

TO: Governor Terry Branstad
Lt. Governor Kim Reynolds

FROM: Libby Jacobs, Chair – Iowa Utilities Board, and Debi Durham,
Director – Iowa Economic Development Authority

CC: Governor's Chief of Staff, Iowa CHP Team Members: Gordon
Dunn, Paritosh Kasotia, Naomi Czachura, Jim Dillon, Doug
Hoelscher

SUBJECT: The Iowa NGA Policy Academy (Iowa CHP Team) Action Plan on
Enhancing Industry through Combined Heat and Power in Iowa

This memo summarizes Iowa's participation in a National Governors Association (NGA) Policy Academy on Enhancing Industry through Energy Efficiency and Combined Heat and Power, and recommends next steps to advance this effort. We appreciate your encouragement of this effort and, with your guidance, look forward to continued exploration of strategies and policies to facilitate Combined Heat and Power¹ (CHP) in Iowa. The Iowa Utilities Board (IUB) and the Iowa Economic Development Authority (IEDA) with the assistance of the Iowa CHP Team will be happy to provide a detailed briefing on the project at your convenience.

The Iowa CHP Team, working through the NGA Policy Academy process, developed and implemented goals and tasks consistent with a detailed Iowa Action Plan. (See Appendix 1) These goals and tasks included:

- Compile and share information;
- Increase understanding of potential CHP market; and
- Identify and address potential policy options.

The Iowa CHP Team sought input from stakeholders via meetings conducted by the Team and surveys implemented by IEDA. Stakeholders included industrial and institutional CHP users, the Office of Consumer Advocate, utility associations, environmental groups and many others. In a meeting held on February 28, 2013, stakeholders suggested priorities for follow-up actions, including activities proposed for the IUB and its staff and the IEDA (for more detail on stakeholders and feedback, see page 3 of this memo and Appendix 3).

With your guidance, we look forward to implementing the following strategies and tasks to continue development of CHP options in Iowa.

¹ CHP is also known as cogeneration. For purposes of this Policy Academy, CHP will include waste heat recovery.

1. **Continue current work by IEDA.** Authorize IEDA to continue working on aspects of CHP identified by stakeholders as important to CHP development. These activities are consistent with the mission of IEDA and its ongoing efforts to facilitate economic development in Iowa. The IEDA Energy Team is familiar with CHP opportunities and obstacles, and can draw on outside support such as the Midwest Clean Energy Applications Center. Specific activities include:

- Explore a coordinated approach to permitting of CHP projects.
- Designate IEDA as the contact within state government for parties that want to discuss CHP development in Iowa.²
- Authorize IEDA to host on its website information needed by industrial energy users and developers pursuing CHP opportunities.
- Explore financial incentives outside of the IUB's scope, for example tax credits, grants, low interest loans, or incentives specifically for those facilities that use biomass/biofuels as a fuel source.

2 **Endorse continued examination of utility-related aspects of CHP through the normal procedures of the IUB.** Activities involving stakeholder priorities relating to utilities would best be pursued in the normal course of proceedings before the Board. During the next twelve months, new five-year energy efficiency plans filed by all three major Iowa investor-owned utilities (IOUs) will be reviewed in contested proceedings before the Board (with the assistance of IUB staff). Many of the stakeholders mentioned above have sought and been granted the status of intervenors in these reviews. One IOU energy efficiency plan includes a proposal for CHP incentives and another IOU has filed with the Board a new electric rate proposal. This rate proposal includes revisions to the IOU's standby tariff, which is a concern of current and potential CHP owners and developers. These filings provide opportunities to address IOU rates and requirements which affect both installed and new CHP facilities of large industrial customers.

The cost of pursuing the activities recommended above should be minimal. The Board's examinations of CHP issues in the context of the contested cases are considered normal course of business and, as such, are not viewed as requiring additional funding. The costs for IEDA (approximately .5 FTE for the next 12 months) will come from the DOE State Energy Program Formula funds.

² Assuming contacts and inquiries involving utility-related CHP policy matters will be directed to the IUB for referral to the appropriate proceedings.

Background

The Iowa CHP Team included the participation of senior Iowa utility personnel with direct experience in utility energy efficiency planning and programs, in addition to staff from the Iowa Utilities Board and the Iowa Economic Development Authority (IEDA). Appendix 2 includes additional information on the Iowa CHP Team members, the Team's activities and a discussion of the Action Plan's strategies and action items.

Stakeholder input and priorities

The Iowa CHP Team was aided by the engagement of a wide variety of stakeholders who participated in three one-day workshops, supplied valuable input on CHP topics, and provided feedback on possible strategies. The stakeholders included industrial energy users, environmental advocacy groups, the Iowa Office of Consumer Advocate and numerous other persons. The presence of private and institutional owners of CHP, who operate much of the 590 megawatts (MW) of existing CHP generation in Iowa provided valuable insight into the complex economics and policy aspects of this technology.

The Iowa CHP Team and stakeholders identified significant challenges to new CHP in Iowa, including: low rates for industrial electricity, utilities' stand-by rates, the site-specific nature of CHP (which requires a need for low-grade heat), initial capital costs and the time to recover the initial investment, interconnection standards, compliance with environmental regulations, and the difficulties of quantifying benefits such as environmental improvements or the value of emergency backup power. Nevertheless, stakeholders encouraged the Iowa CHP Team to continue development of steps to alleviate obstacles to new CHP. Appendix 3 includes a list of the stakeholders that participated in various meetings and an outline of their comments provided at the February 28, 2013 meeting. These comments served as the foundation for the Iowa CHP team's Action Plan and proposed strategies and action steps.

IEDA Survey of Iowa CHP Users and Developers

In addition to the meetings held with stakeholders, staff from the IEDA Energy Team developed and circulated questionnaires, and compiled responses on aspects of CHP in Iowa. The survey was distributed to existing operators of CHP facilities, businesses or institutions with the potential to install CHP, and firms which could assist in developing CHP facilities. A complete description of the survey methodology and results can be found in Appendix 4.

The priorities respondents assigned to various CHP challenges or obstacles appear to vary, depending on size of CHP facility or type of operation, but generally revolve around the topics of environmental permitting process, interconnection and financing. The results of the survey suggest substantial

interest in CHP in Iowa, recognition of various challenges, and an overall impression that a “one-size-fits-all” set of policies may not be appropriate.

Opportunities, Potential, and Economics of CHP in Iowa

CHP tends to be highly site-specific according to various sources such as the Midwest Clean Energy Applications Center and ICF International. A critical prerequisite for CHP is the need for low-grade heat or moderate pressure steam by industrial or institutional energy users.

There are differing estimates for the technical and economic potential for new CHP in Iowa. An American Council for an Energy Efficiency Economy (ACEEE) report states there is over 3,000 MW of technical CHP potential for industrial or commercial facility investment but only 3 MW is viewed as economically feasible.^{3 4} See Appendix 5 for details on Iowa specific potential and economics of CHP.

Unlike some areas of the country with high electric energy rates, Iowa’s low electric rates do not appear to provide a significant financial incentive to build new CHP. Iowa also lacks dedicated state incentives for CHP such as tax credits, low interest loans or credit enhancement programs that may be present in other states. For more information on incentives, see Appendix 6.

CHP “Utility” Topics: Options, Roles, Statutes and Rules

Until recently, combined heat and power has not been a visible aspect of Iowa’s investor-owned utility energy efficiency programs. Financial incentives and technical assistance for customers considering CHP have generally been limited to waste heat recovery.

Various reports on CHP have suggested a variety of roles or options for utility involvement in CHP. However, many of the possible utility roles or options are entangled with complex utility procedures, Administrative Rules of the Iowa Utilities Board, or statutes. For example, on the subject of IOU energy efficiency, a number of current processes or rules might pose obstacles to utility funding of CHP, such as:

- Definitions of energy efficiency
- Attribution and valuation of energy and capacity savings
- Magnitude of CHP costs and level of IOU incentives
- Benefit-cost test definitions

³ Coal Retirements and the CHP Investment Opportunity, Authored by Anna Chittum and Terry Sullivan, American Council for an Energy-Efficient Economy, September 2012, Report IE123.

⁴ Economically feasible was defined as only a 50% acceptance of a two-year payback for a CHP installation.

- Impacts of large-scale CHP projects on recovery of costs for both CHP and energy efficiency funded by IOU incentives.

The proposal by the Iowa CHP Team, to address these topics through the contested review of IOU energy efficiency plans, should provide a forum for detailed examination of the potential for CHP to be pursued as a utility energy efficiency option in Iowa. See Appendix 7, CHP “Utility” Topics: Options, Roles, Statutes and Rules for more information.

Iowa CHP Team follow-up with stakeholders

Assuming the proposed next steps are acceptable, the Iowa CHP Team will distribute this report and appendices to stakeholders, as a means of eliciting continued input into development of CHP assistance and review of utility-related CHP options.

Goals	Strategies	Action Items
<p>Goal 2:</p> <p>Increase understanding of potential CHP market</p>	<p>2.1 Share existing information on economics of CHP in Iowa</p> <p>2.2 Identify potential of CHP market within Iowa</p> <p>2.3 On-going education and interaction with potential market in Iowa</p>	<p>2.1.1 <i>Develop understandable summary of ICF information and share on website.</i> Completed – See Appendix 5.</p> <p>2.2.1 <i>Synthesize and share ICF/ACEEE/other national study data on CHP potential.</i> Completed – See Appendix 5.</p> <p>2.3.1 <i>Provide a Webinar Series on CHP-related topics: Small-scale CHP, Financial Considerations for CHP, and Boiler MACT impacts.</i> See Appendix 1b.</p>

Goals	Strategies	Action Items
<p>Goal 3:</p> <p>Identify and evaluate potential policy options</p>	<p>3.1 Review existing Iowa laws and rules that affect CHP</p> <p>3.2 Continue discussion of utility/3rd party issues and exact role of state</p> <p>3.3 Explore financial incentives for CHP</p> <p>3.4 Develop coordinated approach to permitting</p> <p>3.5 Explore assistance with environmental permitting</p>	<p>3.1.1 <i>Finalize table of existing rules/laws in report.</i> Completed – See Appendix 7.</p> <p>3.2.1 <i>Include list of utility options in report.</i> List Completed – See Appendix 7. On-going discussion in IUB contested (energy efficiency and rate case) proceedings.</p> <p>3.3.1 <i>List of possible incentives and associated agencies or entities.</i> Completed – See Appendix 6.</p> <p>3.4.1 <i>Establish a Web page that provides information on CHP permitting process.</i> See Appendix 1c.</p> <p>3.4.2 <i>Hold educational events statewide that discuss the resources available for the permitting process.</i> See Appendix 1c.</p> <p>3.5.1 <i>Create a Working Group or a Task Force on CHP permitting process that works towards simplifying the permitting process.</i> See Appendix 1c.</p>

