator – Ted Bronson Facilitator – Leslie Farrar Facilitator – John Cuttica
3:00 pm	Break	
3:15 pm	Breakout Session Reports (15 minutes per session)	Session Spokes-Person
4:15 pm	Overview of Day 2 Activities	Brian Olsen DOE Chicago Regional Office
4:30 pm		Adjourn
6:00 pm	Informal Dinner at Local Restaurant	

Wednesday, March 17th

8:00 am	Continental Breakfast	
8:30 am	Review Day One Activities	Brian Olsen DOE Chicago Regional Office
8:45 am	Concurrent Breakout Sessions “Implementing the Top Strategies – Schedules & Resources” & “Role of CHP Center; CHP Initiative; State Organizations”	
	▪ Session 1: Regulatory	Facilitator – Ted Bronson
	▪ Session 2: Market Development	Facilitator – Leslie Farrar
	▪ Session 3: Project Implementation	Facilitator – John Cuttica
10:45 am	Break	
11:00 am	Breakout Session Reports (15 minutes per session)	Session Spokes-Person
11:45 am	Wrap Up and Summary	Gary Nowakowski DOE Chicago Regional Office
Noon	Adjourn	

APPENDIX E Breakout Session 1 Results

CATEGORY: Financial

Marketing Group	Leslie Farrar - Facilitator
Expand definition of ROI to include: security (outage avoidance), reliability, and “good corporate citizenship”. (ROI and Life Cycle Costing) [TARGET: End-users]	17
Identify market opportunities for CHP that go around natural gas as fuel such as; waste heat recovery CHP, biogas, and biofuel. (Alternate Fuels) [TARGET: Equipment manufacturers, ESCOs, and Developers]	12
Development and promotion of packaged systems including installation, operation, service and maintenance, that lower the installed kWh cost. (Like buying a car instead of an engine.) (Miscellaneous)	9
Factor in the cost of outages into financial/ROI assessment. (If a facility has 1 outage a year how much does that cost them in lost production) (Cost of Power Reliability)	8
Midwest CHP Application Center and States should put together database of target markets to help vendors target prospects. (Reduce natural gas exposure) Free/low cost fuel opportunities such as; wood waste (post harvest and production), steam pressure reduction (PRV) opportunities, wastewater treatment facilities (anaerobic digesters), landfill gas, bio-refining gas production. (System Infrastructure)	6
Require portfolio standard for natural gas companies to purchase “X”% as long term (10 years) to provide stability to market. Reduce natural gas price volatility caused by market mentality. (Miscellaneous)	5
Cost avoidance of building out the grid and transmission systems. (Cost of Power Reliability)	5
Define public/societal benefits as a dollar amount into ROI such as; more jobs, cleaner air emissions, security, and makes everyone “happy”. (ROI and Life Cycle Costing) [TARGET: Government – Public PSCs]	4
Publicize “Best Practices” in implemented projects. (Miscellaneous)	3
Be an advocate for utility development of CHP especially in “constrained” areas. Utility financial analysis can recognize life cycle of project and also they have lower ROI requirements. (Financial Subsidies) [TARGET: Utilities]	3
Midwest CHP Application Center and States should put together database of target markets to help vendors target prospects. (Reduce natural gas exposure) Facilities with plans to change their existing infrastructure such as; boilers that are near end of life, boilers that are high polluters, expanding electric or steam only production facilities (utility plants and municipals that are installing backup generators), large natural gas users who need low grade thermal energy, utilities upgrading distribution and substations to serve key customers. (System Infrastructure)	2
Focus on projects over 1 MW. (Miscellaneous)	2
Hedge natural gas price volatility by selling in volatile electricity markets. (Natural Gas Purchase Hedging)	1
Establish relationship with financial institutions in order to take advantage of CHP Projects. Such as performance contracting projects for hospitals, State, and Federal buildings. (Financial Subsidies)	1
Promote the use of Life Cycle Costing over ROI since CHP is and “infrastructure improvement. (ROI and Life Cycle Costing) [TARGET: End-users]	1

