

2014 Minnesota CHP Stakeholder Survey:

Post-Engagement Results Report

Prepared For:

Minnesota Department of Commerce - Division of Energy Resources

Prepared By:



Table of Contents

Front Matter / Acknowledgements	3
Background and Methodology	4
Survey Sample	5
Findings and Analysis.....	6
Longitudinal Analysis.....	8
Conclusion and Next Steps	9
2014 Minnesota CHP Stakeholder Survey: Post-Engagement Results.....	11
Section 1: Demographics.....	11
Section 2: CHP Policy.....	16
Section 3: CHP Resources and Technology	22
Section 4: CHP Financing	23
Section 5: CHP Market Potential	25
Section 6: CHP Education and Training	27
Appendix A: Weighted Average Rank Formula	30

Prepared by:
Peter Douglass and Michael Burr
Microgrid Institute
17501 Ginger Rd.
Little Falls, MN 56345
(320) 632-5342 / mtburr@microgridinstitute.org
<http://www.microgridinstitute.org>

Prepared For:
Minnesota Department of Commerce, Division of Energy Resources
Contract No.: 81000

Acknowledgements

This report was prepared as part of a project supported by the Minnesota Department of Commerce, Division of Energy Resources, with funding provided by the U.S. Department of Energy (*Grant Number: DE-EE0006485*) under Title III, Part D, of the Energy Policy and Conservation Act.

Special thanks to: Jessica Burdette and Adam Zoet (Commerce); Michael Zimmer and Chris O'Brien (Microgrid Institute); and the many individuals, organizations, companies, and agencies that participated in this project.

Disclaimer

This report does not necessarily represent the view(s), opinion(s), or position(s) of the Minnesota Department of Commerce (Commerce), its employees or the State of Minnesota (State). When applicable, the State will evaluate the results of this research for inclusion in Conservation Improvement Program (CIP) portfolios and communicate its recommendations in separate document(s).

Commerce, the State, its employees, contractors, subcontractors, project participants, the organizations listed herein, or any person on behalf of any of the organizations mentioned herein make no warranty, express or implied, with respect to the use of any information, apparatus, method, or process disclosed in this document. Furthermore, the aforementioned parties assume no liability for the information in this report with respect to the use of, or damages resulting from the use of, any information, apparatus, method, or process disclosed in this document; nor does any party represent that the use of this information will not infringe upon privately owned rights.

Background and Methodology

The 2014 Minnesota Combined Heat and Power (CHP) Stakeholder Perspectives Survey seeks to gauge opinions and knowledge among a sample of people interested in CHP utilization in Minnesota and related regulatory policies and market factors. The Minnesota Department of Commerce, Division of Energy Resources (“Commerce”), commissioned the survey as the result of a grant from the U.S. Department of Energy to support stakeholder engagement in the development of a CHP action plan. This longitudinal survey was designed to assess perspectives before and after a series of CHP Stakeholder Engagement Meetings hosted by Commerce in St. Paul during September, October, and November 2014.

The initial (pre-engagement) survey questions focused on factors affecting deployment of CHP systems in Minnesota. Survey questions were divided into five categories:

1. Demographics and CHP Experience
2. CHP Policy
3. CHP Resources and Technology
4. CHP Market Potential
5. CHP Finance

The pre-engagement survey¹ was distributed on Monday, August 4, 2014 with initial notifications distributed via email to 112 recipients. Most recipients completed the survey online, with a few completing the survey by phone. By the survey’s close at 5:00 p.m. on Friday, August 15, 45 participants completed valid responses.

In part, the post-engagement meeting survey repeated questions from the pre-engagement survey, in order to measure changes in attitudes and opinions before and after the stakeholder engagement process. Additionally, the post-engagement survey sought to gauge perspectives on new topics and ideas that emerged during the stakeholder meetings. The post-engagement survey included questions divided into the same five question categories as the pre-engagement survey, with an additional category related to CHP education and training.

Microgrid Institute developed and performed this survey under the direction and review of Commerce. To support its work to develop survey questions, Microgrid Institute participated in all four CHP stakeholder engagement meetings, reviewed Commerce-commissioned reports and other industry literature, and interviewed subject matter experts on CHP markets, policy and legal issues, and finance and economics.

¹ See “CHP Pre-Engagement Stakeholder Survey Report”:
<http://mn.gov/commerce/energy/images/MG-PreEngagementSurvey.pdf>

Except for demographic questions, the post-engagement survey primarily used bounded-continuous answer formats to gauge a range of opinions and perspectives among respondents. Typical questions asked respondents to rate their agreement or disagreement with a series of statements, or asked respondents to rate a series of factors in terms of perceived importance. Microgrid Institute selected these question formats as best-practice methods to gauge respondents’ perspectives, including data illustrating changes in perspectives over the course of the stakeholder meetings.

The post-engagement survey was distributed on December 9, 2014, via email to 218 recipients, with 112 of these comprised of the pre-engagement survey sample and an additional 75 stakeholders identified through the meetings. All responses were collected online. The survey closed at 5:00 p.m. on January 2, 2015, having received 46 valid completed responses. Of these, 41 percent also responded to the pre-engagement survey.

Survey Sample

The sample for the CHP Stakeholder post-engagement survey was comprised of individuals and organizational representatives that Commerce and Microgrid Institute identified in the pre-engagement survey sample as well as those who attended one or more of the stakeholder meetings. Among respondents, about 93 percent reported attending at least one of the four stakeholder meetings, with 36 percent attending all four. Post-engagement survey respondents’ reported organizational affiliations are summarized as follows:

Organization Type	% of Responses
Utility	33
Advocacy groups	15
Consulting/legal/finance	15
Government	9
Institutional/ commercial	9
Industrial	7
Independent power producer	4
Other	8
TOTAL	100

Survey respondents were self-selected – meaning, they opted in to respond to the survey, and Microgrid Institute had limited control over demographic distribution of

responses from among the stakeholder sample. Additionally, the survey required respondents to provide valid contact information to determine whether A) they were among the sample group and B) they would participate in separate interviews on the survey subject. The survey assured respondents that their answers would be treated confidentially by Microgrid Institute and Commerce, and that survey results would be reported only in aggregate form.

Microgrid Institute conducted follow up emails and telephone notifications to increase survey response rates.

Findings and Analysis

Post-engagement survey responses reflect a wide range of knowledge, experience, and opinions related to CHP operations, markets, policies, and economics in Minnesota. The survey results for each of these major areas are summarized below.

CHP Experience, Technology and Operations: In general, respondents hold positive views toward CHP technologies, with substantial majorities agreeing that CHP technologies today:

- are effective and reliable (75 percent agree or strongly agree);
- produce substantial efficiency improvements (67 percent agree or strongly agree);
- can use a wide range of fuels (80 percent agree or strongly agree); and
- can serve a wide range of customer requirements (74 percent agree or strongly agree).

CHP Policy: Responses regarding CHP policies indicate a mix of perspectives, with generally more responses indicating that current energy policies and regulatory frameworks tend to impede CHP deployment in Minnesota.

Almost half (46 percent) of respondents agreed or strongly agreed with the statement that standby power tariffs are fair and non-discriminatory toward CHP systems owned by customers and third parties in Minnesota. In contrast, 39 percent of respondents disagreed or strongly disagreed with the same statement, while 15 percent neither agreed nor disagreed.²

46 percent of respondents ranked utility business interests and strategic conflicts as the most important hindrances to CHP deployment in Minnesota by utilities, with permitting and licensing showing the least hindrance. Uncertainties about applying CHP

² Totals exceeding 100 percent reflect aggregated responses indicating agreement and strong agreement.

toward utility Conservation Improvement Program (CIP) goals were identified as the second-most important hindrance to CHP deployment by utilities (43 percent of respondents), followed closely by uncertainty about rate-base treatment for CHP assets (42 percent).