CHP Process Document DRAFT (Strategy 1.2 from Action Plan)

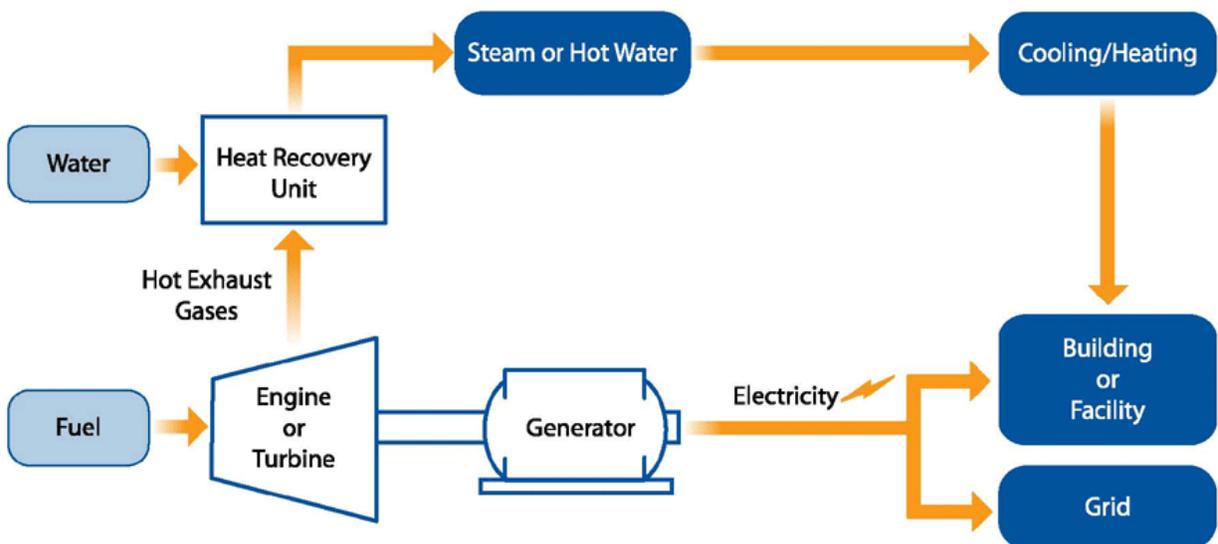
What is CHP?

Combined heat and power (CHP), also known as cogeneration, is the simultaneous production of electricity and heat from a single fuel source, such as: natural gas, biomass, biogas, coal, waste heat, or oil. The two most common CHP system configurations are:

- Gas turbine or engine with heat recovery unit
- Steam boiler with steam turbine

A typical configuration for CHP utilizing a gas turbine or gas engine is illustrated below.

Gas Turbine or Engine with Heat Recovery Unit

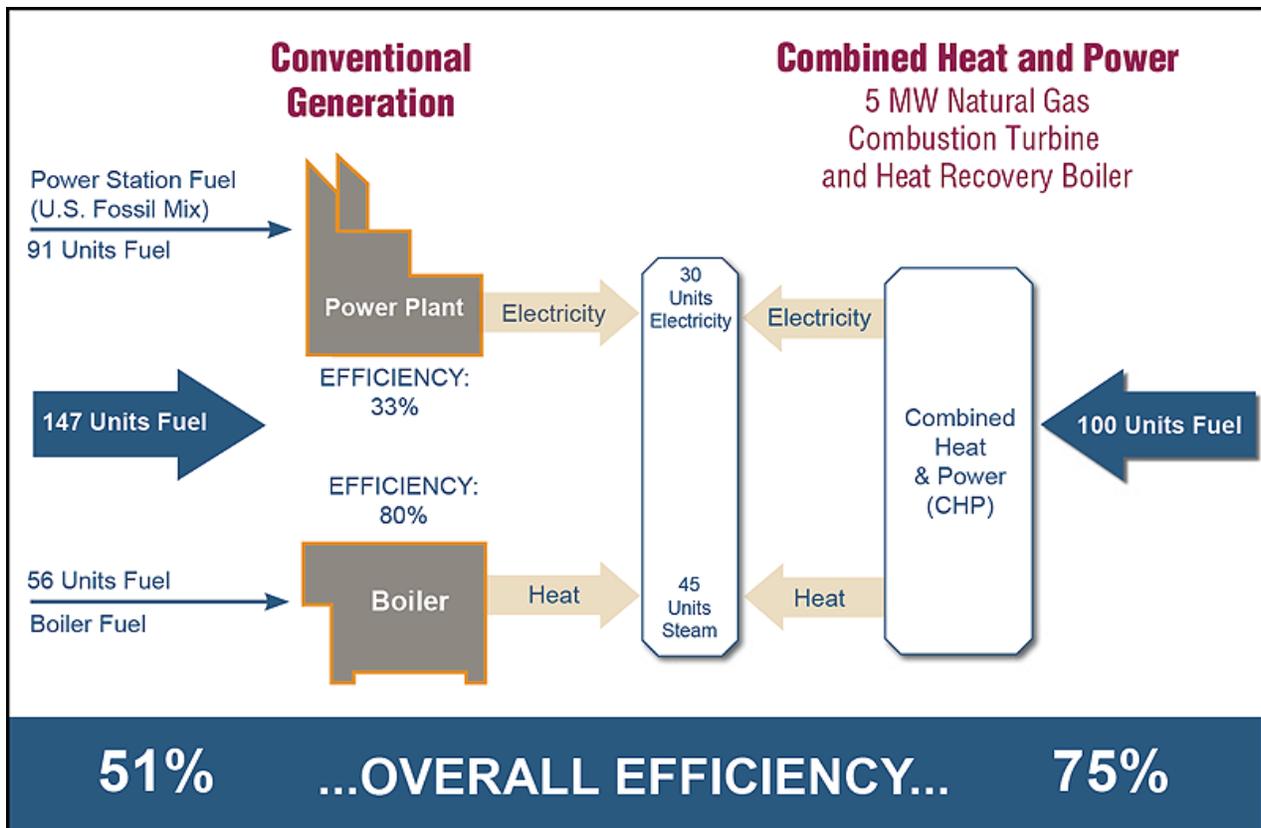


For a more comprehensive discussion of potential CHP technologies and how they work, see the Environmental Protection Agency's website at the link below:

<http://www.epa.gov/chp/technologies.html>

Why Should Facilities Consider CHP?

For facilities with favorable conditions for CHP, the efficiency of producing electricity and thermal energy from the same source can be significantly higher than producing them separately. See illustration below:



Source: Environmental Protection Agency website <http://www.epa.gov/chp/basic/efficiency.html>

This greater efficiency can translate into lower operating costs and decreased levels of emissions. CHP may also offer increased reliability and reductions in congestion and losses on the transmission and distribution systems.

Is My Facility a Good CHP Candidate?

In order for a facility to be a good candidate for CHP, it must have a need for electricity and thermal energy that occurs simultaneously, as both will be produced from the same source. Thermal energy may include steam, hot water, chilled water, hot air, etc.

CHP may be beneficial for many types of facilities. The following types of Iowa businesses have been identified as having significant potential:

- **Industrial manufacturers** - chemical, refining, ethanol, pulp and paper, food processing, lumber and wood, rubber and plastics, primary and fabricated metals, machinery and computer equipment, and transportation equipment
- **Institutions** - colleges and universities, hospitals, and prisons
- **Commercial buildings** - hotels and casinos, large office buildings, nursing homes, food stores and restaurants, data centers, and other retail establishments

- **Municipal/Governmental** - wastewater treatment facilities, K-12 schools, and office buildings
- **Residential** - multi-family housing

Any business that has a need for both heat and thermal energy may be a good candidate, however, even if not specifically part of the identified list.

Other factors that favor consideration of CHP include:

- the number of hours your facility is in operation (more than 5,000/year is beneficial)
- the importance of energy to your business
- relatively high costs of electricity (at least \$0.06/kWh) despite implementation of energy efficiency measures
- the importance of high levels of reliability to your business
- plans for significant changes to your central plant or other significant construction project within 3-5 years
- a desire to limit the impact of your facility on the environment
- adequate available square footage at the facility to incorporate a CHP installation

How Long Will CHP Evaluation and Project Development Take?

The timeline below shows the steps involved in CHP evaluation and development and gives an estimate of the time required for each.

CHP Process Timeline



What Do I Need for Further Evaluation?

A next step to take to determine if a more detailed CHP feasibility study may be beneficial is to access the Environmental Protection Agency's spark spread estimator. This Excel model can be downloaded free of charge from the EPA's website below. It can be found under the "Key Tools" inset on the right-hand side of the page.

<http://www.epa.gov/chp/project-development/index.html>

Information needed to run the spark spread estimator includes:

- Type of business of the facility (select an SIC code in estimator)

- Average monthly electricity usage in kWh
- Monthly heating load (or fuel use) in MMBTu
- Number of hours the facility operates in a year
- If facility has tax liability to utilize federal CHP tax credit
- Fuel price to produce thermal energy (\$/MMBTu)
 - 1 therm = 0.1 MMBTu
 - 1 MCF = 1.03 MMBTu
- CHP fuel price (in Iowa, same as fuel price above)
- All-in electric price in \$/kWh
- Existing thermal equipment efficiency
- Cost of capital used to evaluate investments at your facility

While actual values are preferable for all information, the estimator will use default values for information you do not have. Electricity and natural gas usage and cost can be obtained from your local utility.

- For customers of Interstate Power & Light ...
- For customers of MidAmerican Energy, up to five years of billing history can be accessed on MidAmerican's website. <https://www.midamericanenergy.com/ecss.aspx>. If you have not already established an online account, you can do so by clicking on "create new user" and entering your account number, the zip code where your facility is located, an e-mail address and a password of your choice.
- For natural gas customers of Black Hills Energy...

The results of the spark spread estimator will provide an indication of the potential savings from CHP. The estimator will also identify the best technology for use in a CHP application at your facility.

What If My Spark Spread Estimate Looks Good?

If the results of the spark spread estimator indicate that CHP may be beneficial for your facility, the next step is a high-level feasibility study. Assistance in completing a high-level feasibility study can be obtained from the Midwest Clean Energy Application Center. The Center offers both direct assistance and downloadable software that can be used to prepare a feasibility study.