Consider energy procurement by purchasing electricity and natural gas on a contract basis. (Natural Gas Purchase Hedging) [TARGET: End-user]	0
Participate in a natural gas hedging program. (Most brokers and utility unregulated affiliates can do this.) (Natural Gas Purchase Hedging)	0
Consider coal fired CHP instead of natural gas fired CHP on economic benefit basis. (Alternate Fuels) [TARGET: State policy and rate makers]	0
Issues provide post session – not voted on.	
<i>Redefine CHP as a State issue. While industrials may not be economical, larger scale “utility” size could well be.</i>	N/A
<i>Establish/use leasing to help capital constrained end-users.</i>	N/A
<i>Consider CHP (or DG) when considering back-up generation. (Incremental cost)</i>	N/A
<i>At State level, evaluate economic benefits to industry and industrial prices – coal fired verse natural gas.</i>	N/A
<i>“Free” fuel: waste heat, biogas, fuel flexibility</i>	N/A
<i>Introduce CHP to capacity and demand response markets.</i>	N/A
<i>Educate project developers to leverage total installed cost reductions ...</i>	N/A

CATEGORY: Financial

Regulatory Group	<i>Ted Bronson - Facilitator</i>
Quantify ancillary benefits such as reliability, power quality, voltage support, power outages, and preservation of natural resources. (Value Proposition) [TARGET:	13
Have State and local governments provide financial incentives to CHP such as guaranteed bonds and low interest loans. (Legislative)	8
Provide tax incentives for CHP such as incentive for new boilers, conservations, and reducing first cost. (Legislative) (TARGET: State and Local Offices]	8
Use CHP to compete against transmission siting and pricing issues. (Value Proposition)	5
Eliminate or reduce standby charges by electric utility. (Electric Utility)	5
Establish fund that can be re-paid at ROI Rate whatever it is. (Legislative)	5
Initiate State led Recycling Energy Campaign (Free Fuel) RPS using waste fuel, waste heat, or steam pressure drop CHP applications. (Programs)	5
Accelerate depreciation for CHP investments. (Legislative) [TARGET: Policy Makers]	3
Develop pool of money through manufacturers and investors to use to finance projects. (Legislative) {TARGET: Financiers]	2
Incorporate the emissions (green house gas) benefits of CHP into savings. (Value Proposition)	1
Educate on sensitivity of energy prices on return on investment (ROI). (Value Proposition) [TARGET: Universities and consultants]	1
Couple the cost of CHP equipment/systems with the longer term savings/benefits realized. (Value Proposition)	1
Couple CHP with efficiency investments. (Electric Utility) [TARGET: ESCOs and Government]	1
CHP as a hedge against future prices and terrorist threats. (Value Propositions)	0
Educate potential CHP facility investors about numerous benefits of CHP so they can look beyond longer paybacks, etc.. (Value Proposition)	0
Include back-up power in ROI calculations rather than just pure cost. (Value Proposition)	0
Fully de-regulate [electricity] nationally so price signals travel freely both ways in the market. (Electric Utility) [TARGET: Congress]	0
Incorporate environmental externalities into electric rates. (Electric Utility)	0
Focus on fuel sources other than natural gas (e.g. biomass waste streams, coal) and provide tax incentives for use of these fuel types in CHP applications. (Programs)	0
Ethanol to power RPS. (Programs)	0