In regard to CHP deployment by customers and third parties, 46 percent ranked standby power rates as the most important hindrance, with 39 percent ranking utility business conflicts as most important; with inadequate policy incentives following (30 percent).

Market Potential: With a rating average of 3.4 (on a scale of 1 to 6, with 6 being the best), respondents indicated that examining CHP potential of public facilities would be the most useful mapping initiative to help facilitate CHP deployment in the state. Examining the potential of heat recovery additions at existing generation facilities and studying economic development needs and opportunities both ranked second with rating averages of 2.6.

CHP Economics: Respondents indicated significant doubt about the economics of CHP under current market and policy conditions. 71 percent of respondents disagreed or strongly disagreed that commercial financing allows CHP system payback periods sufficient to support economic deployment. In addition, 68 percent disagreed that environmental and renewable energy incentives adequately support commercial financing for CHP systems while 61 percent disagreed that efficiency incentives also support it.

When evaluating CHP projects, 85 percent of respondents identified cost effectiveness as the most significant criteria. This includes energy cost savings potential, energy efficiency, spark spread, investment returns and risk-reward factors. 73 percent rated customer criteria including demand for CHP outputs, local fuel production capabilities and constraints and resilience factors as the second most important.

Education and Training Needs: Respondents indicated that case studies (46 percent) and site tours (46 percent) followed by technical school courses (45 percent) were most useful education resources needed to help facilitate CHP deployment in the state. Only about one-third of respondents agreed that Minnesota colleges and universities provide adequate technical training to produce qualified CHP operation and maintenance professionals.

Longitudinal Analysis

While responses in the pre-engagement and post-engagement surveys indicated no major trends in shifting perspectives, some longitudinal variances³ were observed.

Demographics: The proportion of respondents identifying themselves as utility representatives increased from 26 percent to almost 33 percent.

CHP Experience, Technology and Operations: There was a decline (from 84 to 75 percent) in the number of respondents who agree or strongly agree that commercially available CHP technologies today to be effective and reliable, while those who believe that commercial CHP technologies can use a wide range of fuel choices increased from 63 to 80 percent.

CHP Policy: For policy issues, in terms of how substantially various policy factors hinder CHP deployment by utilities in Minnesota, respondents consistently placed utility strategic conflicts or business interests along with uncertainty about applying CHP toward meeting utilities' CIP goals among the most important issues. These were followed respectively by uncertainty about rate-base treatment for CHP assets and a utility's inability to monetize system-wide values for CHP assets, both of which ranked as important hindrances in both surveys.

Between the pre- and post-engagement surveys, standby power rates went from ranking third to first as a policy issue hindering CHP deployment by customers and third parties in Minnesota. Utility strategic conflicts, ranked first in the pre-engagement survey, moved to second, while inadequate policy incentives shifted from second to third in the post-engagement survey. Overall, responses consistently identify these factors as the three most important hindrances to customer/third-party CHP development. Moreover, respondents in the post-engagement survey selected transparent and fair standby rate policies as the most effective policy initiative (43 percent ranked among top three choices).

At the same time, however, respondents increased their estimation of the fairness of standby power tariffs toward customer/third-party-owned CHP; 19 percent of respondents in the pre-engagement survey agreed or strongly agreed that standby rate policies are fair and nondiscriminatory, while 46 percent agreed with the statement in the post-engagement survey. This major variance is attributable to a decline in those

³ Longitudinal analysis compares and contrasts all response results between the pre- and post-engagement stakeholder surveys. Comparing responses of only the 41 percent of post-survey respondents who completed the pre-engagement survey produces an inadequate sample for meaningful comparative analysis.

who either disagreed or neither agreed or disagreed with the statement (a decline from 73 percent pre-engagement to 57 percent post-engagement).

This is a significant change in perspectives, but its significance is unclear given its juxtaposition with respondents' rising estimation of standby rates as a policy hindrance. Comparatively, respondents also increased their estimation of the fairness of utility interconnection policies (44 percent judged them to be fair and non-discriminatory in the post-engagement survey, vs. 30 percent pre-engagement) and net-metering tariffs (up to 40 percent from 19 percent). These changes may be attributable, in part, to the information presented in the stakeholder meetings. It also may correlate with the increase in respondents representing utilities in the post-survey.

Market Potential: Those who disagree or strongly disagreed that commercial financing allows CHP system payback periods sufficient to support economic deployment rose from 46 to 71 percent, pre- and post-engagement, respectively. Conversely, the number of respondents who agreed or strongly agreed with the view that CHP systems are cost-effective enough to allow substantial new deployment rose from 26 to 32 percent. These changes may reflect stakeholders' improved understanding that CHP can be cost-effective, but that project investments require low-cost financing that can be difficult to obtain.

Conclusion and Next Steps

To the degree the State of Minnesota determines that CHP represents a potential solution to achieve the state's energy goals, Minnesota policies should, at a minimum, treat CHP in a fair and nondiscriminatory manner, and regulatory frameworks should avoid discouraging or preventing CHP deployment – either by utilities or customers and third parties.

The post-engagement meeting survey results suggest that respondents believe the following are among the most important initiatives⁴ the State could implement to facilitate CHP deployment:

1. Introduce transparent, unbundled pricing for standby rates (43 percent)
2. Establish CHP project evaluation methodologies and criteria (39 percent)
3. Include CHP as a supply-side opportunity in the Electric Utility Infrastructure program under CIP (38 percent)

⁴ *i.e.*, They ranked these issues among the three most effective policy initiatives to facilitate CHP deployment in Minnesota.

Respondents' #1 rating of standby rate transparency reflects stakeholders' expressed interest during CHP stakeholder engagement process in ensuring standby rate policies are effective and fair. Likewise, stakeholders' survey responses are consistent with their expressed interest in proposed initiatives to establish standard CHP project evaluation methodologies and CIP EUI provisions for CHP.

Results from the pre- and post-engagement CHP stakeholder surveys will support Minnesota's ongoing efforts to evaluate options and develop a CHP Action Plan.

