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Issues:	CHP for Critical Infrastructure Economic Development Rider
Witness:	Jane Epperson
Sponsoring Party:	Missouri Department of Economic Development – Division of Energy
Type of Exhibit:	Direct Testimony
Case Nos.:	GR-2017-0215; GR-2017-0216

MISSOURI PUBLIC SERVICE COMMISSION

SPIRE MISSOURI INC.

CASE NO. GR-2017-0215

AND

CASE NO. GR-2017-0216

DIRECT TESTIMONY

OF

JANE EPPERSON

ON

BEHALF OF

MISSOURI DEPARTMENT OF ECONOMIC DEVELOPMENT

DIVISION OF ENERGY

Jefferson City, Missouri
September 8, 2017

(Revenue Requirement)

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Laclede Gas Company's Request to Increase Its Revenue for Gas Service	))	**File No. GR-2017-0215** Tariff No. YG-2017-0195
In the Matter of Laclede Gas Company d/b/a Missouri Gas Energy's Request to Increase Its Revenues for Gas Service	)))	**File No. GR-2017-0216** Tariff No. YG-2017-0196

AFFIDAVIT OF JANE EPPERSON

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

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

1. My name is Jane Epperson. I work in the City of Jefferson, Missouri, and I am employed by the Missouri Department of Economic Development as an Energy Policy Analyst, Division of Energy.
2. Attached hereto and made a part hereof for all purposes is my Direct 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.

J Epperson
Jane Epperson

Subscribed and sworn to before me this 8th day of September, 2017.

LAURIE ANN ARNOLD
Notary Public - Notary Seal
State of Missouri
Commissioned for Callaway County
My Commission Expires: April 26, 2020
Commission Number: 16808714

Laurie Ann Arnold
Notary Public

My commission expires: 4/26/20

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I. INTRODUCTION AND PURPOSE OF TESTIMONY

Q. Please state your name and business address.

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

Q. On whose behalf are you testifying?

A. I am testifying on behalf of the Missouri Department of Economic Development – Division of Energy ("DE").

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. I began work with DE in 2014 as an Energy Policy Analyst. In that capacity I have filed testimony in prior rate cases (ER-2014-0370, ER-2014-0351, ER-2014-0258, ER-2016-0179), participated in Missouri Energy Efficiency Investment Act ("MEEIA") rule revision dockets and various electric and natural gas collaboratives on docketed issues, contributed to the development of the Missouri Comprehensive State Energy Plan ("CSEP"), and am currently project manager for the development of a statewide Technical Reference Manual. Prior to working with DE, I was employed by the Missouri Department of Conservation as Supervisor of the Policy Coordination Unit, which was responsible for statewide and regional planning, statewide compliance with environmental and cultural resource laws, Missouri, Mississippi, White River basin interstate coordination, and human dimensions research. Prior to working with the

Missouri Department of Conservation, I was employed as a Hydrologist III with the Missouri Department of Natural Resources – Director's Office, focusing on interstate water policy and management issues.

Q. What information did you review in preparing this testimony?

A. In preparation of this testimony, I reviewed Direct Testimony and tariffs filed by Laclede Gas Company and Missouri Gas Energy (collectively referred to as "Spire") specific to the proposed Economic Development Rider ("EDR") and Special Contracts in this case; data requests and responses issued in this case; portions of testimony from Union Electric Company d/b/a Ameren Missouri's ("Ameren Missouri") recent rate case, ER-2016-0179; portions of Ameren Missouri's and Kansas City Power & Light Company's ("KCP&L") MEEIA tariffs on file with the Missouri Public Service ("Commission"); natural gas and electric utility EDR and Economic Redevelopment Rider ("ERR") tariffs on file with the Commission; reports and publications about combined heat and power ("CHP") technology; and information on CHP, EDR and ERR initiatives offered in other states.

Q. What is the purpose of your testimony?

A. Section I of my testimony provides an introduction and summary, as well as, information on specific recommendations contained in the CSEP relevant to topics addressed in this case.