<http://www.midwestcleanenergycenter.org/support/feasibility.aspx>

A list of data items needed for a feasibility study has been compiled by the Center and can be downloaded at:

http://www.midwestcleanenergycenter.org/support/documents/Walkthrough_Checklist.pdf

Additional information you may need to complete this study includes:

- Hourly electric loads
- Electric interconnection requirements

- MidAmerican Energy interconnection requirements can be referenced at:
<http://www.midamericanenergy.com/rates7.aspx>
- Interstate Power & Light requirements can be referenced at:
<https://www.alliantenergy.com/AboutAlliantEnergy/DoingBusiness/CustomerOwnedGeneration/029969>
- Iowa Utilities Board rules regarding utility interconnection standards can be found at: <https://www.legis.iowa.gov/DOCS/ACO/IAC/LINC/04-03-2013.Chapter.199.45.pdf>
- Electric tariff for current electric rate
- Electric standby/supplemental service tariff
- Rate for utility purchase of excess energy
 - MidAmerican Iowa electric tariffs can be found at:
<http://www.midamericanenergy.com/include/pdf/rates/elecrates/iaelectric/ia-elec.pdf>
 - Interstate Power & Light tariffs can be found at:
<https://www.alliantenergy.com/AboutAlliantEnergy/CompanyInformation/Tariffs/index.htm>
- Environmental permitting requirements
 - (Link to simplified permitting process)
- Available utility rebates/design assistance

Where Do I Go for a More Detailed Analysis?

If the feasibility study indicates CHP would be beneficial for your facility, the next step is to commission an investment-grade analysis or Level 2 Feasibility Study. This will require assistance from an engineering/design firm. The Midwest Clean Energy Application Center may be able to provide assistance in finding an engineering/design firm with CHP expertise.

The Environmental Protection Agency has developed a document to help customers considering CHP understand the Level 2 Feasibility Study process and aid in development of requests for proposals for an analysis. See below:

http://www.epa.gov/chp/documents/level_2_studies_september9.pdf

The Environmental Protection Agency also maintains a partner's list, which includes supporters of CHP such as federal, state, and local government agencies and private organizations such as energy users, energy service companies, CHP project developers and consultants, and equipment manufacturers.

<http://www.epa.gov/chp/partnership/partners.html>

Proposed On-going plan regarding CHP Policy Academy (Strategy 2.3 from Action Plan)

IEDA team proposes that we hold three webinars in the month of May. The topics for these webinars will include small scale CHP applications and CHP as an alternative to comply with Boiler MACT rules. Details for each webinar are given below.

Webinar Overview

1. Hold a two-part series webinar of invited speakers to present on small-scale CHP application. To date, our efforts have concentrated on large scale industrial CHP systems. However, CHP presents an excellent opportunity for other sectors such as health services (hospitals), higher education (community college/private colleges), K-12 (schools), hospitality (hotels), retirement communities, and similar type of entities. These entities have a strong potential to utilize CHP technologies.

The first part of the webinar will focus on the technology of small-scale CHP systems and the process of installing the systems. This will also cover the technical expertise needed to install them system as well as maintain the system after the installation.

The second part of the webinar will focus on the financial aspects of small CHP systems. This will include topics related to return on investment, payback periods, cost-benefit analysis, and other financial topics.

2. Hold a webinar that is targeted at Boiler MACT rules and what options entities have to comply with them, CHP being one of the options. The Midwest Clean Energy Application Center is already planning to do outreach related to this topic so a combined effort will be more worthwhile.

Webinar Timeline⁵

April 15 to May 12: Plan for the webinars. A number of steps will go into the process. These are:

- Outreach to EPA and DOE and other entities to identify presenters who can present on the webinar topics. This will be the most time consuming part. IEDA has starting conversing with US DOE's CHP team as well as Midwest Clean Energy Application Center to identify potential experts for the webinars.
- Identify the webinar medium. A number of options can be utilized such as Go To Meeting which has the capacity of 100 attendees.

⁵ Proposed dates are subject to change depending on the availability of the speakers.

May 15: Hold the first part of the small CHP application webinar. The first webinar will focus on the technology and technical aspects of small CHP systems.

May 22: Hold the second part of the small CHP application webinar. The second webinar will focus on the financial aspects of small CHP systems.

May 29, 30, or 31: Hold the Boiler MACT rules webinar and the potential of CHP as one of the alternatives for complying with the new rules.

Budget

The staff time to undertake the proposed items will require 40 hours.

Staff cost: 40 hrs. x \$50/hr.: \$2,000

There may be some cost associated with the presenters such as covering their time for the webinar.

Speaker cost: \$2,000 (if any)

We do not see any technology cost at this point. In case there is, it should not exceed \$100.

Technology cost: \$100

Total budget: \$2,100 to \$4,100 (depending on if speaker fees are required) would be paid by the remainder of the NGA Policy Academy Grant.

Permitting Process Plan **(Strategy 3.4 and 3.5 from Action Plan)**

Based on the feedback received during the stakeholder meetings of the CHP Policy Academy, the following plan is developed to simplify the permitting process for CHP applications.

1. Establish a web page that provides information on CHP permitting process. This webpage will contain the following information.
 - a. Compile “How-to Guides” that are available nationally and locally on CHP procurement. Some examples include:
 - i. http://www.epa.gov/chp/documents/pguide_permit_reqs.pdf
 - ii. https://www1.eere.energy.gov/manufacturing/tech_deployment/pdfs/guide_chp_boiler.pdf
2. Create a Working Group or a Task Force on CHP permitting process that works towards simplifying the permitting process.
 - a. Create a Resource Guide for permitting process in Iowa.
 - b. Simplify forms
 - c. Create a tiered approach to permitting process so that the permitting process for CHP systems that are less than 10 or 5 MW can be expedited.
 - d. Develop a standard on the processing time for environmental as well as other permits based on various criteria such as fuel source ex. coal vs. natural gas. This will give entities a good indication on the time requirements and will therefore help with planning.
 - e. Compile a list of companies/consultants that can assist industries with the permitting process.
 - f. Explore “permit by rule” or standard or a standard permit to authorize emissions from CHP systems on the size of the CHP system.
 - g. Explore output based emission models as an incentive for entities to comply with the air regulations.
3. Education and outreach
 - a. Hold educational events statewide that discuss the resources available for the permitting process.

Iowa CHP Team, Activities and Strategies

Timeline:

July 2012

The National Governors Association announced a Request for Applications (RFA) for a Policy Academy on Enhancing Industry through Energy Efficiency and Combined Heat and Power. The Policy Academy would include four states and would begin in September 2012 and end in April 2013. The selected state teams would receive a \$12,000 grant to support the related activities and receive targeted technical assistance from NGA Center staff and a faculty of experts.

August 16, 2012

The State of Iowa submitted its application for the NGA Policy Academy on Enhancing Industry through Energy Efficiency and Combined Heat and Power RFA which contained your letter of support.

The application listed four goals that the team planned to accomplish.

- Establish and raise the level of interest in CHP across a broad spectrum of Iowa's CHP stakeholders.
- Document Iowa-specific barriers to CHP based on actual Iowa industry experience and the comparison of Iowa's current policies and practices to model policies and practices.
- Identify practical, broadly supported solutions to the identified barriers.
- Raise awareness, inform, and educate State of Iowa policymakers.

August 22, 2012

NGA requested additional information to aid in its review of the application.

August 24, 2012

The team responded to the NGA request.

August 30, 2012

Iowa was notified that it had been awarded one of the four⁶ NGA's Policy Academy grants. Other Policy Academy states are Alabama, Arkansas, Illinois and Tennessee.

State Team Members and Advisors

Iowa's CHP Team is comprised of experts from both state government and investor-owned utilities. Gordon Dunn, a staff person with the Iowa Utilities Board acted as the team lead for Iowa's CHP Team which consisted of the following five members.

- Gordon Dunn, Utility Specialist, Iowa Utilities Board

⁶ Initially only four states were to receive grants, but in January 2013, a fifth state (Tennessee) was also selected to be part of the Policy Academy.

Gordon leads the staff team for energy efficiency, which is responsible for reviewing the energy efficiency plans, results, and ongoing operation of energy efficiency programs of the Iowa investor-owned utilities. The energy efficiency team also provides the Board with assistance on topics related to energy efficiency, including the energy efficiency plans of municipal utilities and electric cooperatives, rules relating to energy efficiency and other policy matters. Gordon has worked on energy efficiency for the Iowa Utilities Board since 1985, leading teams which developed initial and revised rules for energy efficiency plans in 1990 and 1996 and leading the analyses of energy efficiency plans filed by investor-owned utilities in 2003 and 2008. Gordon has an Associate Degree in Electrical Engineering from Madison Area Technical College, and a BA in Liberal Arts from Grandview University. He was employed for 11 years with Rockwell-Collins Avionics in Cedar Rapids, Iowa.

- Paritosh Kasotia, Energy Division Team Leader, Iowa Economic Development Authority (IEDA)

Paritosh manages all the energy undertakings of the Division and works closely with energy stakeholders to create long-term economic growth opportunities through energy efficiency, clean energy and biofuels, and sound energy policies. She serves as the member of the Advisory Council of the Iowa Energy Center and also a member of the Governance Committee for the Iowa EPSCoR. Paritosh represents Iowa at the National Association of State Energy Officials (NASEO). In addition, she works closely with the Midwestern Governors Association (MGA) on energy matters pertaining to Iowa. Prior to her role at IEDA, she served as the Federal Programs Manager at the Iowa Office of Energy Independence. Paritosh holds an MBA from Drake University in Management, an MPA in Economic Development and Policy Analysis from Indiana University-Bloomington, and a BA from Drake University in Environmental Policy and Political Science. She also holds the globally-recognized Project Management Professional (PMP) certification and is a member of the Global Project Management Institute.

- Naomi Czachura, MidAmerican Energy Company's Vice President for Rates and Regulatory Strategy.

Naomi has been in her current position at MidAmerican Energy Company since 2005, and since 2010 she has been actively engaged in energy efficiency analyses. Since 1980, she has held various positions at MidAmerican and its predecessor, Iowa Illinois Gas and Electric Company, including Vice President – Regulatory Strategy and Analysis, Manager – Regulatory Analysis, Manager – Electric Accounting, Senior Rate Analyst, Senior Forecasting Analyst and Accountant. Naomi has a BA in Accounting and Economics from Augustana College in Rock Island, IL, and has done graduate work in Economics at the University of Chicago.

- Jim Dillon, Black Hills Energy Company's Program Manager for Energy Efficiency

Jim has been the Energy Efficiency Program Manager in Iowa for the past 4 years. Jim manages all programs in the Black Hills Energy portfolio. Those programs include: Residential, Commercial/Industrial, Low Income, Weatherization, Affordable New Homes, Tree Planting, Environmental Research Funding, School Based Energy Education and Low Income Energy Education. Jim has held various positions within the utility marketplace including account management, key account management, COGEN manager and multiple marketing positions. Jim has a BA in Business Management.