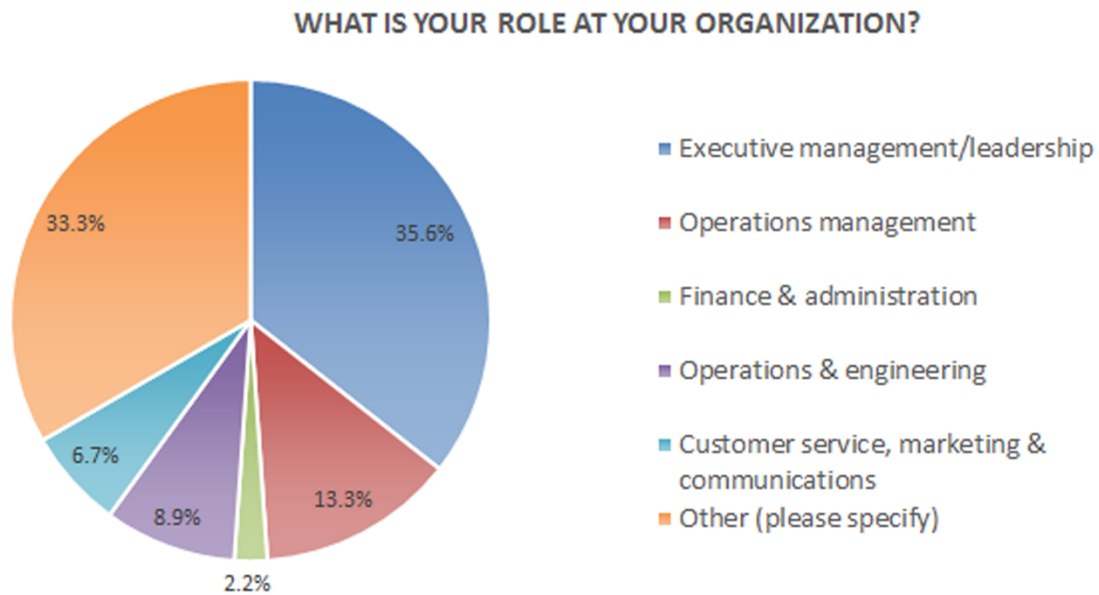
Questions about either the pre-engagement, or post-engagement survey and related reports should be directed to Microgrid Institute:

- Peter Douglass (pdouglass@microgridinstitute.org / 320-493-1923)
- Michael Burr (mtburr@microgridinstitute.org / 320-632-5342)

2014 Minnesota CHP Stakeholder Survey: Post-Engagement Results

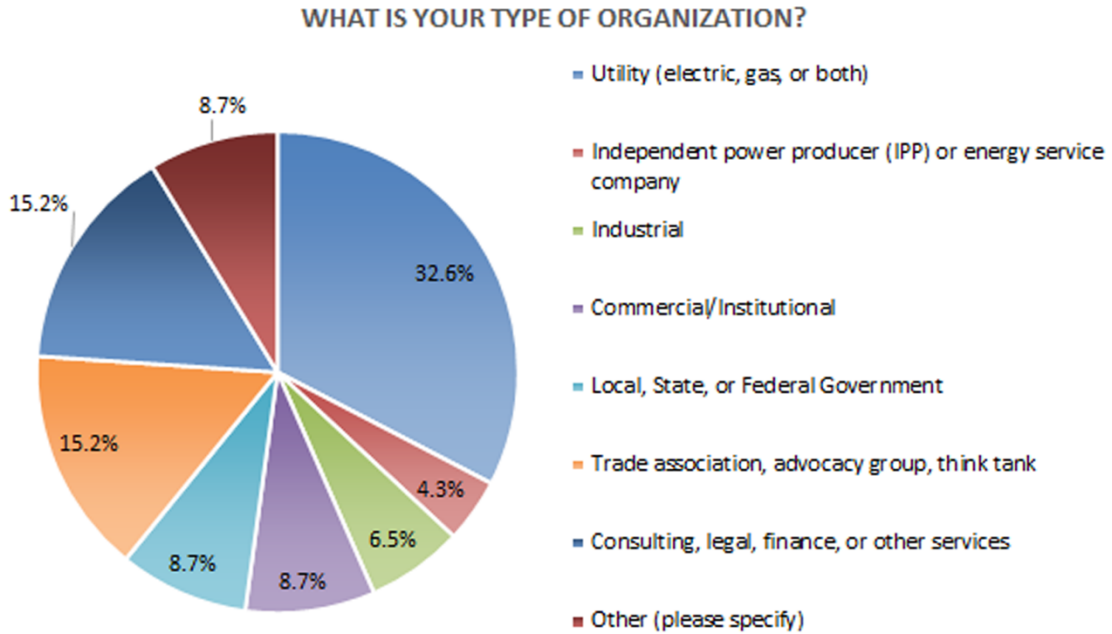
Section 1: Demographics

1. What is your role at your organization?



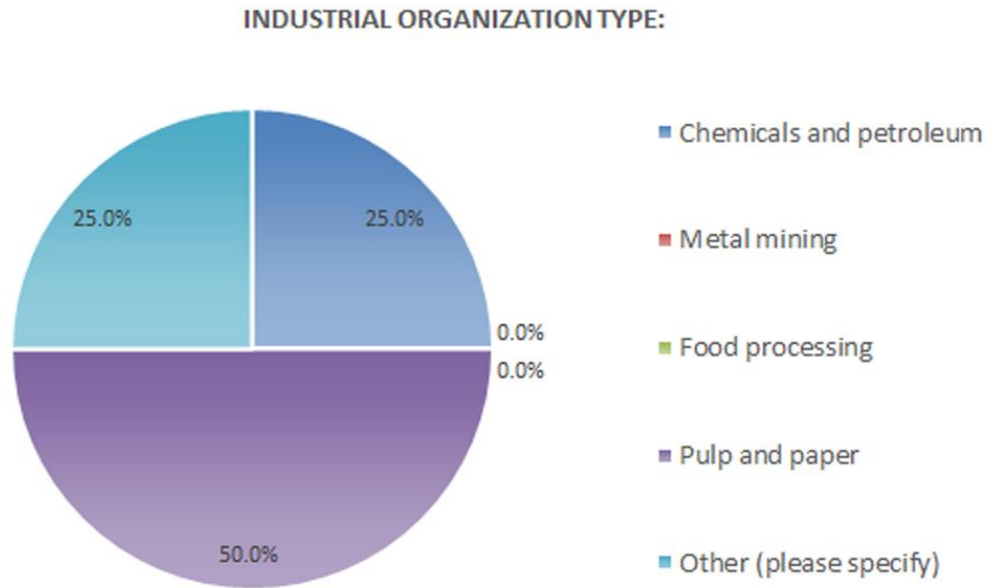
Most attendees (36%) held executive management or leadership roles at their organization. The "Other" category comprised mostly of regulatory and policy related positions followed by planning positions and consultants.

2. What is your type of organization?

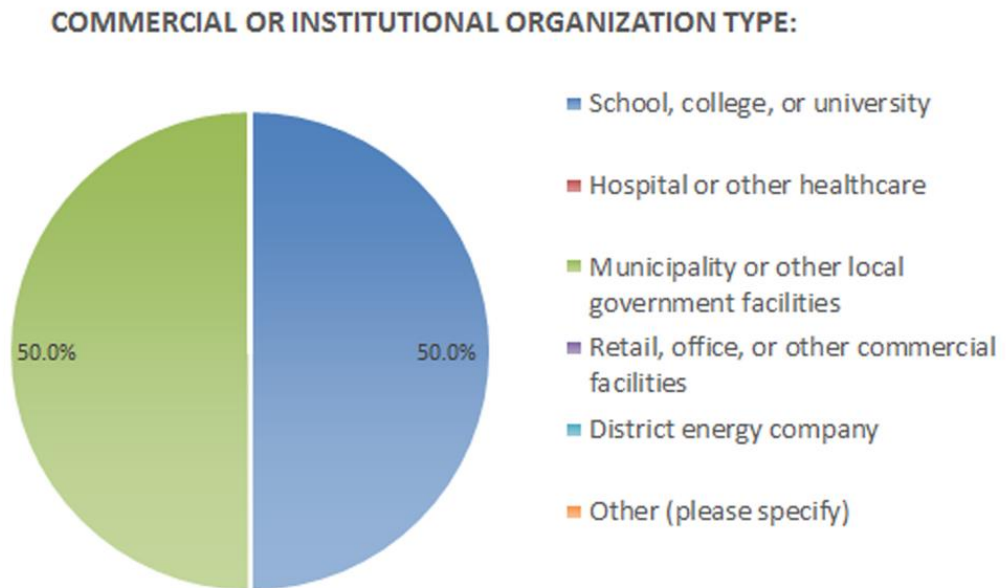


Most (33%) attendees held positions at utilities (gas and electric) with consulting and advocacy groups following at 15% respectively.