Sections II and III of my testimony describe the potential benefits of CHP technology in meeting the goal of ensuring ongoing operation of critical infrastructure during grid outages due to natural disasters, cyber or physical attacks, while also promoting more efficient use of energy resulting from the use of waste heat. Section III of my testimony also provides information about DE's ongoing activities engaging at the state and national levels in efforts to identify and plan for continued operation of facilities critical to local communities, the state, and nation in the event of natural disaster, physical or cyberattack.

Other states have programs that address CHP deployment,[1] and DE supports the creation of such programs in Missouri as well. Section IV of this testimony describes DE's current activity relating to advancing CHP's role in serving critical infrastructure. DE has partnered with Spire in planning for two CHP summits, one in St. Louis and one planned in Kansas City, that will bring together institutional providers of critical services, CHP engineers, security and energy assurance planners and policy makers, to consider how best to leverage CHP to enable continued operation during grid outages. DE also recommends that the Commission authorize Spire to initiate a pilot program through which it would work with a limited number of critical service providers to install CHP to support critical loads. Additional details of the summit and pilot program recommendations are provided in this testimony.

In Section V, I briefly discuss the availability of EDRs and Special Contract rates. My Rebuttal Testimony will include additional details designed to enhance Spire's EDR and Special Contract proposals.

[1] See U.S. Environmental Protection Agency, 2017, "dCHPP (CHP Policies and Incentives Database)," https://www.epa.gov/chp/dchpp-chp-policies-and-incentives-database.

Q. What key recommendations in the CSEP are related to your testimony?

A. The CSEP[2] includes recommendations related to: public-private partnerships to implement energy conservation measures (including CHP); eliminating barriers to on-site customer generation; identifying cost-effective energy efficiency, demand response, and on-site generation opportunities for large customers; encouraging utilities to support technologies that enhance the distribution grid.

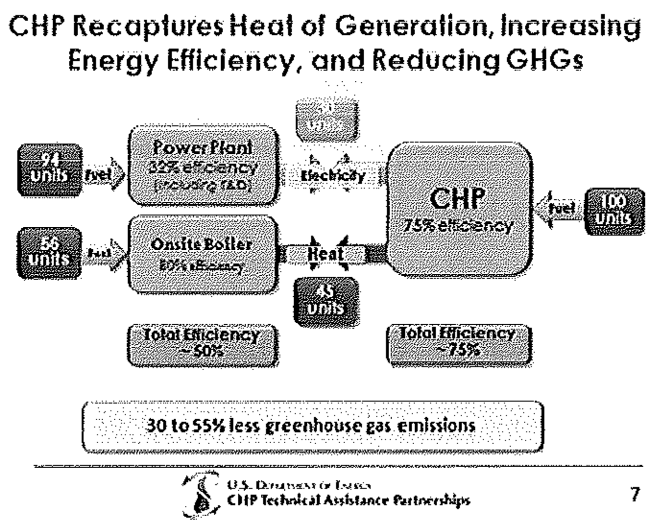
II. COMBINED HEAT AND POWER

Q. What is CHP?

A. CHP refers to an array of proven technologies that concurrently generate electricity and useful thermal energy from the same fuel source (conventional or renewable). A simple illustration of a separate heat and power system is a typical commercial or industrial building that purchases electricity generated by a utility; but has a boiler in the basement that makes hot water to heat the building. Thus, two sources of fuel are needed to meet the building's electric and thermal energy needs. CHP systems utilize one fuel to make both electric and thermal energy. This is accomplished by recovering the otherwise wasted heat from the electric generation process and using it to provide the thermal load of the building. Combined heat and power results in a total system efficiency around 75 percent, compared with separate heat and power at around 50 percent (see Figure 1).

[2] Missouri Department of Economic Development – Division of Energy, 2015, *Missouri Comprehensive State Energy Plan*, https://energy.mo.gov/energy/docs/MCSEP.pdf.

Figure 1: Energy Efficiency Comparison of CHP versus Separate Heat and Power Production.[3]



Q. What CHP facilities exist in Missouri?

A. Table 1 below shows the CHP installations in Missouri and illustrates that CHP technology is found proven and diverse in applications; including schools, colleges, universities, hospitals, government facilities, agriculture, chemicals, and hotels.

