

Draft Combined Heat and Power Action Plan

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Recommendations Prepared for:

**Office of Energy Efficiency and Renewable Energy,
U.S. Department of Energy**

Submitted by:



MINNESOTA DEPARTMENT OF
COMMERCE

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Draft

Executive Summary

CHP Stakeholder Engagement Process Summary

The Minnesota Department of Commerce (Commerce) was awarded a U.S. Department of Energy (DOE) grant to carry out a strategic stakeholder engagement process and develop an Action Plan for combined heat and power (CHP) deployment in Minnesota. As part of this project's scope of work, a series of stakeholder meetings were held 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 increase CHP Implementation.
2. *Facilitate discussion* regarding barriers and opportunities to for greater deployment of CHP technologies.
3. *Solicit ideas* for solutions to the challenges presented during discussion of CHP implementation.
4. *Provide information* through development of an Action Plan and provide details of the necessary steps to increase CHP activity in Minnesota.

The series of CHP stakeholder meetings built upon Commerce's past and current CHP work and focused on more specific policy issues and recommendations. Discussions with stakeholders during the DOE CHP stakeholder engagement process and results from the post-engagement CHP survey suggest six priority issues that would effectively help advance CHP in Minnesota if addressed:

1. *Standby Rates*: Introducing transparent, unbundled pricing for standby rates.
2. *CHP Evaluation Methodology and Criteria*: Establishing an approach for fair, accurate, and comprehensive assessment and valuation of CHP projects.
3. *Mapping CHP Opportunities*: Conducting an empirical study and granular analysis of opportunities for topping-cycle and bottoming-cycle CHP projects.
4. *CHP Ownership Problems and Solutions*: Addressing issues and options involving utility resource planning, ratepayer risks, market power, and behind-the-meter operations.
5. *Education and Training Needs and Options*: Addressing knowledge gaps and defining options for CHP education and training.
6. *Adapting CIP for Supply-Side Investments*: Establishing and clarifying CHP provisions in Conservation Improvement Programs (CIP).

Based on a review and synthesis of the priority issues identified through discussions with stakeholders and Commerce’s recent CHP studies, this section presents a summary of Commerce’s Draft Action Plan recommendations and next steps to help increase CHP activity in Minnesota.

Priority Issues	Action Items	Timing
Standby Rates	Continue Stakeholder Engagement through a Generic Proceeding on Standby Rates	Near-Term (2015-2016)
CHP Evaluation Methodology and Criteria	Establish CHP Energy Savings Attribution Model	Near-Term (2015-2016)
Mapping CHP Opportunities	Map CHP Opportunities at Wastewater Treatment Facilities and Public Facilities	Intermediate-Term (2016-2017)
CHP Ownership Problems and Solutions	Leverage Existing Financing Programs Applicable to CHP	Near-Term (2015-2016)
Education and Training Needs and Options	Expand Education and Training Resources	Near-Term (2015-2016)
Adapting CIP for Supply-Side Investments	Develop and Clarify Electric Utility Infrastructure Policy	Long-Term (2017-Onward)

Draft Action Plan Summary Recommendations

Priority Issue: [Standby Rates](#)

Action Item: [Continue Stakeholder Engagement through a Generic Proceeding on Standby Rates](#)

A generic proceeding on standby rates addresses a priority issue that was identified through the extensive analysis completed by Commerce and its partners. As a near-term action item in identifying improvements to standby service, Commerce encourages stakeholders to participate and submit feedback during the comment period filed by the PUC. Stakeholders should submit comments on the Commission’s website,¹ according to the following timeline and topics for comment:²

- Timeline:
 - *Initial comment period closes on April 15, 2015*
 - *Reply comment period closes on May 15, 2015*

¹ To submit public Comments, visit mn.gov/puc, select Comment on an Issue, find this docket, and add your comments to the discussion. Utilities, telecommunications carriers, official parties, and state agencies are required to file documents using the Commission’s electronic filing system.

