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Issues:	MEEIA Cycle 3 Business Custom Combined Heat and Power
Witness:	Jane E. Epperson
Sponsoring Party:	Missouri Department of Economic Development, Division of Energy
Type of Exhibit:	Rebuttal Testimony
Case Nos.:	EO-2019-0132; EO-2019-0133

MISSOURI PUBLIC SERVICE COMMISSION

KANSAS CITY POWER & LIGHT COMPANY

AND

KCP&L GREATER MISSOURI OPERATIONS COMPANY

CASE NOs. EO-2019-0132 and EO-2019-0133

REBUTTAL TESTIMONY

OF

JANE E. EPPERSON

ON

BEHALF OF

MISSOURI DEPARTMENT OF ECONOMIC DEVELOPMENT

DIVISION OF ENERGY

Jefferson City, Missouri
August 19, 2019

DE Exhibit No. 351
Date 9-23-19 Reporter DE
File No. EO-2019-0132
EO-2019-0133

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Kansas City Power & Light Company's Application for Authority to Establish a Demand-Side Programs Investment Mechanism	)))	**File No. EO-2019-0132**
In the Matter of KCP&L Greater Missouri Operations Company's Application for Authority to Establish a Demand-Side Programs Investment Mechanism	)))	**File No. EO-2019-0133**

AFFIDAVIT OF JANE E. EPPERSON

STATE OF MISSOURI)
) **ss**
COUNTY OF COLE)

Jane E. Epperson, of lawful age, being duly sworn on her oath, deposes and states:

1. My name is Jane E. Epperson. I work in the City of Jefferson, Missouri, and I am employed by the Missouri Department of Economic Development as the Senior Energy Policy Analyst, Division of Energy.
2. Attached hereto and made a part hereof for all purposes is my Rebuttal Testimony on behalf of the Missouri Department of Economic Development – Division of Energy.
3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge.

Jane E. Epperson

Subscribed and sworn to before me this 19th day of August, 2019.

Notary Public

My commission expires:

MELANIE K. BAX
Notary Public - Notary Seal
State of Missouri
Commissioned for Osage County
My Commission Expires: December 13, 2019
Commission Number: 15638689

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Jane E. Epperson. My business address is 301 West High Street, Suite 720, PO Box 1766, Jefferson City, Missouri 65102.

Q. By whom and in what capacity are you employed?

A. I am employed by the Missouri Department of Economic Development – Division of Energy (DE) as the Senior Energy Policy Analyst.

Q. Please describe your educational background and employment experience.

A. I received my Masters of Science in Geology from the University of Missouri-Columbia and my Bachelor of Arts degree in Geology from Stephens College, Columbia, Missouri. Since joining DE, I have filed testimony before the Missouri Public Service Commission (Commission) in Case Nos. ER-2014-0370, ER-2014-0351, ER-2014-0258, WR-2015-0301, SR-2015-0302, ER-2016-0179, GR-2017-0215, EO-2018-0211, and ER-2018-0145/0146. In addition to providing expert testimony for DE, I contributed to the development of the 2015 Missouri Comprehensive State Energy Plan, served as project manager for development of Missouri's first statewide Technical Reference Manual, and participated in Missouri Energy Efficiency Investment Act (MEEIA) rule revision dockets and electric collaboratives. I currently chair the statewide natural gas collaborative. Prior to my current position with DE, I served the Missouri Department of Conservation for 15 years in various positions, including supervisor of the Policy Coordination Unit, which was responsible for statewide, regional, and area planning and policy, statewide compliance with environmental and cultural resource laws, Missouri

River, Mississippi River and White River basin interstate coordination, and human dimensions (surveys) research. Prior to my employment by the Department of Conservation, I served as a Hydrologist for five years for the Missouri Department of Natural Resources, focusing on interstate water law, policy, and management issues.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your Rebuttal Testimony in this proceeding?

A. The purpose of my testimony is to a) describe combined heat and power (CHP) technology and associated benefits to customers, b) recognize Kansas City Power & Light Company (KC&L) and KCP&L Greater Missouri Operations Company (GMO) (collectively, Companies) for their contributions to the positive momentum for CHP in Missouri, c) provide an overview of CHP programs implemented by other independently owned utilities and d) recommend actions to continue the momentum and improve the depth and quality of the CHP option in the Companies' Custom Business Rebate Program.