CATEGORY: Financial

Project Implementation Group	<i>John Cuttica - Facilitator</i>
Promote third party ownership – provides “Day 1” positive cash flow on CHP packages to end-user.	9
Shift/expand the paradigm on acceptable ROI: 5 to 7 years isn’t bad (2 years is wishful thinking someone must be willing to take risk), include intangibles and other benefits of CHP to reduce payback, give credit to early adopters (leaders), provide credits for green house gas reductions. [TARGET: CFOs and CEOs]	7
Need contacts and case studies of successful CHP projects stated by the CEO and CFO of industrial sites where they discuss ALL of the benefits of CHP. [TARGET: Manufacturing, Automotive, Steel, and Chemical Processors CEOs, CFOs, and Plant Manager]	7
Find out the value/savings the end-user would realize by reducing utility outages, increased uptime, reduced restart costs after power outages, and reduced loss of person-hours. Include these savings into the simple payback. [TARGET: From End-User – To End-User]	6
Focus on low-cost [or no-cost] fuel applications, [TARGET: Non-Urban facilities]	6
Continue development of packaged CHP systems. [TARGET: Equipment manufacturers and DOE]	5
Educate end-users how the addition of CHP can provide a new set of natural gas purchase strategies. [TARGET: Small industrial commercial facility management with good CHP characteristics.]	3
Get a good projection of utility costs (electric) after deregulation is complete. [TARGET: ? and End-User]	3
Utility distributed generation rates that provide up front buy-downs of CHP equipment. (See National Fuel Pilot Program. Based on new gas installation that are being sold, performance center – 6 years.) [TARGET: Utility and PUCs]	2
Baseline CHP economics in potential market segments (including all benefits). [TARGET: End-Users and ESCOs]	2
Post CHP project financing in one location. [TARGET: MAC website?]	2
Stabilize Utility interconnection costs. [TARGET: Local Utility and End-User]	1
Get a good <u>understanding</u> of back-up power costs. (ComEd – Rate 18, Constellation - ?, Others - ?) [TARGET: Goal to present to end-user a complete study]	1
Develop market for purchasing and quantifying and maybe even trading emission reductions benefits [credits] of CHP. [TARGET: All]	1
Provide holistic overview (or look) at the full scale of potential <u>savings</u> (ROIs) of CHP at the industrial level (i.e., environmental, security, independence, reliability). Need to visit installed sites. TARGET: Industrial users; automotive, steel, manufacturing, and chemical processors CEOs, CFOs, and Plant Managers.]	1
Secure tax credits for CHP investments (high efficiency and low-pollution). [TARGET: Regulatory Community and National Legislators]	1
Promote CHP as a solution to electric distribution shortfalls. [TARGET: Small utilities]	1
Provide case studies focused on the financing of projects instead of emphasizing the technical fit. (Economic instead of financial analysis). [TARGET: CFOs and Engineers]	1
Lobby PUCs to encourage natural gas fixed price (not indexed) and hedged gas acquisition	0

contracts. [TARGET: PUCs and Utilities]	
Assess use of biomass (economic analysis) and disseminate information. [TARGET: Municipals, States and cities]	0
Understand electrical verse gas infrastructure (and other) costs better. It may help to compete on a cost basis. It would provide a better understanding of the competition and other alternatives [to current situation]. [TARGET: End-users]	0
Research, find and identify “easy win” installation locations, where the system paybacks will be fast. Like manufacturing locations with lots of waste heat. Then use them as case studies.	0
Sell current experience and results. [TARGET: Decision Makers]	0
Don't look for incentives to drive project implementation. Incentives may be available for certain demonstrations and market sectors. “Selectively” use incentives to demonstrate successful applications. [TARGET: All]	0
<i>Comment: Is long-term projecting, especially with natural gas, a viable option or is it a waste of time with the natural gas market being “too” volatile. There is a danger in counting on incentives. [TARGET: Market Users]</i>	N/A