[3] U.S. Department of Energy, Midwest CHP Technical Assistance Partnerships, 2017, "CHP, The Concept – Combined Heat and Power and Waste Heat to Power for Industrial, Institutional, and Commercial Facilities," Presentation, June 27, Toledo, Ohio, http://www.midwestchptap.org/events/20170627/5_Cuttica_CHP_the_Concept_6-27-17.pdf, slide 7,

Table 1: Combined Heat and Power Installations in Missouri.[4]

City	Facility Name	Application	Op Year	Prime Mover **	Capacity (KW)	Fuel Class-Primary Fuel
Butler	Butler	District Energy	1946	ERENG	13,100	OIL - Distrillate Fue
Cape Girardeau	Southeast Missouri State University	Colleges/Univ.	1972	B/ST	6,250	COAL - Coal
Columbia	University of Missouri Power Plant	Colleges/Univ.	1961	B/ST	99,500	BIOMASS - Biomass
Columbia	Columbia Landfill	Solid Waste Facilities	2008	ERENG	3,000	BIOMASS - LFG
Florissant	Service Merchandise Company, Inc.	General Merch. Stores	1985	ERENG	60	NG - Natural Gas
Hannibal	Clemmons Hotel	Hotels	1990	ERENG	150	NG - Natural Gas
Jefferson City	Jefferson City Correction Center	Justice/Public Order	2009	ERENG	3,200	BIOMASS - LFG
Kansas City	Bolling GSA Office	General Gov't	2000	BPST	100	WAST - Steam
Kansas City	Veolia Energy Kansas City	District Energy	2012	B/ST	5,000	BIOMASS - Biomass
Kansas City	Trigen-Kansas City Energy Corporation	District Energy	1990	B/ST	6,000	COAL - Coal
Laddonia	POET Biorefining - Missouri Ethanol	Chemicals	2007	CT	13,000	NG - Natural Gas
Lewistown	Lewistown School District	Schools	2003	MT	60	NG - Natural Gas
Louisiana	Hercules, Inc.	Chemicals	1942	B/ST	15,000	COAL - Coal
Macon	Northest Missouri Grain	Chemicals	2003	CT	10,000	NG - Natural Gas
Mountain View	Smith Flooring, Inc.	Wood Products	1989	B/ST	500	WOOD - Wood
Neosho	La-Z-Boy Chair Company	Furniture	1984	B/ST	750	WOOD - Wood
North Kansas City	North Kansas City	Agriculture	1987	CC	4,000	NG - Natural Gas
St. Louis	Missouri State Hospital	Hospitals/Healthcare	1977	B/ST	5,000	COAL - Coal
St. Louis	Anheuser-Busch	Food Processing	1939	B/ST	26,100	COAL - Coal
St. Louis	Ashley Plant	District Energy	2000	CT	15,000	NG - Natural Gas
St. Louis	Southwestern Bell Telephone	Communcations	1992	ERENG	6,000	OIL - Distrillate Fue
St. Louis	Brandonview Building	Office Building	1969	ERENG	4,300	NG - Natural Gas
	Agriculture Facility	Agriculture	2014	ERENG	800	BIOMASS - Digester G

**B/ST=Boiler/Steam Turbine; CC=Combined Cycle; CT=Combustion Turbine; MT=Microturbine; ERENG=Reciprocating Engine; BPST=Backpressure Steam Turbine.

As Table 2 shows, compared to other Midwestern states with cost of service regulation, Missouri ranks the lowest in terms of percent of total installed generating capacity from CHP.

Table 2: Total Electric Generating Capacity versus State CHP Capacity.[5]

Regulated State	Total Electric Capacity	State CHP Capacity (MW)	CHP as % of Total Capacity (MW)	Number of CHP Installations
Iowa	15,757	630	4	35
Indiana	30,928	2,266	7.3	38
Minnesota	16,608	918	5.5	55
Wisconsin	19,050	1,570	8.2	94
Missouri	23,499	236	1	21

[4] Modified from U.S. Department of Energy, 2016, *U.S. DOE Combined Heat and Power Installation Database*, "Combined Heat and Power Installations in Missouri," https://doe.icfwebservices.com/chpdb/state/MO.
[5] U.S. Department of Energy Midwest CHP Technical Assistance Partnership, John J. Cuttica, Clifford P. Haefke, 2012.

