Exhibit No.:	
Issue(s):	Project Description, Schedule, In-Service Criteria
Witness:	Christopher A. Stumpf
Type of Exhibit:	Direct Testimony
Sponsoring Party:	Union Electric Company
File No.:	EA-2024-0237
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MISSOURI PUBLIC SERVICE COMMISSION

File No. EA-2024-0237

DIRECT TESTIMONY

OF

CHRISTOPHER A. STUMPF

ON

BEHALF OF

UNION ELECTRIC COMPANY

d/b/a Ameren Missouri

St. Louis, Missouri
June 2024

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DIRECT TESTIMONY

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CHRISTOPHER A. STUMPF

FILE NO. EA-2024-0237

I. INTRODUCTION AND PURPOSE OF TESTIMONY

Q. Please state your name and business address.

A. Christopher A. Stumpf, One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri, 63103.

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

A. I am employed by Union Electric Company d/b/a Ameren Missouri ("Company" or "Ameren Missouri") as Senior Director – Engineering, Design and Project Management. My responsibilities and those of my work groups include planning and budgeting capital projects; preparing design and procurement specifications associated with such projects; preparing requests for proposal ("RFP") to be let out for bids; evaluating bids and selection of vendors; and supervising the construction of capital projects. In addition to engineering and project management duties, I am also responsible for oversight, operations, and maintenance of Ameren Missouri's gas turbine fleet.

Q. Please describe your professional background and qualifications.

A. I joined Ameren Missouri in 2005 as a project engineer in Generation Engineering. Before coming to Ameren Missouri, I worked as a mechanical engineer at the engineering firm Burns & McDonnell from 2001 to 2005. In 2008, I was promoted to supervising engineer in Environmental Project Engineering responsible for the execution of environmental air projects for non-nuclear generation (Power Operations). In 2010, I was promoted to managing supervisor in

Environmental Project Engineering to lead multi-faceted teams for the execution of large capital environmental projects. In 2013, I took over the Mechanical Engineering department responsible for major boiler and turbine projects for Power Operations. In 2017, I was promoted to senior manager of Project Engineering with responsibility for the execution of Power Operations' capital projects. In 2018, the engineering organizations for Power Operations and Energy Delivery merged into one organization at which point I was promoted to director, Project Management & Mechanical/Environmental Engineering, with the responsibility to manage Energy Delivery and Power Operations' capital projects. In 2019, I was promoted into my current position of senior director, Engineering Design and Project Management. Much of my career has been in the planning, design, and execution of large capital projects on utility power plants.

I earned a Bachelor of Science degree in Mechanical Engineering from the University of Southern Illinois University at Carbondale in 2001. I am a licensed Professional Engineer in the state of Missouri and hold a Project Management Professional ("PMP") certificate.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide a description of the proposed Castle Bluff Energy Center (the "Project"), discuss its characteristics, the reason for its location, the Project schedule, and to present proposed in-service criteria appropriate for the Project.

II. THE CASTLE BLUFF PROJECT

Q. Where is Castle Bluff located?

A. Castle Bluff will be located on a portion of Ameren Missouri-owned property at the now retired Meramec Energy Center. The new units will be located approximately where the previous plant's coal pile was. The existing retired steam and gas units at Meramec are currently being dismantled.

Q. Why install new equipment at this location?

A. For several reasons, due to both cost and schedule advantages. First, building at an existing energy center site allows current infrastructure to be repurposed, saving time and money. Specifically, with the retirement of Meramec at the end of 2022, it is possible to use the former substation and transmission interconnection with minimal modifications. Planning, permitting, engineering, and construction of new transmission lines can take multiple years. Reuse of the transmission infrastructure that served Meramec reduces this time and saves the cost of constructing new equipment. In addition, it simplifies the process of entering a MISO[1] Large Generator Interconnection Agreement ("LGIA"), which is required for the Project, and which otherwise could take multiple years to complete. Further cost savings will be realized because Meramec Steam Units 1 and 2 were provided natural gas fuel from Enable Mississippi River Transmission, LLC ("MRT"). While the lateral from MRT's pipeline will require an upgrade in size to accommodate Castle Bluff, this upgrade will utilize the existing corridor for the new installation, again saving time and money. And, finally, Ameren Missouri currently owns the Meramec property, which means that customers will avoid both acquisition costs and the time delay associated with acquisition of a new site.