CATEGORY: Regulatory

Regulatory Group	<i>Ted Bronson - Facilitator</i>
Build and tell a story that compels utilities and regulators to <u>ACT</u> on CHP; they currently don't <u>VALUE</u> CHP. (Utilities)	7
[Address] natural gas prices and volatility by developing a standard State portfolio for renewable/recycled energy. (Natural Gas Training) [TARGET: Providers and consumers]	7
Waive standby charge for 5 years for CHP (New York State Public Service Commission has set precedence) (Tariffs) [TARGET: PSC]	6
[Provide] incentive for electric utilities to promote CHP. (Legislative) [TARGET: Commerce Commissions]	6
Expand [electrical] rates to include time of use (high use times higher prices) and locational prices (related to constraints and T&D costs). (Tariffs) [TARGET: PSC]	5
Create tax and financial incentives at State level. (Legislative) [TARGET: State Government Officials and Legislators]	5
Supply model code language on CHP to Code officials. Pre-certify equipment for local code compliance. [Develop more] "plug & play" [type equipment]. (Codes) [TARGET: Local Code Officials]	5
Educate policy makers and regulators about the benefits of CHP. (Utilities)	4
Get involved in NEC/ASHREA/NESC code development. (Codes) [TARGET: National Code and Policy makers]	3
[Provide] credit to CHP for avoided transmission additions. (Tariffs) [TARGET: Non-cooperative utilities]	2
Link CHP activity to Regional transmission company needs (avoid costly build out). (Tariffs) [TARGET: PSCs, TransCos, and Security Agencies]	2
[Provide] tariff for net-metering at market pricing instead of avoided cost. (Tariffs) [TARGET: Commerce Commissions, Manufacturing Associations, all CHP stakeholders (e.g., equipment suppliers, engineering firms, ESCOs, etc.), and citizen watchdog groups.]	2
Mandate that all government facilities use CHP unless they can develop a reason not to (as opposed to needing to come up with justification to do it). (Codes) [TARGET: All government facilities, all government leaders and <u>politicians</u> , and CHP stakeholders]	2
Create mini-grids that supply power between customers without utility. (Tariffs)	1
Make "One Stop Shopping" for CHP within State for permitting, interconnecting, etc. (Utilities)	1
Develop/provide regional interconnections workshops/training. (Utilities)	1
Develop Statewide interconnect standards through the ICC, including conflict resolution. (Utilities) [TARGET: Utilities, providers of electric energy, renewable energy and alternative energy suppliers]	1
Incentive to drill more natural gas wells to increase supply. (Natural Gas Training) [TARGET: Congress]	1
R&D on coal degasification. (Natural Gas Training) [TARGET: Universities and US DOE]	1
Use CHP to compete against MISO/FERC based LMP of transmission. (Legislative) [TARGET: Regulators and CHP Developers]	1

Adopt output based standards favorable to CHP. (Legislative) [TARGET: Regulatory Commissions and State Policy Makers]	1
[Provide] rebate for CHP projects, funded by small fee on electric bill. (Legislative) [TARGET: State Legislators and Commerce Commissions / PSCs]	1
Leverage risk management capabilities of various suppliers to reduce gas price volatility. (Utilities)	0
Delay of game penalty. (Utilities) [TARGET: PUCs and electric utilities]	0
Develop benefit for utilities. (Utilities) [TARGET: Non-cooperative utilities]	0
Develop rationale for interconnection differentiation by size of unit. (Utilities) [TARGET: Utility Commissions and Utilities]	0
Provide technology expertise to resolve interconnect issues. (Utilities) [TARGET: State DOE, end-user, and electric utility]	0
Set up office to investigate non-cooperative utilities and their policies. (Utilities) [TARGET: State policy makers]	0
Natural gas price story and procurement guideline. (Natural Gas Training) [TARGET: Customers]	0
Provide incentive for natural gas storage. (Natural Gas Training) [TARGET: State DOE and Natural Gas Utilities]	0
Locate CHP [facilities] next to interstate pipelines. (Natural Gas Training) [TARGET: Natural Gas Availability]	0
Include waste heat and fuel recovered into RPSD (flared fuel and pressure drop). Build utility support. (Natural Gas Training)	0
Profile energy use capacity to help grid when needed instead of standby charges. (Natural Gas Training)	0
[Provide] tax incentives for energy efficiency efforts. (Legislative) [TARGET: Energy Providers]	0
Require utilities to provide distributed generation/CHP [as an] investment option [when considering] transmission upgrade. (Legislative)	0
[Provide] low cost financing. (Legislative) [TARGET: States]	0
[Provide] long-term low [cost] contract for natural gas; aggregate for CHP. (Legislative)	0
Revisit environmental permitting regulations to decrease red-tape and cost of permitting. (Legislative)	0

