

Final Combined Heat and Power Action Plan (Unabridged Report)

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Recommendations Prepared for:

**Office of Energy Efficiency and Renewable Energy,
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Submitted by:



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Introduction and Background

Statement of Purpose

The Minnesota Department of Commerce, Division of Energy Resources (Commerce) has a long-standing history of developing and implementing energy efficiency and renewable energy initiatives to achieve Minnesota's statewide public policy goals.¹ The efficient use of energy in all sectors is vital to the health of Minnesota's economy and environment. Using energy more efficiently can help consumers lower their utility costs and remain competitive in global markets while also reducing greenhouse gas (GHG) emissions and other pollutants. Energy efficiency improvements also benefit ratepayers by reducing the need for new utility infrastructure, lowering energy costs, and reducing emissions.

A primary goal of Minnesota's State Energy Office, housed within the Department of Commerce, is to accelerate market acceptance of high-efficiency and renewable energy technologies and practices. The State Legislature has long recognized the fact that Minnesota has no fossil fuel resources native to the state, only renewable energy and energy conservation. As a result, priority has been placed on diversifying fuel sources that are not imported into Minnesota and consuming less energy across all sectors.²

Utility Conservation Improvement Programs (CIP) are a significant source of energy efficiency activity in Minnesota and a cornerstone for achieving the statewide energy efficiency resource standard. Providing technical assistance and evaluating energy efficiency programs and technologies are key roles of Commerce's staff.³ Commerce staff manage the regulatory compliance and provides technical assistance for over 180 electric and natural gas utilities to ensure that ratepayer dollars are used cost-effectively and that energy savings are measurable and verifiable. As part of this function, staff regularly evaluate specific technologies that can help consumers be more efficient

“The legislature further finds that cost-effective energy savings should be procured systematically and aggressively in order to reduce utility costs for businesses and residents, improve the competitiveness and profitability of businesses, create more energy-related jobs, reduce the economic burden of fuel imports, and reduce pollution and emissions that cause climate change”
-MN Statute 216B.2401,
Energy Savings Policy Goal

¹ “216C.09 Commissioner Duties - 2015 Minnesota Statutes.” *The Office of the Revisor of Statutes*, 2015. <<https://www.revisor.mn.gov/statutes/?id=216C.09>>.

² “216B.2401 Energy Savings Policy Goal - 2015 Minnesota Statutes.” *The Office of the Revisor of Statutes*, 2015. <<https://www.revisor.mn.gov/statutes/?id=216B.2401>>.

³ “216b.241 Subd. 1d - 2015 Minnesota Statutes.” *The Office of the Revisor of Statutes*, 2015. <<https://www.revisor.mn.gov/statutes/?id=216B.241>>.

in their homes and businesses as well as help utilities sustainably achieve their respective energy savings goals.

Minnesota has several statewide energy policy goals established by law and codified in statute and rules, including:

- Energy-saving goals for electric (1.5 percent of annual retail sales) and gas (1.0 percent of annual retail sales) utilities that operate in the state of Minnesota through CIP.⁴
- A goal that twenty-five percent of the total energy used in the state be met from renewable energy resources by the year 2025.⁵
- GHG emission goals of fifteen percent by 2015, thirty percent by 2025, and eighty percent by 2050.⁶

Additionally, on August 3, 2015, the Environmental Protection Agency (EPA) released the Clean Power Plan Final Rule, setting state targets for carbon dioxide (CO₂) emissions from existing fossil fuel fired power plants.⁷

Combined heat and power systems (CHP) can potentially help support the key policy goals described above by increasing the average efficiency of Minnesota’s electric and thermal generation systems, reducing aggregate greenhouse gas emissions, and improving the energy security and resilience of local energy systems.

To this end, as part of the Energy Savings Goal Study required by the State Legislature in late 2013, Commerce evaluated CHP as a potential cost-effective clean energy technology within the regulatory frameworks established by the 2007 Next Generation Energy Act and as a means to, in part, achieve Minnesota’s energy policy goals. Commerce conducted a series of stakeholder meetings—including two technical work group meetings focused specifically on CHP—and delivered a report on findings and recommendations to the legislature and stakeholders.⁸

“CHP can potentially help support key policy goals by increasing the average efficiency of Minnesota’s electric and thermal generation systems, reducing aggregate greenhouse gas emissions, and improving the energy security and resilience of local energy systems.”

⁴ “216b.241 Energy Conservation Improvement - 2015 Minnesota Statutes.” *The Office of the Revisor of Statutes*, 2015. <<https://www.revisor.mn.gov/statutes/?id=216B.241>>.

⁵ “216B1691 Renewable Energy Objectives - 2015 Minnesota Statutes.” *The Office of the Revisor of Statutes*, 2015. <<https://www.revisor.mn.gov/statutes/?id=216B.1691>>.

⁶ “216H.02 Greenhouse Gas Emissions Control - 2015 Minnesota Statutes.” *The Office of the Revisor of Statutes*, 2015. <<https://www.revisor.mn.gov/statutes/?id=216H.02>>.

⁷ “Clean Power Plan Final Rule.” U.S. *Environmental Protection Agency*, Aug. 2015. <<http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule.pdf>>.

Through the Conservation Applied Research and Development (CARD) program, Commerce also funded two CHP research studies that are specific to Minnesota’s technical potential and regulatory issues related to CHP development.⁹ The first study, “Analysis of Standby Rates and Net Metering Policy Effects on CHP Opportunities in Minnesota” by the Energy Resources Center, examines the effects of existing standby rates and net metering rules on CHP and waste heat-to-power projects.¹⁰ The second study, “Minnesota CHP Policies and Potential” by FVB Energy, evaluates CHP regulatory issues and policies and develops an up-to-date analysis of CHP technical and economic potential.¹¹

To continue to build on Commerce’s CHP analysis and findings and focus on more specific policy details and recommendations, Commerce sought to leverage existing federal funding and was awarded a U.S. Department of Energy (DOE) grant to carry out a strategic stakeholder engagement process and develop an Action Plan for CHP deployment in Minnesota. The goal of this project was to explore current barriers and potential solutions to CHP implementation in the state informed by the stakeholder work and analyses conducted previously. Commerce held a series of stakeholder meetings between September and November 2014 to provide information and facilitate discussion on CHP issues involving Minnesota’s regulatory framework, technical and economic potential, and education and training needs. The objective of these public meetings was to:

1. *Inform Stakeholders* about current activity underway to evaluate CHP technologies and potential implementation.
2. *Facilitate discussion* regarding barriers and opportunities for deployment of CHP technologies.
3. *Solicit ideas* for solutions to the challenges presented during discussion of CHP implementation.
4. *Provide information* of the necessary steps to increase CHP activity in Minnesota.

⁸ Burdette, Jessica and Adam Zoet. “Energy Savings Goal Study and Stakeholder Process Legislative Report.” *Minnesota Department of Commerce*, Apr. 2014. <http://mn.gov/commerce/energy/images/ESG-Legislative-Report_Final.pdf>

⁹ “CARD Grant Program.” *Minnesota Department of Commerce*, 2015. <<http://mn.gov/commerce/energy/utilities/conservation/Applied-Research-Development/>>.

¹⁰ Miller, Graeme, Cliff Haefke, and John Cuttica. “Analysis of Standby Rates and Net Metering Policy Effects on CHP Opportunities in Minnesota.” *Energy Resources Center*, Apr. 2014. <<http://mn.gov/commerce/energy/images/SRNMPE-CHP-Opportunities.pdf>>.

¹¹ Spurr, Mark and Anne Hampson. “Assessment of the Technical and Economic Potential for CHP in Minnesota.” *FVB Energy and ICF International*, Jul. 2014. <<http://mn.gov/commerce/energy/images/CHPTechnicalandEconomicPotential.pdf>>.

Spurr, Mark. “Minnesota Combined Heat and Power Policies and Potential.” *FVB Energy*, Jul. 2014. <<http://mn.gov/commerce/energy/images/CHPRegulatoryIssuesandPolicyEvaluation.pdf>>.

Based on the findings of the CHP stakeholder engagement process and Commerce’s CHP studies, Commerce prepared this Final CHP Action Plan as a deliverable for the DOE grant. The purpose of the Action Plan is to summarize the key findings of Commerce’s CHP work, and to synthesize these findings to inform clear and achievable recommendations that could help lead to potential CHP implementation in Minnesota.

Minnesota Department of Commerce’s Previous CHP Work

The stakeholder engagement process carried out as part of the DOE grant built upon Commerce’s past CHP work and focused on more specific policy issues and recommendations. This section summarizes the key outcomes of Commerce’s CHP studies and efforts that led up to and helped inform the DOE CHP stakeholder process.

Energy Savings Goal Study (2013-2014)¹²

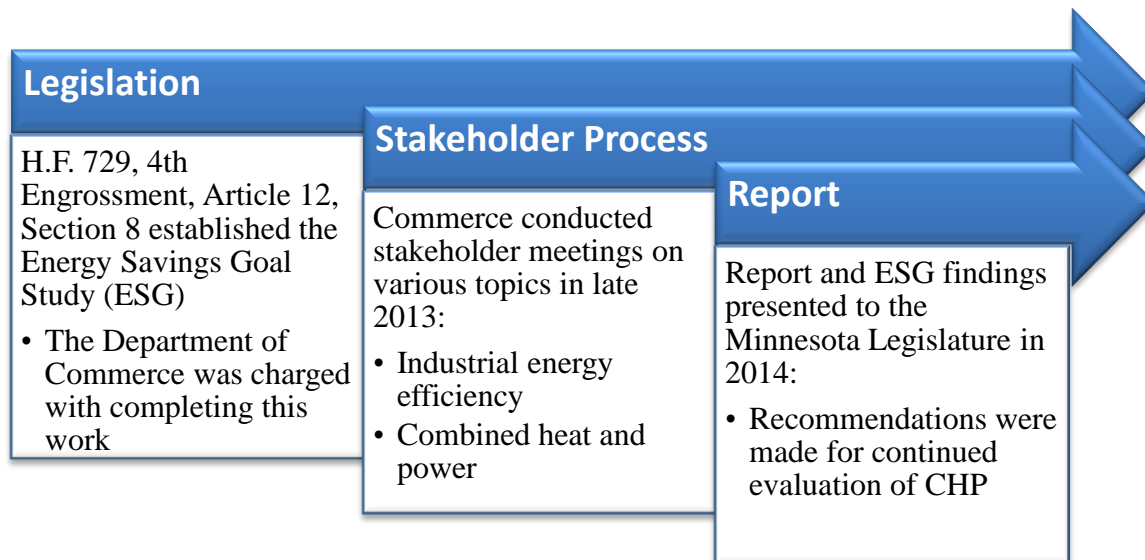


Figure 1. Energy Savings Goal Study Process

In 2013, House File 729 (H.F. 729), 4th Engrossment, Article 12 Section 8 was passed, establishing the Energy Savings Goal Study (ESG).¹³ This legislation directed Commerce to conduct public meetings with stakeholders and members of the public and produce a report on findings and legislative recommendations to accomplish the following purposes:

- Clarify statewide energy-savings policies and utility energy-savings goals;

¹² Burdette, Jessica and Adam Zoet. “Energy Savings Goal Study and Stakeholder Process Legislative Report.” *Minnesota Department of Commerce*, Apr. 2014. <http://mn.gov/commerce/energy/images/ESG-Legislative-Report_Final.pdf>

¹³ “House File 729, 4th Engrossment Article 12 Section 8.” *The Office of the Revisor of Statutes*, 2013. <<http://wdoc.house.leg.state.mn.us/leg/LS88/HF0729.4.pdf>>.

- maximize long-term cost-effective energy savings and minimize energy waste;
- maximize carbon reductions and economic benefits by increasing the efficiency of all sectors of the state's energy system;
- minimize total utility costs and rate impacts for ratepayers in all sectors;
- determine appropriate funding sources for non-conservation projects and programs, cogeneration, and combined heat and power projects;
- determine the appropriate consideration in the integrated resource planning and certificate of need processes of the requirements to meet the state's energy conservation and renewable energy goals; and
- provide the utility the appropriate incentives to meet the state's energy conservation and renewable energy goals.¹⁴

To address some of the legislatively directed requirements listed above, Commerce conducted a series of stakeholder meetings on industrial energy efficiency and CHP—including two technical work group meetings focused specifically on CHP—and delivered a report on findings and recommendations to the legislature.

Key Findings:

- The *policy objective* for greater CHP implementation and eligibility as part of utility Conservation Improvement Programs (CIP) needs to be better defined.
- *Stand-by rates* were identified as a barrier to increased CHP implementation.
- More detailed data on *CHP potential* in Minnesota is needed.
- Any CHP program or standard should *reduce risk to customers and utilities*, and have long-term *achievement objectives* focusing on system reliability and utility/operator relationships.
- Questions remain regarding *CHP system ownership structures* from customer and utility perspectives.

Conservation Applied Research & Development CHP Studies (2013-2014)¹⁵

Commerce funded two CHP research projects that are specific to Minnesota. The first study, “Analysis of Standby Rates and Net Metering Policy Effects on CHP Opportunities in Minnesota” by the Energy Resources Center, examines the effects of existing standby rates and net metering rules on CHP and waste heat-to-power projects. The second study, “Minnesota

¹⁴ “House File 729, 4th Engrossment Article 12 Section 8.” *The Office of the Revisor of Statutes*, 2013. <<http://wdoc.house.leg.state.mn.us/leg/LS88/HF0729.4.pdf>>.

¹⁵ “CARD Grant Program.” *Minnesota Department of Commerce*, 2015.

<<http://mn.gov/commerce/energy/utilities/conservation/Applied-Research-Development/>>.

CHP Policies and Potential” by FVB Energy, evaluates CHP regulatory issues and policies and develops an up-to-date analysis of CHP technical and economic potential.

CHP Standby Rates and Net Metering¹⁶

Commerce awarded a grant to the University of Illinois, Energy Resources Center (ERC) to analyze the effects of existing standby rates and net metering policies on the market acceptance of CHP and waste heat-to-power (WHP) projects in Minnesota and to provide recommendations to reduce the barriers these factors impose on CHP development.

Standby rates are charged by utilities to customers with on-site, non-emergency generation (including CHP) for the service of providing backup power when on-site generation is not available. Net metering is a policy that allows customers with on-site generation to receive a bill credit for unused electricity exported to the grid during times when their generation exceeds their on-site consumption.

The analysis performed by the ERC explains the components of standby rates and identifies best practices for standby rate design to promote transparency, flexibility, and economically efficient consumption. The report provides examples of standby rates used in other states, and information on how other states apply standby rates to net metered facilities. The economic potential of CHP projects in the service territories of Minnesota’s investor-owned utilities (IOUs) was modelled under current versus hypothetically improved standby rates. The ERC’s

recommendations for improving standby rate and net metering policies are summarized below:

Overall, if the economic barrier that standby rates currently impose on CHP projects were completely eliminated, the potential for new CHP capacity with a less than a ten-year payback would increase from 779 megawatts (MW) to 1,116 MW within Minnesota’s IOU service territories.

