Exhibit No. 11

Grain Belt Express LLC – Exhibit 11
Anthony Petti
Direct Testimony
(adopted by Robert Baker)
File No. EA-2023-0017

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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO.

EA-2023-0017

DIRECT TESTIMONY

OF

ANTHONY PETTI

ON

BEHALF OF

GRAIN BELT EXPRESS LLC

August 24, 2022

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I. INTRODUCTION

Q. Please state your name, present position and business address.

A. My name is Anthony Petti. I am a Managing Consultant in the Energy, Sustainability & Infrastructure Practice at Guidehouse, Inc. ("Guidehouse"). My business address is 333 S. Hope Street, Suite 1125, Los Angeles, California 90071.

Q. What are your duties and responsibilities in your present position?

A. In my role as Managing Consultant at Guidehouse, I provide technical analysis, research and business strategy advice relating to energy project developments, including analyses of the impacts of new infrastructure to the reliability and resiliency of the existing infrastructure.

Q. Please describe your education and relevant professional background.

A. I graduated from the University of California, Berkeley with a Bachelor of Arts degree in Environmental Economics and Policy. I also obtained a Project Management Professional Certification from the Project Management Institute.

In my role as Managing Consultant at Guidehouse, I have provided consulting services to several energy developers. I have served as the Project Manager and Subject Matter Expert to develop business practices, assumptions, and technical study parameters for modeling both utility managed and third-party owned energy storage resources. On another project, I served as Project Manager and was responsible for ensuring utility compliance with the state regulatory bodies' required practices for competitive procurement of 900 MW of solar, energy storage and other renewable capacity.

Prior to working at Guidehouse, I served as an Expert level Project Development Specialist for Pacific Gas & Electric ("PG&E"). As a Project Development Specialist, I was responsible for the development of electric utility infrastructure projects identified by Integrated Resource Plans including transmission, substation and power generation resources, including energy storage

assets. Additionally, I supported Federal Energy Regulatory Commission ("FERC") Order 1000 strategic planning efforts and executed a program of battery storage development projects in collaboration with transmission planning and grid operations. I also oversaw PG&E's Oakland Clean Energy Initiative which sought to use a mix of transmissions upgrades, distributed energy resources and utility scale energy storage as alternatives to traditional infrastructure projects.

Prior to my work at PG&E, I worked as a Supervisor and Business Analysist at Banyan Energy, a solar technology and licensing company. I defined operational systems, processes and policies to support commercialization. I also directed internal operations of the company including manufacturing, supply chain, R&D and designed a manufacturing process for the company's proprietary concentrated solar PV modules.

Q. Please describe your background in performing reliability and resiliency studies.

A. In my Project Development Specialist Role at PG&E I was responsible for leading studies of the California Independent System Operator ("CAISO") transmission system to identify novel new projects that provided reliability, policy and economic benefits. I also managed several generator interconnection studies for transmission connected energy storage resources which required load flow and dynamic models for the CAISO Generator Interconnection Process.

A. At Guidehouse, I am currently leading a series of transmission reliability studies for Puget Sound Energy ("PSE"). The results of these studies will model the impact of adding several hundred megawatts of transmission connected energy storage resources to the PSE system.

Q. Have you previously provided testimony before the Missouri Public Service Commission or other regulatory commissions?

A. Yes. I previously provided testimony to the Illinois Commerce Commission on behalf of Grain Belt Express LLC ("Grain Belt Express") in Case No. 22-0499 on the same topics discussed in this testimony.

Q. What is the purpose of your direct testimony?

A. I am testifying on behalf of Grain Belt Express, which is requesting that the Missouri Public Service Commission ("Commission") amend its existing certificate of public convenience and necessity ("CCN") to construct, install, own, operate, maintain, and otherwise control and manage an approximately 800-mile, overhead, multi-terminal +\-600 kilovolt ("kV") high-voltage, direct current ("HVDC") transmission line (with 206 of the HVDC transmission miles located in Missouri) and associated facilities including converter stations and alternating current ("AC") connector lines (the "Project").