CATEGORY: Utility

Marketing Group	<i>Leslie Farrar - Facilitator</i>
Permit CHP facilities on an output basis. (Emissions)	8
Utilities should own and operate CHP facilities as a portion of their portfolio. Benefits would be: 1. Avoids a portion of the need for large peaker units, 2. Keeps management of generation in their hands, 3. Would eliminate standby interconnection issues for those facilities. (Renewable Energy Portfolio)	8
Establish good interconnect standards and fees. (Interconnect Issues)	6
Exempt CHP from standby charges (like in NY). (Standby Issues)	7
Impose emission tax/charge/fee or subsidize CHP. (Emissions) [TARGET: Government agencies and Utilities]	5
Bring utility into the project planning from the beginning. Determine how they can participate. (Interconnection) [TARGET: Utility]	5
Expand definition of Renewable Portfolio Systems (RPS) to include "Recycled Energy." (Renewable Energy Portfolio) [TARGET: PUCS and Utilities (educate them the benefits of CHP and how it reduces fossil fuel use.)]	5
Define/ publish "Fair" standby service charges. (Standby Issues)	4
Have an independent arbitration group to resolve interconnection disputes with electric utility. (Interconnection Issues)	4
Allow for retail rate buy-back and net-metering on large CHP. (Buy-Back Issues)	4
Require utilities to answer: "Why not CHP?" when proposing new projects. (Renewable Energy Portfolio) [TARGET: PUCs]	3
Require utilities to install a percentage of their capacity in CHP. (Renewable Energy Portfolio) [TARGET: State Offices]	2
Explain to the public the real cost of a kWh (coal and utility subsidies and environmental impacts). (Outreach) [TARGET: General Public and Lobbying Groups]	1
State policies/regulations need to be aligned to encourage utilities to construct new CHP facilities or adapt existing electric only stations to CHP. (Renewable Energy Portfolio)	1
Reign in interconnection costs by continuing to educate PSC and Stat Commerce Commissions on the public good from CHP to encourage rules that favor CHP installations.	0
Utilities need to publish interconnection rules and standby costs that are easily understood. (Interconnection Issues)	0
Create more electric verse gas competition by moving to real deregulation. (Miscellaneous) [TARGET: Utilities]	0

CATEGORY: Utility

Project Implementation Group	<i>John Cuttica - Facilitator</i>
Establish Distributed Generation rates and incentives. (See nation Fuel Pilot Program.) [TARGET: PUCs]	7
Manufacturers need to get products evaluated and “certified” to published standards like IEEE 1547 and UL 1741. (It will never be accepted if it is never evaluated. If it is good enough for California and New York, it should be close here.)	7
Educate customers on natural gas hedging strategies.	6
Provide for CHP emissions credits.	6
Utilities to adopt IEEE 1547 and UL 1741 published interconnect standards. [TEARGET: Utilities]	5
Allow electric/gas utilities to higher ROR on CHP investments.	5
Provide regulations that recognize/provide an incentive for “avoided cost” [with the installation of CHP]. (Electric Utility Business Standards) [TARGET: PUCs]	5
Require utilities to consider CHP as an alternative to transmission line extensions, increased reliability, etc..	2
Tariffs should acknowledge benefits of CHP; e.g., avoided distribution costs, reliability, and not overstate the cost of ancillary service such as standby and back-up service. Rate intervention.	2
What will be the electric utility’s costs in the future?	2
Pool natural gas purchases, CHP not-for-profit natural gas company (e.g. like a credit union or a buyer’s cooperative).	1
Establish a partner relationship with electric or gas financial arrangement, so it is not competitive.	1
Put in a pipeline to Alaska for natural gas or open coastal areas for drilling (to lower US energy dependence and costs).	0
Need electric utility projections through 2010 to support CHP.	0
Leverage distributed generation trend/application advantages.	0