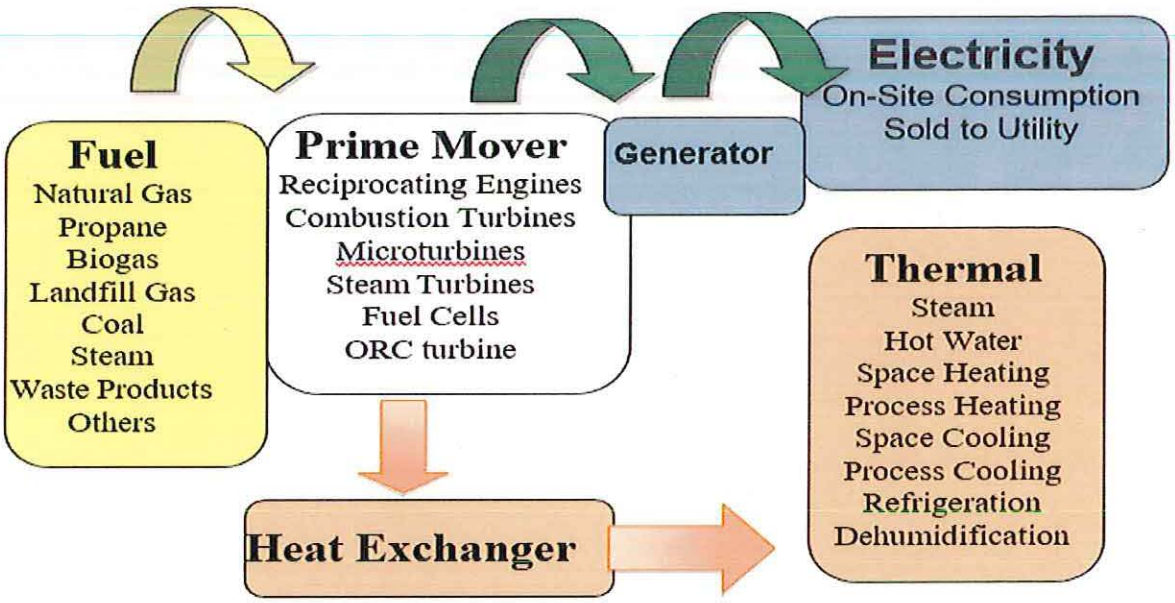
III. COMBINED HEAT AND POWER TECHNOLOGY AND BENEFITS

Q. What is CHP?

A. CHP is an array of proven, commercially available technologies that concurrently generate electricity and useful thermal energy from the same fuel source. CHP results in a significant increase in energy efficiency over separate heat and power systems because the thermal energy that is normally wasted is utilized. Figure 1 is a schematic that summarizes the basic elements of a CHP system. The diversity

of fuel sources, prime movers, and thermal applications highlights the many potential applications of CHP.

Figure 1. CHP System Schematic.[1]



Q. What type of KCPL and GMO customers might benefit from installation of a CHP system?

A. Small, medium and large commercial, industrial, and institutional customers with a steady demand for both thermal and electrical energy are prime candidates for utilization of CHP systems. Examples of commercial sector candidates include data centers and hotels. Examples of industrial sector candidates include food and beverage distributers and manufactures of chemical, wood, agricultural and