Key Findings:

- Standby rates should be transparent, concise and easily understandable.
- Standby usage fees for both demand and energy should reflect time-of-use cost drivers.
- The Forced Outage Rate should be used in the calculation of a customer’s reservation charge.

¹⁶ Miller, Graeme, Cliff Haefke, and John Cuttica. “Analysis of Standby Rates and Net Metering Policy Effects on CHP Opportunities in Minnesota.” *Energy Resources Center*, Apr. 2014. <<http://mn.gov/commerce/energy/images/SRNMPE-CHP-Opportunities.pdf>>.

- Standby demand usage fees should only apply during on-peak hours and be charged on a daily basis.
- Grace periods exempting demand usage fees should be removed where they exist.

Minnesota CHP Policies and Potential

Another CHP study, conducted by FVB Energy and published in September 2014, evaluates Minnesota’s CHP regulatory issues and policies and presents an up-to-date analysis of CHP technical and economic potential in the state. The study was conducted in two parts:

- *Part 1* of the study presents a market assessment to identify the technical and economic potential for CHP given the current market and regulatory framework.¹⁷
- *Part 2* of the research assesses alternative approaches to, and develops recommendations for, potential changes in Minnesota policies and programs to increase the implementation of CHP.¹⁸

Below are FVB Energy’s key conclusions regarding CHP technical and economic potential in Minnesota and policy option recommendations:

Key Findings:

1. Significant CHP potential exists in Minnesota:

- There is currently 961.5 MW of CHP capacity located at fifty-two sites in Minnesota. Of this total, eighty-three percent resides in large systems with capacities greater than twenty MW.
- There is 3,049 MW of technical potential in the state. Of this technical potential, 984 MW has economic potential with a payback of less than ten years, which is located primarily in high load factor markets in Xcel Energy’s and Minnesota Power’s utility service territories, with smaller amounts present in Alliant and municipal/cooperative territories.
- Additional CHP of about 210 MW are projected to be implemented by 2030 without new policies (given a “Business As Usual” or “Base Case”), representing an increase of about twenty percent. In addition, a Base Case market penetration of fifty MW is estimated for waste heat-to-power applications. This capacity is almost all in Xcel Energy’s service territory with some in Minnesota Power’s and Alliant’s territories.

¹⁷ Spurr, Mark and Anne Hampson. “Assessment of the Technical and Economic Potential for CHP in Minnesota.” *FVB Energy and ICF International*, Jul. 2014.

<<http://mn.gov/commerce/energy/images/CHPTechnicalandEconomicPotential.pdf>>.

¹⁸ Spurr, Mark. “Minnesota Combined Heat and Power Policies and Potential.” *FVB Energy*, Jul. 2014.

<<http://mn.gov/commerce/energy/images/CHPRegulatoryIssuesandPolicyEvaluation.pdf>>.

2. Improved policies could lead to greater implementation of CHP:

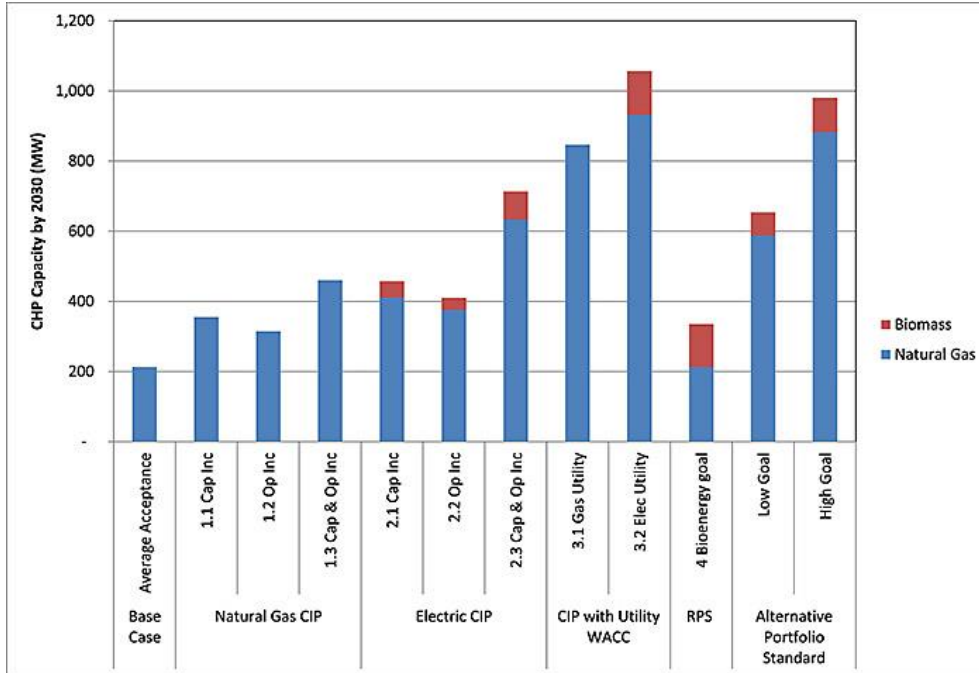


Figure 2. Impacts of Proposed Policy Options - Market Penetration

- FVB Energy analyzed several policy option scenarios to estimate how the introduction of new policies could impact CHP deployment in Minnesota. Figure 2 above summarizes the estimated 2030 CHP market penetration under a base case scenario (no new policies) and with the introduction of the policy options. Each of the policy option groups are described in more detail below
 - *Policy Option Groups 1 and 2* are based on natural gas and electric utility CIP incentives targeted at end-users. Specific Policy Options were modeled with capital incentives, operating incentives, or a combination of both.
 - *Policy Option Group 3* was based on CIP operating incentives for customer or third party-owned CHP as well as significant utility ownership of CHP where the utility would receive an operating incentive and would use its low weighted average cost of capital to fund CHP systems.
 - *Policy Option Group 4* assumes that a specific carve-out is made for bioenergy CHP in either the existing Renewable Portfolio Standard (RPS) or an expanded RPS.
 - *Policy Option Group 5* addresses the potential to create a new Alternative Portfolio Standard (APS), which would require electric utilities to obtain a specified percentage of sales from CHP (regardless of fuel) by a given year.

3. Significant increases in implementation of CHP will require investment by utilities in CHP because:

- Utilities have a sufficiently low weighted average cost of capital to make many CHP projects cost-effective;
- Implementation of CHP will be facilitated if electric utilities are motivated and incentivized; and
- CHP has the potential to help utilities comply with upcoming regulations on GHG emissions from power plants.

4. CHP within CIP has a significant advantage as a policy option because:

- It is an established program for reductions in electricity and natural gas consumption that is familiar to most players; and
- It provides opportunities for incentives (“carrots”) for utility adoption of CHP, in contrast to the APS, which relies solely on a “stick” approach.

5. There are important issues relating to utility investment in CHP, including:

- Ratepayer risks if CHP host goes out of business;
- Risk profiles of potential thermal hosts vary dramatically;
- Consider CHP risks in context of existing risks to ratepayers; and
- Potential ratepayer risks could be addressed through range of mechanisms.

6. Integrated Resource Planning provides a context for:

- Consideration of potential benefits of CHP that currently do not have a market value; and
- Analysis of CHP opportunities in the utility service area in comparison with other resources.

Climate Strategies and Economic Opportunities (2014-2015)¹⁹

Between 2006 and 2008, a broad stakeholder process was carried out through the Minnesota Climate Change Advisory Group (MCCAG) with the goal of developing and evaluating a set of policy options that could help reduce greenhouse gas (GHG) emissions in Minnesota.²⁰

To further refine the policy analysis and recommendations established by the MCCAG, an interagency effort was conducted through the Climate Solutions and Economic Opportunities

¹⁹ “Climate Solutions and Economic Opportunities Stakeholder Engagement Process.” *Environmental Initiative*. <<http://www.environmental-initiative.org/our-work/environmental-policy/climate-solutions-economic-opportunities>>.

²⁰ “Minnesota Climate Change Advisory Group Final Report.” MCCAG, Apr. 2008. <<http://www.pca.state.mn.us/index.php/view-document.html?gid=20234>>.

(CSEO) process from mid-2014 to early-2015. As part of this process, the Environmental Quality Board Climate Subcommittee in collaboration with state agencies and other key organizations analyzed an updated set of Minnesota-specific policy options, and engaged stakeholders regarding opportunities and barriers to implementation.

A policy option to increase CHP deployment in Minnesota was analyzed as part of CSEO. Within this overarching policy option, existing regulatory frameworks would be leveraged and new standards developed to be included in other policy development areas addressing GHG reductions. The policy option would be implemented as follows.

Conservation Improvement Program (Minnesota Statute 216B.241) – Expand the electricity and natural gas utility CIP goals to promote use of CHP systems, including encouragement of electric or natural gas utility-owned CHP as well as incentives for implementation of non-utility-owned CHP.

Goal	Timeline	Details
<p><u>Natural Gas Utility:</u> 1.5% CIP Goal</p> <ul style="list-style-type: none"> • Include 1% from Demand-side Management only • Include 34 TBtu output of displaced fossil fuels goal by 2030 <p><u>Electric Utility:</u></p> <ul style="list-style-type: none"> • 2.5% Demand-Side Management (1.5% must be DSM as defined in 216B.241) • (Include an embedded 800 MW of generated electricity from CHP systems goal by 2030) 	<ul style="list-style-type: none"> • 2016 - 2030 • 3 Year ramp up period between 2016-2019 • Minimum goal for End-Use Efficiency with an embedded CHP goal for electric and natural gas utilities. 	<p>Includes:</p> <ul style="list-style-type: none"> • Projects as defined in 216B.241, Subdivision 1 (e) (n) and (o); and Subdivision 10 • Natural Gas CHP and distributed generation tech/fuel sources eligible under 216B.2411

Table 1. CIP CHP Policy Framework

Renewable Energy Standard (Minnesota Statute 216B.1691) – Expand the RES to include a specific goal within the RES for currently eligible CHP technologies, and incorporate additional provisions for RES credit to encourage use of biomass for thermal energy production without power production in areas of the state without access to natural gas service.

Goal	Timeline	Details
5% Biomass CHP (300MW)	2016-2030	<p>Includes:</p> <ul style="list-style-type: none"> • Tech/renewable fuel sources eligible under 216B.1691 (and 216B.2411) • Minimum efficiency standard of 60%.

Table 2. RES CHP Policy Framework

Integrated Resource Planning (Minnesota Statute 216B.2422) – Require electric utilities to demonstrate that, before power-only capacity is proposed, CHP opportunities within their service territory have been thoroughly assessed to determine the benefits of CHP (and associated technologies such as thermal energy storage) relative to existing and planned thermal loads total primary energy efficiency, GHG emissions, power grid resiliency, peak demand management and risk management.

Key Findings:

Summary GHG emissions reduction and option costs results for the CHP policy analyzed are provided in Table 3 below. Overall, this option results in 4.87 million metric tons (which is the same as teragrams—trillion grams or Tg in the table below) of annual CO₂e savings in 2030, with about 46 million metric tons of CO₂e savings over the analysis period. A little more than half of the savings comes from implementation of natural gas CHP systems.

	2030 GHG reductions (Tg CO₂e)	2015 – 2030 cumulative reductions (Tg CO₂e)	Net present value of societal costs, 2015 – 2030 (million \$2014)	Cost effectiveness (\$2014/t CO₂e)
Expanded Natural Gas-fueled CHP Implementation	2.55	25.09	\$(771.03)	\$(30.73)
Expanded Renewable-fueled CHP Implementation	2.32	21.37	\$(340.48)	\$(15.94)
TOTAL	4.87	46.46	\$(1,111.50)	\$(23.93)

*Note that the figures in parenthesis indicate positive, cost-effective net benefits.

Table3. Estimated Net GHG Reductions and Net Costs or Savings (as of 3/19/2015)

Department of Energy CHP Grant: CHP Stakeholder Engagement Process (2014- 2015)²¹

The major findings from Commerce’s previous CHP work summarized in the section above provided the necessary knowledge foundation and momentum to inform a detailed dialogue with stakeholders in Minnesota. Commerce was awarded a DOE grant to convene a series of stakeholder meetings during fall 2014 to provide information and facilitate discussion on CHP

²¹ “Combined Heat and Power Stakeholder Meetings Webpage.” *Minnesota Department of Commerce*, 2015. <<http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/chp-meetings.jsp>>.

issues involving Minnesota’s regulatory framework, technical and economic potential, and education and training needs. The objective of these public meetings was to:

1. *Inform Stakeholders* about current activity underway to evaluate CHP technologies and potential implementation.
2. *Facilitate discussion* regarding barriers and opportunities for deployment of CHP technologies.
3. *Solicit ideas* for solutions to the challenges presented during discussion of CHP implementation.
4. *Provide information* of the necessary steps to increase CHP activity in Minnesota.

Commerce contracted Microgrid Institute to help lead the stakeholder engagement process, including facilitating four stakeholder meetings, synthesizing and reporting results from a public comment period, and performing pre- and post-engagement stakeholder surveys.²² The process was designed to inform and facilitate discussion among stakeholders, and to synthesize information toward development of the CHP Action Plan.

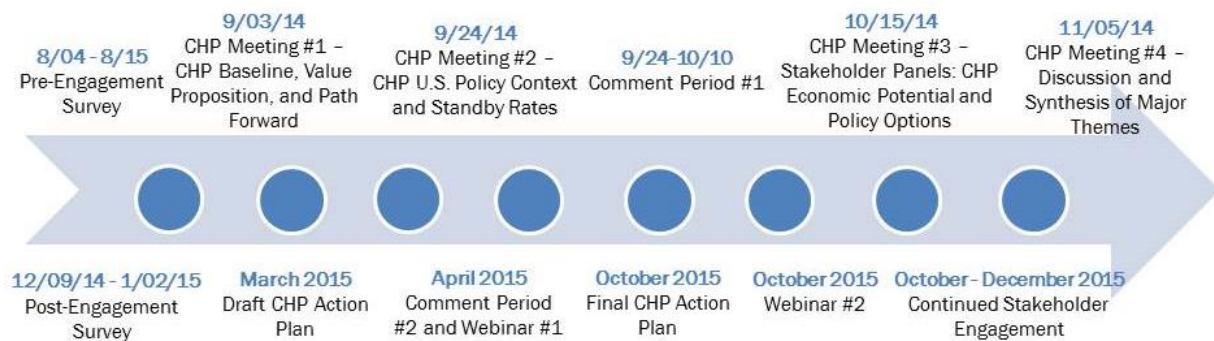


Figure3. DOE CHP Grant Process

Figure 3 above presents a graphical summary of the CHP strategic stakeholder engagement process that was carried out through the DOE grant. The following section on “Key Findings” presents the major outcomes for each of the steps in this process.