Table 3 provides the technical detail that underscores the strengths of CHP technology and shows that CHP is not an untested technology. Note the performance parameters that quantify the benefits of high efficiency (55 to 80 percent), range of capacity (.005 to several hundred MW), high availability (72 to 99 percent), fuel diversity, and lower emissions of air pollutants.

Table 3: Comparison of CHP Technology Sizing, Cost, and Performance Parameters.[6]

Technology	Recip. Engine	Steam Turbine	Gas Turbine	Microturbine	Fuel Cell
Electric efficiency (HHV)	27-41%	5-40+%	24-36%	22-28%	30-63%
Overall CHP efficiency (HHV)	77-80%	near 80%	66-71%	63-70%	55-80%
Effective electrical efficiency	75-80%	75-77%	50-62%	49-57%	55-80%
Typical capacity (MWe)	.005-10	0.5-several hundred MW	0.5-300	0.03-1.0	200-2.8 commercial CHP
Typical power to heat ratio	0.5-1.2	0.07-0.1	0.6-1.1	0.5-0.7	2-Jan
Part-load	ok	ok	poor	ok	good
CHP Installed costs ($/kWe)	1,500-2,900	$670-1,100	1,200-3,300 (5-40 MW)	2,500-4,300	5,000-6,500
Non-fuel O&M costs ($/kWhe)	0.009-0.025	0.006 to 0.01	0.009-0.013	0.009-.013	0.032-0.038
Availability	96-98%	72-99%	93-96%	98-99%	>95%
Hours to overhauls	30,000-60,000	>50,000	25,000-50,000	40,000-80,000	32,000-64,000
Start-up time	10 sec	1 hr - 1 day	10 min - 1 hr	60 sec	3 hrs - 2 days
Fuel pressure (psig)	Jan-75	n/a	100-500 (compressor)	50-140 (compressor)	0.5-45
Fuels	natural gas, biogas, LPG, sour gas, industrial waste	all	natural gas, synthetic gas, landfill gas, and fuel oils	natural gas, sour gas, liquid fuels	hydrogen, natural gas, propane, methanol
Uses for thermal output	space heating, hot water, cooling, LP steam	process steam, district heating, hot water, chilled water	heat, hot water, LP-HP steam	hot water, chiller, heating	hot water, LP-HP
Power Density	35-50	>100	20-500	May-70	20-May
NOx (lb/MMBtu) (not including SCR)	0.013 rich burn 3-way cat. 0.17 lean burn	Gas 0.1-.2 Wood 0.2-.5 Coal 0.3-1.2	0.036-0.05	0.015-0.036	0.0025-.0040

[6] U.S. Environmental Protection Agency Combined Heat and Power Partnership, 2015, *Catalog of CHP Technologies*, https://www.epa.gov/sites/production/files/2015-07/documents/catalog_of_chp_technologies_section_1._introduction.pdf, page 1-6.

III. ENERGY RELIABILITY AND RESILIENCY THROUGH CHP

Q. Why is CHP a key technology to improve energy resiliency and recovery?

A. CHP is a proven technology, as demonstrated by entities with CHP systems in place during Hurricane Sandy. According to the U.S. Environmental Protection Agency and U.S. Department of Energy ("USDOE"):

> During and after Hurricane Sandy, combined heat and power ... enabled a number of critical infrastructures and other facilities to continue their operations when the electric grid went down. Time and again, CHP has proved its value as an alternative source of power and thermal energy (heating and cooling) during emergencies, and demonstrated how it can be a sound choice in making energy infrastructure more resilient in the face of extreme weather events. (Footnotes omitted)[7]

Examples of successful CHP utilization are not limited to Hurricane Sandy.[8]

Q. How could CHP improve resiliency and recovery at the community level?

A. To serve at the community level, CHP systems can be configured as part of a microgrid, which is, "... a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that act as a single controllable entity with respect to

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[7] U.S. Environmental Protection Agency and U.S. Department of Energy, 2013, "Guide to Using Combined Heat and Power for Enhancing Reliability and Resiliency in Buildings," https://www.epa.gov/sites/production/files/2015-07/documents/guide_to_using_combined_heat_and_power_for_enhancing_reliability_and_resiliency_in_buildings.pdf, page 2.