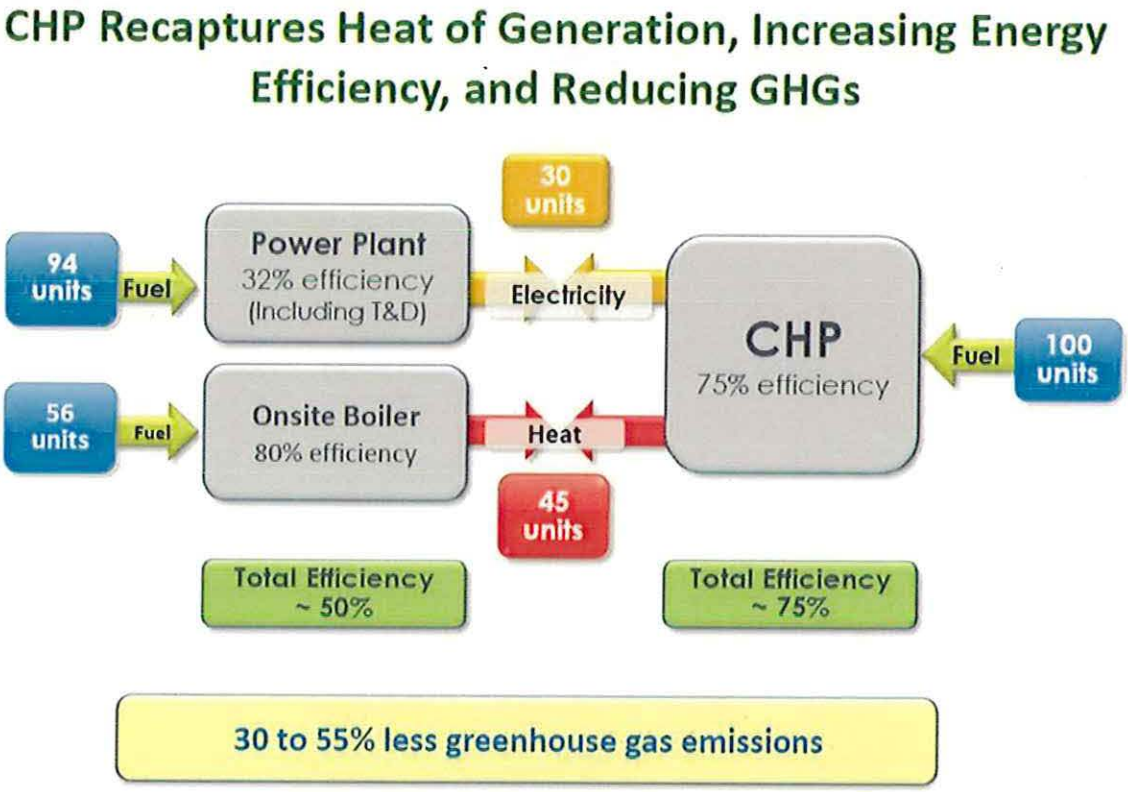
[1] U.S. Department of Energy Central CHP Technical Assistance Partnership, Cliff Haefke, June, 2018.

furniture products. Examples of institutional sector candidates include hospitals and nursing homes, public water and wastewater treat facilities, universities and colleges, and municipal government emergency service facilities.

Q. How much energy does a CHP system save?

A. CHP systems produce both electricity and heat from a single fuel source, typically reducing by one-third the energy required to provide the same heat and power.

Figure 2. Energy Efficiency Comparison of CHP Versus Separate Heat and Power Production.[2]



The left half of Figure 2 depicts separate heat and power production illustrated by two fuel inputs, resulting in an overall efficiency of 50 percent. An example of

[2] U.S. Department of Energy Central CHP Technical Assistance Partnership, 2018.

separate heat and power is a business owner that buys electricity from a utility and has a boiler in the basement that provides hot water and space heating for the facility. The right half of Figure 2 depicts CHP with the use of a single fuel input, resulting in an overall efficiency of 75 percent. Depending on the specific customer facility, energy fuel costs may constitute a significant and ongoing business expense. The capital resulting from energy efficiency and reduced fuel costs can be reinvested or otherwise applied by a business or community to improve its services, competitiveness, and contribute to the local and state economy. A business or community can also benefit from the capital created by the avoidance of electric grid outages due to the reliability of CHP systems, thus increasing its resiliency.

Q. What are some examples of capital that a business or community customer may save through the resiliency of a CHP installation?

A. While there is currently no market mechanism for valuing resiliency, there are many examples that address the cost of outages and thus the cost savings if those outages are avoided. A Department of Defense national study reported approximately 127 utility outages that lasted eight hours or longer in 2015, with a financial impact estimated to be $179,087 per day.[3] A Ponemon Institute research report estimated the average cost of unplanned outages for 67 data centers to be $690,204 per incident.[4] The U.S. Department of Energy's Energy Sector Risk Profile for the state of Missouri states that: a) Missouri electric transmission

[3] Department of Defense Annual Energy Management Report Fiscal Year 2015, 2016. Office of the Assistant Secretary of Defense. Pages 45-57.
[4] 2013 Cost of Data Center Outages, 2013. Ponemon Institute. Pages 7-9.