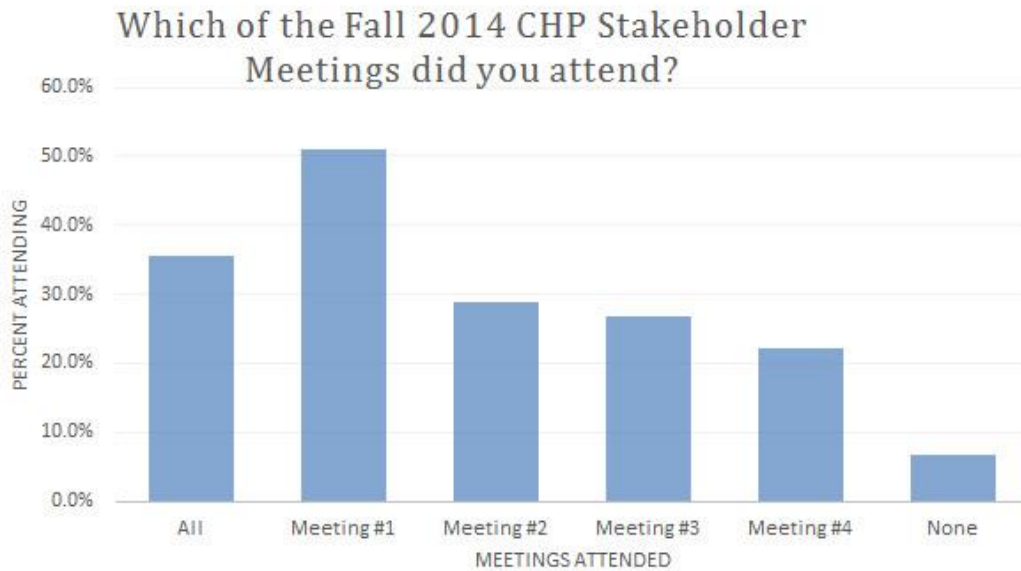
3. Industrial organization type:



4. Commercial or Institutional organization type:



5. Which of the fall 2014 CHP Stakeholder Meetings did you attend?



6. When you attended the CHP stakeholder meetings, were you seeking a specific solution to a business need or problem?

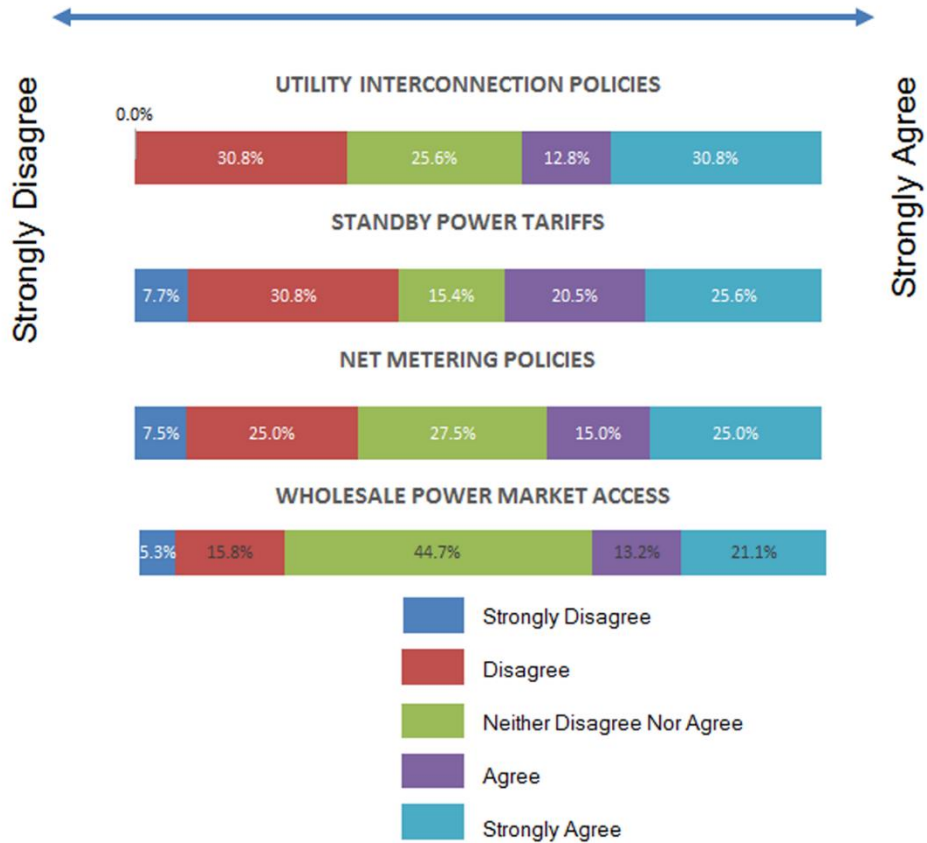
If you responded "Yes," what was that need?

1. *Address barriers to CHP in Minnesota. Learn more about how CHP might be integrated into existing or new MN policy*
2. *Broaden acceptance of CHP.*
3. *Gaining understanding of possible legislation. Learning about potential, costs, and benefits of CHP.*
4. *Guidance on funding support and key metrics for planning, evaluating and completing a CHP project*
5. *Ideas to overcome obstacles to building a CHP*
6. *In part looking for how funding mechanisms and policies impact implementation/operation of a CHP facility fueled from biogas produced from the wastewater treatment process.*
7. *Information as to regulation and policies in regards to ownership and standby rates in regards to our combined heat and power project that we have planned.*
8. *Interested in the prospect of state funding/matching grants for CH&P systems.*
9. *Lack of consumer and producer incentives as well as prohibitive utility policies for increasing the proliferation of combined heat and power systems*
10. *My interest was learning of CHP as a possible solution to smaller communities reliant on propane.*