² See PUC docket number E999/CI-15-115 for more details

Priority Issue: [CHP Evaluation Methodology and Criteria](#)

Action Item: [Establish a CHP Energy Savings Attribution Model](#)

The following are possible near-term (2015-2016) action items that could help provide regulatory certainty regarding how CHP energy savings are quantified and counted within CIP:

- Establish a CHP attribution model as part of Minnesota's Technical Reference Manual (TRM)³ in collaboration with Technical Reference Manual Advisory Committee (TRMAC) members.
- Examine ways to adapt and incorporate aspects of Illinois' CHP TRM to establish a Minnesota-specific CHP savings methodology.⁴
- The Energy Resources Center (ERC) will present an overview of Illinois' CHP TRM during the webinar in April on Commerce's Draft Action Plan. Commerce will email an invitation for the webinar to stakeholders and also post a link for registration on the Department's CHP webpage.⁵

Priority Issue: [Mapping CHP Opportunities](#)

Action Item: [Map CHP Facility-Specific Opportunities](#)

The following are possible intermediate-term (2016-2017) action items that could help identify specific CHP project opportunities for implementation:

- *Mapping CHP Opportunities at Minnesota Wastewater Treatment Facilities*
 - Commerce was recently awarded a DOE grant to decrease energy use at Minnesota municipal wastewater facilities and scope opportunities for renewable energy generation.
 - As part of the project's scope of work, Commerce will assess opportunities for CHP implementation at wastewater facilities. 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.
- *Mapping CHP Opportunities at Public Facilities*

³ 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. 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.

⁴ For Illinois' CHP savings methodology, see section 4.4.32 on page 323 of 801 of Illinois' TRM:

http://www.ilsag.info/il_trm_version_4.html

⁵ <http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/chp-meetings.jsp>

- 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.
- To highlight more granular, facility-level CHP opportunities in the state, Commerce intends to build off of the analysis completed by FVB Energy and assess CHP opportunities at public facilities in Minnesota.

Priority Issue: [CHP Ownership Problems and Solutions](#)

Action Item: [Leverage Existing Financing Programs Applicable to CHP](#)

Stakeholders emphasized that access to financial assistance is critical to help advance CHP project implementation, and the following are possible near-term (2015-2016) action items that could help address this issue:

- Improve awareness and communication of existing financing programs that could be better leveraged to meet the individual needs of customers for CHP projects.
- Explore, summarize, and communicate information about existing financing programs. A summary of these programs will be included in the Final Draft of the CHP Action Plan

Priority Issue: [Education and Training Needs and Options](#)

Action Item: [Expand Education and Training Resources](#)

As a possible near-term (2015-2016) action item to address gaps in CHP education and training, the Department's CHP Stakeholder Engagement webpage could be expanded with resources that stakeholders can easily access in a centralized location. Education and training resources might include:⁶

- **CHP Evaluation Methodology Training and Support:**
 - *CHP evaluation materials:* Information, tools, and guidance to support stakeholders' ongoing CHP development efforts.
 - *Upcoming webinars and workshops:* Training to enable stakeholders to adopt and apply Minnesota's CHP project evaluation methodologies and criteria.
 - *CHP evaluation resources:* Technical resources for stakeholder efforts to evaluate CHP development opportunities.
- **CHP Outreach and Development Support:**
 - *CHP information tools and programs:* Multimedia resources, case studies, and other information materials supporting stakeholder efforts to research and evaluate CHP generally.

⁶ Link to CHP Stakeholder Engagement webpage: <http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/chp-meetings.jsp>

- *Legal and regulatory information:* Practical explanation and expert guidance relating to Minnesota laws, policies, and procedures affecting CHP development.
- *Financing resource guide:* Guidance and reference information to assist stakeholders in efforts to plan and obtain financing for CHP projects.
- *Project feasibility support:* Training, guidance, and ongoing assistance for stakeholder efforts to study the feasibility of CHP projects.

Priority Issue: [Adapting CIP for Supply-Side Investments](#)

Action Item: [Develop and Clarify Electric Utility Infrastructure Policy](#)

As a starting point to clarify whether and how CHP could qualify as an eligible electric utility infrastructure (EUI) resource, one possible action item could be to identify and develop a set of EUI measures (including CHP) to be included in Minnesota’s TRM as well as the Energy Savings Platform Smart Measure Library.