[8] Environmental and Energy Study Institute, 2013, "Energy Efficient Infrastructure for More Resilient Local Economies: The Role of District Energy, CHP, and Microgrids," http://www.eesi.org/briefings/view/energy-efficient-infrastructure-for-more-resilient-local-economies-the-role.

the grid."[9] Microgrids typically consist of multiple generating assets (for example, CHP and solar), energy storage, and an automated control system that enables the microgrid to function with and without connection to the grid (often referred to as islanding).[10] CHP configured as the heart of a microgrid that serves multiple facilities and/or customers can mitigate the short- and long-term impact of emergencies; for example by sustaining not only fire, police, and/or other emergency response facilities, but also a grocery store, a gas station, and a multi-family residential building so that residents (particularly vulnerable populations) can shelter-in-place during an emergency (preserving life by avoiding danger and stress to relocate).

Q. Has DE been actively engaged in other efforts to identify critical infrastructure and improve resiliency?

A. Yes. DE is one of 24 states, communities, utilities, and others participating in a two-year, USDOE-sponsored CHP for Resiliency Accelerator ("Accelerator"). The purpose of the Accelerator is to expand the consideration and implementation of CHP and other forms of distributed generation for critical infrastructure. Table 4 provides a list of official partners in the CHP for Resiliency Accelerator. USDOE is providing informational resources to assist the partners in developing CHP goals and identifying opportunities and next steps toward meeting those goals.

[9] Sandia National Laboratories, 2014, *The Advanced Microgrid: Integration and Interoperability*, https://energy.gov/sites/prod/files/2014/12/f19/AdvancedMicrogrid_Integration-Interoperability_March2014.pdf.
[10] Baier, Martin, Bhavaraju, Vijay, Murch, William, and Sercan Tleke, 2017, "Making Microgrids Work: Practical and technical considerations to advance power resiliency," http://www.eaton.com/ecm/groups/public/@pub/@electrical/documents/content/wp027009en.pdf.

Table 4: USDOE CHP for Resiliency Accelerator Partners.

Communities	States	Utilities	Ambassadors
Boston, MA	Commonwealth of Massachusetts	Bath Electric Gas Water	Edison Electric (EEI)
Hoboken, NJ	Maryland Department of Commerce	National Grid	International District Energy Association (IDEA)
Miami-Dade County, FL	NYSERDA	Long Island Power Authority	Health Care Without Harm
Montgomery County, MD	Pennsylvania Public Utility Commission	PSEG Long Island	
New York, NY	State of Missouri	Tennessee Valey Authority	
Pittsburgh, PA	State of Utah	United Illuminating	
Thermal Energy Corporation (TX Medical Center - Houston)		Nicor Gas	
Woodbridge, CT Partnership			

Another initiative was developed as part of the Stipulation and Agreement in File No. EM-2016-0213.[11] The Empire District Electric Company ("Empire") is assisting DE and the USDOE Midwest CHP Technical Assistance Partnership ("CHP TAP") in completing an outreach effort for screening potential CHP customers within The Empire District Gas Company's service territory in Missouri. A screening tool provided by the CHP TAP is a survey to help determine if CHP is a good fit for the customers from a financial and technical perspective. Target sectors include public, commercial, institutional, and industrial facilities with consistent gas consumption throughout the year, indicative of consistent thermal load requirements. Customers that may generally fit this profile

[11] Missouri Public Service Commission Case No. EM-2016-0213, *In the Matter of the Empire District Electric Company, Liberty Utilities (Central) Co. and Liberty Sub Corp, Concerning an Agreement and Plan of Merger and Certain Related Transactions*, Amended Stipulation and Agreement as to Division of Energy and Renew Missouri, August 23, 2016, pages 2-4.

include hospitals, large residential facilities such as; nursing homes, correctional facilities, universities, and food processing facilities. Those surveyed customers with favorable evaluations will be encouraged to take the next step of allowing the CHP TAP to perform a complimentary, more detailed CHP feasibility study.

As a result of the same stipulation, Empire also agreed to consider a microgrid interconnection strategy consistent with the recommendations contained within the *Missouri Microgrid Interconnection Requirements*, prepared by the Missouri University of Science and Technology Microgrid Industrial Consortium for DE.[12, 13] This is a significant step toward addressing an impediment to greater CHP utilization – clear, transparent, non-discriminatory, consistent interconnection requirements for connecting to utilities.