outages affect 1,600,305 customers 45 hours per year on average (2008-2013), b) electric distribution outages caused by weather and falling trees affect 214,783 customers 45 hours per year annually, and c) severe weather causes average property loss of $58.9 million per year (1996-2014).[5] The value of resiliency for hospitals is particularly difficult to quantify as one considers the human and monetary impacts of outages on ICU patients, surgeries, diagnostic testing, laboratory results, patient safety, evacuation, lost revenue, and facility reputation.[6] [7] In a presentation at the Western Missouri Combined Heat and Power Summit, Jonathan Flannery estimated the value of resiliency in avoidance of a 2 hour outage at an outpatient clinic to be $93,750.[8]

Q. How do CHP systems provide greater resiliency than the grid?

A. CHP systems are proven to be highly reliable—not prone to outages—because of their on-site location (which eliminates transmission and distribution outages) and high performance, as measured by their "availability" parameter, which is the percent of time in a year that a CHP system runs without an unplanned outage. Depending on the specific prime mover of the CHP, systems are verified reliable and available 70-99 percent of the time.[9]

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[5] https://www.energy.gov/sites/prod/files/2016/09/f33/MO_Energy%20Sector%20Risk%20Profile_2.pdf
[6] Eric Cote and Jonathan Flannery, Roadmap to Resiliency, 2017. American Society for Healthcare Engineering.
[7] Mark Mininberg, Thomas Mort, and Steve Jalowiec, Best Practices in Business Planning for Energy Resiliency, 2018. American Society for Healthcare Engineering.
[8] https://energy.mo.gov/sites/energy/files/ValuingEnergyResiliencyFlanneryOct16.2018.pptx_.pdf
[9] U.S. Environmental Protection Agency Combined Heat and Power Partnership, 2017. Catalog of CHP Technologies, p 1-6.

IV. POSITIVE MOMENTUM FOR CHP IN MISSOURI

Q. Describe what progress been made toward increasing the awareness of CHP solutions and potential benefits to Missouri businesses and communities.

A. A CHP Summit for Resiliency of Critical Facilities was held in Kansas City April 16, 2018, to increase awareness of CHP technology. The participation of sponsors and exhibitors with direct experience in CHP systems brought a breadth of resources to the Summit, benefiting all participants. All Summit materials and presentations are now available online to the public.[10] DE continues to update its public website with additional information about CHP technologies and hyperlinks to reference resource.[11]

The U.S. Department of Energy CHP Technical Assistance Partnership has performed more than 20 confidential CHP qualification screenings in Missouri within the last three years for organizations interested in CHP, many of which are critical infrastructure facilities.[12]

Q. Has progress been made toward reducing uncertainty regarding the engineering and performance of CHP systems for businesses and communities?

A. Yes. Until recently, most CHP applications were individually designed and engineered for the specific facility, followed by on-site assembly. The strength of this approach is that the CHP system is the best combination of components to maximize performance for that specific facility. There is a cost in both time and

[10] https://energy.mo.gov/chp-summit
[11] https://energy.mo.gov/clean-energy/combined-heat-power
[12] https://betterbuildingssolutioncenter.energy.gov/chp/central-chp-technical-assistance-partnership

technical expertise associated with this approach that can be discouraging to a business or community. Manufactures are now offering factory-built CHP systems that eliminate many of the site-specific engineering requirements and associated costs. The pre-packaged CHP systems reduce customer uncertainty regarding performance, shorten installation time, streamline permitting, reduce design errors, and reduce the overall cost. The U.S. Department of Energy (USDOE) identifies CHP as "a commercially available clean energy solution that directly addresses a number of national priorities including improving the competitiveness of U.S. manufacturing, increasing energy efficiency, reducing emissions, enhancing our energy infrastructure, improving energy security and growing our economy."[13] USDOE created the Packaged CHP Accelerator Program to a) develop a national web-based catalog[14] (currently functioning) of USDOE-vetted packaged CHP suppliers, and b) validate that packaged system installation times and total project costs can be reduced by 20 percent or more compared to individually engineered systems.[15] Due to the economic development and increased resiliency potential of CHP to benefit Missouri businesses and communities, DE joined as an Engagement Partner for the Packaged CHP Accelerator Program to share information about the Energy Loan Program,[16] [17] and encourage packaged CHP