- Doug Hoelscher, Director of State-Federal Relations

Doug is the Director of the Iowa Office of State-Federal Relations. In this role, Doug develops and executes Iowa's state-federal relations program serving as a liaison between elected and appointed officials at various levels and branches of government. The Office of State-Federal Relations monitors and analyzes federal funding levels, laws, policies, programs, and regulations and works with various stakeholders to ensure that Iowa's interests are front and center in the national debate. Iowa is a leader in renewable energy development and Doug has helped coordinate a number of energy related issues. Previously, Doug spent three years at PricewaterhouseCoopers where he advised federal agencies, helping to assess and improve the effectiveness of government programs and provided leadership on the execution of various projects and programs. Doug's previous public service included several years as the White House Liaison and as the Executive Director of the Homeland Security Advisory Committees for the U.S. Department of Homeland Security where he helped incorporate the perspectives of state, local, private sector, and academic partners into homeland security policy. He also served over two years at the White House during the George W. Bush Administration where he coordinated personnel matters and presidential events. Doug holds a BA from the University of Iowa and is a certified PMP.

Other staff members, namely Brenda Biddle (Iowa Utilities Board), and Shelly Peterson and Carrie Weber (Iowa Economic Development Authority) provided tremendous assistance to carry out the CHP work.

Iowa CHP Team Activities

Work on the Policy Academy began in September 2012 with several conference calls among the Iowa CHP Team and the NGA liaison, Andrew Kambour. On October 2, 2012, the CHP Team, along with Mr. Kambour, hosted a stakeholder meeting in which the Iowa CHP Team drafted the vision statement and identified goals. Stakeholders provided valuable input which guided in the creation of the vision statement and narrowing of goals.

The National Governors Association Center for Best Practices hosted the Opening Convening of the Policy Academy in Portland, Oregon (October 16-19, 2012). During the Academy, nearly thirty senior-level state policy makers representing four states – **Alabama, Arkansas, Illinois** and **Iowa** - gathered together to hear from expert faculty and start to develop an action plan. State teams learned of best practices and interacted with public and private stakeholders representing Oregon's leading industrial energy efficiency efforts, as part of the NGA Learning Lab model. Substantial time was also dedicated to state strategic planning so state teams could begin to draft their strategic action plans. Teams toured the Purdy Brush Factory/Sherwin Williams Plant which offered an inspirational example of a factory that successfully adopted a number of best practices related to industrial energy efficiency and sustainability.

In November and December, the team drafted a survey to identify barriers to CHP in Iowa. A second stakeholder meeting on November 27, 2012, provided input on the survey and an opportunity to hear from the Iowa Department of Natural Resources about environmental regulations that could potentially impact CHP facilities in Iowa. Iowa Economic Development Authority distributed the survey during December 2012 and January 2013.

On February 28, 2012, a third stakeholder meeting was held, with the assistance of Andrew Kambour from NGA. During this meeting, Iowa Economic Development Authority reviewed the survey results and the stakeholders provided feedback on the project and helped to refine strategies for the CHP Team going forward.

The National Governors Association Center for Best Practices hosted the Second Convening of the Policy Academy on Enhancing Industry through Energy Efficiency and Combined Heat and Power with support from the U.S. Department of Energy. The meeting was held March 4-6, 2013, in Philadelphia, Pennsylvania. During the Academy, the state teams gathered together to hear from expert faculty, share lessons learned during the Academy to date and continue to develop state action plans. The Second Convening provided a forum for states to learn from expert faculty and peer-sharing through presentations and discussions. Time was also dedicated to NGA Center-facilitated team discussions to help states develop their strategic action plans.

During the initial months of the Policy Academy, the Iowa CHP Team toured two CHP facilities in the Des Moines area. On October 30, 2012, the group toured the Archer-Daniels-Midland facility and on November 27, 2012, toured the Des Moines Waste Water Reclamation facility. On February 15, 2012, Archer-Daniels-Midland hosted a second site visit which included Lt. Gov. Kim Reynolds, IUB Board Members Libby Jacobs, Darrell Hansen and Swati Dandekar, the former Chief Operating Officer of Iowa Economic Development Authority, Craig Block, and Core Team members Gordon Dunn and Paritosh Kasotia as well as Andrew Kambour from the National Governors Association.

Vision and Goals

The vision statement adopted by the Iowa team in the October stakeholder meeting is: “Through a better understanding of the benefits of and barriers to CHP, the state and its stakeholders will create an energy policy framework that educates Iowans and increases access to CHP options.”

The goals for Iowa’s CHP Policy Academy have evolved from those noted in the initial application. After incorporating stakeholder input from the various meetings, the Core Team established the following goals:

1. Compile and share information;
2. Increase understanding of potential CHP market; and
3. Identify and evaluate potential policy options.

Appendix 1 is the CHP Team’s Action Plan which includes the vision statement, goals, strategies and action items.

Strategies

In order to accomplish the first goal (to compile and share information), the CHP Team formulated three strategies. First, the Iowa CHP Team researched existing CHP-related information and has shared that information with stakeholders at stakeholder meetings and proposes to maintain links to the information through a Web page hosted by the IEDA. The Iowa CHP Team also proposes to create documents that will help parties interested in CHP by providing a flowchart and contacts for various utilities and state agencies which can assist with siting, permitting and approving such facilities. The team has also conducted a survey (See Appendix 4) to determine the barriers to CHP in Iowa.

The second goal is to increase the understanding of the potential CHP market in Iowa. This goal included identifying the existing CHP facilities, identifying Iowa’s technical and economic potential for CHP and sharing that information with stakeholders and interested parties. The Iowa CHP Team compiled this information into an easy to understand document which will be posted on the CHP web page hosted by IEDA. (See Appendix 5)

The third goal (to identify and evaluate potential policy options) includes a review of Iowa’s existing laws and rules that may affect CHP policies. (See Appendix 7) Also, based on stakeholder discussions, the CHP Team proposes to continue a dialogue concerning utility/third party issues surrounding CHP and identify possible actions for the state

The Iowa CHP Team has also listed potential financial incentives for CHP which may be addressed in continued discussions. (See Appendix 6) Finally, the CHP Team proposes to continue exploration of possibility for a coordinated approach for permitting and assistance with environmental permitting, hosted by the IEDA.

Stakeholders

Outside stakeholders were an integral part of the Iowa CHP Team’s activities and provided valuable input to the Teams direction. The table below shows stakeholders that participated in the Iowa NGA Policy Academy on CHP process.

Ag Processing, Inc.	Iowa Association of Electric Cooperatives
Alliance Pipeline	Iowa Association of Municipal Utilities
Archers-Daniels-Midland Company	Iowa Department of Natural Resources – Air Quality Bureau
Brown Engineering Company	Iowa Environmental Council
City of Des Moines WRA Wastewater Reclamation Facility	Iowa Office of Consumer Advocate
Environmental Law and Policy Center	Iowa Utility Association
International Paper Company	Large Energy Group
Interstate Power and Light Company	Roquette America Inc.

The information below is an outline of stakeholder comments on CHP topics, provided at the third stakeholder meeting hosted by the Iowa CHP Team on February 28, 2013.⁷

The “priority solutions” were the topics which stakeholders identified as needing attention first.

Priority Solutions

- Have a One-Stop shop
 - Information, permitting process
 - Have others direct to single site
 - Identify manufacturers/developers in Iowa that potential parties can connect with.
- Develop coordinated approach to permitting process
- Explore financial incentives
 - Tax credits (property tax, production, investment, sales tax exemption, pollution control)
 - Utility incentives/investments
 - Energy Center revolving loan fund financing
- Explore assistance with environmental compliance (SIP credit, output-based standards)
- Continue discussion of utility/3rd party issues, especially standby rates and tariffs

The next section lists the topic areas, the associated barriers with that topic, and potential solutions.

⁷ Note that “Barriers” can also be interpreted as obstacles or challenges, and “solutions” means potential options, to be achieved in undetermined ways.

Information and Outreach

- Barriers
 - Information quality is ok, just not outreach
 - Companies assume CHP is only for larger customers
 - Economic factors limiting those with interest
 - Lack of internal expertise
 - Lack of “hook”
- Solutions
 - Encourage CHP manufacturers/developers to spread the word
 - Let them know companies in Iowa want to hear
 - Share basic comparison tool
 - Highlight safety/reliability aspects (natural disasters)
 - Fund for audits/studies
 - Targeted outreach

Environmental Regulations/Permitting

- Barriers
 - Rigidity/Cost of permitting
 - Long-term uncertainty of regulations
 - Energy/Emission Benefits of CHP are not reflected in the standards
- Solutions
 - Team Approach to permitting – across agencies or team with state, utility, etc
 - One stop shop – prioritization and coordination of resources
 - Harmonizing procedures
 - Look into the possibility of output based standard/SIP credit
 - Permitting process diagram
 - Awareness of faster process for small systems

Financing

- Barriers
 - Variation in payback expectations/need for “sure” payback
 - Fuel source risk
 - High initial cost

- Solutions
 - Utility development/ownership/operation of CHP – large customers only (or other 3rd party?)
 - Tax credit/Incentives – new or expanding the existing program
 - CHP within Energy Efficiency plans (rebates, etc.)
 - Subsidy for feasibility study – higher if they install CHP

Grid/Operation

- Barriers
 - FERC/MISO Interconnection
 - Regulations for non-qualified facilities
 - Ability to sell into the MISO market
 - Demand charge/ratchet rate leading to high fixed costs
- Solutions
 - Sales/Tax exemption for CHP fuel
 - Gas-fired CHP eligible for net metering
 - Expand 500 kw cap
 - Something regarding stand-by rates?

Other Questions to consider:

- What is capacity for state to expand CHP permitting/development?
- How do you make CHP economically viable? If not, why not?
- What is the state/Governor's appetite for CHP?
- How do we share information/benefits of CHP?
 - How do you get the right people selling it?
- What is the timeframe?
- What is the market potential/appetite?
- What are incentives for the public sector?
- How do we get vendors interested in Iowa?
- Who will drive beyond policy academy?
- Who is getting information to small/medium companies?
- What's in it for the State?
- Has Iowa been down this road before? What can we learn?
- Is there money from DOE for education?
- Is there value to others?
- What is the real issue with financing?
- Who is going to pay?
- How do we take the solutions to the policy makers?