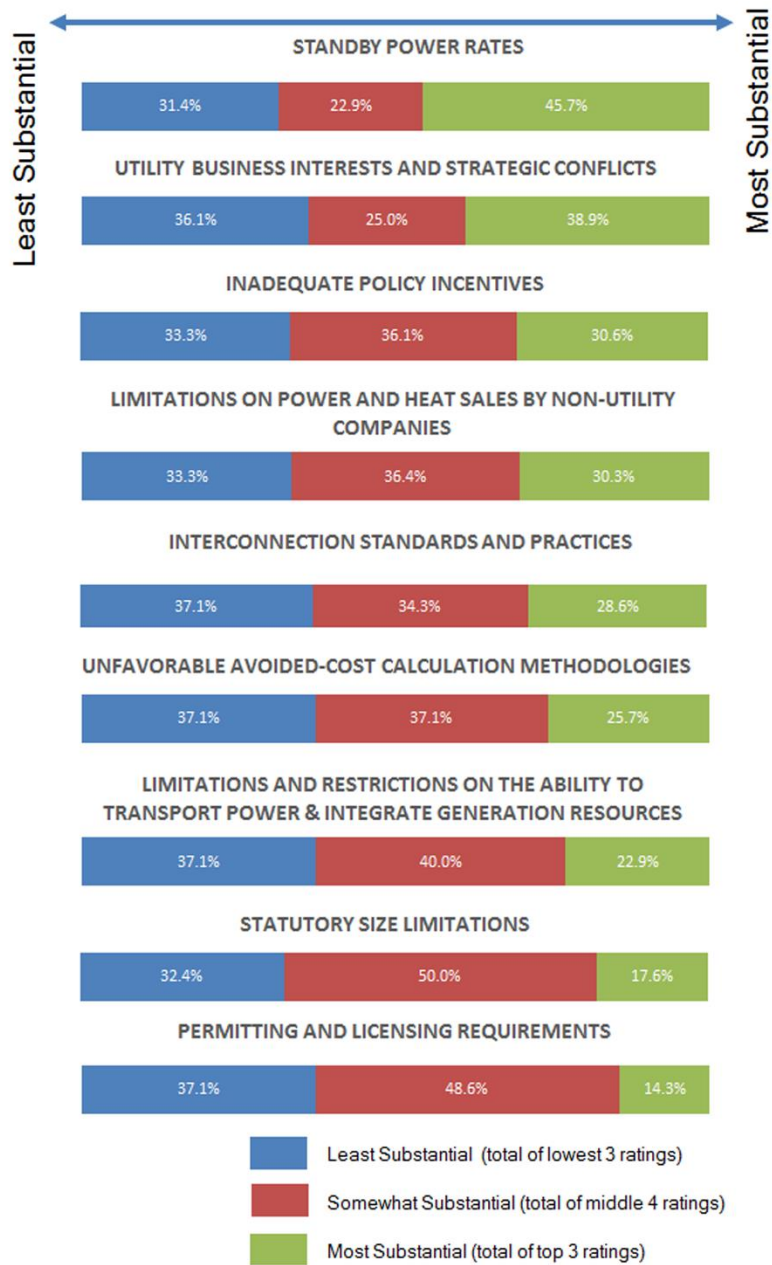
11. *Opportunities for CHP to be credited in the State of Minnesota through existing or new utility programs.*
12. *Primary purpose was to gain knowledge of the subject matter and the overall process.*
13. *Project implementation issues. Standby costs.*
14. *Pursuing regulatory reform to support cost recovery for utility-owned CHP projects.*
15. *State review of unwarranted standby rates and other barriers to CHP & WHP deployment in MN; Inclusion of CHP and WHP in MN CIP or alternative energy incentive programs; Structuring of state and utility programs to most effectively incentivize CHP & WHP project development.*
16. *To gain an understanding of all stakeholder perspectives, ideas, concerns; to get an introduction to the overall DOC process*
17. *We were looking for a deeper understanding of how CHP could benefit large industrial users. Also, to understand the technology capabilities.*
18. *We were seeking information, analysis, and policy options on pathways Minnesota could pursue to remove regulatory and market barriers to CHP in the state, and opportunities to create incentives for greater deployment of CHP in the state.*
19. *We plan to install bio-gas fueled engine generators to supply electricity and heat for our processes.*

Section 2: CHP Policy

- Please indicate the degree to which you agree or disagree that each of the following policies is fair and nondiscriminatory towards customer- and/or third-party-owned CHP systems in Minnesota.



8. On a scale of 1-10 please rate the following policy issues in terms of how substantially they hinder CHP deployment by customers and third parties in Minnesota. (With 10 being the most substantial and 1 being the least substantial)



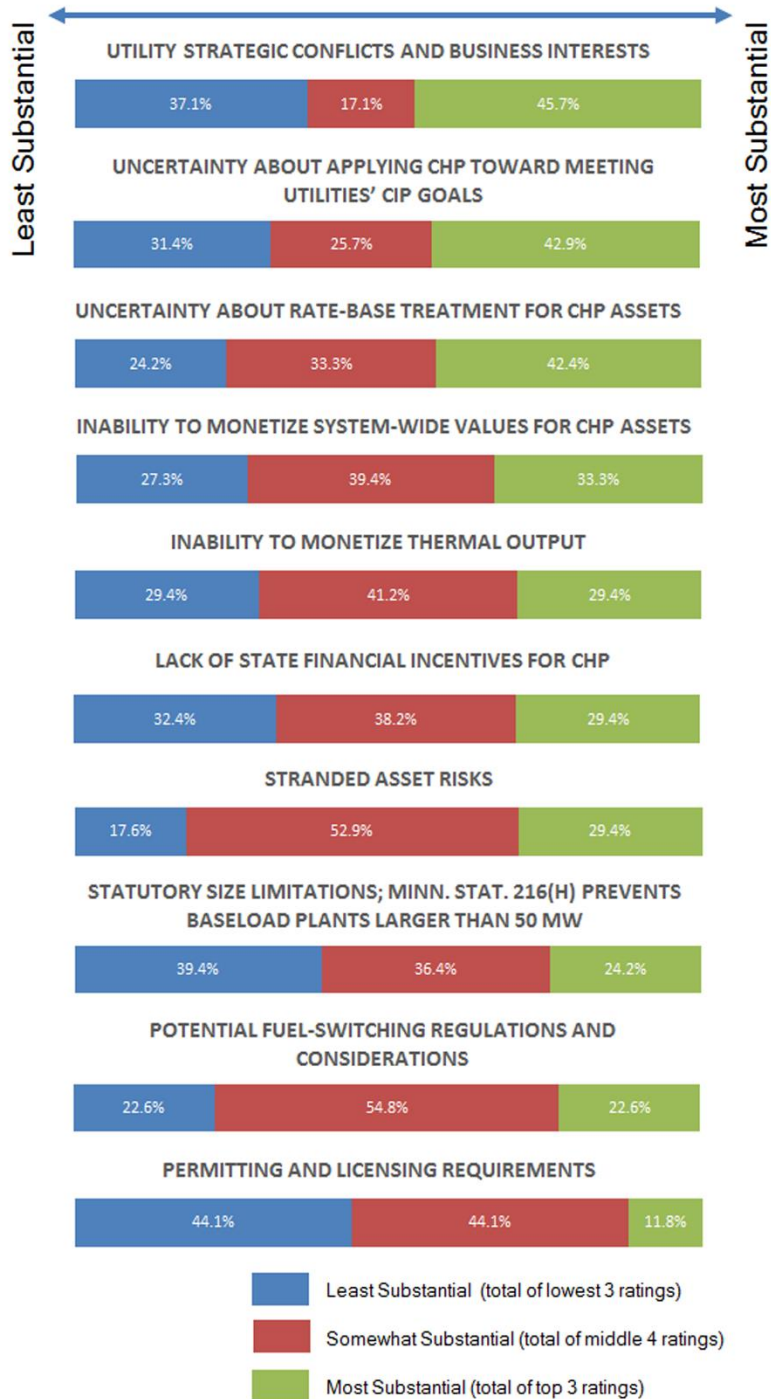
Other Comments:

1. Lack of project finance
2. Low utility "avoided cost" calculations
3. Market Potential and low avoided costs are the largest barriers
4. Project economics

5. *The biggest obstacle is that in most instances, it doesn't make financial sense for customers or third parties to invest in CHP.*
6. *Transparency of standby rates and interconnection costs*

Continued on next page

9. On a scale of 1-10 please rate the following policy issues in terms of how substantially they hinder CHP deployment by utilities in Minnesota. (With 10 being the most substantial and 1 being the least substantial)