CATEGORY: Equipment

Project Implementation Group	<i>John Cuttica – Facilitator</i>
O&M requirements and costs (Case studies) (Installation Issues)	5
Packaged CHP systems families – best price first. Who are they? (Installation Issues) [TARGET: General contractors to use information. Industrial manufactures, automotive, steel, and chemical processors.]	4
250 kW to 5 MW packaged systems. (Cost) [TARGET: Manufacturers]	4
Back an initiative for the collaborative effort between the power generation equipment manufacturers and a matched heat recovery system. (For smaller systems include chillers, dehumidification, etc..) [TARGET: Equipment Manufacturers]	4
Include CHP as part of the high performance building criteria as part to LEEDs certification.	4
Push States and PUCs to adopt common interconnect document like IEE 1547 and UL 1741 to facilitate manufacturers to get certified.	4
Provide more DOE funds to develop high efficiency engines and turbines at current equipment costs. [TARGET: DOE]	4
Develop “Yellow Pages” for CHP equipment and installers. Centralized list.	4
Establish “families” of equipment to reduce complexity of [smaller units] 50 kW, 100 kW, 500 kW, and 1 MW.	3
Packaged systems to lower equipment, engineering, installation, and O&M costs. Allow for life-cycle optimization.	2
Organize multiple end-users to negotiate volume discounts.	2
Standardize protective relay systems to reduce/lower costs.	1
Provide equipment maintenance payback costs versus the end-users current system. (Where, who and ease of use?) [TARGET: Industrial automotive, chemical processors, steel, manufacturers.]	0
Demonstrate/document good maintenance program available to keep provide good availability. [TARGET: Distributor to End-User]	0
Utilize third party means to finance.	0

CATEGORY: Education

Market Development Group	<i>Leslie Farrar – Facilitator</i>
Educate Policy Makers and groups that influence policy makers (unions and trade groups) that Recycled Energy means jobs. Quantify supported by more efficient use of fuels, CHP systems require more work from steamfitters, plumbers, etc. (Public Benefits)	13
Public/Media Relations target major urban areas, businesses, and vertical specific (industrial, healthcare, schools). Focus on CHP success in addressing key energy issues: improved profitability, power reliability, social environmental stewardship, and economic development. Misc.)	12
Focus on architecture firms especially those working in markets where CHP is an easy fit: Higher Education, Healthcare, Industrial (Education)	12
Make buying a CHP system as easy as buying a car (with third party financing). (Cost Advantages)	12
Conduct “Awareness” conferences for end users, including Executive level managers. Tie in with recycling energy campaign. (Education)	9
Create CHP technology selection and feasibility analysis guides Example Targets: IL Capital Development Boards and LEEDs certified project (Education)	6
Promote via AEE, ASHRE, etc. local chapter meetings (Education)	4
Take template developed at CHP Roadmap workshop and hold a similar meeting for Stakeholders in that State. Use straw man for development of State Roadmap plan. (Misc.)	4
Quantify “public good” benefits (Public Benefits)	2
CHP as an alternative to new central power plants; security, power, jobs. (Misc.)	2
Need to identify and educates high thermal load end users. Possibly through natural gas suppliers or manufactures association (Education)	1
Target outreach messages and activities to high ROI opportunities (Education)	1
Detailed case studies by vertical market with economic specifics, testimonials, and access to reference site. (Education)	0
Emphasis/deemphasize of financial, reliability, efficiency issues to specific audiences (Customization to potential customer. (Education)	0
Free fuel focus: waste heat, biogas, etc.(Cost Advantages)	0
Advantages: cost, reliability, cleaner air. (Cost Advantages)	0

Issues provide post session – not voted on.	
<i>Incorporate CHP into various engineering college curriculums (M.E., E.E., etc.)</i>	N/A
<i>Identify target end-user. Identify what is important to communicate to that end-user and what is necessary to further the CHP in industry (reliability, economics, environmental, etc.) and with policy makers (jobs, economics, etc.)</i>	N/A
<i>Educate service community on CHP as applied to utilities; make CHP a required part of central plant planning.</i>	N/A
<i>Hold educational programs on different types of CHP.</i>	N/A
<i>Have equipment to loan to Industrial Assessment Centers (IACs).</i>	N/A
<i>Utilize “Marketing Briefs” (like those developed by GTI natural gas applications) to educate end-users.</i>	N/A