In collaboration with Minnesota utilities through the TRMAC, CHP project eligibility as a EUI resource could be clarified. The table below outlines a possible timeline for a process to update the TRM:

Date	Deliverable
August, 2015	Kick-off meeting with the Department and TRMAC
October, 2015	List of potential prescriptive EUI measures delivered
January, 2016	Draft of EUI measures for TRM inclusion
February, 2016	Final Draft of EUI measures for TRM inclusion
February, 2016	Smart Measure library complete

Introduction and Background

The Minnesota Department of Commerce (Commerce) was awarded a U.S. Department of Energy (DOE) grant to carry out a strategic stakeholder engagement process and develop an Action Plan for combined heat and power (CHP) deployment in Minnesota. As part of this project's scope of work, a series of stakeholder meetings were held 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 increase CHP Implementation.
2. *Facilitate discussion* regarding barriers and opportunities to for greater deployment of CHP technologies.
3. *Solicit ideas* for solutions to the challenges presented during discussion of CHP implementation.
4. *Provide information* through development of an Action Plan and provide details of steps necessary to increase CHP activity in Minnesota.

Based on the findings of the CHP stakeholder engagement process and Commerce's recent CHP studies, Commerce prepared this Draft 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)⁷

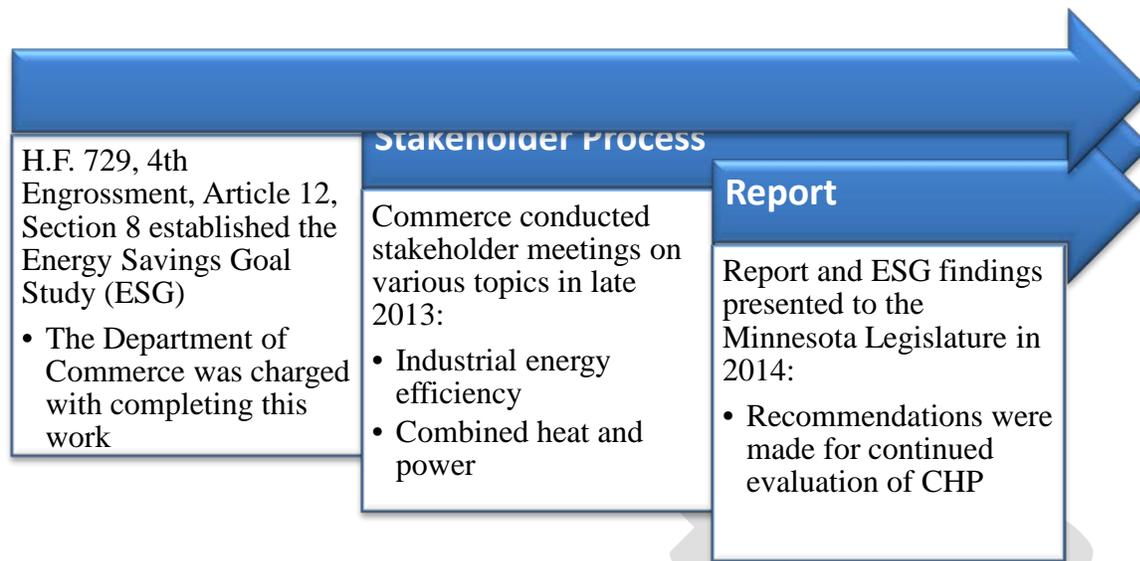


Figure 1. Energy Savings Goal Study Process

In 2013, House File 729 (H.F. 729), 4th Engrossment, Article 12 Section 8 was passed, establishing the Energy Savings Goal Study (ESG). 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;
- 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.⁸

⁷ The full "Energy Savings Goal Study Legislative Report" can be accessed here: http://mn.gov/commerce/energy/images/ESG-Legislative-Report_Final.pdf

To address the statutory 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)⁹

Over the past two years, 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 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 Metering¹⁰

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

⁸ [House File 729, 4th Engrossment Article 12 Section 8](#)

⁹ For more information about Commerce’s Conservation Applied Research and Development Grant Program, see: <http://mn.gov/commerce/energy/utilities/conservation/Applied-Research-Development/>

¹⁰ The full “Analysis of Standby Rates and Net Metering Policy Effects on CHP Opportunities in Minnesota” report can be accessed here: <http://mn.gov/commerce/energy/images/SRNMPE-CHP-Opportunities.pdf>

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:

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.
- 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.
- 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.

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 atmosphere.¹¹
- *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.¹²

¹¹ A copy of the "Assessment of the Technical and Economic Potential for CHP in Minnesota" report can be accessed here: <http://mn.gov/commerce/energy/images/CHPTechnicalandEconomicPotential.pdf>

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.