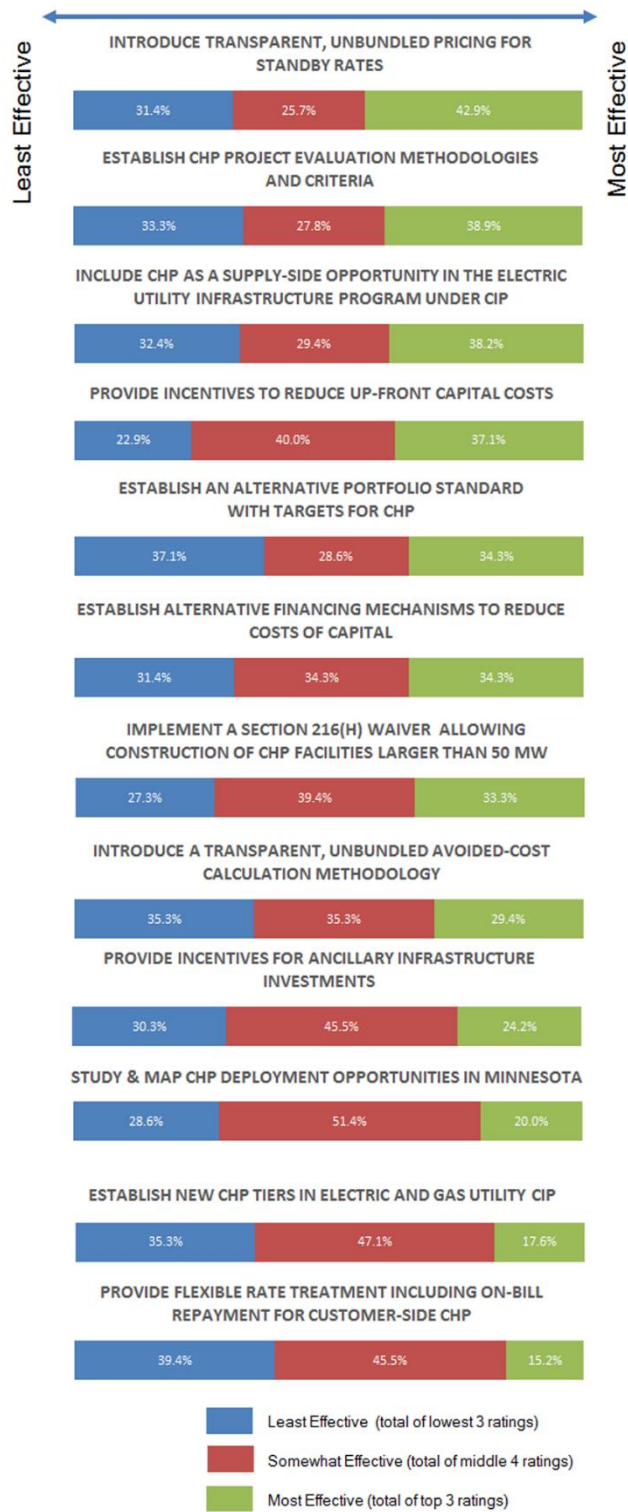


Other Comments:

1. *Complexity of multi-party partnerships*

Continued on next page

10. On a scale of 1-10, please rate of the following initiatives the state could consider implementing to help facilitate CHP deployment in Minnesota. (With 10 being the most effective and 1 being the least effective)

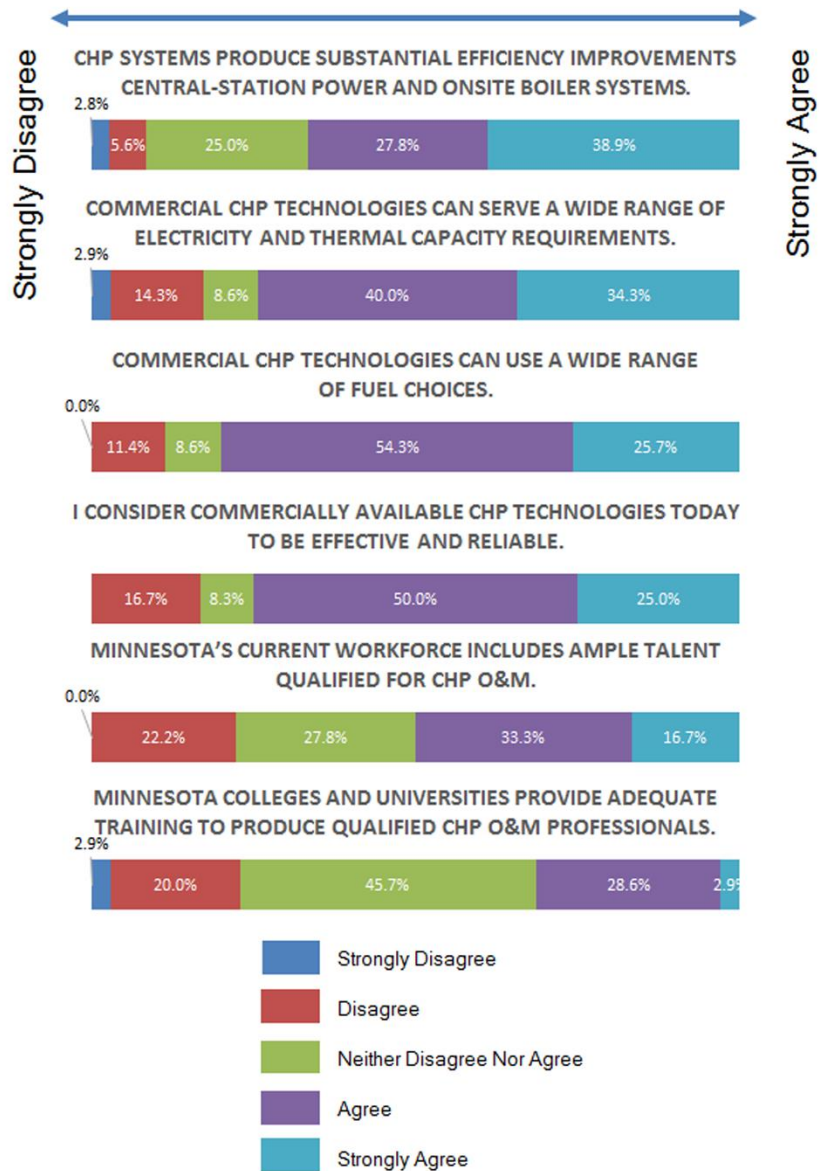


Other Comments:

1. ANY Utility Owned/Operated DG should be allowed to be rate-based.
2. Require consideration of CHP in IRP

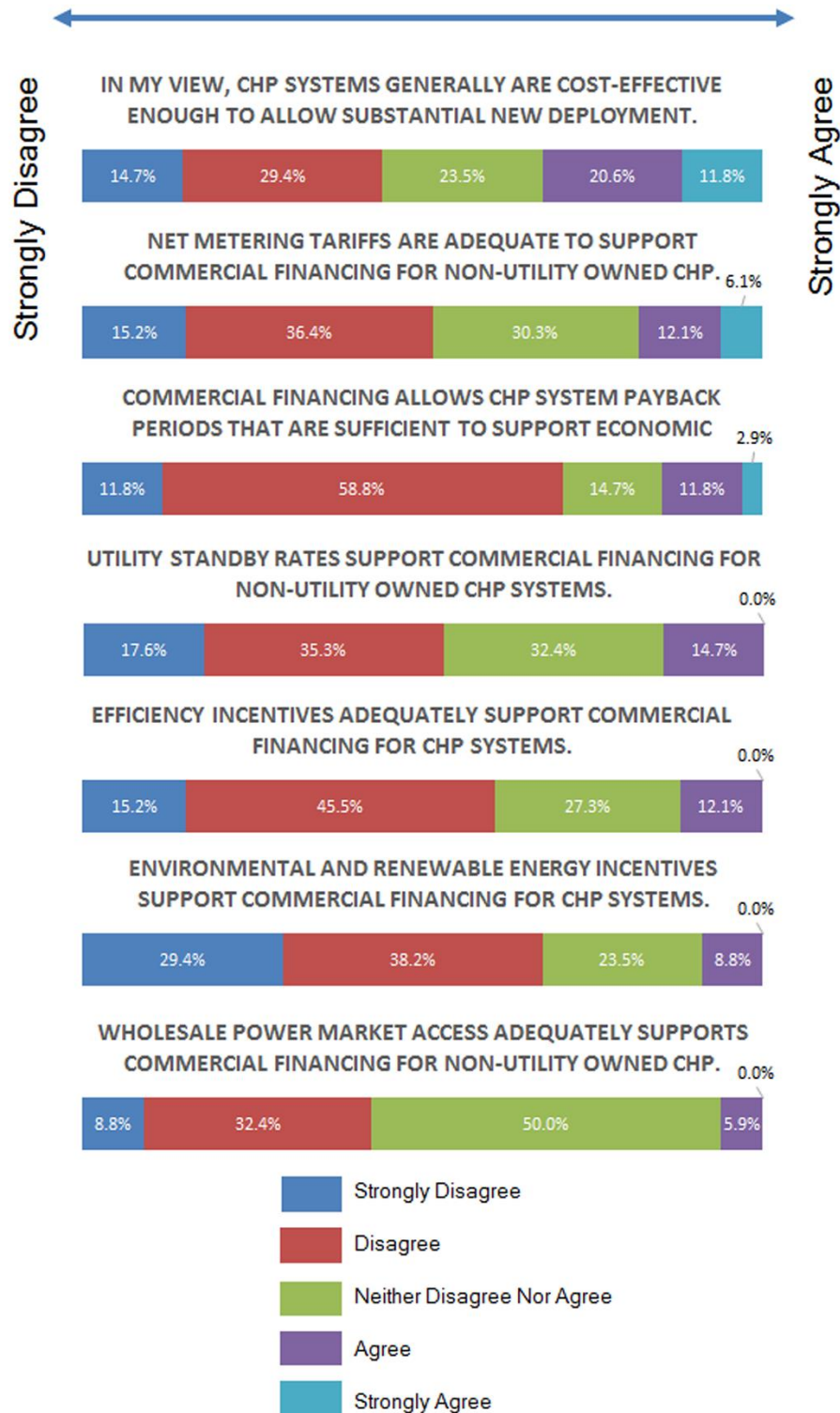
Section 3: CHP Resources and Technology

11. Please indicate the degree to which you agree or disagree with the following statements.

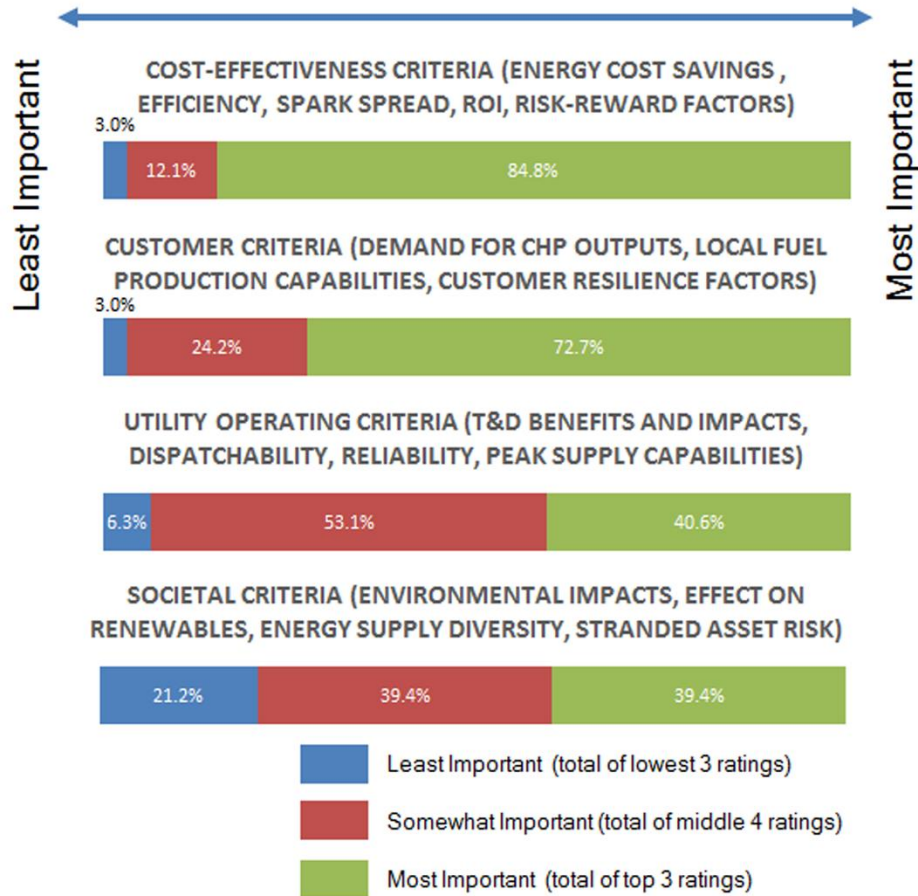


Section 4: CHP Financing

12. Please indicate the degree to which you agree with the following statements as they apply to CHP in Minnesota today.



13. In terms of their importance, please rate each of the following categories of criteria for ensuring CHP projects are evaluated appropriately (1=least important, 10 = most important).



Other Comments:

1. Each of these criteria has different levels of importance in different regulatory and market contexts. So while all of them are relatively very important, each of them carry more weight depending on the context in which CHP projects are being evaluated.

Section 5: CHP Market Potential

- 14. Rank the following CHP mapping initiatives that would be most useful and effective to facilitate CHP deployment in Minnesota. (Rank with 5 being the most useful and 1 least useful):**



- 15. What specific areas of CHP development would you be interested in learning more about?**