Survey on Combined Heat and Power

Methodology

The Iowa Economic Development Authority conducted a survey of topics related to CHP which targeted two groups. First, facilities with existing CHP installations were surveyed to rank barriers. Using the Department of Energy CHP Database for Iowa with thirty-four listings of existing CHP, a questionnaire was electronically distributed to twenty locations for which contact names and e-mail addresses were available. Two locations were contacted by telephone and contact people could not be confirmed at the remaining twelve locations. Fifteen survey responses were received from this group.

The second focus group consisted of consultants, vendors, utilities and industrial users who had considered CHP but had not installed the technology. The Midwest Clean Energy Application Center provided a list of contacts and electronic surveys were distributed to over sixty individuals. The Iowa Association of Municipal Utilities and the Iowa Association of Electric Cooperatives also distributed survey forms to member organizations. In addition, the Large Energy User organization solicited feedback from affiliated industries. Seven completed surveys were returned from this group and an additional seven organizations, comprised of cities and REC's, replied that they did not have any CHP experience and could not complete the survey.

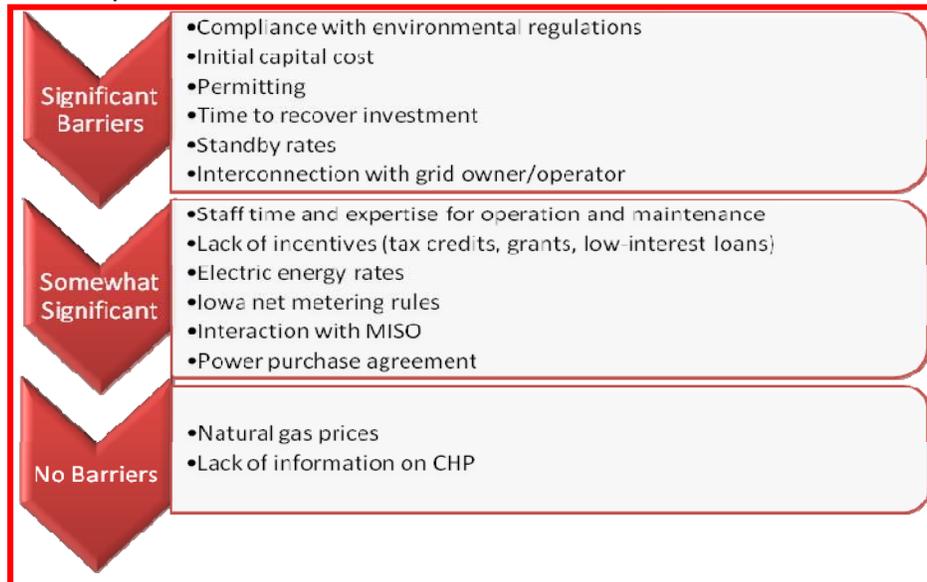
Surveys were distributed throughout December 2012 and January 2013. A copy of the survey form is included at the end of this Appendix.

Results

For the existing CHP subset, compliance with environmental regulations was the most significant barrier reported, followed by permitting and initial capital cost. Other highly ranked barriers included time to recover investment, standby rates, and interconnection with grid owner/operator. Lack of incentives, staff time and expertise for operation and maintenance, interaction with MISO, net metering rules, power purchase agreement and electric energy rates were commonly ranked as "somewhat of a barrier". The lowest ranked barriers were lack of information on CHP and natural gas prices.

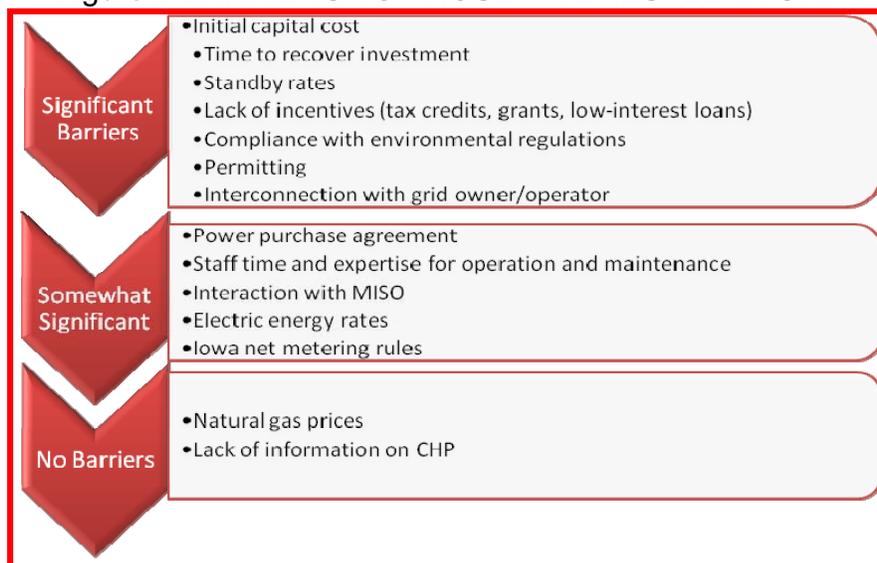
Note that every potential barrier was ranked as significant by at least one respondent. Those organizations with private ownership generally ranked cost related issues as more significant than the publicly held CHP installations. Most of the current CHP facilities that filed survey responses have been in operation for many years, with a large number of installations in the decades of the 1980's and 1990's. In most instances, the person completing the survey was not on staff for the financing and connection phases of the CHP project and would not have direct experience with these barriers.

Figure 1 BARRIERS TO EXISTING CHP FACILITIES
Responses are sorted from most common to least common



The results from the second survey group, those interested in CHP, indicate that the highest barriers perceived are the initial capital cost, time to recover investment, and standby rates. This is followed closely by lack of incentives, compliance with environmental regulations, permitting, and interconnection with the grid owner/operator. The lowest ranked barriers mirror the findings from the existing CHP survey, with lack of information on CHP and natural gas prices most often scored as “no barrier”. As these respondents represent those who do not have installed CHP, they would not have direct experience with the operation and compliance aspects of CHP and appear to have ranked these barriers slightly lower than did those organizations that have installed CHP.

Figure 2 BARRIERS TO THOSE INTERESTED IN CHP



While lack of information on CHP was not seen as a significant barrier to either group that completed the survey, seven individuals did respond that they would not complete the survey because their organization did not have any CHP experience. Attempts to obtain contact information from twelve sites listed on the DOE database as having installed CHP also indicated a basic lack of knowledge regarding the technology. These results indicate that adequate technical information on CHP is readily available to those that have familiarity with CHP, but there is a lack of general knowledge on the topic for those outside the survey group.

The survey provided information on the number of full-time employees required to operate the CHP facility. The findings indicate that small and medium sized facilities (<50 MW) require on average 1.5 employees per MW of installed CHP for operation and maintenance. There is some economy of scale, as the very large facilities (>150MW) operate with an average of 0.3 full time employees per MW. Respondents commented that the availability of skilled staff is a challenge, especially for the biogas installations.

Other qualitative feedback includes the following selected responses:

- It is easier to appropriate funds for utility expenses than to get capital expenses for new construction of CHP.
- Operation of CHP is not a core business function.
- High cost of natural gas pipeline tap and pipeline capacity limitations limit new CHP.
- Air permitting regulations do not recognize the reduced net air emissions from CHP.
- CHP permitting requirements are based on peak loads, but facilities rarely operate at peak.
- Our site is reaching maximum emission limits even with technological controls.
- The spark spread between electric costs and natural gas costs needs to widen a bit more to make CHP financially attractive.
- CHP operations become “electrical power generators” according to state definitions and this is not a role a company wants to play.
- Utilities are non-supportive of CHP efforts.
- Every facility is unique by nature and CHP must be integrated with the facilities existing infrastructure. Organizations are reluctant to spend the upfront money for a feasibility study.
- Purchase price rates vary considerably across the state and project by project.
- The cost of generators has increased due to lack of competition in the market.
- Establishing partnerships, for feedstock materials, thermal loads, etc. can help make a CHP project cost-effective.
- Tax credits are not an incentive to a public entity.

Survey on Combined Heat and Power for Business, Industry and Institutions

The state of Iowa, through a National Governors Association Policy Academy program, is reviewing combined heat and power (CHP) for application in the state. The goals of the Academy effort include compiling and sharing CHP information, identifying barriers to CHP implementation, gaining a better understanding of the potential for CHP in Iowa, and identifying potential policies to promote CHP. Please see the attached for an overview of CHP technologies.

The Iowa CHP Team seeks information and opinions on CHP topics from people within industries, commercial sites and institutions who have experience with energy use in facilities and asks you to complete this survey. Completed surveys can be returned to Shelly Peterson at the Iowa Economic Development Authority, shelly.peterson@iowa.gov or 200 East Grand Avenue, Des Moines, Iowa, 50309. If you have questions about the form, please contact Shelly at 515-725-0418.

The following website contains a definition of and more technical information on CHP. Please go to: <http://www.midwestcleanenergy.org/cleanenergy/chp/>.

Your responses will remain confidential and will be aggregated without any association to your name or your organizational affiliation.

Section 1: Background Information

Please complete this section if your facility has CHP installed where the unit produces electricity and heat. **If your organization has multiple CHP installations please provide background information for all systems.**

1. Does your facility have CHP in place?
2. What year was the system installed?
3. What is the source of fuel for the CHP system?
4. What is the size (MW) of the CHP system?
5. a. Does the system provide all of the annual electrical need of the facility?
b. If not, what percentage of electricity is provided by the system?
6. How many staff members are dedicated to the operation of the CHP system? (Indicate in FTEs)
7. Will EPA air quality regulations impact continued operation of your CHP system?

Section 2: Experience with CHP

Please provide a brief account of your experience with CHP? (Such as information on design, construction, and operation of a CHP system or interactions with utilities and regulators)

Section 3: CHP Installations and Barriers

A. Please check the most appropriate box for each of the following factors that affect CHP installations.

	Factors affecting Combined Heat and Power (CHP) Installations	No Barrier	Somewhat of a Barrier	Significant Barrier
1	Initial capital cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Time to recover investment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Lack of Incentives (tax credits, grants, low-interest loans, etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Staff time and expertise for operation and maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Compliance with environmental regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Permitting process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Interconnection with grid owner/operator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Interaction with MISO (transmission)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Iowa net metering rules	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Power purchase agreement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Standby rates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Natural gas prices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Electric energy rates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Lack of information on CHP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B. Please comment on areas where you agree significant barriers exist (refer to the numbered rows above). If you have determined that CHP is not feasible for your location, please be specific on the primary barriers:

Section 4: Contact Information

Please provide the following contact information:

Name:

Title:

Phone number:

E-mail address:

Address:

Thank You!