On November 3, 2021 Grain Belt Express engaged Guidehouse to quantify the reliability and resiliency values of the Project for the State of Missouri. I oversaw the preparation of the Grain Belt Express: Reliability and Resilience Values report (the "Guidehouse Report") and am testifying regarding the methodology, analysis and findings therein. The Guidehouse Report details research and conclusions supporting a finding that the Project will enhance the reliability and resiliency of electricity infrastructure and capacity in Missouri. By applying widely used and accepted study methodologies[1] to assess resource adequacy, my testimony will demonstrate that

[1] The methodologies and assumptions used to approximate Project benefits are explained in detail within the Guidehouse report.

the addition of incremental transmission transfer capacity via the Project will improve the reliability and resiliency of the Missouri bulk electric system.

Q. Are you sponsoring any schedules or exhibits as part of your direct testimony?

A. Yes, I am sponsoring the following exhibits/schedules:

- Schedule AP-1 – My curriculum vitae
- Schedule AP-2 – Grain Belt Express: Reliability and Resilience Values report prepared by Guidehouse, dated July 21, 2022.

II. OVERVIEW OF THE GUIDEHOUSE REPORT

Q. At a high level, please describe the Guidehouse Report.

A. Grain Belt Express engaged Guidehouse to determine how the Project will affect the reliability and resiliency of electric transmission in Missouri and other states. Guidehouse performed in-depth research and detailed analyses to study what value the Project could reasonably generate to the benefit of electric utility customers. Due to ingrained shortcomings of industry standard transmission system planning practices, long-haul interregional transmission projects like Grain Belt Express require project proponents to estimate customer benefits using methodologies and tools available in the public domain to capture the broad reaching benefits of a novel interregional transmission project with a breadth of beneficiaries. The Guidehouse Report documents this research and analysis as well as our conclusions with respect to reliability and resilience.

Q. What were your general findings?

A. Guidehouse determined that the Project with amended configuration could reasonably provide measurable improvements to the reliability and resiliency of the regional electric transmission systems with which the Project interconnects. Among other things, I found the following specific improvements and benefits:

- Mitigation of high energy prices during extreme weather events;
- Avoided loss of load benefits;
- Reduced local resource adequacy procurement obligations;
- Hedges against future capacity procurement needs;
- Influence Planning Resource Auction prices;
- Value of system restoration capabilities; and
- HVDC resource reliability.

A. MITIGATION OF HIGH ENERGY COSTS DURING EXTREME WEATHER

Q. Please describe your research and findings with respect to the Project's mitigation of high energy prices during extreme weather events.

A. As described in more detail in the Guidehouse Report at Section 3, Guidehouse analyzed how the Project will impact organized energy markets during extreme weather events like those recently experienced. My research examined the frequency and impact of recent extreme weather events, including their impact on emergency energy prices, and quantified the potential benefit the Project could have provided during these scenarios. For example, Guidehouse found that had the Project been in operation during Winter Storm Uri and transmitting 2,500 MW of electricity east to west, the Project could have saved SPP participants over $300 million in costs. The total savings generated by the Project with a capacity of 5,000 MW for Winter Storm Uri, the

Northeast "Bomb Cycle" cold weather snap of 2017/2018, the Northeast "Polar Vortex" of 2014 and the Midwest "Polar Vortex" of 2019 is estimated at $407 million[2].

B. AVOIDED LOSS OF LOAD BENEFITS

Q. Please describe your research and findings with respect to the Project's impact on loss of load.

A. In Section 4, Guidehouse studied the potential value of the Project with respect to limiting loss of load events. Value of Loss of Load ("VOLL") calculations are performed to estimate the cost that a customer bears due to an interruption in electric supply. Noting the recurrence of severe weather and loss of load potentiality, the Midcontinent Independent System Operator ("MISO") used its Long Range Transmission Planning business case to identify and calculate VOLL for its transmission planning regions. In calculating the VOLL for this Project, Guidehouse adopted the same assumptions made by MISO in its VOLL calculations. Applying MISO's VOLL methodology to a 1,500 MW line injection capacity for the Project within MISO territory, Guidehouse estimates that the Project will provide a VOLL for MISO Region LRZ4-7, which includes Missouri, ranging from $84 million to $552 million every 3 years, which equals a present day value of $360 million to $2.37 billion assuming a discount rate of 6.057% and a lifespan of 30 years.[3] The wide range of potential benefits is attributable to the capped and uncapped value of mitigated losses as defined by the MISO Independent Market Monitor.[4]

[2] See Table 6 of the report for allocation of emergency storm energy savings.

[3] See Tables 12 and 13 of the Guidehouse report for calculation details.