²² “Microgrid Institute.” *Microgrid Institute Webpage*. <<http://www.microgridinstitute.org/resources.html>>.

Key Findings

Pre-Engagement Stakeholder Survey: Gauging Stakeholder Perspectives²³

Prior to the series of stakeholder meetings, a pre-engagement stakeholder survey was distributed to identified stakeholders to develop a baseline of participant understanding of and attitudes toward CHP issues and to help identify priority issues to address in the subsequent stakeholder meeting discussions.

The pre-engagement survey was distributed on 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 on August 15, 2014 forty-five participants completed valid responses. Pre-engagement survey respondents' reported organizational affiliations are summarized as follows:

Organization Type	% of Responses
Utility	26
Advocacy groups	17
Consulting/legal/finance	11
Government	26
Institutional/ commercial	2
Industrial	11
Independent power producer	2
Other	4
TOTAL	100

Table 4. Pre-Engagement Survey Respondents

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

- Demographics and CHP Experience
- CHP Policy
- CHP Resources and Technology
- CHP Market Potential
- CHP Finance

As presented in Microgrid Institute's "CHP Pre-Engagement Stakeholder Survey Results" report, below are the key findings based on Microgrid's analysis of the survey results.

²³ Burr, Michael and Peter Douglass. "2014 Minnesota CHP Stakeholder Survey: Pre-Engagement Results Report." *Microgrid Institute*, 2014. <<http://mn.gov/commerce/energy/images/MG-PreEngagementSurvey.pdf>>.

Key Findings:

Standby power tariffs and net metering are not considered fair toward third-party-owned CHP

- Forty-nine percent of respondents “disagree” or “strongly disagree” that standby rates are fair and nondiscriminatory toward third-party owned CHP.
- Thirty-five percent of respondents “disagree” or “strongly disagree” that net metering policies are fair toward third-party owned CHP.

Utility strategy/business conflicts are seen as hindrances to CHP

- Sixty-three percent of respondents rank utility business interests as the number one or second most important policy impediment to *third-party owned CHP*.
- Fifty-three percent of respondents rank utility business interests as the number one or second most important policy impediment to *utility-owned CHP*.

CHP economics are considered mixed for commercial financing

- Fifty-six percent of respondents can accept payback of eight years or greater.
- Forty-six percent of respondents indicate payback periods are too long and not sufficient for economic deployment of CHP.

Existing incentive programs are viewed as inadequate to support CHP financing in Minnesota

- Sixty percent “disagree” or “strongly disagree” that incentives for renewable energy, efficiency, and environmental performance are adequate.
- Uncertainty about using CHP to meet CIP goals ranked as the second most substantial policy hindrance to CHP deployment by utilities.

The biggest gaps in knowledge and talent involve business, finance, and legal expertise

- Sixty-six percent of respondents rank strategic understanding as the first or second greatest technology and operational hindrances to CHP deployment.
- Finance/development and legal/policy issues rank as the most important education and training needs.

Overall, the pre-engagement survey’s results emphasized a need to more closely examine and discuss and clarify Minnesota’s current policies and regulatory frameworks as part of the stakeholder meetings, and how current policy barriers could be addressed to encourage CHP deployment in the state.

Stakeholder Meetings One and Two: Presentation of Key Background Information

The first two stakeholder meetings, held on September 3rd and September 24th 2014, focused on presenting the key results of Commerce’s CHP studies, and building the necessary foundational knowledge from which more detailed discussions with stakeholders could evolve as part of stakeholder meetings three and four.

Mtg.	Date	Focus Topic(s)	Objectives	Format
#1	9/3/14	CHP Baseline, Value Proposition, and Path Forward	Inform stakeholders re: CHP in Minnesota and FVB Energy proposed policy options	Presentations and moderated Q&A
#2	9/24/14	CHP U.S. Policy Context and Standby Rates	Clarify stakeholders’ understanding of key policy issues affecting CHP	Presentations and moderated discussion

CHP Stakeholder Meeting #1²⁴: The first CHP Stakeholder Meeting, "CHP Baseline, Value Proposition, and Path Forward" convened on Sept. 3, 2014 at the Wilder Center in Saint Paul, Minnesota and included a total attendance of seventy-four. The primary goal of the meeting was to present the current state of CHP development in Minnesota and provide an overview of the policy options recommendations that were developed by FVB Energy in the “Minnesota CHP Policies and Potential” report.

Key Findings:

As presented in Microgrid Institute’s “Stakeholder Meeting #1 Summary Report,” below is a summary of the key issues identified by stakeholders as meriting additional consideration following the first stakeholder meeting:

- How do CHP investments compare to other CIP investments, in terms of performance per ratepayer dollar invested?
- How do CHP benefits compare or contrast between industrial, commercial, and institutional end-use applications?
- How do the proposed policy options compare, contrast, and complement CHP programs and policies in other U.S. states and the federal government?
- How do standby rates and net metering policies affect CHP deployment?
- How should incentives be balanced to ensure equitable treatment of CHP investments by utilities, customers, and third parties?

²⁴ Burr, Michael and Peter Douglass. “Combined Heat and Power Stakeholder Meeting #1 Summary Report.” *Microgrid Institute*, 2014. <<http://mn.gov/commerce/energy/images/MG-StakeholderMeeting1Summary2014.pdf>>.

- What barriers to utility investment in CHP can be effectively addressed with state policies or programs?
- How should revenue streams from utility-owned CHP capacity be treated, for regulatory accounting purposes? How might that treatment affect CHP investment factors for utilities?
- How would utilities claim CIP credits for CHP investments?
- Given the policy drivers of improving primary energy efficiency and reducing GHG emissions, what is the most effective CIP credit structure to facilitate the most productive deployments?

Stakeholder Meeting #2²⁵: The second CHP Stakeholder Meeting, “CHP U.S. Policy Context and Standby Rates,” convened on Sept. 24, 2014 at the Wilder Center in Saint Paul, Minnesota and included a total attendance of sixty-five people. The primary goals of the meeting were to present information regarding various state policies and utility strategies regarding CHP deployment, as well as information about Minnesota’s standby rates and net-metering tariffs as they pertain to CHP facilities.

Key Findings:

As presented in Microgrid Institute’s “Stakeholder Meeting #2 Summary Report,” below is a summary of the key issues that were identified by stakeholders as meriting additional discussion following the second meeting:

1. Cost-benefit characteristics of CHP versus other energy options serving similar objectives.
2. Challenges that some potential hosts face in raising affordable capital for CHP projects with payback exceeding just one or two years.
3. Policy options for prospective CHP plants built larger than required to serve host site requirements to capture greater scale economics.

Comment Period One: Stakeholder Feedback on CHP Barriers and Opportunities²⁶

In order to gather more in-depth feedback from stakeholders, Commerce arranged a public comment period from September 24 through October 10, 2014 and invited stakeholders to submit written comments on issues related to:

- FVB Energy’s proposed CHP policy options.
- CHP finance, policy, technical application, and education and training needs.

²⁵ Burr, Michael and Peter Douglass. “Combined Heat and Power Stakeholder Meeting #2 Summary Report.” *Microgrid Institute*, 2014. <<http://mn.gov/commerce/energy/images/CHPMeeting2Summary.pdf>>.

²⁶ Burr, Michael and Peter Douglass. “Comment Period #1 Synthesis Report.” *Microgrid Institute*, 30 Oct. 2014. <<http://mn.gov/commerce/energy/images/UpdatedFinalizedCHPStakeholdeCommentsSummary.pdf>>.

- Alternative mechanisms and approaches to facilitate economically efficient deployment of CHP in Minnesota.
- Current barriers and issues hindering CHP projects.
- Resource planning, strategic, and regulatory factors affecting CHP options and potential.
- Any other CHP issues on which stakeholders would like to comment.

By the close of the comment period, Commerce received twelve submissions from the following stakeholder organizations:

- [BlueGreen Alliance](#)
- [CenterPoint Energy](#)
- [Cummins Power Generation](#)
- [Fresh Energy](#)
- [Great Plains Institute](#)
- [Great River Energy](#)
- [Midwest Cogeneration Association](#)
- [Minnesota Chamber of Commerce](#)
- [Minnesota Power](#)
- [Otter Tail Power](#)
- [Vergent Power Solutions](#)
- [Western Lake Superior Sanitary District](#)
- [Xcel Energy](#)

Key Findings:

Based on Microgrid Institute’s analysis of the stakeholder comments, below is a summary of the key themes as presented in Microgrid’s “Comment Period #1 Synthesis Report”:

1. **CHP Economic Potential and Value Proposition:** Minnesota’s utilities acknowledged substantial potential for CHP in some parts of the state, and they support policy changes that would clarify their ability to obtain regulated cost-recovery for investments in CHP assets at customer sites where those investments make sense.
2. **FVB Energy’s CHP Policy Options:** Minnesota’s utilities expressed general opposition to CHP policy options that envision new regulatory requirements. Their reasons tend to target the basic assumptions underlying the proposed options such as estimations of market potential, comparative economics, and underlying environmental and energy policy strategies. Additionally, they indicate concerns about unintended consequences including potential ratepayer cross-subsidization, community burdens without

commensurate benefits, and policies that favor natural gas companies at the expense of electric companies.

3. **Capital Costs and Utility Investment Prospects:** Potential CHP customers and vendors identify structural barriers in current policies and standards that they suggest unnecessarily complicate CHP projects and inflate project costs. Some stakeholders express concern about policies that focus too much on driving utility investment in onsite power systems. Others assert that energy policy priorities support establishing appropriate price signals for environmental, social, and system attributes, and implementation challenges should not prevent the state from continuing its leadership in promoting conservation and clean energy alternatives to serve customers.

Generic Proceeding on Standby Rates

On May 19, 2014 the Public Utilities Commission (PUC) issued an “Order Setting Final Solar Photovoltaic Standby Service Credit, Requiring Updates, and Requiring Compliance Filing”²⁷ and directed Commerce to scope whether a generic proceeding on standby service tariffs was needed to address:

- The methodology for standby rates.
- The appropriateness of existing standby rates.
- When standby rates should be applied.
- Whether standby rates should be structured differently depending on the type of customer.
- The terms and conditions for applying such rates.

Through a stakeholder meeting convened on September 11, 2014 followed by a public comment period, Commerce engaged in discussions with stakeholders about the need and scope for a generic proceeding on standby service.²⁸

On January, 30, 2015, Commerce filed its findings on scoping for a generic proceeding on standby rates and recommended that the PUC open a generic proceeding to re-examine the standards.²⁹

²⁷ “Order Setting Final Solar Photovoltaic Standby Service Capacity Credit, Requiring Updates, and Requiring Compliance Filing.” *Docket E-002/M-13-315*, 19 May, 2014.
<<https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPop&documentId=%7b1D00E999-FB0E-4B4D-AE8F-40548E1D2E12%7d&documentTitle=20145-99678-01>>.

²⁸ “Standby Rates: Scoping for Generic Proceeding Webpage.” *Minnesota Department of Commerce*.
<<http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/standby-rates.jsp>>.

²⁹ See Docket Nos. E002/M-13-315, E002/M-13-642, E001/M-13-667, E015/M-13-770, and E017/M-13-609 for relevant filings.

On February 12, 2015, the PUC filed a “Notice of Comment Period on Standby Service Tariffs,” establishing the following proceeding timeline and topics for comment:³⁰

- **Timeline:**
 - Initial comment period closed on April 15, 2015
 - Reply comment period closed on May 15, 2015
- **Topics for Comment:**
 - Reliability of electric service
 - Transparency and flexibility
 - Promotion of economically efficient consumption
 - Accurate accounting of all relevant value streams, including both costs and benefits
 - Examination of whether rates reasonably reflect cost-causality and other ratemaking goals
 - Simplification of input data sets and methodology, where possible and warranted
 - How to ensure that that standby rates provide neither an incentive nor a disincentive for distributed generation
 - Maintaining fair compensation for the utility
 - Fully addressing rate design considerations
 - Designing rates based on best practices
 - Examining procedures or approaches to a generic proceeding that would further these goals

At the time that this report was published, stakeholders have finished submitting comments through the PUC’s comment period, but the PUC has not yet established a generic proceeding on standby rates.

Stakeholder Meetings Three and Four: Stakeholder Discussions and Path Forward

Whereas the first two stakeholder meetings focused on information sharing through presentations by CHP experts, the final two stakeholder meetings, held on October 15th and November 5th 2014, centered on discussions with stakeholders regarding CHP policy options, economic potential, and recommendations for a path forward to address current barriers.

³⁰ See Docket No. E999/CI-15-115 for relevant filings.

Mtg.	Date	Focus Topic(s)	Objectives	Format
#3	10/15/14	Stakeholder Panels – CHP Economic Potential and Policy Options	Share and discuss perspectives of several key stakeholder organizations and commenters	Moderated panel presentations and discussion
#4	11/5/14	Discussion and Synthesis of Major Themes	Obtain stakeholder comments and suggestions	Moderated discussion and synthesis of information

Stakeholder Meeting #3³¹: The third CHP Stakeholder Meeting, “Stakeholder Panels – CHP Economic Potential and Policy Options,” convened on Oct. 15, 2014 at the Wilder Center in Saint Paul, Minnesota. The meeting was attended by sixty-seven people. The primary goals of the meeting were to provide stakeholders from several organizations the opportunity to comment on issues related to CHP market potential and policy options, and to facilitate discussion among participants about the topics presented. The meeting was divided into two panel discussions, with moderated Q&A sessions providing opportunities for feedback and questions.

Key Findings:

As presented in Microgrid Institute’s “Stakeholder Meeting #3 Summary Report,” below is a summary of the five key themes that were identified by stakeholders as meriting additional discussion during the final stakeholder meeting:

1. **CHP Evaluation Criteria:** Considerations and approaches for fair, accurate, and comprehensive assessment and valuation of CHP attributes.
2. **Mapping CHP Opportunities:** Empirical study and granular analysis of opportunities for topping-cycle and bottoming-cycle CHP projects.
3. **CHP Ownership Problems and Solutions:** Issues and options involving utility resource planning, ratepayer risks, market power, and behind-the-meter operations.
4. **Adapting CIP for Supply-Side Investments:** Establishing and clarifying CHP provisions in CIP.
5. **Education and Training Needs and Options:** Prioritizing knowledge gaps and defining options for CHP education and training.