Thank you for completing this survey. Your participation will assist the Iowa CHP team define the opportunities and obstacles to further CHP development in Iowa. If you have questions on the Policy Academy, please contact Shelly Peterson at the information listed above. Information from the CHP Policy Academy will be posted at the Iowa Economic Development Authority website at the following link: http://www.iowaeconomicdevelopment.com/business/energy_chp.aspx

Background on Opportunity, Potential and Economics of CHP in Iowa

Iowa utilities have offered most Iowa industrial energy users “end use” energy efficiency programs since 1991. Many industrial companies have participated in and benefited from these very successful programs. As a result of these long-standing efficiency efforts, savings for non-residential customers exceed 400 MW of peak demand reduction and two million MWh of energy savings per year.

Until recently, combined heat and power⁸ (CHP) has not been a visible aspect of Iowa’s investor-owned utility energy efficiency programs. Financial incentives and technical assistance for customers considering CHP have generally been limited to waste heat recovery.

The recent promotion of CHP by the U.S. Department of Energy (DOE) has created heightened interest among Iowa facility managers and others who frequently contact the State Energy Office⁹ seeking technical and financial assistance for CHP projects. The State Energy Office has also been approached on a number of occasions by the Midwest Clean Energy Application Center to help design programs and policies that will encourage CHP applications in Iowa.

The DOE CHP database¹⁰ lists 34 sites in Iowa with CHP installations, for a total installed capacity of 590 MW. The food processing industry in Iowa accounts for the largest percentage of the total CHP installed capacity, followed by college/university campuses. While several biogas systems operate at municipal wastewater treatment facilities or landfills, these facilities are generally smaller in capacity and do not contribute significantly to the statewide installed capacity.

What is CHP?

CHP is the concurrent production of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy. Instead of purchasing electricity from a local utility and then burning fuel in a furnace or boiler to produce thermal energy, consumers use CHP to provide these energy services in one efficient step.

CHP is composed of a suite of technologies that uses a variety of fuels to generate electricity or power at the point of use, allowing the heat that would normally be lost in the power generation process to be recovered to provide needed heating and/or cooling. This allows for improved fuel efficiency and lower costs and CO₂ emissions.

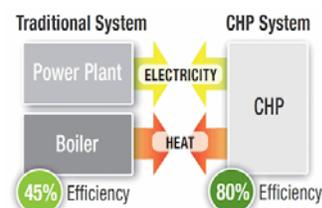


Figure 1: Comparison of Traditional System and CHP System

Source:

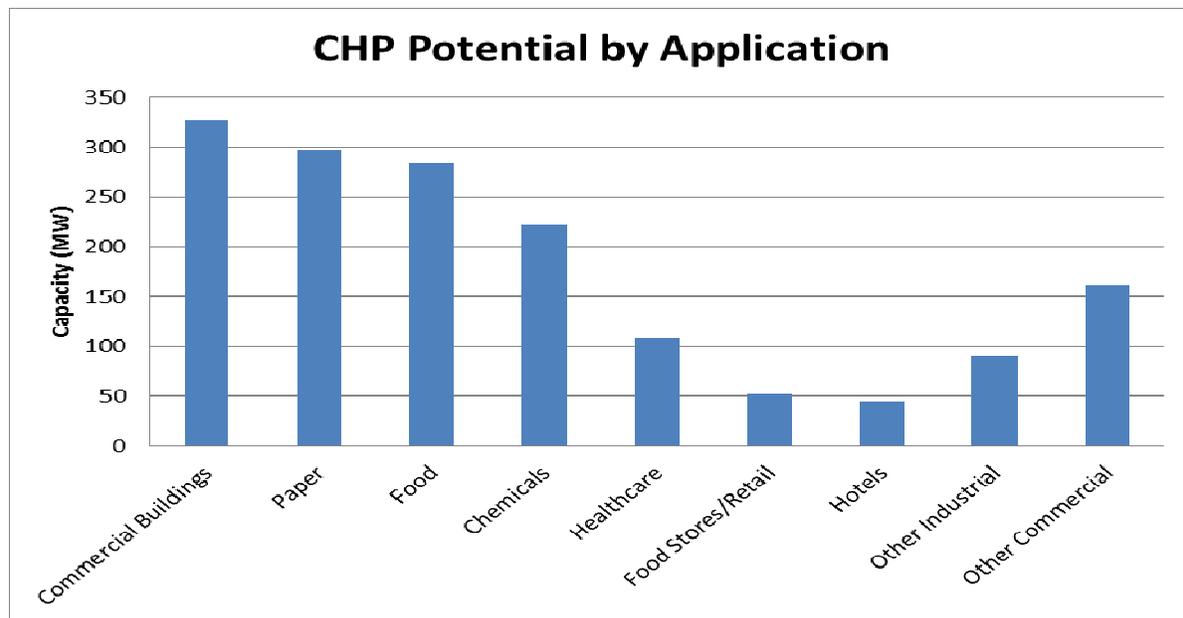
www.integralpower.com/whatischp.html

⁸ CHP is also known as cogeneration. For purposes of this Policy Academy, CHP will include waste heat recovery.

⁹ State Energy Office, Iowa Economic Development Authority and Energy Division refer to the same entity and are being used interchangeably in this document.

¹⁰ <http://www.eea-inc.com/chpdata/States/IA.html>

ICF International has analyzed the potential for CHP in Iowa by types of application and has provided the chart below. The primary industrial applications appear to be focused in the paper, food or chemical industries. The chart also shows potential for CHP in commercial buildings, healthcare (hospitals or clinics), food/retail stores and hotels.



Source: ICF International¹¹

There are differing estimates for the technical and economic potential for CHP in Iowa. An American Council for an Energy-Efficient Economy (ACEEE) report states there is over 3 GW of technical CHP potential for industrial or commercial facility investment but only 3 MW is viewed as economically feasible.^{12,13} The economic potential would increase if utilities are considered as possible investors. The 3 GW of technical potential includes 1 GW of onsite CHP and 2 GW of for “export” (sales to the grid).

ICF International’s analysis of the potential for CHP in Iowa (see table below) shows the total technical potential for CHP in industrial and commercial applications to be 1.5 GW with much of that potential in projects that are less than 5 MW.¹⁴

¹¹ Combined Heat and Power – Current Status and Future Potential, Bruce Hedman, ICF International, NGA Policy Academy, October 16, 2012 (Slide 12).

¹² Coal Retirements and the CHP Investment Opportunity, Authored by Anna Chittum and Terry Sullivan, American Council for an Energy-Efficient Economy, September 2012, Report IE123.

¹³ Economically feasible was defined as only a 50% acceptance of a two-year payback for a CHP installation.

¹⁴ Hedman, personal communication, through National Governors Association. Andrew N. Kambour Senior Policy Analyst, Environment, Energy & Transportation Division, National Governors Association Center for Best Practices, (202) 624-3628, akambour@nga.org

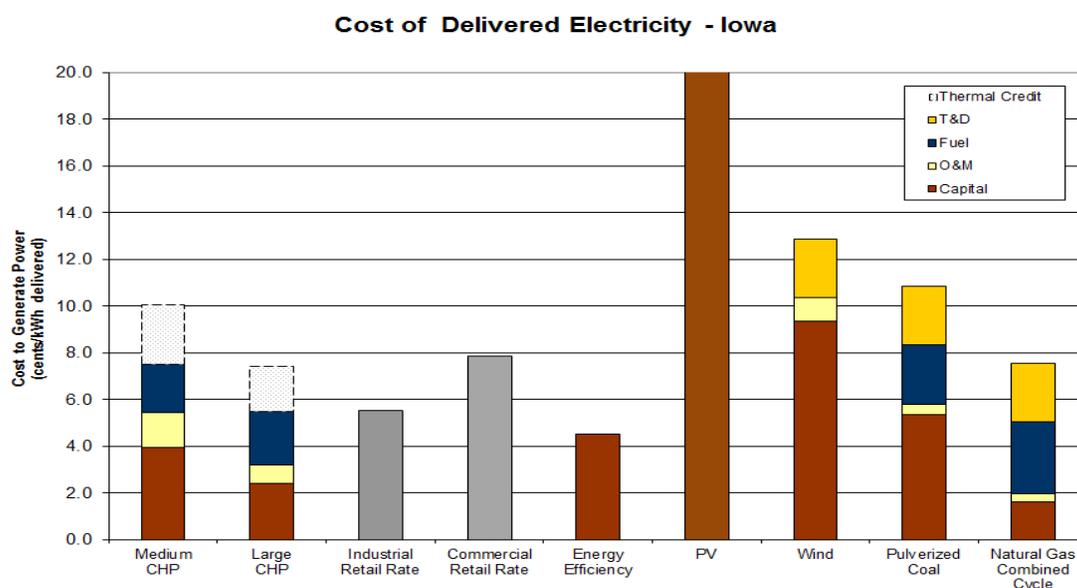
Iowa Technical Potential	Facility Size					Total Capacity (MW)
	50-1000 kW (MW)	1-5 MW (MW)	5-20 MW (MW)	20-50 MW (MW)	50-100 MW (MW)	
Industrial	73.7	294.4	270.2	107.9	147.7	893.8
Commercial	454.2	223.8	15.2	0.0	0.0	693.2
Total Potential	527.9	518.2	285.4	107.9	147.7	1,587.0

Economics of CHP in Iowa

One of the key factors in developing CHP is to determine whether incorporating a combined heat and power facility is economically feasible. In Iowa the price of electricity and natural gas are relatively low making the economics of CHP more difficult. ICF International provided cost estimates for medium and large natural gas fueled CHP facilities. It estimated that to generate power for a medium-sized CHP facility would cost approximately \$0.0748/kWh¹⁵ compared to the commercial retail rate for electricity in Iowa of \$0.0785/kWh.

For a large CHP facility, ICF International estimated the cost at approximately \$0.0546/kWh to generate power compared to the industrial retail rate for electricity of \$0.0550/kWh. For both the medium and large CHP facilities, the estimated costs are net of a thermal credit (estimated by ICF International at \$0.0256/kWh and \$0.0193/kWh respectively) which reflects the cost of boiler fuel avoided by capturing and using the waste heat from CHP.

The figure below illustrates ICF International's cost estimates and gives a general picture of the cost to generate power in Iowa.¹⁶



¹⁵ Costs include capital, operations and maintenance expense, and fuel.

¹⁶ Hedman, NGA 2012, Slide 13.

CHP Related Incentives

In this summary, pages 31-33 are based on a report from the American Council for an Energy Efficient Economy, identified as “ACEEE 2011”¹⁷

State Financial Incentives

A number of states offer financial incentives in the form of grants, bonds, rebates, tax credits, and loans for developers or owners to install new CHP systems or retrofit existing systems with CHP.