IV. INITIATIVES TO SECURE CRITICAL INFRASTRUCTURE

Q. Please describe the recent collaboration between Spire and DE to host a CHP Summit.

A. Spire and DE are partnering to host the CHP Summit for Critical Infrastructure Resiliency ("Summit") in the Spring of 2018. The purpose of the Summit is to increase awareness of the applicability of CHP technologies in the institutional sector. Specifically, the Summit will inform potential CHP candidates within the critical infrastructure sector of the mechanics, economics, and benefits of CHP technology. We

[12] *Ibid*, page 4.
[13] See Rolufs, Angela B., 2016, *Missouri Microgrid Interconnection Requirements*, https://www.efis.psc.mo.gov/mpsc/commoncomponents/viewdocument.asp?DocId=936016677.

have committed to holding the Summit on April 10, 2018, at the St. Charles Convention Center and envision a similar summit in Kansas City in the Fall of 2018.

Q. Under what circumstances should infrastructure be considered critical?

A. Critical infrastructure is that infrastructure which, if incapacitated, would have a substantial negative impact on public health and safety or economic security, including hospitals, nursing homes, public water and wastewater treatment facilities, government facilities (military, correctional, police, and fire), emergency shelters (schools, universities, or community centers) and data centers.[14, 15]

Q. What attributes are essential in meeting the energy needs of critical infrastructure?

A. Critical infrastructure requires a higher level of reliability (ideally 100 percent) and resiliency. Reliability is characterized by the frequency and duration of outages. While some customers may be willing and/or able to tolerate fairly numerous, short outages that do not compromise their heating, cooling, and food refrigeration functions, critical facility customers may not have similar flexibility. Critical facility customers are less willing and/or able to tolerate outages that may result in compromised medical and/or emergency support functions.

Resiliency is the relative ability of a facility to recover to partial or full function after an interruption in energy service. New hospitals, for example, are required under Missouri regulations to have standby emergency generators so that full voltage and frequency is

[14] U.S. Department of Homeland Security, Federal Emergency Management Agency, 2017, *Critical Facility*, "Definition/Description," http://www.fema.gov/national-flood-insurance-program-2/critical-facility.
[15] USA Patriot Act of 2001, Public Law 107-56, Section 1016 (e), https://www.gpo.gov/fdsys/pkg/PLAW-107publ56/pdf/PLAW-107publ56.pdf.

available and supplying power to emergency loads within 10 seconds after normal power is interrupted.[16] The challenges associated with standby emergency generators, which are typically diesel-fueled reciprocating engines, include: a) difficulty in maintaining more than a few days of on-site fuel storage; b) fuel delivery that is subject to weather and transportation vulnerabilities; and c) the need to be regularly maintained, fuel instability (diesel goes bad over time). CHP is an alternative, high-efficiency, low-emissions technology that can provide continual on-site power generation to reliably serve part or all the energy and thermal load of a facility in coordination with, or independently of, the utility grid.

Q. What threats to energy reliability have been identified for Missouri?

A. The "State of Missouri Energy Sector Risk Profile,"[17] produced by the USDOE, Office of Electricity Delivery & Energy Reliability, highlights natural and manmade hazards to the electric, natural gas, and petroleum infrastructures. The leading event affecting electric transmission outages in Missouri from 1992 to 2009 was "natural force" (i.e., thunderstorms, winter storms, high wind, and ice). The average duration of electric outages between 2008 and 2013 was 45 hours per year. Thunderstorms and lightning caused the greatest overall property loss from 1996 to 2014, at $58.9 million per year. Flooding was the second most costly cause of property damage at $48.8 million per year.

[16] 19 CSR 30-20.030 (26) (E) (3).
[17] U.S. Department of Energy, Office of Electricity Delivery & Energy Reliability, 2016, "State of Missouri Energy Sector Risk Profile," https://energy.gov/sites/prod/files/2016/09/f33/MO_Energy%20Sector%20Risk%20Profile_2.pdf.