³¹ Burr, Michael and Peter Douglass. “Combined Heat and Power Stakeholder Meeting #3 Summary Report.” *Microgrid Institute*, 2014. <<http://mn.gov/commerce/energy/images/MI-CHPSMeeting3Summary.pdf>>.

Stakeholder Meeting #4³²:

The fourth and final CHP Stakeholder Meeting, “Discussion and Synthesis of Major Themes,” convened on Nov. 5, 2014 at the Wilder Center in Saint Paul, Minnesota. The meeting was attended by approximately sixty people. The primary goals of the meeting were to facilitate discussion among participants synthesizing the results of previous meetings, submitted comments, and analysis by Commerce and its consultants. The meeting was divided into two segments, with moderated discussion of five primary themes:

1. CHP Evaluation Criteria
2. Mapping CHP Opportunities
3. CHP Ownership Problems and Solutions
4. Adapting CIP for Supply-Side Investments
5. Education and Training Needs and Options

Key Findings:

As presented in Microgrid Institute’s “Stakeholder Meeting #4 Summary Report,” below is a summary of the key discussion points from stakeholders during the fourth meeting:

1. CHP Evaluation Criteria

- *CHP Evaluation Criteria Suggestions* - Participants identified numerous criteria to be considered:
 - General Criteria: Efficiency/energy savings (minimum threshold), fuel type, environmental impact analysis (consider both thermal and electric output, 111d compliance benefits), risk-reward analysis, overall societal benefits.
 - Location-Specific Criteria: Location-specific value to/or effect on grid and system resources, local fuel production capabilities, demand for CHP outputs, and resilience both for host and local grid.
 - Utility Grid/System Operations Criteria: Peak supply capabilities, dispatchability, operating flexibility (including storage capabilities), and net impact on utilization of renewables.
- *Minnesota Energy Planning and Evaluation Considerations* - Stakeholders discussed how CHP evaluation methodologies should fit into Minnesota’s other energy planning and evaluation processes:

³² Burr, Michael and Peter Douglass. “Combined Heat and Power Stakeholder Meeting #4 Summary Report.” *Microgrid Institute*, 2014. <<http://mn.gov/commerce/energy/images/microgrid-institute-chp-meeting-summary-4.pdf>>.

- Pilot projects and demonstration programs can serve to advance development frameworks, clarify alternative project approaches and structures, and test their viability.
- Policy development should consider whether and how CHP may affect other resources evaluated during Integrated Resource Plan (IRP) processes.
- Least-cost planning processes merit adaptation to allow objective consideration of non-cost factors when evaluating utility CHP investments.
- Some participants suggested IRP's specific scope of study may not effectively serve CHP evaluation, which depends fundamentally on project-specific factors with many indeterminate variables for the IRP time horizon. However, it was noted that the IRP framework may provide utilities with an opportunity to think about CHP and district energy in long-term planning.
- CHP evaluation should be separated from CIP demand-side conservation project evaluation and budgets.
- *Other Criteria Evaluation Considerations* - Participants offered additional comments on issues related to the criteria discussed:
 - Evaluation methodologies and systems should be both flexible and driven by State goals.
 - Evaluation methodologies may be able to address a broader range of attributes and factors if they are separated from CIP.
 - Energy savings should be calculated and allocated in a way that is fair and encourages cost-effective efficiency investments by either electric or gas utilities.
 - Fuel switching issues bear further definition and analysis to ensure evaluation criteria avoid conflicts with existing regulations while also facilitating economical investments to achieve energy savings.

2. CHP Mapping Opportunities

- *Potential CHP Mapping Initiatives* - Participants suggested several topics for possible focus through a State-initiated study effort:
 - Public facilities, including district energy systems.
 - Critical local resilience and preparedness requirements.
 - Economic development needs and opportunities.
 - Studies of information not accessible to utilities, including customers' proprietary or confidential data.

- Heat recovery additions at existing generation facilities.
- Small-scale applications.
- *Mapping Objectives* - Participants offered numerous comments related to drivers and objectives for additional efforts to map CHP potential in the state:
 - Except for limited utility studies, efforts to identify CHP opportunities tend to happen only with policy impetus.
 - The role of the State in mapping opportunities bears clarification; existing models such as wind resource potential maps provide analogue examples in some respects.
 - Some aging boilers already have been identified for upgrades or replacement to comply with federal Boiler MACT (Maximum Achievable Control Technology) regulations.
 - State mapping efforts might identify thermal and electric savings opportunities that might not be considered in evaluations by utilities or customers.
 - Initial efforts might naturally focus on CHP opportunities at public facilities, including district energy systems.
 - There are opportunities to consider CHP in the context of long-range community planning and State preparedness planning.
 - Some examples (e.g., Iowa and Wisconsin) illustrate state approaches to mapping and tracking biogas generation, use and disposal.
 - Potential models for Minnesota include programs encouraging utilities to identify energy efficiency studies.
 - Project feasibility studies, potentially with State support, would also help clarify potential for CHP development.

3. CHP Ownership Problems and Solutions

- *Utility CHP Investment Regulatory Issues* - Discussion identified several regulatory and legal issues affecting utilities' ability to finance, own, and operate CHP projects:
 - Statutory size limitations; Minn. Stat. 216H prevents baseload plants larger than fifty MW.
 - Stranded asset risks.
 - Reliability, integration, and risk-mitigation costs.
 - Utility service obligations and restrictions.

- Least-cost planning requirements and cost-calculation, apportionment, and recovery provisions.
- Lack of mechanisms to attach a value to thermal output.
- Potential fuel-switching regulations and considerations.
- *Third-Party and Customer CHP Investment Regulatory Issues* - Participants observed a few key regulatory and legal issues affecting the ability of third parties and customers to finance, own, and operate CHP projects:
 - Statutory size limits (Minn. Stat. 216H and PURPA) constraining potential for economic CHP development.
 - Limitations and restrictions on the ability to transport power and integrate generation resources.
 - Limitations on power and heat sales by non-utility companies.
- *Regulatory Roadmap for CHP Investment* - Discussion focused on several considerations and options to facilitate CHP financing and deployment:
 - Potential 216H waiver process or alternative treatment for CHP facilities that achieve certain benefit thresholds – e.g., high efficiency.
 - Incentives to reduce up-front capital costs.
 - Direct support for ancillary infrastructure investments.
 - Financing programs to reduce costs of capital.
 - Flexible rate treatment including on-bill repayment for utility investments in customer-side CHP.
 - Transparent, unbundled pricing for standby rates and avoided cost calculation.

4. Adapting CIP for Supply-Side Investments

- *Supporting CHP through CIP* - Participants identified only the opportunity for topping-cycle CHP to qualify for CIP incentives, and addressed questions related to expanding or adapting CIP to encourage bottoming-cycle CHP and other generation and utility infrastructure investments:
 - Segregating a new category of supply-side conservation opportunities with new and separate goals and incentives.
 - CIP generation efficiency provisions should accommodate and support both large and small CHP projects.

- Cost-benefit analysis, metrics, goals, and evaluation methodologies could address supply-side and electric utility infrastructure investments.

5. Education and Training Needs and Options

- *Opportunities for Improvement in Market Knowledge, Capabilities, and Education Resources* - Participants identified several key areas with opportunities for improvement in market knowledge, capabilities, and education resources in the state:
 - Laws, regulations, and policy and administration processes.
 - Interconnection and permitting policies and procedures.
 - Financing approaches and resources.
 - Strategic planning and option valuation.
 - CHP operation and related areas, such as building automation.
- *CHP Education and Outreach Resource Suggestions* – Participants offered a number of suggestions for the types of education and outreach resources that would most effectively address the identified knowledge gaps:
 - Programs supporting publicity, public outreach, and education regarding energy initiatives and assets.
 - Workshops and seminars.
 - Information resources, such as background materials, guides, and checklists.
 - Webinars and other multimedia programs.
 - Example CHP education initiatives: Online resources provided by Baltimore Gas & Electric and webinars and other programs offered by the State of Illinois under the DCEO pilot program.

Post-Engagement Stakeholder Survey: Identifying Stakeholder Priorities for CHP Action Plan³³

The post-engagement stakeholder survey was distributed to stakeholder from December 9th, 2014 to January 2nd, 2015. The purpose of the post-survey was to help Commerce identify priorities for developing a CHP Action Plan and to measure any changes in the level of understanding or acceptance of CHP related issues.

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-

³³ Burr, Michael and Peter Douglass “2014 Minnesota CHP Stakeholder Survey: Post-Engagement Results Report.” *Microgrid Institute*, 2015. <<http://mn.gov/commerce/energy/images/mg-post-engagement-survey.pdf>>.

engagement survey sample as well as those who attended one or more of the stakeholder meetings. Among respondents, about ninety-three percent reported attending at least one of the four stakeholder meetings, with thirty-six 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

Table 5. Post-Engagement Survey Respondents

Key Findings:

As presented in Microgrid Institute’s “CHP Post-Engagement Stakeholder Survey” report, the post-engagement survey’s results highlighted what stakeholders see as priorities that the State could implement to better facilitate CHP deployment. Survey participants ranked the following issues as the three most effective policy initiatives to facilitate CHP deployment in Minnesota:

1. Introduce transparent, unbundled pricing for standby rates (forty-three percent of respondents)
2. Establish CHP project evaluation methodologies and criteria (thirty-nine percent of respondents)
3. Include CHP as a supply-side opportunity in the Electric Utility Infrastructure program under CIP (thirty-eight percent of respondents)

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 electric utility infrastructure (EUI) provisions for CHP.

Comment Period Two: Stakeholder Feedback on Draft CHP Action Plan Recommendations³⁴

Commerce convened a public comment period from March 31 through May 15, 2015, during which stakeholders were invited to submit written comments on the Draft CHP Action Plan.³⁵

³⁴ Burr, Michael and Peter Douglass. “Draft CHP Action Plan: Comment Period Synthesis Report.” *Microgrid Institute*, Jun. 2015. <<http://mn.gov/commerce/energy/images/microgrid-comment-period-synthesis.pdf>>.

When the comment period closed, Commerce received written twelve submissions comprising more than fifty pages of comments.

Key Findings

Microgrid Institute reviewed the submitted comments and summarized the feedback into a synthesis report. As summarized in Microgrid’s report, the comments reflected a diverse range of perspectives on the role and potential of CHP in Minnesota. Below is a summary of recurring areas of clarification that stakeholders expressed as needing to be addressed in the Final CHP Action Plan:

- Facilitating non-utility CHP development and private capital access.
- Clarity regarding treatment of CHP in IRP processes.
- Clarity on how CIP EUI provisions could facilitate supply-side efficiency improvements, including topping-cycle CHP, and implications for existing demand-side CIP programs.
- Comprehensive, objective, “technology-agnostic” approach to resource planning, consistent with State strategies for implementing the pending federal EPA Clean Power Plan.
- Policy direction and statutory authority for proposed action items.
- Clearer definition of CHP Action Plan objectives and guiding principles.
- Clarity about options for utility investments in CHP assets on customer property, especially stranded asset risks and least-cost planning requirements.
- Alternatives to CIP as a vehicle for financing CHP deployment.
- Both supporting and opposing stakeholders included comments suggesting that Commerce should coordinate TRM development actions with the ongoing CIP planning and compliance timeline – either postponing or accelerating the process, and including flexibility in implementation.

Microgrid Institute’s Recommendations

Based on a review analysis of the stakeholder comments that were submitted, Microgrid Institute recommended implementing several refinements to the Draft CHP Action Plan as follows:

A. Provide Clear Objectives and Guiding Principles

1. Include a formal statement of purpose and objectives.

³⁵ Zoet, Adam, and Jessica Burdette. “Draft Combined Heat and Power Action Plan.” *Minnesota Department of Commerce*, 31 Mar. 2015. <<http://mn.gov/commerce/energy/images/draft-chp-action-plan-2015.pdf>>.

2. Include a generic set of principles reflecting State policy interests that should guide implementation of action items, *e.g.*:
 - a. Objectivity and comprehensiveness of solutions to ensure efficient outcomes.
 - b. Facilitation for both utility and non-utility CHP investments.
 - c. Preservation of utility franchise rights and obligations.
 - d. Opportunity for innovation and private capital deployment.

B. Thoroughly Describe Action Items

1. Describe Commerce’s intent and expectations for each action item.
2. Explain how action items follow applicable guiding principles.
3. Clarify how action items may obviate or address apparently omitted items.

C. Add Action Items of Critical Interest to Stakeholders

1. Study IRP treatment for CHP and other DG.
2. Review utility avoided-cost calculation methodologies.
3. Establish contingent action item as alternative to CIP EUI approach.

D. Apply CHP Stakeholder Input in Comprehensive Policy Process

1. Ensure inputs and outcomes inform State efforts toward comprehensive policy updates.

Final Action Plan Recommendations and Next Steps

The studies, reports, and presentations examined during the CHP stakeholder engagement process provided a comprehensive examination of the issues affecting CHP deployment. Over the course of the project, Commerce engaged a diverse list of around 250 stakeholders with representatives from utilities, advocacy groups, trade associations, think tanks, consulting firms, legal firms, government agencies, commercial/institutional/industrial users, and independent power producers. Results of this stakeholder engagement include:³⁶

- Four in-person stakeholder meetings with an average attendance of seventy participants per meeting.
- Two stakeholder surveys with ninety-one valid completed responses.
- Two public comment periods with twenty-five written submissions, comprising more than one hundred pages of comments plus attachments.
- Thirty-eight reports and presentations produced and disseminated.

³⁶ “Combined Heat and Power Stakeholder Meetings Webpage.” *Minnesota Department of Commerce*, 2015. <<http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/chp-meetings.jsp>>.

- Two webinars to share project results.

As a result of this work product, Commerce and stakeholders have a more robust and nuanced understanding of the opportunities and barriers to CHP in Minnesota. Specifically, discussions with stakeholders during the DOE CHP stakeholder engagement process suggest six priority areas that would effectively help advance CHP in Minnesota if addressed:

- I. **CHP Evaluation Methodology and Criteria:** Establishing an approach for fair, accurate, and comprehensive assessment and valuation of CHP projects.
- II. **Mapping CHP Opportunities:** Conducting an empirical study and granular analysis of opportunities for topping-cycle and bottoming-cycle CHP projects.
- III. **Education and Training Needs and Options:** Addressing knowledge gaps and defining options for CHP education and training.
- IV. **CHP Ownership Problems and Solutions:** Addressing issues and options involving utility resource planning, ratepayer risks, market power, and behind-the-meter operations.
- V. **CIP CHP Supply-Side Investments:** Exploring CHP as an eligible EUI resource under CIP.
- VI. **Standby Rates:** Introducing transparent, unbundled pricing for standby rates.