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

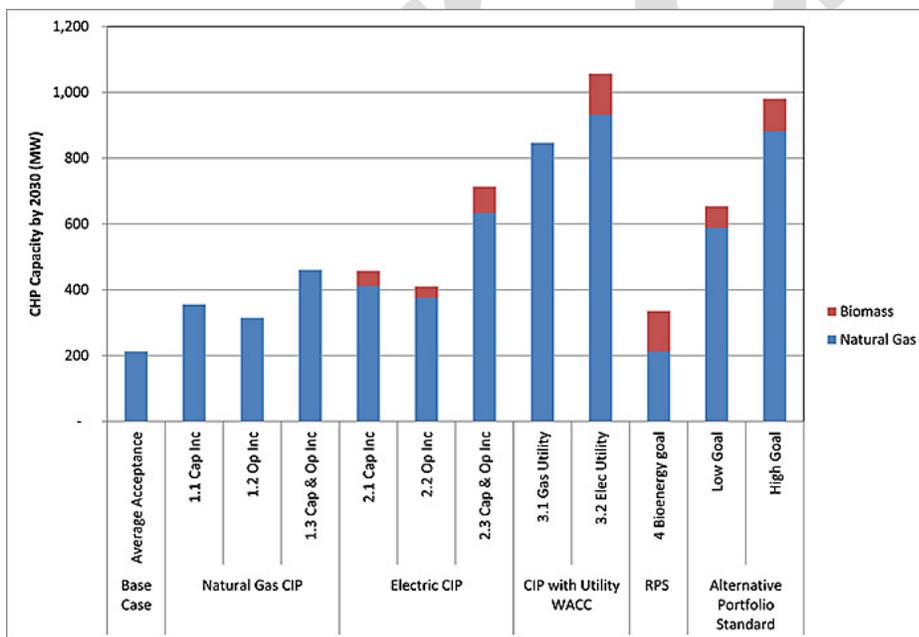


Figure 2. Impacts of Proposed Policy Options - Market Penetration

¹² A copy of the “Minnesota Combined Heat and Power Policies and Potential” report can be accessed here: <http://mn.gov/commerce/energy/images/CHPRegulatoryIssuesandPolicyEvaluation.pdf>

- 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)¹³

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.¹⁴

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

¹³ More information, including the most current results of the CSEO analysis, can be found at the Environmental Initiative's website: <http://www.environmental-initiative.org/projects/cseo-stakeholder-engagement/meetings-cseo-stakeholder-engagement>

¹⁴ The "Minnesota Climate Change Advisory Group Final Report" can be accessed here: <http://www.pca.state.mn.us/index.php/view-document.html?gid=20234>

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 CHP policy option 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)¹⁵

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 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 increase CHP Implementation.
2. *Facilitate discussion* regarding barriers and opportunities to for greater deployment of CHP technologies.
3. *Solicit ideas* for solutions to the challenges presented during discussion of CHP implementation.
4. *Provide information* through development of an Action Plan and provide details 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

¹⁵ Resources from the DOE CHP Stakeholder Engagement Process can be accessed at Commerce’s website here: <http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/chp-meetings.jsp>

comment period, and performing pre- and post-engagement stakeholder surveys. The process was designed to inform and facilitate discussion among stakeholders, and to synthesize information toward development of the CHP Action Plan.¹⁶



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.

Key Findings

Pre-Engagement Stakeholder Survey: Gauging Stakeholder Perspectives¹⁷

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

¹⁶ Microgrid Institute’s website can be accessed here: <http://www.microgridinstitute.org/resources.html>

¹⁷ For more details about the Pre-Engagement Survey’s results, see the “CHP Pre-Engagement Stakeholder Survey Report” here: <http://mn.gov/commerce/energy/images/MG-PreEngagementSurvey.pdf>

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.

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 #1¹⁸: 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

¹⁸ For more details about findings from the first stakeholder meeting, see Micrigrad Institute’s “Stakeholder Meeting #1 Summary Report” here: <http://mn.gov/commerce/energy/images/MG-StakeholderMeeting1Summary2014.pdf>

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?
- 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 #2¹⁹: 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.