This section will not attempt to describe all the different types of incentives or the merits and drawbacks of each. It will, however, describe some of the types of incentives greatly impacting the CHP market today, and discuss how they are being used.

Financial incentives for CHP can be viewed in two ways: 1) they can be used to make the economics of a project more favorable, increasing the likelihood of the project’s execution; or 2) they can be used to mitigate the existing regulatory barriers-to defray the costs of interconnection studies and fees, compliance with emissions standards, and other fees and procedures.

Tax Credits

One particular tax credit, a 35% renewable energy tax credit in North Carolina, is already garnering substantial interest among CHP developers, as the credit was expanded to include CHP in 2010. Tax credits were noted to be very useful to third-party investors and others investing in CHP systems because they are a reliable source of savings and can easily be worked into a pro forma statement or other forward-looking business plan.

Production credits, such as New York’s per-kWh Existing Facilities Program, were highly regarded by developers and were also viewed as a very reliable source of savings.

The federal government provides an investment tax credit, a 10% credit against business taxes that is viewed by developers and CHP supporters as important, but not a “game changer.” These improvements are time-limited. After 2010 they will diminish greatly.¹⁸

To take advantage of tax credits, an entity must have some tax liability. For businesses that have little tax liability, this solution may not be helpful. Tax credits are also not useful to tax-exempt nonprofit institutions, including universities and hospitals, which have no business tax liabilities.

¹⁷ Challenges Facing Combined Heat and Power Today: A State-by-State Assessment, Anna Chittum and Nate Kaufman, September 2011, Report Number IE111, pp. 13-16.

¹⁸ “Section 1603 payments will revert back to the standard 10% federal investment tax credit once the ARRA payment program ends at the end of 2010.” Chittum and Kaufman, 2011, p. 15.

Feed-In-Tariffs

A feed-in tariff (FIT) is a long-term contract a generator may enter into with a utility to have the generator's power purchased at a set rate. Like a production credit, a FIT pays a CHP system a set amount per kWh produced. However, unlike a production credit, a FIT locks in a rate for years; giving a CHP developer substantial assurance that the CHP project will earn a certain premium on produced power over the years. Today, only California has attempted to establish a true FIT, and only the Sacramento Municipal Utility District (SMUD) has developed a FIT specifically for CHP. The SMUD program was very popular and is now closed to new contracts due to oversubscription (SMUD 2010).

Loans and Loan Guarantees

Loans and loan guarantees are a popular offering at the state level to encourage CHP and other renewable energy and energy efficiency investments. States tend to favor loans because there is relatively little cost to the government in lost revenue as tax incentives, and it is easy to partner with existing banks and development authorities to issue the loans or loan guarantees.

A typical energy efficiency loan program has a 10-year repayment period and a project cap of well under \$100,000. CHP developers were interested in programs with longer repayment periods and larger project caps. As noted before, CHP projects can be very expensive, and a local loan program will typically not be big enough to make a significant impact on a CHP system.

Net Metering

CHP systems are rarely able to take advantage of net metering policies, which allow CHP owners to receive credit against their electricity bills for the electricity generated by a CHP unit and delivered to the grid. This is most often due to limitations on project size or project technology embedded in the net metering regulatory language. Currently, 16 states and the District of Columbia have net metering policies in place for some form of CHP.

Grants

The most widely noted grant program by CHP developers and supporters was the funds distributed by the DOE under the American Recovery and Reinvestment Act of 2009 (ARRA). Under this program, approximately \$100 million was awarded to CHP and waste heat recovery projects.

The ARRA money has been entering the CHP marketplace slowly. Projects that were awarded funds are now just beginning to break ground, or are still in the preliminary planning stages.

Section 1603 payments for energy property in lieu of tax credits (United States Treasury 2010), is another special short-term program authorized under the ARRA. The fact that

payments under this plan are made up front, instead of as tax credits to be enjoyed after the capital costs have already been incurred, significantly reduces the challenge of securing financing, as any amount to be financed is reduced by the amount of the Section 1603 payment. It therefore also reduces the overall cost of a project, because the developer or owner does not have to incur the cost of capital when securing the upfront financing covered by the payments.

Portfolio Standards

The inclusion of CHP and waste heat in an energy portfolio standard has traditionally been viewed by CHP supporters as important in strengthening the CHP market. This inclusion usually comes in the form of an energy efficiency resource standard (EERS) or an alternative energy portfolio standard that includes CHP or waste heat recovery as qualifying resources. When CHP or waste heat is included in an EERS, it means the state requires regulated utilities to meet some percentage of future energy use with CHP or waste heat. Sometimes CHP is specifically called out and assigned a percentage of future use, and other times it is part of a large group of technologies that may all count towards a certain required percentage. To date, 18 states allow some sort of CHP or waste heat to qualify as a resource for a state energy efficiency or alternative energy standard.

The policy is generally viewed as having no teeth, in part because so many portfolio standards have only been in place a few years. Most of these policies have set goals 5, 10, or even 20 years into the future, so the impact on the current CHP market has been minimal.

CHP is sometimes included as an eligible resource in Renewable Portfolio Standards (RPS), but often only renewable-powered CHP or strict “waste heat” is allowed as an eligible resource.

Additional information on incentives available in other states, on pages 34-35, was compiled by the Iowa Economic Development Authority.

Incentive to Overcome Financing Barriers

Financing barriers can be addressed through a variety of avenues including bonds, production incentives, tax exemptions and incentives, state funded grants and loans, utility natural gas rates, utility or third party ownership agreements, and utility based rebates or incentives. Sample programs to minimize financing barriers include the following:

- Federal Business Energy Investment Tax Credit – This existing credit is equal to 10% of expenditures, with no maximum limit stated. Eligible CHP property generally includes systems up to 50 MW in capacity that exceed 60% energy efficiency.
- North Carolina extended their renewable energy tax credit to CHP in 2010. The 35% energy tax credit is intended to spur CHP installations. There is a \$2.5 million cap on the credit ([DSIRE](#)).
- Iowa has included natural gas cogeneration at ethanol plants as eligible applicants under the Renewable Energy Tax Credit. Applicants can claim a production tax credit of 1.5¢ per kW for facilities above 750 kW.
(http://www.state.ia.us/government/com/util/energy/renewable_tax_credits.html)
- A significant shortcoming of tax incentive programs is the exclusion of public sector projects. Oregon has developed a “pass through” system that allows transfer of tax credits from a public project to a private entity.
- Oregon DOE gives grants for feasibility studies for renewable energy and heat and fuel projects
(http://www.oregon.gov/energy/RENEW/Pages/creff.aspx#Community_Renewable_Energy_Feasibility_Fund_CREFF_)
- Alabama features a revolving loan program Alabama SAVES, providing funding for retrofitting existing facilities with CHP.
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AL44F&re=0&ee=0
- In Minnesota and Wisconsin, Alliant Energy offers a financing program called Shared Savings that pays a business for the initial cost of equipment. Repayment of the equipment occurs over a five year term. This would apply to CHP installations.
<http://www.alliantenergy.com/SaveEnergyAndMoney/AdditionalWaysSave/FinancingOptions/029922>
- [In Iowa and Minnesota, Alliant Energy offers incentives for CHP through its Custom Rebate energy efficiency program.](#)
- Both Massachusetts and Rhode Island have set a specific target for CHP in their Energy Efficiency Resource Standard. Massachusetts aims to have 5% of the state’s electrical load served by alternative energy in the form of CHP by 2020 (called the Alternative Portfolio Standard). Rhode Island utilities have to specify in their annual efficiency plans how they will support CHP installations.
http://www.epa.gov/chp/documents/ps_table.pdf,
<http://aceee.org/blog/2012/11/determining-chp-savings-energy-effici>,

<http://www.aceee.org/energy-efficiency-sector/state-policy/Rhode%20Island/211/all/195>,
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA21R&re=1&ee=1

- Muscatine Power & Water developed an agreement with an industry to co-locate and use the thermal heat from the municipal utility electrical generation plant. The 18 MW system was installed in 1999.
- Colorado created “recycled energy” category for their RPS and have defined “recycled energy” as “energy produced by a generation unit with a nameplate capacity of not more than 15 megawatts (MW) that converts the otherwise lost energy from the heat from exhaust stacks or pipes to electricity and that does not combust additional fossil fuel. Incorporating a similar definition for recycled energy would make CHP eligible for a renewable energy tax credit. (ACEEE)

Operating Cost Barriers

Operating cost barriers include standby rates, Iowa net metering rules, and staff time and expertise for operation and maintenance. The survey results indicated a significant staffing commitment for CHP facilities. Sponsoring trainings for CHP operation and maintenance is one opportunity to further educate the work force on this topic. Iowa must also address how the unregulated utilities differ from regulated utilities. Other resources in regards to minimizing operating cost barriers include the following:

- In the state of New Jersey, natural gas and utility service used by CHP are exempt from sales and use tax. [EPA CHP Database](#)
- A 2012 report titled “Iowa On-Site Generation Tariff Barrier Overview”, completed by the US DOE Midwest Clean Energy Application Center, provides an in-depth analysis of standby rates and demand ratchets in the state. Utilities in the states of Oregon, Colorado, Arkansas and Minnesota have implemented CHP neutral or favorable standby rates.
- California, Connecticut, Hawaii, New Jersey, and New York offer special gas rates or gas rebates on natural gas provided to combined heat and power fueled facilities. (<http://www.epa.gov/chp/policies/database.html> Filtered by show all and utility rate)
- Include CHP in net metering rules (ACEEE)

Grid and Technical Barriers

Grid and technical barriers may result in the interconnection process with the utility service provider or through interaction with the Midwest Independent Transmission System Operator (MISO). Iowa recently revised interconnection standards for investor-owned utilities and these revisions include many of the ACEEE recommendations for interconnections standards for CHP, however, this standard does not apply to the unregulated utilities in the state.

Alabama is evaluating a standard interconnect agreement as part of this Policy Academy.

CHP “Utility” Topics: Options, roles, statutes and rules

Possible CHP “utility options” for continued discussion (compiled by staff of the Iowa Utilities Board)

Various reports on CHP have suggested a variety of roles or options for utility involvement in CHP. Some possible topics involving Iowa utility regulation and CHP are listed below. Following the list of Iowa utility topics is an excerpt from a recent report on CHP by the American Council for an Energy-Efficient Economy. In addition, this appendix contains an extensive list of utility-related statutes and IUB Administrative Rules which may interact with or be affected by potential solutions to CHP obstacles.

Utility engagement with CHP on the level of ordinary utility business practices

Tariffed IOU services-Interconnection rules. Does Iowa’s detailed set of rules for interconnection in Iowa Admin. Code 199-Chapter 45 provide adequate guidance and procedures for all CHP projects? If not, how should changes be made?