Q. Please describe the proposed installation.

A. Castle Bluff will be a simple cycle combustion turbine generator ("CTG") installation. The site as proposed will include four General Electric ("GE") Frame 7FA.04 CTG units in a dual fuel configuration. Each unit will be capable of generating 176 megawatts ("MW") during hot summer conditions while firing natural gas and over 200 MW on cold winter days on fuel oil back-up. In addition to the gas turbines, Castle Bluff will include an office/control service

[1] Midcontinent Independent System Operator, Inc.

building, natural gas compressors, fuel oil storage tanks, a demineralized water tank, auxiliary building, and a warehouse. See Figure 1, which is an artist's rendering of the site:

Figure 1

Q. Why is the site being designed for gas and fuel oil firing?

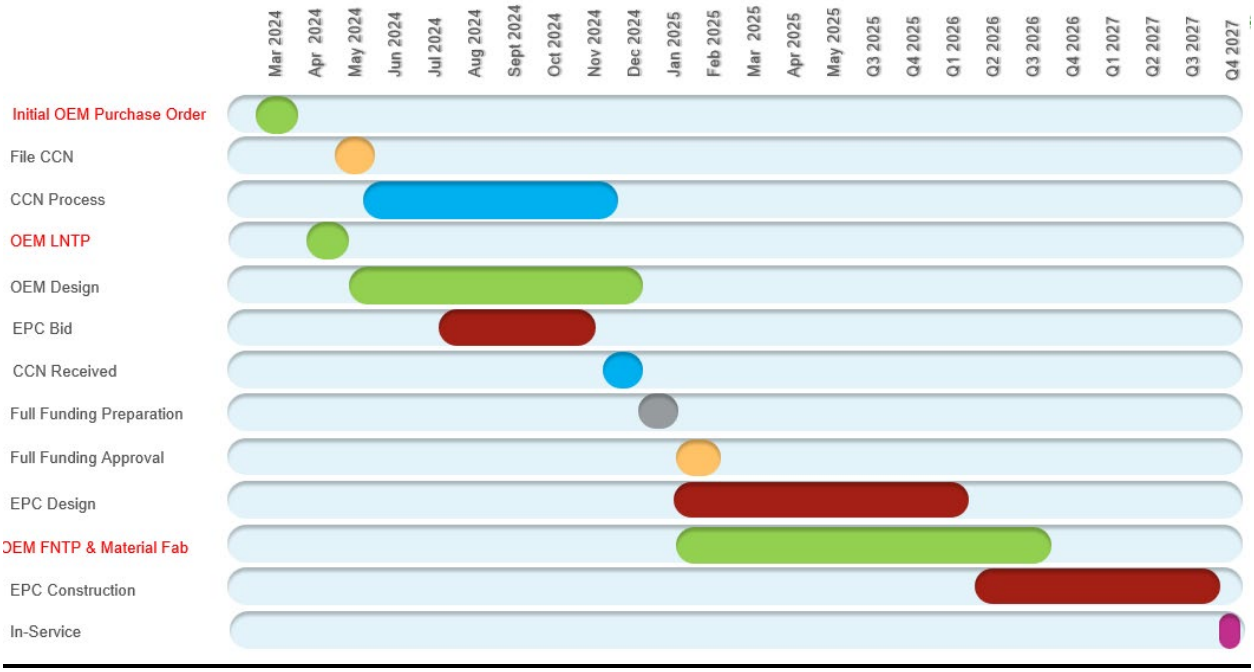
A. Natural gas will be the primary fuel at Castle Bluff. Use of fuel oil as a back-up is needed to provide winter peaking availability during periods of high natural gas demand for winter heating needs. As noted in Andrew Meyer's testimony, fuel contracts for firm gas supply are not available for Castle Bluff, nor would they be economically viable at expected capacity factors. Having the ability to operate with a loss of pipeline gas fuel, expected during the coldest days of the year, is key to Castle Bluff's ability to provide year-round reliable peaking capacity. Oil storage has been designed to supply fuel for approximately 72 hours of operation with all four units operating at full load. Seventy-two hours was selected based on a combination of historical operation needs as well as modeling of future needs.

Q. Can you provide information on the scheduling of the Castle Bluff Project?

A. Yes. Castle Bluff is currently scheduled to be in-service by October 31, 2027, to allow the new units to bid into the MISO capacity markets for the Winter of 2027/2028. To meet this in-service date, Ameren Missouri released a preliminary purchase order to the CTG supplier, GE, on March 8, 2024. The initial funds secure pricing, limited notice to proceed ("LNTP") to begin design in April 2024, long lead materials (e.g., castings, forgings, raw materials, etc.), as well as our production reservation slots for timely fabrication of equipment. A final notice to proceed ("FNTP") for CTG fabrication must be issued by February 2025 for the Project to achieve schedule. Under the contract terms with GE, failure to release a FNTP by February 2025 can result in additional contract costs or loss of production slots. Construction at the site would begin in 2026 with commissioning of the CTGs beginning in Summer/Fall 2027.