¹⁹ For more details about the second stakeholder meeting’s outcomes, see Micrigrad Institute’s “Stakeholder Meeting #2 Summary Report” here: <http://mn.gov/commerce/energy/images/CHPMeeting2Summary.pdf>

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 Opportunities²⁰

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.
- 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](#)

²⁰ For more information about Comment Period #1's findings, see Microgrid Institute's "Comment Period #1 Synthesis Report" here:

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

- [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 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 cross-subsidies, 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”²¹ and directed Commerce to scope whether a generic proceeding on standby service tariffs was needed to address:

- The methodology for standby rates.

²¹ See ordering point 3, [Order Setting Final Solar Photovoltaic Standby Service Capacity Credit, Requiring Updates, and Requiring Compliance Filing](#), Docket E-002/M-13-315, May 19, 2014.

- 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.²²

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.²³

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:²⁴

- **Timeline:**
 - Initial comment period closes on April 15, 2015
 - Reply comment period closes 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

²² Meeting materials from the September 11th, 2014 Standby Rates: Scoping for Generic Proceeding Meeting can be accessed on Commerce’s website at the following link: <http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/standby-rates.jsp>

²³ For more details, see Docket Nos. E002/M-13-315, E002/M-13-642, E001/M-13-667, E015/M-13-770, and E017/M-13-609

²⁴ See PUC docket number E999/CI-15-115 for more details

- 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

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.

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 #3²⁵: 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:

²⁵ For more details about stakeholder meeting #3’s outcomes, see Microgrid Institute’s “Stakeholder Meeting #3 Summary Report” here: <http://mn.gov/commerce/energy/images/MI-CHPSMeeting3Summary.pdf>

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.

Stakeholder Meeting #4²⁶:

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:*
 - General Criteria: Efficiency/energy savings, fuel type, environmental impact analysis (consider both thermal and electric output, 111d compliance benefits,), risk-reward analysis, overall societal benefits.

²⁶ For more details about stakeholder meeting #4’s outcomes, see Microgrid Institute’s “Stakeholder Meeting #4 Summary Report” here: <http://mn.gov/commerce/energy/images/microgrid-institute-chp-meeting-summary-4.pdf>

- 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:*
 - 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 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. As a counterpoint, 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.
- *General Considerations:*
 - 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.
 - Efficiency and energy savings criteria may include a minimum threshold.
 - 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:*
 - Initial efforts might naturally focus on CHP opportunities at 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.
- *General Comments from Stakeholders:*
 - 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.
 - 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

- *Regulatory Issues - Utility CHP Investment:*
 - Stranded asset risks.
 - Statutory size limitations; Minn. Stat. 216H prevents baseload plants larger than fifty MW.

- 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.
- 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 Issues - Third-Party and Customer CHP Investment:*
 - 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:*
 - 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

- 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:*
 - 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.
 - Participants suggested knowledge gaps related to energy technology generally, and CHP in particular, among various groups including legislators and staff. Additionally, information “silos” among government agencies limit accessibility of knowledge, affecting inter-agency programs and regulatory treatment.
- *CHP Education and Outreach Resource Suggestions:*
 - 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
 - Participants identified a few examples of initiatives to ensure effective CHP education, including 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 Plan²⁷

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-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)

²⁷ See Microgrid Institute's "Post-Engagement Survey Report" for more details regarding the survey results: <http://mn.gov/commerce/energy/images/mg-post-engagement-survey.pdf>

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

Action Plan Recommendations and Next Steps

Discussions with stakeholders during the DOE CHP stakeholder engagement process and results from the post-engagement CHP survey suggest six priority issues that would effectively help advance CHP in Minnesota if addressed:

7. *Standby Rates*: Introducing transparent, unbundled pricing for standby rates.
8. *CHP Evaluation Methodology and Criteria*: Establishing an approach for fair, accurate, and comprehensive assessment and valuation of CHP projects.
9. *Mapping CHP Opportunities*: Conducting an empirical study and granular analysis of opportunities for topping-cycle and bottoming-cycle CHP projects.
10. *CHP Ownership Problems and Solutions*: Addressing issues and options involving utility resource planning, ratepayer risks, market power, and behind-the-meter operations.
11. *Education and Training Needs and Options*: Addressing knowledge gaps and defining options for CHP education and training.
12. *Adapting CIP for Supply-Side Investments*: Establishing and clarifying CHP provisions in CIP.