[13] Combined Heat and Power: A Clean Energy Solution, U.S. DOE and U.S. EPA, August 2012, https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/chp_clean_energy_solution.pdf
[14] https://chp.ecatalog.lbl.gov/search
[15] Packaged CHP Accelerator Fact Sheet, U.S. DOE, 2018, https://betterbuildingsinitiative.energy.gov/sites/default/files/attachments/Packaged-CHP-Accelerator-Fact-Sheet-FINAL.pdf
[16] https://energy.mo.gov/assistance-programs/energy-loan-program
[17] https://energy.mo.gov/sites/energy/files/emlp-fact-sheet.pdf

suppliers to expand their service territories to include Missouri. DE recommends that KCPL and GMO become Engagement Partners for the Packaged CHP Accelerator Program to share information about the Companies' Custom Business Rebates that include CHP. DE also recommends that the Companies invite the growing number of packaged CHP solution providers to become registered contractors [18] associated with Custom Business programs.

Q. Are there other incentives available to KCP&L and GMO business and community customers for CHP?

A. Yes. The Federal Business Energy Investment Tax Credit was extended to 2021 and provides a 10 percent tax credit to the purchase of CHP projects with no maximum limit on total cost stated.[19]

Q. Has KCPL and GMO contributed to the positive momentum for CHP in Missouri?

Yes. DE acknowledges the efforts the Companies have made in the area of standby service rates. Standby service rates are intended to reflect the costs the Company incurs to be on "standby" for such time as a self-generating customer requires energy. The Companies revised their standby service rider tariffs, to which CHP customers are subject, in their recent rate cases (Case Nos. ER-2018-0145 and ER-2018-0146) by making the tariffs significantly more clear, user-friendly, and cost-based.[20]

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[18] https://www.kcpl.com/contractors
[19] http://programs.dsireusa.org/system/program/detail/658
[20] https://www.kcpl.com/-/media/indexedmedia/my_bill/mo/detailed_tariffs_mo/modt_28standbyservicerider_1210_2018.pdf?la=en

The Companies are also working on a customer service tool associated with the improved standby service rider that would enable a potential CHP customer to input projected load profiles and generation assumptions to estimate the impact of the Companies' standby service rider on their utility bill. This is significant because one of the barriers to CHP deployment is the unknown and potentially prohibitive charges associated with standby service. The completion of this tool would contribute to the Companies' stated goal of reducing barriers to entry by developing additional on line tools and streamlining processes.[21]

It is DE's understanding that the Companies will include cost-effective CHP projects to be offered within their MEEIA Cycle 3 portfolios as a Business Custom measure, as no changes have been proposed to the Business Custom measures, and CHP was included in the MEEIA Cycle 2.[22] DE recommends the explicit reference to CHP as an eligible measure under the Custom Business Rebate Program in future MEEIA filings.