A high-level schedule for the Project (Figure 2) is as follows:

Figure 2



Q. Why do the in-service date and the Project's construction schedule require that a Certificate of Convenience and Necessity ("CCN") be issued no later than the December 31, 2024, date identified in the Company's Application?

A. The Company requests that the Commission issue a CCN for the Project no later than December 31, 2024, so that contract details and contractual documentation may be finalized to allow it to provide GE the FNTP in February 2025, which allows the Company to avoid a possible loss of production slots and increased Project costs. As explained above and as the construction schedule demonstrates, meeting the February date is essential to meeting the Project's in-service date.

Q. What features make the installation of CTGs at Castle Bluff an ideal Project for Ameren Missouri's system?

A. Large frame CTGs have many advantages for Ameren Missouri's system operation due to their inherent flexibility. The engines selected for Castle Bluff are the GE 7FA.04 and have the capability to be remotely started from the Energy Management and Trading (EM&T) Operating Center, which is manned on a 24/7 basis, thereby allowing immediate engagement of the engines. Once started and online, the Castle Bluff engines will be capable of fast ramp rates. These features provide an excellent, ready source of peaking power for Ameren Missouri's system and complement Ameren Missouri's existing fossil fleet and its expansion in renewable generation. The Company has designed the CTGs to be capable of operating in any temperature condition expected, from -20° F to 125° F. The systems are proven to be reliable--there are one hundred-seventy 7FA.04 engines in service in the United States with a combined average operating reliability of over 98%.

Q. What is the estimated cost for Castle Bluff?

A. Ameren Missouri's current estimate for Castle Bluff is approximately $900 million.

Q. How does Ameren Missouri intend to issue contracts for Castle Bluff?

A. Our current Project plan includes purchase of the following items on a lump sum, firm price basis through competitive bidding:

- Combustion Turbine Generators (4)
- Generator Step Up Transformers (4)
- Station Service Transformers (4)
- 138kV Breakers (8)
- Fuel Oil Storage Tanks (2)
- Demineralized Water Storage Tank (1)
- Natural Gas Compressors (4)
- Continuous Emission Monitors (4)

Installation of Ameren Missouri-furnished equipment and the balance of the plant will be executed through an Engineer, Procure, Construct ("EPC") contract. The EPC contract will be competitively bid, including both local and national contractors. The EPC contract will be responsible for all balance of plant design, foundations, buildings, materials, commissioning, and include erection of Ameren Missouri-furnished materials listed above.

Q. Please provide the plans and specifications for the generators and associated component equipment required by the Project.

A. Attached as **Schedule CS-D1** are the following plans and specifications that exist as of this filing:

File Name	Description
CTG – CB-SPEC-00001 Rev 1 – Conformed for Contract	Combustion Turbine Generator Major Equipment Supply (Power Island)
GSU Transformer – CB-SPEC-000002 Rev 2 – Conformed for Contract	Generator Step-Up Transformer Equipment Supply & Assembly
Station Service Transformer – CB-SPEC-000006 Rev 1 – Conformed for Contract	Station Service Transformer Equipment Supply & Assembly
Tanks CB-SPEC-000005 Rev B – DRAFT[2]	Fuel Oil, Demineralizer, and Service/Fire Water Tanks Equipment Supply and Installation
CEMS CB-SPEC-000007 Rev A – DRAFT	Continuous Emissions Monitoring Equipment Supply
Gas Compressors – CBV-SPEC-000004 Rev A -- DRAFT	Natural Gas Compressor Equipment Supply

Q. Has Ameren Missouri identified potential risks to the Project and developed plans to mitigate those risks should they arise?

A. Yes. A key risk for the Project is material and commodity cost escalation. Mitigation strategy for this risk is to lock in pricing early using fixed price contracts with minimal down payments. Delivery of major materials and sequencing is also a Project risk that could impact both schedule and cost. Mitigation efforts here include coordination of Ameren Missouri purchased equipment with the EPC contractor and communication on deliveries, delays, and other concerns. This coordination is critical especially where, as here, delivery of materials is the responsibility of the material suppliers. Contractor availability as well as labor availability are also Project risks. Ameren Missouri will mitigate these risks through early bidding and allowing

[2] While some of these specifications are in draft form, the final specifications are not expected to differ in any meaningful way. Ameren Missouri will supplement its filing with the finalized versions once they are available.

both national and local contractors to participate in the bid process. Finally, obtaining permit approvals is also a risk to the successful completion of the Project. To mitigate these risks, Ameren Missouri has filed these permit requests at a time that is intended to allow for timely permit approvals.