CATEGORY: Education

Regulatory Group	<i>Ted Bronson - Facilitator</i>
Conduct seminar on energy for non-engineers (Financial Institutions, Architects, End-Users, etc.).	9
Develop standard ("ANSI") terminology, specifications and standards for CHP (include pro forma line items).	9
Promote HUGE nationwide campaign for "Recycled Energy"	8
Involve Universities in CHP challenge (like solar car competition).	7
Develop and conduct training courses through ASHRAE (addressing the benefits and cost of CHP).	7
Include articles on CHP in major trade magazines.	7
Educate policy makers on benefits, reduce price volatility, increased reliability and reduced vulnerability.	4
Training through Architects Societies Organizations and Meetings.	2
Push for a real National Energy Policy that promotes benefits of CHP and how it lessens energy imports.	2
Develop speakers "pool" to address professional associations.	2
Write case studies for successful CHP installations.	2
Promote CHP through continuing education credit programs.	2
Use the "Recycled Energy" brand campaign to educate executive level decision makers in a way that is relevant to them.	1
Educate utilities to view CHP as an opportunity rather than a threat.	1
Develop and conduct a natural gas pricing and procurement strategy course.	1
Develop and use financial optimization model and use as a way to increase returns.	1
Teach the benefits of CHP in schools.	0
Educate Financial Institutions on CHP equipment reliability (to reduce financing cost).	0
Standardize specifications based on load profile, generation, chilling and steam.	0
Better define the value proposition of CHP – NOT just cost savings.	0
Develop and conduct system design Optimization and procurement course	0
Develop statistics on existing fleet of CHP installations include: life cycle length, percentage of outage time, and costs relative to \$/BTU and \$/kWh.	0
Develop specialized regional energy building profiler (LEEDS)	0

APPENDIX F Workshop Evaluation Form Results

1. What topics or parts of the Workshop were most valuable to you?

- The survey results were very valuable (2).
- The Breakouts were very helpful.
- Status of CHP in the Midwest
- Review on First-Day breakouts.
- Meeting with others in the industry and discussing the current situation with CHP.
- Developing Action Plans (2).
- Interaction of the small groups.

2. What suggestions do you have for continuing the dialogue beyond this Workshop?

- Would it make any sense to facilitate a similar mini-session with other stakeholders such as, electric utilities, commissioners, others?
- Send a copy of the Roadmap to all participants.
- Get the same groups together again on a conference call review.
- Find a way to pull the industry together with one “spokesman” organization.
- Issue newsletter and other types of communication from that “spokesman” organization to the industry members.
- Follow-up on activities or at least updates of where we are.
- Keep doing what you are already doing.
- Involve utilities more.
- E-mail.

3. Suggestions for improving future Workshops:

- Great location, easy to get to.
- Good facilitation.
- No suggestions for improvement
- Liked the fact that during breakout sessions that we moved away from structure from time-to-time.
- Review current analysis tools and databases.
- More opportunity to break into small groups within the groups also.
- Get more input from beyond Illinois.
- If we are going to break up into groups on east and west side of the room, maybe have assigned seating? (*Assume sarcastic remark about being assigned to different groups.*)
- Invite utility and public utility commissioners to participate to get their perspective.
- More structure – I know it would be hard because of there were a lot of people, ideas, and passion.

4. Additional comments or suggestions:

- I found out a lot of new information on what the Midwest CHP is capable of doing and is doing.
- Thanks for inviting me.
- Next time pick the top two or three topics for this meeting.
- Show progress and then let us work on the next steps.
- Great venue for the meeting.
- We are heading in the right track. It just takes time.
- RFP for Case studies from; students, lobbyist groups, manufacturers.
- More funding to IAC/MAC/DOE to purchase data gathering equipment for the IACs to put together a more informed and complete report for the MAC to base it's time, money and other resource allocation.