V. OVERVIEW OF UTILITY CHP PROGRAMS

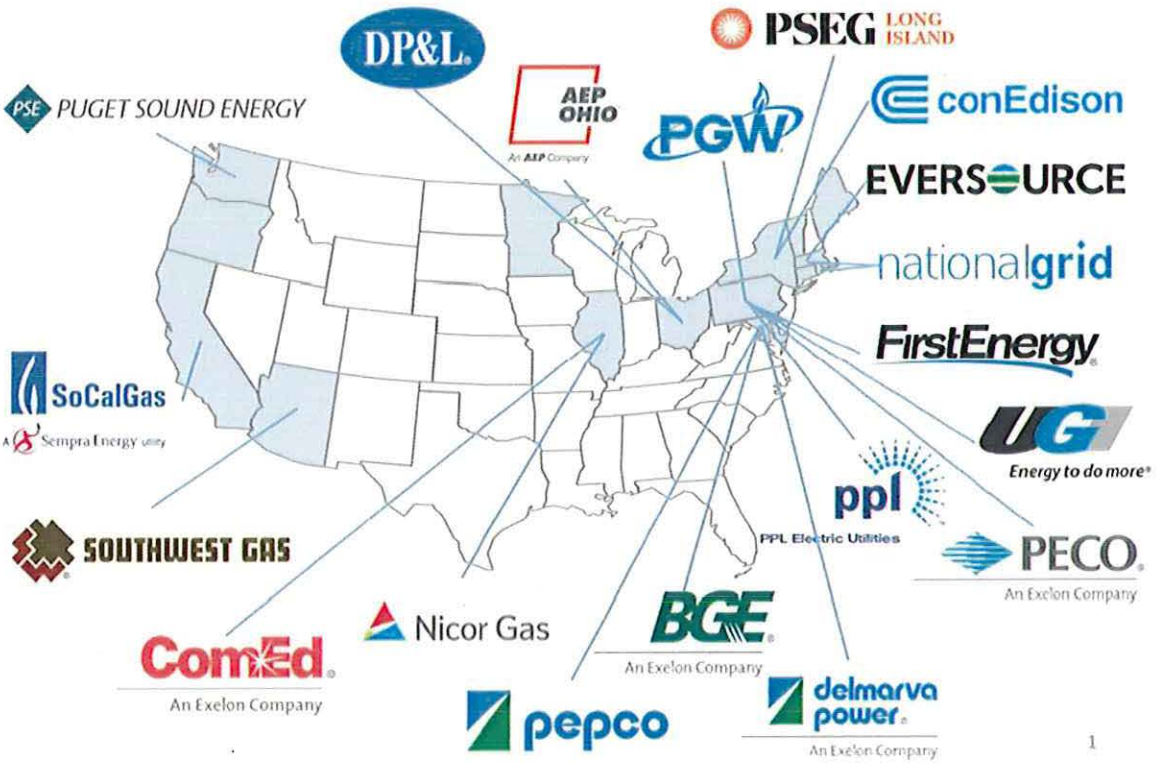
Q. Do other investor-owned utilities (IOUs) administer CHP programs?

A. Yes. A recent national review documented that about half of the 20 utility-led CHP programs are offered as part of a business-custom energy efficiency program while the other half are standalone programs, which may more fully address the specifics of CHP systems[23]. The various IOU CHP programs offer a wide range and

[21] November 29, 2018 MEEIA Cycle 3 2019-2022 Filing, page 35.
[22] E-mail communication from Brian A. File to Jane E. Epperson, December 18, 2018.
[23] Kelly, M. and A. Hampson. 2018. A National Review of Combined Heat and Power Programs in Utility Energy Efficiency Portfolios. Proceedings of the 2016 ACEEE Summer Study on Energy Efficiency in Buildings. Washington, DC: ACEEE. https://aceee.org/files/proceedings/2018/#/paper/event-data/p113

combination of incentives, including: capacity incentives from $75-$1,800 per kW; production incentives from 2-30 cents per kWh for 12-18 months; up to 50-70 percent of total project cost; and 25-50 percent of feasibility assessment costs.[24] For example, in Illinois, ComEd and Nicor Gas jointly offer 75 percent of the feasibility assessment cost (up to $37,000) for a CHP system. In addition, ComEd provides 7 cents per kWh without a cap, while Nicor Gas provides $1 per therm savings (capped at $500,000).[25]

Figure 3. Independently Owned Utility-Administered CHP Programs [26]



[24] ibid
[25] ibid
[26] ibid

There is no shortage of existing IOU CHP programs that can be used as frameworks from which to build program guidance for potential KCPL and GMO CHP customers. DE recommends that KCPL and GMO complete collaboratively-developed CHP-specific program guidance within one year of case conclusion; provide the CHP-specific guidance to customers via the website and through registered contractors and business development representatives; and adopt the goal of successfully assisting one customer to complete a CHP installation within the three years of case conclusion. Built upon the experience of other IOU CHP programs, DE recommends these steps for elevating the awareness of CHP as an eligible measure for the custom business rebate program.

VI. RECOMMENDATIONS AND CONCLUSION

Q. Please summarize your recommendations.

A. DE recommends the Companies continue their momentum and improve the depth and quality of the CHP option in the Custom Business Rebate Program by a) completing collaboratively-developed CHP-specific program guidance within one year of case completion, which DE would be pleased to assist the Company in this effort and provide support, and, b) providing collaboratively-developed CHP-specific program guidance to registered contractors, business development representatives, and customers (via website), c) including specific reference to CHP in future MEEIA filings, and d) adopting the goal of successfully assisting one customer to complete a CHP installation within three years of case completion.

Q. Does this conclude your Rebuttal Testimony?

A. Yes.