Q. Please describe Ameren Missouri's qualifications to build and operate a new CTG energy center.

A. Ameren Missouri has qualifications and experience to build and manage a project of this type and size. Ameren Missouri has been responsible for CTG construction in the past, with the last two large projects entering service at Venice and Peno Creek. Moreover, Ameren Missouri currently operates a fleet of 43 CTGs at twelve different plants across both Missouri and Illinois, providing a total summer net capability of 2,761 MW and winter net capability of 3,331 MW. The CTG fleet has a variety of ages, engine sizes and configurations. I am responsible for operation of Ameren Missouri's existing gas turbine fleet, and in 2023, our CTGs had a starting reliability—a measure of the percentage of successful starts versus total starts—of over 98%. Ameren Missouri is clearly qualified to construct and operate the CTG Project at Castle Bluff.

Q. You earlier referred to the permitting required for the Project. Can you discuss permitting and emissions from the new units, as compared to the previous steam plant installation?

A. In addition to the CCN required for this Project, a number of permits will be required for the Project from St. Louis County, the Missouri Department of Natural Resources, and other entities. A complete list of the permits required for the Project is attached as **Schedule CS-D2**. The primary permit required from St. Louis County will be a construction permit for air emissions. Castle Bluff will have substantially lower emissions than the former Meramec units,

while at the same time have higher thermal efficiencies. On a per megawatt-hour (MWh) basis, Ameren Missouri expects emission rate reductions of 99% for sulfur dioxide, 80% for nitrogen oxides, and 40% for carbon dioxide while firing natural gas fuel.

Q. Are there any operating limits expected for Castle Bluff?

A. Ameren Missouri filed with St. Louis County for a construction permit on February 16, 2024. As part of the permit process, Ameren Missouri expects to have a facility limited to a capacity factor of approximately 30%, which is tied to particulate and nitrogen oxide limits.[3] On May 9, 2024, the EPA published in the *Federal Register* its final rule under Section 111(b) of the Clean Air Act, "New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel Fired Electric Generating Units," effective July 8, 2024.[4] The new 111(b) rules will limit CO_2 emissions from new gas-fired combustion turbines. The Castle Bluff units will comply with the new rule's Best System of Emission Reductions by firing "low emitting fuels," which include natural gas and fuel oil. Under the new rule, Castle Bluff falls within the "Low Load Subcategory," which imposes a capacity factor limit of 20%. It should be noted that a capacity factor of 20% is significantly higher than any of our current CTGs have historically operated or would be expected to operate under in the future.

Q. How will Castle Bluff impact the local community in Oakville?

A During construction, the area will see impacts due to increased traffic for equipment deliveries and construction workers. Ameren Missouri is in discussions with Metropolitan Sewer District (MSD) to use MSD's private road for the majority of construction traffic, as opposed to

[3] Capacity factor refers to the ratio of the electrical energy produced by a generating unit for the period of time considered to the electrical energy that could have been produced at continuous full power operation during the same period. Theoretically, a plant with a capacity factor of 100% means it is producing power all the time.
[4] The new 111(b) rules will be subject to significant litigation, and challenges have already been filed by West Virginia (joined by 24 other states including Missouri), by Ohio, Kansas, and by National Rural Electric Cooperative Association.

Fine Road, which is the public road. Large components--i.e., the gas turbine, generator, and transformers--are expected to be delivered by rail, thereby minimizing traffic issues, which is another advantage of repurposing the Meramec site. Castle Bluff is expected to operate at much lower noise levels than Meramec did during its operation.

Q. Are there any benefits to the local community driven by construction of Castle Bluff?

A. Yes. Developing Castle Bluff will employ hundreds of construction workers, create permanent on-site operations positions, and provide additional tax revenue for St. Louis County and the surrounding region. Whenever possible, Ameren Missouri hires local contractors, labor, and diverse-owned businesses. With a projected investment of approximately $900 million, the whole community will benefit in these different ways.

Q. Please describe the plans for operation and maintenance of the facility and how this compares with existing Ameren CTG installations.

A. It is anticipated Castle Bluff will be staffed and operated in a similar manner as Ameren Missouri's Venice Energy Center. Full-time, Ameren Missouri-employed staff will work a single shift, five days per week. Units will be operated locally with on-site staff or remotely dispatched by the Company's EM&T department, similar to Ameren Missouri's other gas turbine operations. Routine maintenance will be handled by on-site staff. Non-routine maintenance will be handled either with outside contractors or by supplementing Castle Bluff staff with other Ameren Missouri craft labor on a temporary basis from other locations.