Based on a review and synthesis of the priority issues identified through discussions with stakeholders and Commerce's recent CHP studies, this section presents Commerce's Draft Action Plan recommendations and next steps to help increase CHP activity in Minnesota. The table below provides a summary of the priority issues identified by stakeholders and possible action items that could help address each issue:

Priority Issues	Action Items	Timing
Standby Rates	Continue Stakeholder Engagement through a Generic Proceeding on Standby Rates	Near-Term (2015-2016)
CHP Evaluation Methodology and Criteria	Establish CHP Energy Savings Attribution Model	Near-Term (2015-2016)
Mapping CHP Opportunities	Map CHP Opportunities at Wastewater Treatment Facilities and Public Facilities	Intermediate-Term (2016-2017)
CHP Ownership Problems and Solutions	Leverage Existing Financing Programs Applicable to CHP	Near-Term (2015-2016)

Education and Training Needs and Options	Expand Education and Training Resources	Near-Term (2015-2016)
Adapting CIP for Supply-Side Investments	Develop and Clarify Electric Utility Infrastructure Policy	Long-Term (2017-Onward)

Priority Issue: Standby Rates

The ERC’s study on the effects of standby rates on CHP deployment and discussions with stakeholders suggest that improvements to existing standby frameworks could lead to greater implementation of CHP and other distributed generation resources. 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, 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.

Action Item: Continue Stakeholder Engagement through a Generic Proceeding on Standby Rate Tariffs

A generic proceeding on standby rates addresses a priority issue that was identified through the extensive analysis completed by Commerce and its partners. As a near-term action item in identifying improvements to standby service, Commerce encourages stakeholders to participate and submit feedback during the comment period filed by the PUC. Stakeholders should submit comments on the Commission’s website,²⁸ according to the following timeline and topics for comment:²⁹

- Timeline:
 - *Initial comment period closes on April 15, 2015*
 - *Reply comment period closes on May 15, 2015*
- Topics for Comment:
 - Reliability of electric service
 - Transparency and flexibility

²⁸ To submit public Comments, visit mn.gov/puc, select Comment on an Issue, find this docket, and add your comments to the discussion. Utilities, telecommunications carriers, official parties, and state agencies are required to file documents using the Commission’s electronic filing system.

²⁹ See PUC docket number E999/CI-15-115 for more details

- 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

Priority Issue: CHP Evaluation Methodology and Criteria

Discussions with stakeholders suggest a need to provide regulatory certainty regarding how CHP energy savings are quantified and counted 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. Stakeholder feedback indicates that such a CHP attribution model should include the following considerations:

- Be both flexible and driven by State goals.
- Efficiency and energy savings criteria may include a minimum threshold.
- 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.
- Consider incorporating general, location-specific, and utility grid/system operations criterion.
- 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.

Action Item: Establish a CHP Energy Savings Attribution Model

The following are possible near-term (2015-2016) action items that could help provide regulatory certainty regarding how CHP energy savings are quantified and counted within CIP:

- Establish a CHP attribution model as part of Minnesota's Technical Reference Manual (TRM)³⁰ in collaboration with Technical Reference Manual Advisory Committee (TRMAC) members.
- Examine ways to adapt and incorporate aspects of Illinois' CHP TRM to establish a Minnesota-specific CHP savings methodology.³¹
- The ERC will present an overview of Illinois' CHP TRM during the webinar in April on Commerce's Draft Action Plan. Commerce will email an invitation for the webinar to stakeholders and also post a link for registration on the Department's CHP webpage.³²

Priority Issue: 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.

Action Item: Map CHP Facility-Specific Opportunities

The following are possible intermediate-term (2016-2017) action items that could help identify specific CHP project opportunities for implementation:

Mapping CHP Opportunities at Minnesota Wastewater Treatment Facilities

³⁰ 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. 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.

³¹ For Illinois' CHP savings methodology, see section 4.4.32 on page 323 of 801 of Illinois' TRM:

http://www.ilsag.info/il_trm_version_4.html

³² <http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/chp-meetings.jsp>

Commerce was recently awarded a DOE grant to decrease energy use at Minnesota municipal wastewater facilities and scope opportunities for renewable energy generation. As part of the project's scope of work, Commerce and its core project partners will:

- *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
- *Conduct EE opportunity assessments* at sites with sufficient energy efficiency opportunity potential and that are positioned to implement resulting opportunities
- *Facilitate site investment* in identified proposed project concepts to decrease site energy consumption
- *Assess renewable generation opportunities*

Commerce will assess opportunities for CHP implementation at wastewater facilities as part of this project's scope. 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.