Commerce convened a public comment period from March 31 through May 15, 2015, during which stakeholders were invited to submit written comments on the Department's Draft CHP Action Plan.³⁷ Commerce greatly appreciates the time and effort stakeholders contributed throughout the CHP stakeholder engagement process. Commerce closely reviewed the written comments provided by stakeholders on the priority areas and action items presented in the Draft CHP Action Plan.

Based on a thorough review and synthesis of the priority areas identified through discussions with stakeholders, analysis from Commerce's CHP studies, and consideration of stakeholder comments submitted on the Draft Action Plan, this section presents Commerce's Final CHP Action Plan recommendations to help increase CHP activity in Minnesota. Addressing these priority areas can help remove some of the current barriers to CHP, increase deployment of the technology, and ultimately improve the average efficiency of Minnesota's electric and thermal generation systems, reduce aggregate greenhouse gas emissions, and improve the energy security and resilience of local energy systems.

³⁷ Zoet, Adam, and Jessica Burdette. "Draft Combined Heat and Power Action Plan." *Minnesota Department of Commerce*, 31 Mar. 2015. <<http://mn.gov/commerce/energy/images/draft-chp-action-plan-2015.pdf>>.

Summary of Recommendations

Number ID	Priority Areas	Action Items	Timing
I	CHP Evaluation Methodology and Criteria	Establish CHP Energy Savings Attribution Model and Project Evaluation Criteria	Near-Term (2015-2016)
II	Mapping CHP Opportunities	Map CHP Opportunities at Wastewater Treatment Facilities and Public Facilities	Intermediate-Term (2016-2017)
III	Education and Training Needs and Options	Expand Education and Training Resources on Commerce's Website	Near-Term (2015-2016)
IV	CHP Ownership Problems and Solutions	Leverage Existing Financing Programs Applicable to CHP	Near-Term (2015-2016)
V	CIP CHP Supply-Side Investments	Examine Electric Utility Infrastructure Policy	Long-Term (2015-Onward)
VI	Standby Rates	Continue Discussion Through PUC's Generic Proceeding	Long-term (2015-Onward)

I. Priority Area: CHP Evaluation Methodology and Criteria

Discussions with stakeholders suggest a need to provide regulatory certainty regarding how CHP projects could be evaluated within CIP. Thirty-nine percent of respondents who participated in the post-engagement CHP stakeholder survey indicated that establishing CHP project evaluation methodologies and criteria would be an effective initiative to facilitate CHP deployment in Minnesota.

I. Stakeholder Comments on Draft CHP Action Plan

Stakeholder comments submitted on the Draft CHP Action Plan were generally supportive of the proposed action item to establish a CHP attribution model and project evaluation criteria. There are, as stakeholders pointed out, key issues that would need to be addressed as part of a process to establish a CHP attribution model and project criteria, including:

- **Comments – Technical Expertise:** Technical Reference Manual Advisory Committee (TRMAC) members are generally not accustomed to reviewing technologies that have elements of both supply-side or demand-side efficiency and address system efficiency improvements.³⁸

³⁸ The Minnesota Technical Reference Manual consists of a set of standard methodologies and inputs for calculating the savings impacts and cost-effectiveness of utility CIPs in Minnesota. Commerce established the TRMAC in 2013, and it acts as a forum for Minnesota electric and natural gas utilities and other stakeholders to provide ongoing feedback and recommendations to Commerce regarding the content of the Minnesota TRM for energy conservation improvement programs.

- **Commerce Response:** To address this issue, Commerce will work with TRMAC members to establish two CHP subcommittees composed of the necessary mixture of engineering and regulatory expertise required to develop a CHP attribution model and project criteria. One CHP subcommittee could include experts with technical/engineering backgrounds and focus on creating a CHP attribution model and the other subcommittee could include regulatory/policy experts and focus on defining CHP project evaluation criteria.
- **Comments – State CHP Models:** The Illinois CHP Technical Reference Manual model provides a valuable starting point in establishing a CHP attribution model in Minnesota, but it is likely that it will not completely align with Minnesota’s needs.
 - **Commerce Response:** Commerce recognizes this and intends to review additional CHP model approaches in other states to help determine a methodology that is most appropriate for Minnesota. Staff will prepare materials and provide available information to the TRMAC CHP subcommittee (as described in more detail in the “Plan” section below).
- **Comments – Evaluation Criteria:** Stakeholder comments emphasize the need to discuss and agree upon the criteria by which CHP projects would be evaluated.
 - **Commerce Response:** Commerce understands the importance of this and intends to work with the CHP subcommittee to fully explore what criteria should be evaluated for CHP projects while still flexible enough account for the complexity of evaluating CHP projects.

I. Action Item: Establish CHP Energy Savings Attribution Model and Project Evaluation Criteria

Objective: Establish a CHP attribution model and project evaluation criteria to clarify how CHP projects would be evaluated and determined as eligible as part of CIP.

Timing: Near-term (2015-2016). While establishing a CHP attribution model and project criteria will likely take a considerable amount of time to finalize, working to develop them during 2015 and 2016 can still help inform utilities’ 2017-2019 CIP Triennial Plan filings or provide information for stand-alone project proposals evaluated and approved by the Department. As one stakeholder pointed out in comments submitted on the Draft CHP Action Plan, “Even if a final model is not available in time for utilities to develop CHP-specific CIP offerings for inclusion in their 2017-2019 plan filings, having the model available could allow them to support CHP projects through custom rebate offerings, as well as the development of additional programs through the CIP modification process.”³⁹

³⁹ 7690.1430 New Project Proposals; Ending Existing Projects - Minnesota Administrative Rules.” *The Office of the Revisor of Statutes*, 19 Jan. 2005. <<https://www.revisor.mn.gov/rules/?id=7690.1430>>.

“7690.1400 Proposed Project Changes; Supplemental Procedures - Minnesota Administrative Rules.” *The Office of the Revisor of Statutes*, 19 Jan. 2005. <<https://www.revisor.mn.gov/rules/?id=7690.1400>>.

Plan: Commerce will establish a CHP attribution model and project evaluation criteria in collaboration with two CHP subcommittees composed of experts recommended by the TRMAC. Below is a “scope of work” outlining how Commerce plans to achieve the goals of this effort:

Activity #1: Scoping

The objective of this activity is to work strategically with the TRMAC to finalize a “work plan” that establishes timelines and expectations and defines an ongoing communications plan in order to achieve the goals set out in the subsequent phases of this effort.

- **Task 1.1** – Establish Project Plan. Commerce will work internally and with TRMAC members to establish timelines and expectations.
 - **Milestone 1.1.1** – Commerce will finalize and distribute the project plan.
- **Task 1.2** – Research, compile, and distribute existing information about relevant CHP attribution models and project evaluation criteria across other states.
 - **Milestone 1.2.1**– Commerce will draft and distribute a summary report that synthesizes existing information on CHP attribution models and criteria used in other states.

Activity #2: CHP Subcommittee Meetings

The goal of this activity is for Commerce to convene a series of CHP subcommittee meetings to discuss and define establishing a CHP attribution model and project evaluation criteria.

- **Task 2.1 – Kick-Off Meeting:** Establish the scope of a CHP attribution model and evaluation criteria. Discuss formulating two CHP subcommittees in consultation with TRMAC members. One CHP subcommittee could include experts with technical/engineering backgrounds and focus on creating a CHP attribution model and the other could include regulatory/policy experts and focus on defining CHP project evaluation criteria.
 - **Milestone 2.1.1** – Commerce will send out notes and next steps from the kick-off meeting; invitations and an agenda for the next meeting.
 - **Milestone 2.1.2** – TRMAC members will send recommendations for CHP subcommittee membership. One committee could focus on CHP attribution model development and the other could focus on CHP evaluation criteria definition.
 - **Milestone 2.1.3** – Commerce will circulate a finalized list of CHP subcommittee members.
- **Task 2.2 – State CHP Models and Criteria Meeting:** Discuss existing CHP attribution models and project evaluation criteria from other states and ways to adapt and incorporate aspects of them to develop a Minnesota-specific approach.

- **Milestone 2.2.1** – Commerce will send out notes and next steps from the meeting; invitations and an agenda for upcoming meetings.
- **Task 2.3 – CHP Project Evaluation Criteria Issues Meeting:** Discuss CHP project evaluation criteria, how to address regulatory issues, and how to ensure evaluation criteria avoids conflict with existing regulations while also facilitating economical investments to achieve energy savings.
 - **Milestone 2.3.1** – Commerce will send out notes and next steps from the meeting; invitations and an agenda for the next meeting.
- **Task 2.4 – CHP Attribution Model Issues Meeting:** Discuss CHP attribution models and technical assumptions issues that need to be addressed to incorporate CHP into Minnesota’s Technical Reference Manual (TRM).⁴⁰
 - **Milestone 2.4.1** – Commerce will send out notes and next steps from the meeting; invitations and an agenda for the next meeting.

Activity #3: CHP Attribution Model and Project Evaluation Criteria Drafting

The goal of this activity is to propose and finalize a CHP attribution model and project evaluation criteria.

- **Task 3.1** – Based on the discussions from the previous activities in this effort, Commerce will propose an initial draft of the CHP attribution model and project evaluation criteria for review and comment by the respective CHP subcommittees.
 - **Milestone 3.1.1** – Commerce will issue a “Straw Man” proposal to stakeholders, outlining a proposed CHP attribution model methodology.
 - **Milestone 3.1.2** – Commerce will issue a “Straw Man” proposal to stakeholders, outlining proposed CHP project evaluation criteria.
- **Task 3.2** – Straw Man Proposal Comment Period. Commerce will establish a public comment period on the CHP attribution model and project criteria “Straw Man” proposals.
 - **Milestone 3.2.1** – Commerce will review and summarize stakeholder comments and distribute a “Comment Period Synthesis Report.”
- **Task 3.3 – CHP Attribution Model Final Meeting:** Review stakeholder comment period feedback and discuss proposed revisions to finalize CHP attribution model.
 - **Milestone 3.3.1** – Commerce will send out notes and next steps from the meeting.

⁴⁰ The Minnesota TRM consists of a set of standard methodologies and inputs for calculating the savings impacts and cost-effectiveness of utility CIPs in Minnesota.

- **Task 3.4 – CHP Project Evaluation Criteria Final Meeting:** Review stakeholder comment period feedback and discuss proposed revisions to CHP project criteria.
 - **Milestone 3.4.1** – Commerce will send out notes and next steps from the meeting.

Activity #4: CHP Attribution Model and Project Evaluation Criteria Regulatory Process

The goal of this activity is to formalize these efforts through Commissioner’s Order pursuant to Minnesota Rules Chapter 7690.

- **Task 4.1** – Finalize CHP attribution model and project evaluation criteria.
 - **Milestone 4.1.1** – Commerce will issue a Commissioner’s Order on eDockets with final versions of the CHP attribution model and project evaluation criteria.

II. Priority Area: Mapping CHP Opportunities

FVB Energy’s “CHP Technical and Economic Potential” report illustrates (at a high-level) there is significant economic potential for CHP in the state, but more granular analysis is needed to identify specific project opportunities for implementation. Feedback from the CHP stakeholder meetings indicate that except for limited utility studies, efforts to identify CHP opportunities tend to happen only with a policy impetus and pilot projects and demonstration programs can serve to advance development frameworks, clarify alternative project approaches and structures, and test their viability. Stakeholders also suggested that project feasibility studies, potentially with State support, could help clarify potential for CHP development in the state.

Stakeholders specifically indicated that examining CHP potential at public facilities would be the most useful mapping initiative to help facilitate CHP deployment in the state. Public facilities are good candidates for implementation of CHP systems in Minnesota as many have significant and concurrent electric and thermal demands. Additionally, public entities are better able to accept longer paybacks and have access to financing.

There is also a great opportunity to utilize CHP and other distributed generation technologies at wastewater treatment facilities to capture energy savings. One approach to reduce electricity consumption at wastewater facilities is to use anaerobic digestion to produce digester gas and then use the digester gas as a fuel for the combined production and beneficial use of heat and electrical power.

II. Stakeholder Comments on Draft CHP Action Plan

Overall, stakeholder comments submitted on the Draft CHP Action Plan were supportive of an action item to map CHP project opportunities at wastewater treatment facilities and at public facilities. Recurring feedback from stakeholder comments related to this action item include:

- **Comments – Outreach:** Use CHP opportunity mapping as a way to elevate awareness among facility owners and operators about CHP options. Focus education and outreach

efforts on this task as it relates to Commerce’s priority action item on expanding education and training resources.

- **Commerce Response:** Commerce agrees with this feedback and will expand its CHP Stakeholder Engagement webpage for its wastewater treatment CHP mapping initiative (described in the action item below) where stakeholders can access relevant education/training resources and participate in the project.
- **Comments – Project Costs:** Costs for CHP opportunity mapping should not be borne by utility customers.
 - **Commerce Response:** Commerce understands this concern and is leveraging external funding sources to help support the CHP mapping effort.
- **Comments – Mapping Criteria:** Prioritize mapping of high-potential facility types (like higher-education campuses or locations with existing or planned district energy systems) and sites that could provide grid benefits. Include a holistic and comprehensive assessment of efficiency benefits and environmental values – to avoid inefficient investment of resources toward achieving the State’s environmental policy goals. Include a requirement that prospective CHP host facilities must first demonstrate that “all reasonable cost-effective conservation investments have previously been made to the facility before participating in any CHP project using public funds.”
 - **Commerce Response:** Commerce intends to screen for the most favorable site opportunities through the mapping effort and will demonstrate how projects were screened and selected as part of project deliverables.
- **Comments – Existing Potential:** The Draft Action Plan is based on an overly optimistic assessment of CHP potential in the state. Commerce should address discrepancies among various CHP potential studies, including its own commissioned assessments.
 - **Commerce Response (based on a follow-up discussion with ICF International):** In the CHP market assessment for Minnesota, the ICF CHP Database was used to provide background information on the amount of CHP installed in the state.⁴¹ This database remains the most comprehensive and highly utilized database on CHP installations that is currently available. Since the CHP Database only includes data on existing or previous CHP systems, it was not used in the estimation process for technical and economic potential for future CHP systems in the state. The data on potential CHP candidate sites came from a variety of different sources including the Dun & Bradstreet Hoovers database, the Manufacturers News database, specific industry association databases, as well as the state boiler database, as outlined in the report. ICF International has a high confidence level in these data sources and the data was procured in Fall of 2013 before the technical and economic potential portion of the study began in Spring of 2014.

⁴¹ “U.S. DOE Combined Heat and Power Installation Database Webpage.” *U.S. Department of Energy*, 5 Aug. 2015. <<https://doe.icfwebservices.com/chpdb/>>.

II. Action Item: Map CHP Opportunities at Wastewater Treatment Facilities and Public Facilities

Objective: Map CHP project opportunities at wastewater treatment facilities and at public facilities to identify most viable project opportunities for potential implementation.