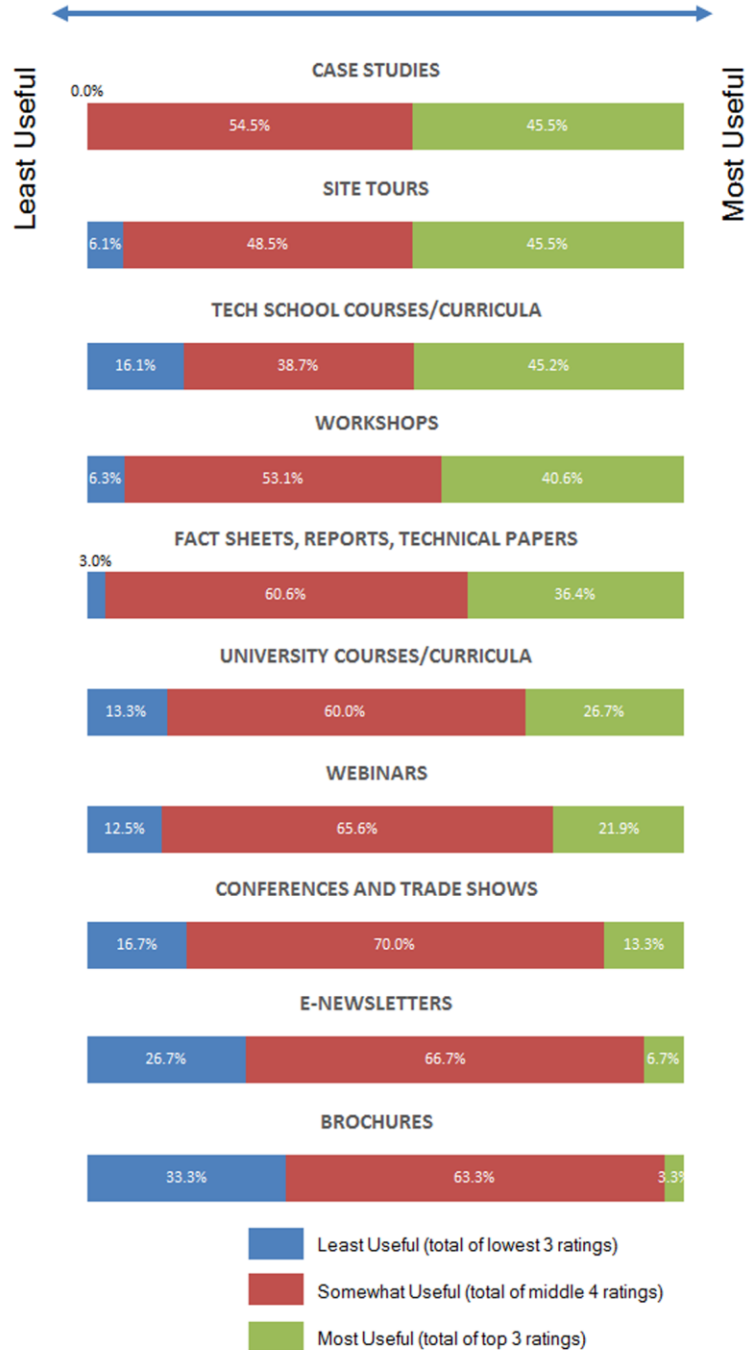
- 1. Any and all! Especially: Economic evaluation criteria and methodology, advances in CHP technologies; integration of CHP into the "smart grid"*
- 2. Legislative initiatives*
- 3. Look at locating thermal load where existing generation exists that could be transitioned to CHP, or installing pipelines to take recovered heat to where it can be used. Don't limit to just examining public facility CHP potential. Can be broadened. Examine where CHP already exists, is it possible to increase the thermal load to increase cogenerated electricity, or expand the use of CHP. Redevelopment opportunities, including brownfields, are locations where thermal load can be aggregated to support CHP.*

4. *Opportunities for CHP deployment at MN ethanol/biofuels plants; Opportunities for CHP deployment at MN WWTPs; Moderated roundtable discussions with utilities, CHP developers and end-users to discuss perceived issues*
5. *Renewable Based and best available technology.*
6. *Renewable fuel CHP sources and applications.*
7. *Rural manufacturing development potential of CHP in economic development packages.*
8. *Wastewater Treatment*

Continued on next page

Section 6: CHP Education and Training

16. In terms of usefulness please rate the following education, training, and information resources needed to support CHP deployment? (With 10 being the most useful and 1 being least useful)



Other Comments:

1. *Robust state and utility website CHP & WHP pages describing available financing programs and incentives*

17. Are you willing to take part in a separate interview on these topics?

71% of respondents indicated they would be willing to take part in a separate interview on CHP while 29% said they would not.

18. Use this portion for any additional comments:

1. *Answers provided are supported by the NSPM CHP Market Potential Study conducted by EPRI this fall and filed with our comments to the MN DOC in October 2014. Unanswered questions are deemed inconsistent with the intent of the utility's regulatory compact.*
2. *CHP is a fascinating technology which includes many benefits. Unfortunately this technology's application has economic potential in very few areas. While the technology does have its merits it does not fit within CIP as a demand side resource. With very limited economic potential opportunities, it seems using a "stick" and requiring new standards or mandates could penalize certain areas of the State. Any use of ratepayer or taxpayer funds for economic development should be used in all corners of the state. The best CHP opportunities may exist at current generating sites.*
3. *Great job! The fall meetings were well run and comprehensive. Many thanks to the Department for providing this forum and the focus on CHP and WHP program options. We look forward to seeing the Action Plan. Happy holidays!*
4. *I know enough to be dangerous about CHP, but I am confident distributed CHP facilities would enhance resiliency and remove market volatility by reducing reliance on propane (specific to rural communities).*
5. *My personal opinion is that customer/3rd-Party owned/operated CHP (or DG in general) must not be allowed to generate more electricity than can be consumed "behind the meter" - at least not yet. Distribution Grids, as they currently exist, were planned, designed and constructed for one-way electricity flow. It would be pre-mature to assume that utilities have the resources, today, to be capable of making significant Grid upgrades and/or plan, design, construct new Grids capable of supporting a "dynamically evolving" energy system. I believe a thoughtful, mutually agreed to, "staged" approach will help both customers and utilities develop the Grid of the Future.*
6. *Sure, but our background in implementation is quite limited.*
7. *The keys to CHP development in Minnesota are: (1) Remove 216H restriction (2) Establish a mechanism whereby an entity can "buy space" (\$ per Megawatt per mile) on the transmission grid to allow CHP producers to generate their own electricity, transport it across the grid, and use it to displace retail purchased electricity. This type of structure would radically improve the economics of CHP's. The mechanism would be similar to tariffs charged on a common carrier pipeline.*
8. *The line of questioning within this survey seems to be operating under the assumption that CHP facilities inherently generate value for end use customers and non-CHP participants due to the value that is provided to the grid. The current economic picture with respect to CHP does not necessarily lead to this conclusion. For utilities that have no*

need for new generation resources CHP does not represent a benefit to their end use consumers. The discussions around incentives and policy treatment are geared towards trying to ensure that these types of systems will be developed, which can occur if the incentives and favorable treatment are great enough. But an incentive based rationale for major investments such as CHP has not played out favorably in past development scenarios such as renewable energy development. The approach to CHP development must rely on a need based approach.

- 9. Third party investors will be the single most influential driver behind any CHP deployment. Therefore, CHP will only reach its deployment potential with adequate incentives for those investors. By way of example, the federal 1603 tax credit program stimulated significant CHP development nationwide, but was not renewed.*
- 10. This is not my expertise nor do I have any background in CHP projects or potential.*
- 11. Two concerns: Renewable energy opportunities and Carbon free generation. It is not addressed in any CHP discussions.*

- END OF SURVEY REPORT -

Appendix A: Weighted Average Rank Formula

Ranking questions calculate the average ranking for each answer choice to determine which answer choice was the highest ranked overall. The largest average ranking number indicates the top answer choice. When presented on a bar graph, for example, the longest bar will logically correspond with the highest ranked answer choice. The weighted ranking results are produced by the source application and cannot be adjusted by the survey administrator.

The ranking average is calculated as follows, where:

w = weight of ranked position

x = response count for answer choice

$$\frac{X_1W_1 + X_2W_2 + X_3W_3 \dots X_nW_n}{\text{Total}}$$

(Source: SurveyMonkey)

Appendix C:
Survey Response Data

[Please see separate XLS files containing raw survey response data from pre- and post-engagement CHP stakeholder surveys.]