Since natural gas transmission and distribution is via underground pipeline, it is less vulnerable to the natural forces that result in costly electric outages. The leading events affecting natural gas transmission (at an average of one incident per 3.4 years) and distribution pipelines (at an average of 1.23 incidents per year) in Missouri from 1986 to 2014 were "outside forces," which are pipeline failures due to vehicular accident, sabotage, or vandalism. The average annual loss due to natural gas from outside forces was $1.5 million, which is 2.5 percent of the losses due to thunderstorms and lightning from electricity outage. I should note that the electricity data reflects an 18-year period that excludes the great flood of 1993, while the natural gas data reflects a 28-year period of time.

Q. Why focus on critical infrastructure for improved energy resiliency and recovery from emergencies?

A. Infrastructure that, by definition, affects public health and safety or economic security is an appropriate priority to focus efforts to improve energy resiliency and recovery.

Q. Who will benefit from improved reliability and resiliency of critical infrastructure?

A. Increased reliability of critical infrastructure will enable continued access to critical services when they are needed most (such as during a natural disaster or act of terrorism). Continuity of these services is paramount to lessening the impacts of the events underlying supply disruptions and will aid in emergency response before, during and after disruptive incidents. This enhanced response capability will alleviate strains on the economy due to energy supply disruptions and support faster post-disaster economic recovery. Economic development will also occur as a result of the design and construction of resilient infrastructure.

Q. Do you propose that Spire be authorized to initiate a pilot program to assist institutional or business customers with deploying CHP to serve critical loads?

A. Yes. A pilot can contribute to developing a reproducible framework to serve customers who need the increased reliability and resiliency that a tailored CHP system can provide. DE anticipates that such an initiative will benefit the public by enabling institutional and business customers interested in CHP to consider it as an option for serving critical loads.

Q. Please describe the proposed CHP pilot program.

A. Spire and DE have already been considering customers that are located in the Spire service area and may have an interest in CHP as a means of serving critical loads. Authorizing Spire to offer a CHP pilot program can help to address obstacles that these customers may face in deploying CHP.

DE recommends the following guidelines to support and enable Spire to work cooperatively to co-deliver a CHP pilot program:

- Establish a definition of critical infrastructure that encompasses the range of CHP applications, from individual facilities (e.g., hospitals) to communities (e.g., hospital plus water and wastewater treatment facility, shelter, and grocery store)).
- In the report and order in this case, the Commission should authorize Spire to investigate and develop a proposed CHP pilot program to serve critical

infrastructure, with a total program budget not to exceed $5.1 million[18] for 10 projects and with each specific project proposed to be included in the program filed with the Commission for its approval within 60 days.

- The Commission should allow Spire to track, and in the future seek recovery of, the cost of participating in the pilot program. Such costs might include offsetting up to $10,000 of the cost of a project's feasibility study following a positive initial screening conducted by CHP TAP identifying a customer as a good candidate for CHP, the cost of any contribution by Spire to a project's installed cost (up to the lesser of $500,000 or 30 percent of a project's installed cost), and any buy-down on the rate of interest offered for financing of a project.
- The Commission should allow Spire to extend the cost recovery periods (up to 15 years) for customer repayments on the customer portion of the cost of natural gas line extensions and other natural gas facilities necessary to develop a CHP system.
- The Commission should allow Spire to offer on-bill financing to assist potential CHP customers in funding the necessary capital improvements needed for CHP installation.

[18] This amount is based on figures provided by Cifford Paul Haefke of CHP TAP in an email, assuming 10 projects at up to $10,000 per project towards a feasibility study and up to $500,000 per project to offset a portion of the project's installed costs. The calculation does not include any costs related to the buy-down of interest rates for customer financing, but such costs would be included under the $5.1 million cap.

- Spire should use a societal cost test to evaluate the potential benefits of critical infrastructure projects. Spire currently uses a societal cost test in evaluating custom rebates under its Commercial and Industrial Rebate Programs.[19]
- For projects jointly offered with electric utilities offering MEEIA programs, the Commission should direct that the costs and benefits of CHP be symmetrically valued by developing a transparent and reproducible formula to reasonably allocate and assign the value of energy savings and project costs between natural gas and electric companies and customers.
- The Commission should allow a potential CHP pilot program customer to participate in otherwise-applicable EDRs or Special Contract service rates.