Tariffed IOU services-Standby rates and demand penalties. Do the rates and procedures in IOU tariffs for standby rates and determination of demand charges pose obstacles to CHP? If so, how should changes be made; through statutes, IUB rulemaking or contested rate proceedings?

Tariffed or negotiated power purchase procedures and rates. Do the rates offered by IOUs for power purchase from CHP producers pose barriers to CHP in Iowa? If so, who has jurisdiction over these rates; the FERC or the IUB?

Participation in CHP by IOUs as partners or owners and providers of CHP

Would changes to statutes and rules be needed to allow and encourage direct participation or ownership of CHP facilities by Iowa IOUs? How would such changes be accomplished? What might be the consequences of such changes?

ACEEE Report¹⁹ on CHP as a replacement for coal-fired generation

The following excerpt is from pages 15 and 16 of the ACEEE 2012 report. (Note that the numbers were developed by ACEEE from national data sources, using various broad assumptions, and may not be directly applicable to particular industries or CHP installations in Iowa.)

The Role of Utilities

Utilities are uniquely positioned to invest in CHP, and their investments in CHP technologies will be critical to the meeting of the new national CHP goals. While an average industrial or commercial facility may find an investment with a five-year payback period to be unattractive, utilities are very used to making such investments. Their appetite for longer investment horizons is well-established and embraced by shareholders.

Table 3 shows the percentage of coal retirements that could economically be replaced with CHP if utilities were to become major investors in new CHP projects. These percentages assume the highest projected amount of coal retirement in each of the 12 target states as well as the “utility case” economic potential as described above.

Table 3: Estimated Percentage of Retiring Coal Capacity That Could Be Replaced With New Combined Heat and Power (CHP) Systems, 2011 – 2020. (ACEEE 2012, page 16)

State	Percentage Lost Coal Capacity Potentially Replaced with CHP
Alabama	51 %
Colorado	19 %
Georgia	40 %
Indiana	21 %
Iowa	2 %
Kansas	100 %
Kentucky	8 %
Louisiana	N/A
North Carolina	56 %
Ohio	16 %
South Carolina	100 %
West Virginia	32 %
Sources (from ACEEE 2012)	ICF 2012, FBR 2010, SourceWatch 2012, SNL 2011, EIA 2012a, EIA 2012d, See Appendix A and B

¹⁹ “Coal Retirements and the CHP Investment Opportunity” Anna Chittum and Terry Sullivan, September 2012, Report Number IE123, American Council for an Energy-Efficient Economy (ACEEE 2012). (The following excerpt is from pages 15 and 16 of the ACEEE 2012 report.)

At present, most electric utilities still see CHP as antithetical to their business model. Greater investments in CHP will yield a reduced consumption of utility-provided electricity. Electric utilities are therefore hard pressed to put much effort toward encouraging their customers to install CHP. Shareholders of investor-owned utilities would rightly balk at such an effort, absent other possible revenue streams.

There are several ways policy makers could encourage utilities to invest in CHP. These include:

1. Giving utilities assurance that investments in CHP will return financial returns similar to or better than investments in other generation and distribution assets;
2. Allowing utilities to integrate CHP-focused programming into their suite of energy efficiency programming, and fund such programs out of collected ratepayer cost-recovery mechanisms and/or energy efficiency fees;
3. Treating CHP as a priority resource (Tier 1) as part of an established energy efficiency resource standard or other portfolio standard, or establishing a specific portfolio goal for CHP; and
4. Giving utilities better regulatory certainty at the state and federal level so that investments in CHP can be accurately and adequately valued for their ancillary benefits, such as transmission and distribution loss reductions and emissions reductions.

Utility regulations in the United States are not structured in a manner that allows utilities to view investments in CHP as a profit-making enterprise. By addressing this disconnect, the U.S. could move rapidly toward the new goal of 40 GW set by President Obama and help move the electric generation industry toward a cleaner and more prosperous future.

Summary of statutes and administrative rules which may interact with CHP policy options (compiled by staff of the Iowa Utilities Board)

Iowa Utilities Board staff believes there may be several areas of interaction between possible new policies intended to facilitate construction or use of Combined Heat and Power and existing Iowa statutes and administrative rules. Staff notes that statutes and rules pertaining to “independent power production” were enacted as early as 1980, while other statutes and rules regarding renewable energy date to the early 1980s, with significant updates in 1990 and 2001. In addition, statutes and rules related to energy efficiency programs of Iowa utilities date from 1990, with updates in 1996 and 2008.

Many of the following laws and rules may directly relate to Combined Heat and Power (usually termed “cogeneration”). Other statutes and rules govern how utilities relate to their customers or prescribe detailed processes for licensing larger electric generating facilities. Finally, extensive statutes and rules govern utility energy efficiency programs.

Staff has scanned the statutes and rules, and excerpted major sections of what appear to be relevant law and administrative processes.

Staff summary comments and conclusions

Iowa utility-related statutes and rules

Statutes and rules for “Location and Construction” of power plants. Do these statutes and rules pose obstacles to CHP? If so, what changes are needed and how should changes be made?

Statutes and rules granting exclusive electric service areas in Iowa. Do these statutes and rules pose obstacles to CHP development by third-party providers? If so, what are the obstacles, and what might be the consequences of attempting to change these statutes and rules?

Statutes and rules relating to renewable energy in Iowa. Would any of these extensive laws and rules be affected by changes made to facilitate CHP in Iowa?

Statutes and rules relating to energy efficiency. Do features of these statutes and rules pose obstacles to CHP? Do the obstacles include the following, and if so, what are the possibilities and consequences of potential changes?

- Definitions of energy efficiency?
- Attribution and valuation of energy and capacity savings?
- Magnitude of CHP costs and level of IOU incentives?
- Benefit-cost test definitions?
- Impacts of large-scale CHP projects on recovery of costs for both CHP and energy efficiency funded by IOU incentives.

The following is only a partial list of Iowa Code statutes and Iowa Administrative Rules which may be affected by or interact with efforts to establish programs or incentives for CHP through Iowa utilities. Investor-owned utilities are the most likely foci of such efforts, thus the list of statutes and rules pertains mostly to IOUs.

Iowa Statutes

Statutes providing general goals related to energy, energy efficiency, and the environment

- Iowa Code 473.2 *Energy Development and Conservation - Findings*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.473.2.pdf>)
 - ❖ Specifically Iowa Code 476.6(14), (16), (18)
- Iowa Code 473.3 *Energy resource management goal*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.473.3.pdf>)
 - ❖ Specifically Iowa Code 473.3(1) and (2)

Statutes governing utility-related energy efficiency plans and programs

- Iowa Code 476.1 *Applicability of authority* [Iowa Utilities Board]
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.1.pdf>)
 - ❖ Specifically Iowa Code 476.1(7)
- Iowa Code 476.6 *Changes in rates, charges, schedules, and regulations - supply and cost review*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.6.pdf>)
 - ❖ Specifically Iowa Code 476.6(14), (16), (18)

Statutes governing utility-related generating facility rate-making policies

- Iowa Code 476.53 *Electric generating and transmission facilities*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.53.pdf>)
 - ❖ Specifically Iowa Code 476.53(1), (2), (3)

Statutes Governing Electric Power Generation Facilities

- Iowa Code Chapter 476A *Electric Power Generation*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Chapter.476A.pdf>)
 - ❖ Specifically Iowa Code 476A(1), (2), (5), (6), (15)

Statutes related to renewable energy

- Iowa Code 476.41 *Alternative Energy Production Facilities – Purpose*

- (See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.41.pdf>)
- Iowa Code 476.42 *Definitions*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.42.pdf>)
 - Iowa Code 476.43 *Rates for alternate energy production facilities*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.43.pdf>)
 - Iowa Code 476.44 *Exceptions*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.44.pdf>)
 - Iowa Code 476.44A *Trading of credits*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.44A.pdf>)
 - Iowa Code 476.45 *Exemption from excess capacity*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.45.pdf>)
 - Iowa Code 476.46 *Alternate energy revolving loan program*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.46.pdf>)
 - Iowa Code 476.47 *Alternate energy purchase programs*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.47.pdf>)
 - Iowa Code 476.48 *Small wind innovation zone program*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Section.476.48.pdf>)
 - Iowa Code 476B *Wind Energy Tax Credit*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Chapter.476B.pdf>)
 - Iowa Code 476C *Renewable Energy Tax Credit*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IC/LINC/Chapter.476C.pdf>)

199 Iowa Administrative Code (IAC) - Iowa Utilities Board Administrative Rules.

- 199 IAC Chapter 15 *Cogeneration and Small Power Production*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IAC/LINC/04-03-2013.Chapter.199.15.pdf>)
 - ❖ Specifically:
 - 15.1 Definitions
 - 15.2 Scope
 - 15.4 Rate-regulated electric utility obligations under this chapter regarding qualifying facilities
 - 15.5 Rates for purchases from qualifying facilities by rate-regulated electric utilities

- 15.6 Rates for sales to qualifying facilities and AEP facilities by rate-regulated utilities
 - 15.7 Additional services to be provided to qualifying facilities and AEP facilities by rate-regulated electric utilities
 - 15.8 Interconnection costs
 - 15.9 System emergencies
 - 15.10 Standards for interconnection, safety, and operating reliability
 - 15.11 Additional rate-regulated utility obligations regarding AEP facilities
 - 15.17 Alternate energy purchase programs
 - 15.18 Certification of eligibility for wind energy tax credits under Iowa Code chapter 476B
 - 15.19 Certification of eligibility for wind energy and renewable energy tax credits under Iowa Code chapter 476C
 - 15.20 Applications for wind energy tax credits under Iowa Code chapter 476B
 - 15.21 Applications for renewable energy tax credits under Iowa Code chapter 476C
 - 15.22 Small wind innovation zones
- 199 IAC Chapter 20 *Service Supplied by Electric Utilities*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IAC/LINC/04-03-2013.Chapter.199.19.pdf>)
- ❖ Specifically:
 - 20.10 Ratemaking standards
- 199 IAC Chapter 24 *Location and Construction of Electric Power Generating Facilities*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IAC/LINC/04-03-2013.Chapter.199.24.pdf>)
- ❖ Specifically:
 - 24.1(1) Authority
 - 24.1(2) Purpose
- 199 IAC Chapter 35 *Energy Efficiency Planning and Cost Review*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IAC/LINC/04-03-2013.Chapter.199.35.pdf>)
- 199 IAC Chapter 45 *Electric Interconnection of Distributed Generation Facilities*
(See: <https://www.legis.iowa.gov/DOCS/ACO/IAC/LINC/04-03-2013.Chapter.199.45.pdf>)