Q. Please describe the criteria by which Ameren Missouri will use to determine that the Castle Bluff Project is in-service.

A. Ameren Missouri is proposing to use in-service criteria similar to that used and approved by the Commission for the large-fame CTGs installed at the Venice Energy Center. The proposed criteria will provide assurance that the asset will be fully operational and useful for service, as well as assuring that the asset complies with environmental regulations. I have included the proposed criteria as **Schedule CS-D3**.

Q. You state that the criteria are "similar" to the in-service criteria for the Venice Energy Center. What are the primary differences from the Venice in-service criteria?

A. The primary difference is that Ameren Missouri proposes for purposes of placing Castle Bluff in-service that the criteria require that the units be fully capable of dispatch. The Venice criteria requested the unit successfully meet all contractual obligations. While Ameren Missouri has little concern that the contractual operational guarantees for the CTGs at Castle Bluff will be met, its goal during commissioning is to establish that the units are operational while minimizing the number of factored starts on the engines, primarily for the purpose of reducing costs to the Company's customers. Frame CTG maintenance cycles are driven by the number of factored starts. For Castle Bluff, engines will need a hot gas path inspection at 1,200 factored starts. Minimizing starts during commissioning will extend this inspection time, thereby reducing long-term maintenance costs to customers. Moreover, ensuring that the units are fully capable of dispatch allows Ameren Missouri to engage those units to meet the capacity and reliability needs to the benefit of the Company's customers.

Another primary difference is that the proposed criteria require Ameren Missouri to meet the air permit requirements for operation rather than the contractual guarantees. The emission guarantees in the contract are more stringent than the current regulations and expected permit requirements and are not necessary for the Castle Bluff units to be fully operational and useful for

service. While Ameren Missouri will enforce all contractual guarantees, the contract allows the supplier a 180-day cure period for contract guarantees which, if included in the in-service criteria, would prevent the units from being placed in service even though they would be fully operational and useful for service.

Q. Are there other changes that deviate in substance from the Venice criteria?

A. Yes. While the Castle Bluff engines will have fast start capability, the contract does not provide for a fast start performance guarantee. Therefore, no testing is necessary to ensure that the fast start meets performance guarantees. Moreover, while the possibility of a fast start operation cannot be ruled out, the likelihood of such an event is quite small. Considering this fact, the cost of the testing necessary to demonstrate the units' ability to meet the fast start capability, which will increase the capital costs associated with the facility, and add to physical wear on the equipment's life itself, means that benefit of the testing is clearly outweighed by the concerns of cost and risk to the equipment.

Another deviation is the change from 50% to 30% capacity factor regarding the testing within a 72-hour period. This change more properly reflects the capacity factor limit based on the Construction Air Permit application and environmental regulations. Moreover, while testing that demonstrates a 30% capacity factor will not fully demonstrate the operational capability of the units, it will demonstrate their operational readiness for their anticipated service and result in a significant cost savings to customers. Specifically, assuming $3/MMbtu gas prices, a fuel burn on a single engine approaches $5,000/hour at full load. The reduction from 50% to 30% capacity factor is a function of time, and because the fuel burn rate is constant, the total amount of fuel used during testing is greatly reduced. Fuel burned during commissioning is a cost to the Project and minimizing this cost will benefit customers.

The final minor deviation from the Venice in-service criteria is a clarification regarding the interconnection facilities at the Castle Bluff plant. As I explained earlier, one of the benefits to using the prior Meramec site is that the former substation and transmission interconnection will be utilized with minimal modifications to the transmission interconnection facility. Accordingly, the proposed in-service criteria reference the MISO Interconnection Agreement that governs the existing interconnection facilities.

Q Does this conclude your testimony?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Permission and Approval and Certificate of Public Convenience and Necessity Authorizing it to Construct a Renewable Generation Facility	)))))	File No.: EA-2024-0237

AFFIDAVIT OF CHRISTOPHER A. STUMPF

STATE OF MISSOURI)
) ss
CITY OF ST. LOUIS)

Christopher A. Stumpf, being first duly sworn on his oath, states:

My name is Christopher A. Stumpf, and hereby declare on oath that I am of sound mind and lawful age; that I have prepared the foregoing *Direct Testimony*; and further, under the penalty of perjury, that the same is true and correct to the best of my knowledge and belief.

/s/ Christopher A. Stumf
Christopher A. Stumpf

Sworn to me this 3rd day of June 2024.