CHP Mapping at Wastewater Treatment Facilities

Commerce was awarded, in partnership with the University of Minnesota Technical Assistance Partnership (MNTAP) and the Minnesota Pollution Control Agency (MPCA), a DOE grant to decrease energy use at Minnesota municipal wastewater facilities and scope opportunities for renewable energy generation. Commerce will assess opportunities for CHP implementation at wastewater facilities as part of this project's scope.⁴² These facilities could serve as demonstration projects for CHP in the wastewater treatment sector and help guide the development and implementation of similar projects in the state. Through this project, Commerce and its core project partners will:

1. *Develop partnerships* with municipalities operating wastewater treatment facilities with technical assistance providers, technology providers, and state/regional resources to assess operations for improved energy efficiency opportunities
2. *Conduct EE opportunity assessments* at sites with sufficient energy efficiency opportunity potential and that are positioned to implement resulting opportunities
3. *Facilitate site investment* in identified proposed project concepts to decrease site energy consumption
4. *Assess renewable generation opportunities* (e.g. facilities with cogeneration potential).

CHP Mapping for Public Facilities

Commerce intends to build on the analysis completed by FVB Energy and assess CHP opportunities at public facilities in Minnesota provided external funding can be procured to support such an effort.⁴³ The primary goal of this project would be to map and identify the most viable CHP opportunities at public facilities in Minnesota. This project could help spur implementation of favorable CHP projects identified at public facilities and increase the current 961.5 MW of CHP capacity in Minnesota by around 100 MW in the near-term. Through this project, Commerce in partnership with the Energy Resources Center (ERC) would map and identify the most viable CHP opportunities at public facilities in Minnesota by:

⁴² "Wastewater Treatment Plant Project Webpage." *Minnesota Technical Assistance Program*, 2015. <<http://www.mntap.umn.edu/POTW/wwtp.html>>.

⁴³ To fund this project, Commerce and its project partner Energy Resources Center submitted a grant application to the DOE as part of the State Energy Program 2015 Competitive Awards. Unfortunately, Commerce was not awarded the grant. The Department will need to search for other funding sources to support this effort.

1. Expanding upon Commerce and the ERC’s body of CHP work in Minnesota by identifying and mapping existing sources of CHP potential for possible development.
2. Conducting an initial market characterization of CHP opportunities at public facilities in Minnesota relying on existing public data and utilizing a specialized CHP screening tool developed by the project team.
3. Carrying out detailed CHP feasibility studies (based on a quantitative and qualitative approach) at 8-15 of the most favorable sites identified through the initial screening of CHP public facilities.
4. Reviewing the opportunity potential and next steps with site management and key stakeholders to facilitate impact and project implementation.
5. Developing an Implementation Model that focuses on the CHP public facility screening tool developed and validated during the project, which other public facilities can utilize to identify and implement CHP opportunities. This Implementation Model would lay the groundwork for a dedicated Lead By Example initiative in Minnesota, that could be leveraged by other states, dedicated to the implementation of CHP in the public sector.

Timing:

- CHP Mapping at Wastewater Treatment Facilities: intermediate-term (2016-2017)
- CHP Mapping for Public Facilities: TBD based on procurement of external funding to support project

Below is a high-level outline of the timelines for the two CHP mapping efforts. More detail about each of the individual tasks is provided in the following “Plan” section.

CHP Mapping at Wastewater Treatment Facilities Project Timeline

- | | |
|---|--|
| <i>Task 1:</i> Strategic Planning (Months 1-3) | <i>Task 5:</i> Identify RE Opportunities (Months 9-36) |
| <i>Task 2:</i> Develop Partnerships (Months 1-12) | <i>Task 6:</i> Implementation Model (Months 24-36) |
| <i>Task 3:</i> Conduct EE Assessments (Months 5-30) | <i>Task 7:</i> Dissemination of Results (Months 33-36) |

CHP Mapping for Public Facilities Project Timeline

- | | |
|--|---|
| <i>Task 1:</i> Strategic Planning (Months 1-3) | <i>Task 4:</i> CHP Feasibility Assessments (Months 12-23) |
| <i>Task 2:</i> Initial Public Facility CHP Market Characterization (Months 4-9) | <i>Task 5:</i> Implementation Model (Months 24-32) |
| <i>Task 3:</i> Competitive RFP for CHP Feasibility Assessments Evaluator (Months 9-11) | <i>Task 6:</i> Dissemination of Results (Months 33-36) |

Plan: At a high-level, the goals of this action item will be achieved by implementing the following strategy and plan outlined below:

Mapping CHP Opportunities at Minnesota Wastewater Treatment Facilities

- **Task 1: Strategic Planning** – Work strategically with DOE and project partners to finalize the scope of work, establish timelines and expectations, and to define an ongoing communications and management plan in order to achieve the goals set out in the subsequent phases of this project.
- **Task 2: Develop Partnerships** – Engage municipal wastewater treatment facility managers and operators and inform them of the program opportunity. Additional partnership activities will be focused on aligning regional utilities and assistance providers, technology providers, and state/regional resources to assess operations for improved energy efficiency and finance opportunities. Conduct an energy efficiency training event for wastewater treatment operators.
- **Task 3: Conduct Energy Efficiency Assessments** – Conduct energy efficiency opportunity assessments at sites with sufficient energy efficiency opportunity potential and that are positioned to implement resulting opportunities. Provide site specific detailed report summary of energy efficiency recommendations. Review the opportunity potential with site management and key stakeholder to promote impact. Share training resources with site and regional staff to improve awareness and self-directed assessment of energy efficiency opportunities.
- **Task 4: Facilitate site investment** – Identify barriers to implementation of facility energy efficiency recommendations. Connect project implementation decision makers with program partners such as technology vendors, utilities, and economic development resources to develop strategies to overcome technical and financial barriers to implementation. Engage state agency staff to determine options to manage regulatory issues that create barriers to implementation.
- **Task 5. Identify Renewable Energy Opportunities** – Identify and advance opportunities for renewable energy generation at wastewater facilities. Such opportunities may be available at facilities that manage high load effluent streams or that have clients that generate such streams. A broad based approach to support opportunities for distributed energy generation at such facilities will be taken to engage local and regional partners to scope technology and financing options for appropriate projects. The ERC will be a key project partner in providing technical assistance by conducting detailed onsite evaluations for CHP opportunities at identified wastewater treatment facilities.
- **Task 6: Action Plan/Implementation Model** – Develop an Action Plan/Implementation Model that would present a detailed step-by-step process that other wastewater treatment facilities can follow to identify and implement onsite energy efficiency and renewable energy opportunities. By summarizing all of the resources and best practices gathered in previous project tasks, this Action Plan will present a comprehensive toolset with explicit

strategies and tactics that can be employed by wastewater treatment facilities across Minnesota and in other states.

- *Task 7: Dissemination of Results* – Promote the resources that were developed under this project to key stakeholders. To foster change, it is critically important for wastewater treatment facilities to have clear, actionable items (i.e. strategies and best practices) as a result of the previous six phases of this project. The project management team understands the importance of developing actionable items for Minnesota stakeholders, but also recognizes the importance of providing a model for other interested states facilities. Therefore, a final objective will be for the project management team to work with DOE staff to seek opportunities to present on the challenges and achievements experienced under this project and promote the final project deliverables that can be utilized by wastewater facilities. For example, regional organizations will be contacted for presentation and advisory opportunities.

Mapping CHP Opportunities at Public Facilities (Commerce will need to search for external funding sources to support this effort)

- *Task 1: Strategic Planning* – Work strategically with DOE and project partners to finalize the scope of work, establish timelines and expectations, and to define an ongoing communications and management plan in order to achieve the goals set out in the subsequent phases of this project.
- *Task 2: Initial Public Facility CHP Market Characterization* – Conduct an initial market characterization of CHP opportunities at public facilities in Minnesota relying on existing data and utilizing a specialized CHP screening tool developed by the project team. The ERC will be a key project partner in developing a public facility CHP screening tool and carrying out the initial CHP screenings and public facility market characterization. Using facility level energy usage data from state agencies and other centralized sources the ERC will conduct over 5,000 CHP screenings of public sector buildings. The results from these screenings will be used to compile the public sector market characterization report which will allow Commerce and other stakeholders to see where, and in what quantity, public sector CHP potential is located. The results from the market characterization report will be used to select the top candidates for more detailed CHP feasibility studies in Task 4.
- *Task 3: Competitive RFP for CHP Feasibility Assessments Evaluator* - The project team will develop and issue a request for proposal (RFP) to hire a CHP evaluator to carry out the CHP feasibility assessments at public facilities as part of Task 4's scope. Proposals will be evaluated and a responder will be chosen. The ERC will be a key project partner in assisting in the RFP development/responder evaluation.
- *Task 4: CHP Feasibility Assessments* - Based on findings of the initial public facility CHP screenings and the CHP market characterization report, the project team will conduct CHP feasibility studies (based on a quantitative and qualitative approach) at 8-15 of the most favorable sites identified in Task 2. The project team will provide a site-specific detailed report summary of the benefits and costs of implementing CHP on-site,

detailed financial analysis for the life of the system, detailed savings analysis for the life of the system, sensitivity analysis for electricity and fuel prices, review of the requirements to tie-in a CHP system at the site, and review the opportunity potential with site management and key stakeholders to promote impact and implementation.

- **Task 5: Implementation Model** – Develop an Implementation Model (IM) that focuses on a specialized CHP public facility screening tool developed and validated during the project, which other public facilities can utilize to identify and implement CHP opportunities once it is made publicly available. This IM will present a comprehensive toolset with explicit strategies and tactics that can be employed by public facilities across Minnesota and in other states. This IM would lay the groundwork for a dedicated Lead By Example initiative in Minnesota, that could be leveraged by other states, dedicated to the implementation of CHP in the public sector.
- **Task 6: Dissemination of Results** – Promote and deploy the resources that were developed under this project to key stakeholders. To foster change, it is critically important for public facilities to have clear, actionable items (i.e. strategies and best practices) as a result of the previous five phases of this project. The project management team understands the importance of developing actionable items for Minnesota stakeholders, but also recognizes the importance of providing a model for other interested facilities. Therefore, a final objective will be for the project management team to work with DOE staff to seek opportunities to present on the challenges and achievements experienced under this project and promote the final project deliverables that can be utilized by public facilities in other states. For example, regional organizations will be contacted for presentation and advisory opportunities.

III. Priority Area: Education and Training Needs and Options

Commerce contracted Microgrid Institute to develop a CHP Training and Education Plan by identifying gaps in knowledge and skills, considering training and education options, and producing a set of recommendations to support CHP deployment in the state.⁴⁴ Microgrid Institute gathered input and led discussion on training and education topics during the CHP stakeholder engagement process. An analysis of survey responses and meeting discussion content show that stakeholders perceive three primary gaps in market knowledge and workforce resources:

1. **CHP options and opportunities:** Some key stakeholder groups – most notably including prospective end-use customers – lack knowledge and understanding about CHP systems and their potential.
2. **Regulatory, finance, and development issues:** CHP development processes and factors are perceived as complex and uncertain, which tends to discourage decision makers from exploring and pursuing CHP development.

⁴⁴ Burr, Michael and Peter Douglass. “Combined Heat and Power: Training and Education Plan.” *Microgrid Institute*, Feb. 2015. <<http://mn.gov/commerce/energy/images/mg-chp-training-education-plan.pdf>>.

3. *Onsite energy staffing:* Workforce and training resources may be inadequate to support needs among prospective users of CHP and other onsite energy systems, including energy management and efficiency solutions.

III. Stakeholder Comments on Draft CHP Action Plan

Stakeholder comments submitted on the Draft CHP Action Plan were generally supportive of an action item addressing CHP education and training resources with the following feedback:

- **Comments – Establish Webpage:** Establish a website that highlights CHP as an energy-efficient technology, provides hyperlinks to state and federal programs and resources supporting CHP projects, and includes information about existing CHP projects in Minnesota, as well as vetted engineering firms and project developers.
 - **Commerce Response:** Commerce agrees with this comment and will expand its CHP Stakeholder Engagement webpage to include links to additional CHP resources.
- **Comments – Project Screening:** Training and support for both technical and economic aspects of CHP and establishment of a “pre-screening tool and scoping procedure” to focus attention on high-priority projects.
 - **Commerce Response:** Commerce acknowledges the need for training and technical assistance, but the Department is not able to provide this type of training support directly. Commerce will expand its CHP Stakeholder Engagement webpage to include technical resources related to its CHP mapping effort described in Action Item II. Commerce encourages other institutions (e.g. a university, community college, etc.) to consider providing resources of this nature.
- **Comments – Funding Sources:** Identify what funding sources would be used for development of planned education materials, website expansion, outreach, and other training resources.
 - **Commerce Response:** Commerce has been resourceful in procuring funding outside of Minnesota and leveraging other funding sources, which have all added value to the state’s collective knowledge regarding the complexities of CHP. Commerce intends to utilize federal funding from its wastewater treatment DOE grant project described in Action Item II develop and post education and training resources to its CHP Stakeholder Engagement webpage.
- **Comments – Funding Sources:** CHP options and opportunities should be Commerce’s focus to the degree CHP as a “technology and strategy” suits customers’ needs. CHP is not a plug and play system and it does require a skill set that may be different that the existing facility staff.
 - **Commerce Response:** Commerce agrees and will focus on providing information and engaging stakeholders about CHP project opportunities through its DOE wastewater treatment grant described in Action Item II.

III. Action Item: Expand Education and Training Resources on Commerce's Website

Objective: Commerce will continue to disseminate information about CHP opportunities primarily through updates to the Department's webpage.

Timing: Near-term (2015-2016).

Plan: Commerce will continue to disseminate information about CHP opportunities primarily through updates to the Department's CHP Stakeholder Engagement Webpage.⁴⁵ Updated resources will include:

- *Webinars and workshops:* Training to enable stakeholders to adopt and apply Minnesota's CHP project evaluation methodologies and criteria.
 - Commerce will address this goal by posting resources on the Department's website developed under Action Item I as they relate to establishing CHP attribution model and project evaluation criteria.
- *Project feasibility support:* Training, guidance, and ongoing assistance for stakeholder efforts to study the feasibility of CHP projects.
 - Commerce will address this by posting information resources on the Department's website related to its CHP mapping initiative outlined in Action Item II.
- *CHP evaluation resources:* Technical resources for stakeholder efforts to evaluate CHP development opportunities.
 - Commerce will address this goal by posting resources on the Department's website related to its CHP mapping initiative outlined in Action Item II.
- *Financing resource guides:* Guidance and reference information to assist stakeholders in efforts to plan and obtain financing for CHP projects.
 - Commerce will address this issue by providing links to financing programs on the Department's website that stakeholders can access for potential CHP projects.
- *Existing resources:* Commerce believes that there is already a wealth of existing CHP resources available from organizations such as the DOE CHP Technical Assistance Partnership,⁴⁶ EPA CHP Partnership,⁴⁷ SEE Action,⁴⁸ ACEEE,⁴⁹ and ICF International⁵⁰ that address the other education and training gaps that stakeholders identified, including:

⁴⁵ "Combined Heat and Power Stakeholder Meetings Webpage." *Minnesota Department of Commerce*, 2015. <<http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/chp-meetings.jsp>>.