Mapping CHP Opportunities at Public Facilities

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 the state as many have significant and concurrent electric and thermal demands and public entities are better able to accept longer paybacks and have access to financing to implement CHP projects.

To highlight more granular, facility-level CHP opportunities in the state, Commerce intends to build off of the analysis completed by FVB Energy and assess CHP opportunities at public facilities in Minnesota. To fund this project, Commerce and its project partner Energy Resources Center are submitting a grant application to the DOE as part of the State Energy Program 2015 Competitive Awards.

Priority Issue: 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.

Action Item: Leverage Existing Financing Programs Applicable to CHP

Access to financial assistance is critical to help advance CHP project implementation, and the following are possible near-term (2015-2016) action items that could help address this issue:

- Improve awareness and communication of existing financing programs that could be better leveraged to meet the individual needs of customers for CHP projects.
- Explore, summarize, and communicate information about existing financing programs. A more complete summary of these programs will be included in the Final Draft of the CHP Action Plan
- Below is a brief/incomplete summary of the potential programs that can be utilized to help implement CHP projects.

	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 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 NOTE: program is not operational to date
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/	Commerce NOTE: program is not operational to date

Priority Issue: 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. 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.
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.

Action Item: Expand Education and Training Resources

As a possible near-term (2015-2016) action item to address gaps in education and training, the Department's CHP Stakeholder Engagement webpage could be expanded with resources that stakeholders can easily access in a centralized location. Education and training resources might include:³³

- **CHP Evaluation Methodology Training and Support:**
 - *CHP evaluation materials*: Information, tools, and guidance to support stakeholders' ongoing CHP development efforts.
 - *Upcoming webinars and workshops*: Training to enable stakeholders to adopt and apply Minnesota's CHP project evaluation methodologies and criteria.
 - *CHP evaluation resources*: Technical resources for stakeholder efforts to evaluate CHP development opportunities.
- **CHP Outreach and Development Support:**
 - *CHP information tools and programs*: Multimedia resources, case studies, and other information materials supporting stakeholder efforts to research and evaluate CHP generally.

³³ Link to CHP Stakeholder Engagement webpage: <http://mn.gov/commerce/energy/businesses/clean-energy/distributed-generation/2014-workshops/chp-meetings.jsp>

- *Legal and regulatory information:* Practical explanation and expert guidance relating to Minnesota laws, policies, and procedures affecting CHP development.
- *Financing resource guide:* Guidance and reference information to assist stakeholders in efforts to plan and obtain financing for CHP projects.
- *Project feasibility support:* Training, guidance, and ongoing assistance for stakeholder efforts to study the feasibility of CHP projects.

Priority Issue: Adapting CIP for 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 bottoming-cycle 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 facilitate CHP deployment in Minnesota.

However, issues remain regarding whether and how CHP would qualify as an eligible EUI resource under current statutory language and Commerce’s TRM currently does not provide any prescriptive measures for Electric Utility Infrastructure projects.

Action Item: Develop and Clarify Electric Utility Infrastructure Policy

As a starting point to clarify whether and how CHP could qualify as an eligible EUI resource, one possible action item could be to identify and develop a set of EUI measures (including CHP) to be included in Minnesota’s TRM as well as the Energy Savings Platform Smart Measure Library.

In collaboration with Minnesota utilities through the Technical Reference Manual Advisory Committee, CHP project eligibility as a EUI resource could be clarified. The table below outlines a possible timeline for a process to update the TRM:

Date	Deliverable
August, 2015	Kick-off meeting with the Department and TRMAC
October, 2015	List of potential prescriptive EUI measures delivered
January, 2016	Draft of EUI measures for TRM inclusion
February, 2016	Final Draft of EUI measures for TRM inclusion
February, 2016	Smart Measure library complete

Draft

Appendix A: September 3, 2014, CHP Stakeholder Meeting #1 – CHP Baseline, Value Proposition, and Path Forward

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 - Overview and Comparison of State CHP Policies and Programs, Standby Rates and Net Metering

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 Faruqi'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 - Stakeholder Presentations and Path Forward

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 - Discussion and Synthesis of Major Themes

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 \(.pdf\)](#)
- [Microgrid Institute CHP Post-Engagement Survey Results Report \(.pdf\)](#)
- [Microgrid Institute CHP Training and Education Plan \(.pdf\)](#)