V. ECONOMIC DEVELOPMENT AND SPECIAL CONTRACT RIDERS

Q. Does DE support the availability of EDRs and Special Contract rates in Spire's service areas?

A. Yes. DE supports the availability of EDRs and Special Contract rates that provide benefits to communities, the state, and utility ratepayers. Energy costs can constitute a significant cost of doing business, especially for manufacturing processes, and can be a key factor in determining at what location, and at what scale a business might operate. DE supports allowing Spire and other investor-owned utilities reasonable flexibility in

[19] Missouri Public Service Commission Tariff No. JG-2011-0384, Laclede Gas Company, *Standard Rules and Regulations*, Conservation and Energy Efficiency Programs – Commercial and Industrial (C/I) Rebate Program, February 26, 2011, Sheet No. R-46, and Missouri Public Service Commission Tariff No. YG-2014-0428 (most recently approved filing), Laclede Gas Company d/b/a Missouri Gas Energy, *Schedule of Rates and Charges and General Terms and Conditions for Gas Service*, Promotional Practices – PP: Commercial and Natural Gas Energy Efficiency Initiatives, May 1, 2014, Sheet No. 103; both sets of tariffs have been adopted by Spire Missouri Inc. d/b/a Spire.

responding to economic development and retention opportunities. In addition to employment and other economic benefits, such tariffs, when properly structured, can promote better use of existing infrastructure, allowing fixed costs to be spread over greater sales volumes and lowering the otherwise applicable rates paid by other customers.

Q. What elements should be included in EDRs and Special Contract rates to assure benefits to other customers, communities, and the state?

A. These types of rates should be flexible. Volumetric rates under these tariffs should be set at no less than the marginal cost of serving particular customers – i.e., the commodity cost of natural gas and any other variable costs. Other incremental costs of serving particular customers (e.g., line extensions) should be recovered through these rates over a reasonable period of time. Service under EDRs and Special Contract rates should reasonably be tied to the receipt of other state or local incentives. The rates should be directed at retaining customers that would otherwise leave the state, attracting new customers from outside of the state, or promoting customer expansion.

Q. Has Spire filed proposals on EDRs and Special Contract rates?

A. Yes. DE is generally supportive of Spire's proposals, but has recommendations related to tariff conditions and additional enhancements. I will address DE's recommendations in response to Spire's proposals in detail in my Rebuttal Testimony.

VI. RECOMMENDATIONS

Q. In summary, what are DE's specific recommendations?

A. DE recommends the following guidelines to support and enable Spire to deliver a CHP pilot program:

- Establish a definition of critical infrastructure that encompasses the range of CHP applications from individual facilities (e.g., hospitals) to communities (e.g., hospital plus water and wastewater treatment facility, shelter, and grocery store).
- In the report and order in this case, the Commission should authorize Spire to investigate and develop a proposed CHP pilot program to serve critical infrastructure, with a total program budget not to exceed $5.1 million and with each specific project proposed to be included in the program filed with the Commission for its approval within 60 days.
- The Commission should allow Spire to track, and in the future seek recovery of, the costs of participating in the pilot program. Such costs might include offsetting a portion of the cost of a project's feasibility study following a positive initial screening conducted by CHP TAP identifying a customer as a good candidate for CHP, the cost of any contribution to a project's installed cost, and any buy-down on the rate of interest offered for financing of a project.
- The Commission should allow Spire to extend the cost recovery periods to up to 15 years for customer repayments on the customer portion of the cost of natural

gas line extensions and other natural gas facilities necessary to develop a CHP system.

- The Commission should allow Spire to offer on-bill financing to assist potential CHP customers in funding the capital improvements needed for CHP installation.
- Spire should use a societal cost test to evaluate the potential benefits of critical infrastructure projects.
- For projects jointly offered with electric utilities offering MEEIA programs, the Commission should direct that the costs and benefits of CHP be symmetrically valued by developing a transparent and reproducible formula to reasonably allocate and assign the value of energy savings and project costs between natural gas and electric utilities and customers.
- The Commission should allow a potential CHP pilot program customer to participate in otherwise-applicable EDRs or Special Contract service rates.

Q. Does this conclude your Direct Revenue Requirement Testimony?

A. Yes.