⁴⁶ "CHP Technical Assistance Partnership (CHP TAPs) Webpage." *U.S. Department of Energy*. <<http://energy.gov/eere/amo/chp-technical-assistance-partnerships-chp-taps>>.

⁴⁷ "Combined Heat and Power Partnership Webpage." *U.S. Environmental Protection Agency*. <<http://www.epa.gov/chp/>>.

⁴⁸ "Combined Heat and Power Webpage." *State & Local Energy Efficiency Action Network*. <<http://www4.eere.energy.gov/seeaction/topic-category/combined-heat-and-power>>.

⁴⁹ "Combined Heat and Power Webpage." *American Council for an Energy Efficient Economy*. <<http://aceee.org/topics/combined-heat-and-power-chp>>.

- *CHP information tools and programs:* Multimedia resources, case studies, and other information materials supporting stakeholder efforts to research and evaluate CHP generally.
- *Legal and regulatory information:* Practical explanation and expert guidance relating to CHP laws, policies, and procedures affecting development.

IV. Priority Area: CHP Ownership Problems and Solutions

Discussions with stakeholders and results from the FVB Energy’s “CHP Technical and Economic Potential” study illustrate that the economics of CHP projects are very site-specific, the upfront cost of CHP systems is often a significant barrier, and there is not a “one-size-fits-all” financial program or mechanism that meets the needs of every CHP project.

Stakeholder discussions suggest possible ways to overcome these barriers include incentives to reduce up-front capital costs, direct support for ancillary infrastructure investments, leveraging financing programs to reduce costs of capital, and flexible rate treatment including on-bill repayment for utility investments in customer-side CHP.

IV. Stakeholder Comments on Draft CHP Action Plan

Stakeholder comments submitted on the Draft CHP Action Plan, expressed support for Commerce’s proposed action item related to leveraging and communicating information about financing programs. Feedback included the following points:

- **Stakeholder Comments:**
 - Existing financing programs outside of CIP should be explored for CHP, including both private and public funding mechanisms.
 - Efforts to leverage existing financing programs should not preclude efforts to develop or implement new programs.
 - Identifying and leveraging existing financing programs should be incorporated as part of Commerce’s education and training action item.
 - Focus efforts on credit enhancements and other financing strategies, such as new market tax credits.
 - There is a need for financing mechanisms to help allay the risk of stranded assets if the host customers were to go out of business or significantly reduce their energy needs. It also calls for a “regulatory solution” to allow utilities to obtain favorable cost-recovery treatment for investments in CHP assets.
 - In addition to communicating information about existing financing programs, a useful effort would critique these programs and consider whether changes may be required

⁵⁰ “U.S. DOE Combined Heat and Power Installation Database Webpage.” *U.S. Department of Energy*, 5 Aug. 2015. <<https://doe.icfwebservices.com/chpdb/>>.

- to make them work for CHP financing, specifically regarding impediments to program access for various types of projects and owners.
- Utility rebate programs are more important than financing mechanisms, in terms of supporting timely investment returns required to attract affordable capital.
 - There are additional ownership-related issues not addressed in the Draft Action Plan, specifically: limitations on energy sales by third-party owners and operators; uncertainties regarding utility ownership and partnering; potential stranded-asset risks; and statutory limits on the size of new fossil-fired base-load power plants.
 - The plan omits a regulatory structure that appropriately addresses the value of CHP, while maintaining a financially suitable model for utilities and customers.
 - One utility said it would support opportunities for utility ownership or development of CHP, but that a utility mandate is not the most effective way to promote CHP deployment, which it says “is by nature a customer-driven solution.”
- **Commerce Response:** Commerce appreciates stakeholder feedback on this complex priority area. The comments above clearly demonstrate the need for a variety of financial program offerings for CHP projects. Commerce is committed to continuing to explore and better defining its own financing program offerings to help meet the needs of CHP projects. However, fully addressing this priority area requires a wider effort led by a collective effort of stakeholders to address and resolve these complex issues.

IV. Action Item: Leverage Existing Financing Programs Applicable to CHP

Objective: Explore, communicate, and improve awareness of financing programs that could be better leveraged to meet the individual needs of customers for CHP projects.

Timing: Near-term (2015-2016).

Plan: Commerce will continue to explore ways to improve its own financing program offerings that could be utilized for CHP projects (such as the ones summarized in Table 6 below). However, there is a need for an organization(s) outside of Commerce to champion a wider effort to explore CHP financing and ownership issues, synthesize and summarize existing resources that could be leveraged, and provide recommendations for ways to address gaps and barriers.

	Guaranteed Energy Savings Program	Local Energy Efficiency Program	Energy Savings Partnership	Trillion Btu Program	Commercial - Property Assessed Clean Energy Program	Rev It Up Program
Eligibility (recipient)	State Agencies, Higher Ed, Local Governmental Units, K-12	Local Governmental Units, K-12	LEEP Program participants	Commercial and Industrial Businesses, 501 (c)(3) organizations	Commercial and Industrial Businesses, 501 (c)(3) organizations	Local Governmental Units, Commercial and Industrial Businesses, Small Businesses (< 50 employees), Health Care Facilities, MHFA
Type	State Administered Energy Savings Performance Contracting (ESPC) Program	State Administered Design-Bid-Build (DBB) Program for local governmental entities	Lease Purchase Agreement	Revolving Loan Fund	Special Assessment (against property)	Revenue Bonds – tax-exempt or taxable (project dependent)
Project Size	Min. \$350k Max. none	Min \$50k Max. \$350k	Min. \$50k Max. none	Min. 10k Max. \$1M	Max. 20% of Assessed Property Value	Min. \$1M Max. \$20M
Term (years)	Up to 25	Up to 15	Up to 15	Up to 5	Up to 20	Up to 25
Interest Rate			3 – 6%	4.5 – 6%	4 - 6%	Dependent upon issuance (4 – 6%)
Administrator	Commerce	Commerce	St. Paul Port Authority	St. Paul Port Authority	St. Paul Port Authority; SWRDC	Commerce
Resources	http://mn.gov/commerce/energy/topics/financial/Energy-Savings-Program/	http://mn.gov/commerce/energy/topics/financial/Energy-Savings-Program/	http://sppa.com	http://sppa.com	sppa.com http://www.swrdc.org/economic-development/grant-opportunities/	http://mn.gov/commerce/energy/businesses/financial/funding-opportunities.jsp

Table 6. Summary of Existing Programs

V. Priority Area: CIP CHP Supply-Side Investments

As discussed during the CHP stakeholder meetings, CHP systems do not fit neatly into the standard definition of supply-side or demand-side efficiency resources as CHP systems address system efficiency improvements. Consequently, CHP does not clearly fit into utility CIPs, which focus on demand-side efficiency to meet the 1.5% energy savings goal.

Stakeholders explored issues related to expanding or adapting CIP to encourage CHP through a new category of supply-side conservation opportunities with new and separate goals and incentives. Thirty-eight percent of respondents who participated in the post-engagement CHP stakeholder survey indicated that including CHP as an eligible supply-side resource under electric utility infrastructure (EUI) investments in CIP would be an effective policy initiative to explore and facilitate CHP deployment in Minnesota.⁵¹

V. Stakeholder Comments on Draft CHP Action Plan

Stakeholder comments submitted on the Draft CHP Action Plan presented divergent views on whether CIP funds can or should be used to support new CHP projects. Feedback included the following comments:

- **Comments - Timing:**
 - Adapting CIP for supply side investments should be moved up in the timeline to the near or immediate term.
 - In the draft action item, the TRM and Smart Measure library timelines leave little time for utilities to develop CIP programs in time for the June 1, 2016 triennial filing deadline. Flexibility in proposing programs filed outside that Triennial deadline should be encouraged.
- **Comments – Concerns Regarding CIP Changes:**
 - CHP can serve as both a supply- and demand-side efficiency improvement, and should be considered in CIP to stimulate both demand and supply side investments.
 - The CIP framework can accommodate inclusion of CHP. There are existing frameworks in other states and there is statutory support for including CHP in CIP. The question of specifically how CHP projects should be incorporated remains open.
 - Some stakeholders express opposition to the action item to amend CIP EUI provisions to support topping-cycle CHP. There are concerns with modifying CIP

⁵¹ Minnesota Statute 216B.241 subd. 1c (d) allows a utility or association to include in its energy conservation plan energy savings from EUI improvements projects approved by the Minnesota Public Utilities Commission under 216B.1636 on top of a minimum energy saving goal of at least one percent from end-use efficiency measures, provided that the EUI projects result in greater energy efficiency than would have occurred through normal maintenance activity. EUI cost recovery is addressed for investor-owned utilities in 216B.1636.

to accommodate CHP projects, that would need to be addressed and questions about whether it would be allowable under statute.

- Bottom-cycle waste-heat recovery systems are consistent with CIP’s mission, but topping-cycle CHP systems are new generation resources and should be treated as such by inclusion in a Resource Plan rather than being considered as a conservation measure.
- If supply resources are to be included in CIP, then CHP should be evaluated alongside other, potentially more cost-effective supply-side options.
- **Comments – Concerns Regarding Statute Language:**
 - CIP can only include “waste heat recovered and used for thermal energy” as an energy conservation measure that can be included in utilities’ CIP programs.
 - Minnesota Statute (216B.241, Subd 1, part (e)), states that “energy conservation improvement ... does not include electric utility infrastructure projects approved by the commission under section 216B.1636.
 - Targeted fuel switching in CIP projects is prohibited, among other things, by a deputy commissioner’s order in Docket No. G008/CIP-00-864.07.
- **Comments – Areas of Clarification:**
 - There is a need for clarity on: 1) How a modified CIP program would address differences between energy conservation and generation efficiency; 2) How the program would be administered or funded; and 3) How prescriptive savings calculations would measure non-uniform, heterogeneous CHP project benefits.
 - There are questions that need to be addressed related to program design, administration, and regulatory treatment.
 - There are fundamental differences between promoting conservation and promoting generation efficiency. A CHP-specific benefits analysis tool should be developed to evaluate societal, utility, and non-participant effects.
 - Commerce should seek clarification from the Legislature before pursues further development of CHP in the state.
- **Commerce Response:** Commerce appreciates the in-depth feedback stakeholders provided on this priority area, and for highlighting legitimate issues that need to be carefully considered as part of an action item to explore CHP supply-side eligibility under CIP. Commerce intends to incorporate these comments as issues that will be clarified and addressed as part of its action item to examine CHP under existing EUI statutory language.

V. Action Item: Examine Electric Utility Infrastructure Policy

Objective: Commerce will explore and clarify whether and how CHP could qualify as an eligible supply-side resource as defined under EUI statutory language.

Timing: Long-term (2015-Onward). Examining and clarifying EUI policy will likely take time to develop and finalize, but beginning to explore this issue in the near-term can still help inform

CIP Triennial Plan filings, and programmatic changes can be incorporated into utility plans in the longer-term through the CIP modification process.

Plan: Commerce issued an RFP in April 2015 to hire a consultant to identify and develop a set of EUI measures that could be included in Minnesota's TRM as well as the Energy Savings Platform Smart Measure Library. GDS Associates was selected as the successful responder and will perform the following tasks as part of the project:

Task 1. Identify and recommend a set of prescriptive EUI measures for inclusion in the TRM.

- 1.1. Create a preliminary, expansive list of all possible EUI measures that may be useful for Minnesota. The estimated number of measures is expected to be in the range of 40-50. The 2011 CARD report *Utility Infrastructure Improvements for Energy Efficiency* will be used as a starting point as well as identifying other states' TRM measures.
- 1.2. Present the preliminary list to the TRMAC to kick off the stakeholder collaboration of the project. The presentation will include high-level, approximate measure attributes including savings estimate, cost, lifetime, market potential, and availability and reliability of resources.
- 1.3. Evaluate the initial list of preliminary measures down to a list of approximately 15 measures to be recommended for TRM inclusion. Obtain feedback from stakeholders for additional measures or recommendations on measure criteria. Develop a set of criteria to evaluate measures for inclusion.
- 1.4. Deliverable – Provide list of approximately 15 measures recommended for TRM inclusion.

Task 2. Develop a standard and defensible method to quantify energy and demand savings in a prescriptive manner.

- 2.1. Deliver a draft of completed EUI measures to the Department. The measures will include a clearly defined prescriptive method to calculate energy and demand savings along with associated lifetimes of energy efficiency persistence. Additionally, each measure will include:
 - 2.1.1 A concise measure description
 - 2.1.2 Allowable actions
 - 2.1.3 Target end uses (generation, transmission, or distribution)
 - 2.1.4 Defined eligibility requirements that must be met for the measure to apply
 - 2.1.5 Prescriptive algorithms to calculate energy savings and demand reduction
 - 2.1.6 Clear definitions of each variable used in the algorithms
 - 2.1.7 List of inputs required from the utility or contractor in order to complete the savings calculations
 - 2.1.8 Deemed or default recommended variable values, if appropriate

- 2.1.9 Recommended default variables that reflect an appropriate typical baseline condition in Minnesota.
- 2.1.10 Expected lifetime of energy efficiency persistence
- 2.1.11 Methodology for developing the algorithms and justification for the applicability of references
- 2.1.12 An example of how to use the measure
- 2.1.13 Incremental cost estimate (see Task 3)
- 2.1.14 References to support the algorithm, lifetime, and incremental cost
- 2.1.15 Brief notes about the measure’s limitations (more complete documentation about how to improve measures in the future will be provided as part of Task 7 and deliverable 6)
- 2.1.16 For applicable measures, a method to adjust the savings algorithm and incremental cost for a project that is partially implemented in the course of normal maintenance activity (as required by statute). Work with Department staff to clearly define “normal maintenance activity.”

2.2. Hold team meetings that TRMAC members and Department staff can attend via teleconference. These meetings will review progress, identify remaining tasks, prioritize tasks and assign action items to team members.

2.3. Deliver a final draft of EUI measures that will be included in the TRM. This will follow a similar format to the draft in Task 2.1.

2.4. Deliverables – Draft of completed EUI measures, Final draft of EUI measures

Task 3. Develop default incremental cost estimates for each EUI measure

3.1. Develop incremental costs using available pricing information and past experience designing infrastructure projects for clients.

3.2. For measures that do not have accurate prevailing pricing, work with the Department to confidentially survey Minnesota utilities to ensure accurate, recent, local assumptions are built into the cost estimates. The survey will involve 5-8 utilities with approximate 10 questions each.

Task 4. Develop a Smart Measure in ESP® reflecting the measure characterizations in the new TRM

4.1. Deliver a complete Smart Measure for each new EUI TRM measure. The Smart Measure will reflect the measure characterizations developed over the course of this project.

- 4.2. Deliverable – A complete Smart Measure for each new TRM measure

Task 5. Document all EUI measures in a format to be determined in consultation with the Department.

- 5.1. Work with the Department to ensure that the TRM measures are presented in a format best suited for inclusion in the TRM.
- 5.2. Work with the Department to adjust the list of specific attributes (Task 2.1) as necessary to develop all aspects of the final measure format.

Task 6. Coordinate with the Department to present and discuss findings from Minnesota utilities in a series of technical working meetings.

- 6.1. Facilitate at least 3 in-person technical working meetings. These meetings will provide an accessible avenue for utilities to offer feedback on EUI measure development and learn about progress on the measures to inform their preliminary 2017-2019 CIP planning efforts.
- 6.2. The first meeting will occur around October to introduce the project objective to utility representatives.
- 6.3. The second meeting will occur around November to allow feedback from the utilities.
- 6.4. The final meeting will be held around December to discuss specific use cases that utilities are likely to encounter when implementing the measures under development.
- 6.5. Deliverable – 3 in-person technical working meetings.

Task 7. Recommend an ongoing schedule for future updates to the EUI measures to ensure that they meet the changing standards and new technological advances in EUI.

- 7.1. Deliver a recommended ongoing schedule for future updates and required maintenance of MN EUI TRM measures. This will include three levels of recommendations:
 - 7.1.1 An overall recommended update procedure (the order in which measure characteristics should be examined and how changing one characteristic affects the others).
 - 7.1.2 A recommended schedule for updating each specific measure along with likely potential sources of information.
 - 7.1.3 Indicate which specific references could be bolstered to improve measure accuracy or reliability.
- 7.2. Include a list of preliminary measures that were rejected for development under this

project. Include a recommendation to review each measure again, a specific required piece of information for it to become viable or an explanation as to why the measure is not worth considering.

7.3. Deliverable – An ongoing schedule for future updates and required maintenance of MN EUI TRM measures.

The new EUI measures for the TRM produced via this project could be used as the basis for developing measures for CIP plans and calculating claimed savings over 2017-2019 by Minnesota investor-owned, municipal, and cooperative electric utilities. The new TRM will be finalized and released by year-end 2015. The EUI measures will be added after the release in the review period.

This project will act as a starting point to also explore policy questions regarding whether and how CHP could qualify as an eligible EUI resource. Commerce will collaborate with Minnesota utilities and stakeholders through the TRMAC to examine whether CIP EUI provisions could facilitate supply-side efficiency improvements, including CHP, and explore the implications for existing demand-side CIP programs.

V. Alternative to CIP EUI Approach

There were myriad CHP regulatory and policy barriers raised during the CHP stakeholder engagement process. FVB Energy’s “Minnesota CHP Policies and Potential” study provides a thorough assessment of potential changes to Minnesota policies and programs to increase the implementation of CHP.⁵² Among FVB Energy’s key conclusions is that improved policies could lead to significantly greater implementation of CHP in Minnesota. Specifically, the creation of a new Alternative Portfolio Standard (APS), which would require electric utilities to obtain a specified percentage of sales from CHP (regardless of fuel) by a given year, could increase Minnesota’s CHP deployment by as much as 1,000 MW of new CHP by 2030 - approximately a doubling of current CHP.

While an APS would require legislation and creation of an entirely new program and implementation mechanisms, it could prove to be a viable alternative approach to help spur CHP implementation in the state. Therefore, if CIP EUI provisions are deemed inappropriate or ineffective to support CHP investments, Commerce recommends continued discussion with stakeholders regarding alternate policy solutions such as a new APS that could increase CHP deployment, where appropriate, in Minnesota and explore the addition of other thermal renewable fuel sources.

⁵² Spurr, Mark. “Minnesota Combined Heat and Power Policies and Potential.” *FVB Energy*, Jul. 2014. <<http://mn.gov/commerce/energy/images/CHPRegulatoryIssuesandPolicyEvaluation.pdf>>.

VI. Priority Area: Standby Rates

Forty-three percent of respondents who participated in the post-engagement CHP stakeholder survey indicated that introducing transparent, unbundled pricing for standby rates would be an effective policy initiative to facilitate CHP deployment in Minnesota. Overall, the standby rate discussion that occurred as part of CHP stakeholder engagement process and ERC's study on the effects of standby rates on CHP deployment suggest that improvements to existing standby frameworks could lead to greater implementation of CHP and other distributed generation resources. If the economic barrier that standby rates currently impose on CHP projects were completely eliminated, the ERC's analysis indicates that the potential for new CHP capacity with a less than a ten-year payback would increase from 779 MW to 1,116 MW within Minnesota's IOU service territories.

VI. Stakeholder Comments on Draft CHP Action Plan

Stakeholder comments submitted on the Draft CHP Action Plan were generally supportive of the recommendation to continue stakeholder engagement through a generic proceeding on standby rates that could be established by the PUC. Some of the feedback about standby rates included the following points:

- **Comments – Issues for Continued Discussion:**
 - The PUC proceeding could provide a forum for thorough review of cost causation, market diversity and reliability, coincident peak/non-peak rates, planned outages, CHP attributes and appropriate capacity crediting, and practices such as standby charge ratchets.
 - Standby rates should be as simple and understandable as possible, while sending clear price signals and incentives for customer-owned generation to be operated as efficiently as possible. Policies on standby rates should be flexible, accommodating differences among Minnesota utility service territories.
 - Portraying standby rates as a market barrier implies that removing standby service charges would yield only positive outcomes; however, standby service represents a real cost for the utility, which should be considered.
 - Any proposed changes to standby service pricing policies should consider the existing statutory structure.
 - Further discussion is needed regarding how to value the benefits of distributed generation systems in relation to standby rate service.

VI. Action Item: Continue Discussion Through PUC's Generic Proceeding

Establishing a generic proceeding on standby rates would help address a priority issue that was identified through the extensive analysis completed by Commerce and its partners. Commerce hopes that the PUC will open such a proceeding in the near future so that stakeholders can collaborate to examine possible improvements to standby service. Commerce intends to participate in this regulatory proceeding.

Appendix A: September 3, 2014, CHP Stakeholder Meeting #1 Resources

Meeting Resources

- Meeting Agenda: <http://mn.gov/commerce/energy/images/CHPMeeting1Agenda.pdf>
- Department of Commerce, Jessica Burdette's Presentation:
<http://mn.gov/commerce/energy/images/CHPMeeting1-CommercePresentation.pdf>
- Microgrid Institute, Michael Burr's Presentation:
<http://mn.gov/commerce/energy/images/CHPMeeting1MG-Presentation.pdf>
- FVB Energy, Mark Spurr's Presentation:
<http://mn.gov/commerce/energy/images/CHPMeeting1FVB-Presentation.pdf>
- Microgrid Institute's CHP One-Pagers:
 - [Technical and Economic Potential](#) (.pdf)
 - [Baseline and Value Proposition](#) (.pdf)
 - [Energy Policy Context](#) (.pdf)
- Microgrid Institute Pre-Engagement Survey Results Report:
<http://mn.gov/commerce/energy/images/MG-PreEngagementSurvey.pdf>
- Microgrid Institute CHP Stakeholder Meeting #1 Summary:
<http://mn.gov/commerce/energy/images/MG-StakeholderMeeting1Summary2014.pdf>

Appendix B: September 24, 2014, CHP Stakeholder Meeting #2 Resources

Meeting Resources

- Meeting Agenda: <http://mn.gov/commerce/energy/images/CHPMeetingAgenda2.pdf>
- Department of Commerce, Lise Trudeau's Presentation: <http://mn.gov/commerce/energy/images/CommercePresentation2.pdf>
- Microgrid Institute, Michael Burr's Presentation: <http://mn.gov/commerce/energy/images/MGInstPresentation2.pdf>
- Department of Energy Combined Heat and Power Technical Assistance Partnership, Cliff Haefke's Presentation: <http://mn.gov/commerce/energy/images/DOEPresentation2.pdf>
- The Brattle Group, Dr. Ahmad Faruqui's Presentation: <http://mn.gov/commerce/energy/images/BrattlePresentation2.pdf>
- Energy Resources Center, Graeme Miller's Presentation: <http://mn.gov/commerce/energy/images/EnergyResourcePresentation2.pdf>
- Microgrid Institute CHP One-Pagers:
 - [Standby Rate Design Elements](#) (.pdf)
 - [CHP and State Portfolio Standards](#) (.pdf)
- Microgrid Institute CHP Stakeholder Meeting #2 Summary: <http://mn.gov/commerce/energy/images/CHPMeeting2Summary.pdf>

Appendix C: September 24-October 10, 2014, Comment Period #1

Comments Received:

- [BlueGreen Alliance Comments](#) (.pdf)
- [CenterPoint Energy Comments](#) (.pdf)
- [Cummins Comments](#) (.pdf)
- [Fresh Energy Comments](#) (.pdf)
- [Great Plains Institute Comments](#) (.pdf)
- [Great River Energy Comments](#) (.pdf)
- [Midwest Cogeneration Association Comments](#) (.pdf)
- [Minnesota Chamber of Commerce Comments](#) (.pdf)
- [Minnesota Power Comments](#) (.pdf)
- [Otter Tail Power Comments](#) (.pdf)
- [Vergent Power Solutions Comments](#) (.pdf)
- [Western Lake Superior Sanitary District Comments](#) (.pdf)
- [Xcel Energy Comments](#) (.pdf)
- [Xcel Energy - Technical, Economic Potential for DG and CHP in Xcel's MN Territory](#) (.pdf)

Appendix D: October 15, 2014, CHP Stakeholder Meeting #3 Resources

Meeting Resources

- Meeting Agenda: <http://mn.gov/commerce/energy/images/CHPMeeting3-Agenda.pdf>
- Department of Commerce, Jessica Burdette's Presentation:
<http://mn.gov/commerce/energy/images/CHPMeeting3-CommercePresentation.pdf>
- Microgrid Institute, Michael Burr's Presentation:
<http://mn.gov/commerce/energy/images/CHPMeeting3-MGPresentation.pdf>
- Microgrid Institute CHP Stakeholder Comments Preliminary Summary Report :
<http://mn.gov/commerce/energy/images/CHPMeeting3-MGCommentsReport.pdf>
- Microgrid Institute CHP Stakeholder Meeting Summary #3:
<http://mn.gov/commerce/energy/images/MI-CHPSMeeting3Summary.pdf>

Appendix E: November 5, 2014, CHP Stakeholder Meeting #4 Resources

Meeting Resources

- Meeting Agenda:
<http://mn.gov/commerce/energy/images/CHPStakeholderMeeting4Agenda.pdf>
- Department of Commerce, Jessica Burdett's Presentation:
<http://mn.gov/commerce/energy/images/CommerceMeeting4Presentation.pdf>
- Microgrid Institute, Michael Burr's Presentation:
<http://mn.gov/commerce/energy/images/MG-Meeting4Presentation.pdf>
- Updated/Finalized - Synthesis of Stakeholder Comments Summary Report:
<http://mn.gov/commerce/energy/images/UpdatedFinalizedCHPStakeholderCommentsSummary.pdf>
- Microgrid Institute CHP Stakeholder Meeting Summary #4:
<http://mn.gov/commerce/energy/images/microgrid-institute-chp-meeting-summary-4.pdf>

Appendix F: Continued Stakeholder Engagement Resources

February Updates

- Microgrid Institute CHP Stakeholder Engagement Process Summary Report: <http://mn.gov/commerce/energy/images/mg-stakeholder-final-report.pdf>
- Microgrid Institute CHP Post-Engagement Survey Results Report: <http://mn.gov/commerce/energy/images/mg-post-engagement-survey.pdf>
- Microgrid Institute CHP Training and Education Plan: <http://mn.gov/commerce/energy/images/mg-chp-training-education-plan.pdf>

March Updates

- Draft CHP Action Plan: <http://mn.gov/commerce/energy/images/draft-chp-action-plan-2015.pdf>

April Updates

- Draft CHP Action Plan Webinar
 - Microgrid Institute's Presentation: <http://mn.gov/commerce/energy/images/mg-chp-action-plan-webinar-draft.pdf>
 - Energy Resources Center's Presentation: <http://mn.gov/commerce/energy/images/erc-chp-action-plan-webinar.pdf>
 - Draft CHP Action Plan Webinar Recording: <https://www.youtube.com/watch?v=uvHn-3U1Qwo&feature=youtu.be>

May Updates

- Comment period on the Draft CHP Action Plan. Comments Received:
 - CenterPoint Energy Comments: <http://mn.gov/commerce/energy/images/centerpoint-energy-comments.pdf>
 - Cummins Comments: <http://mn.gov/commerce/energy/images/cummins-comments.pdf>
 - Ever-Green Energy Comments: <http://mn.gov/commerce/energy/images/ever-green-energy-comments.pdf>
 - Fresh Energy Comments: <http://mn.gov/commerce/energy/images/fresh-energy-comments-2015.pdf>
 - Great River Energy Comments: <http://mn.gov/commerce/energy/images/great-river-energy-comments-2015.pdf>
 - Midwest Cogeneration Association Comments: <http://mn.gov/commerce/energy/images/midwest-cogeneration-association-comments.pdf>
 - Midwest Cogeneration Association Attachment A: MCA Comments Re DP&L CHP Custom Program:

<http://mn.gov/commerce/energy/images/midwest-cogeneration-association-attachment-a.pdf>

- Minnesota Municipal Utilities Association Comments:
<http://mn.gov/commerce/energy/images/minnesota-municipal-utilities-association-comments.pdf>
- Minnesota Power Comments: <http://mn.gov/commerce/energy/images/minnesota-power-comments-2015.pdf>
- Missouri River Energy Services Comments:
<http://mn.gov/commerce/energy/images/missouri-river-energy-services-comments.pdf>
- NRG Comments: <http://mn.gov/commerce/energy/images/nrg-comments.pdf>
- Otter Tail Power Company Comments:
<http://mn.gov/commerce/energy/images/otter-tail-power-company-comments.pdf>
- Xcel Energy Comments: <http://mn.gov/commerce/energy/images/xcel-energy-comments-2015.pdf>

June Updates

- Microgrid Institute Draft CHP Action Plan: Comment Period Synthesis Report:
<http://mn.gov/commerce/energy/images/microgrid-comment-period-synthesis.pdf>