[4] Potomac Economics, September 15, 2020. IMM Quarterly Report: Summer 2020. https://cdn.misoenergy.org/IMM%20Quarterly%20Report_Summer%202020478028.pdf

C. VALUE OF REDUCING PROCUREMENT OBLIGATIONS

Q. Please describe your research and findings with respect to the Project's impact on procurement obligations.

A. As described in more detail in the Guidehouse Report at Section 5, Guidehouse reviewed how the Project will affect Local Resource Adequacy requirements and Planning reserve margin ("PRM") obligations of system planners and operators which are established to ensure a reliable supply of generation capacity during exceptional events related to unplanned outages, extreme weather or critical transmission contingencies. The procurement of additional generation capacity to satisfy the Local Resource Adequacy and PRM requirement drives additional costs for customers.

Using projected injections from the Project and cost of new entry for generation capacity, we estimate that the Project will mitigate additional reliability driven generation capacity investments of approximately $526 million per year and approximately $7.6 billion for the life of the Project (assuming an asset lifespan of 30 years and a discount rate of 6.057%) for a 5,000 MW line capacity.[5] Of these total Project benefits, the savings generated by reduced procurement obligations are broken down by the individual benefitting regions in Table 9 of the Guidehouse Report. Using SPP's regional cost of new entry the Project is capable of saving approximately $85 million per year for AECI customers in Missouri and $145 million per year for customers in MISO Zone LRZ4-7 which includes Missouri.

Q. Will this impact future capacity procurement needs?

A. Yes, the Project will hedge against future capacity procurement needs. Using data on planned retirements of power stations and projected sourcing of energy resources over the next

[5] See Table 14 of the Guidehouse report for calculation details.

two decades, we identify that the Project is a necessary hedge to future shifts away from traditional fuel resources by providing enhanced generation resource diversity, access to low-cost renewable capacity and measurable reductions of local capacity procurement.

D. IMPACT ON MISO PLANNING RESOURCE AUCTION ("PRA") PRICES

Q. Please describe your research and findings with respect to the Project's impact on MISO PRA auctions prices.

A. In order to continuously serve customers with safe and reliable electric service, MISO conducts a resource adequacy auction, also known as the PRA, every April to ensure LRZs have procured enough generation capacity to meet their respective Local Reserve Requirement ("LRR") and MISO Regions have met the Planning Reserve Margin Requirement ("PRMR") for the year. These auctions ensure that sufficient capacity is secured to meet the established 0.1-day-per-year (1 day in 10 years) loss of load expectation target required by the MISO tariff. [6] MISO's 2022/2033 PRA experienced abnormally high auction clearing prices due to nearly 3.4 GW generation capacity electing not to participate in the annual auction.[7] Although roughly 2.5 GW of net new generation resources participated in the 2022/2023 PRA, the MISO North/Central territory experienced a net generation capacity shortfall of approximately 1,230 MW resulting in an Auction Clearing Price ("ACP") of $236.66/MW-day. [8]

In order to approximate the potential influence of the Project over the Planning Resource Auction ACP, Guidehouse developed estimated alternate ACPs that assume GBX in-service at a

[6] MISO FERC Electric Tariff Module E-1 68A.2.1. March 1st, 2018. https://docs.misoenergy.org/legalcontent/Module_E-1_-_Resource_Adequacy.pdf

[7] MISO 2022/2023 Planning Resource Auction (PRA)Additional Detail, Revised June 3, 2022. https://cdn.misoenergy.org/20220525%20RASC%20Item%2004d%20PRA%20Detail624732.pdf

[8] *Id.*

minimum 1,500 MW injection rating to MISO and applied the MISO provided quantity of load exposed to the 2022/2023 ACP to determine the potential annual PRA savings generated by GBX. Using an adjusted ACP of $26.82/MW-day Guidehouse estimated an annual savings of $410.9 million or a savings of $346.0 million using a $60/MW-day ACP. The portion of these annual savings benefitting Missouri can be approximated by multiplying the portion of the state's load exposed to the MISO ACP by the savings per MW-day generated by the Project. Using this methodology the Project can provide Missouri with approximately $28 million to $33 million of MISO PRA ACP savings per year.

E. OPERATIONAL IMPROVEMENT OF HVDC RESOURCES

Q. Will the Project's HVDC technology provide any reliability or resilience value to the system?

A. Yes. As described in more detail in the Guidehouse Report at Section 6, Guidehouse performed a literature review of technical material related to Voltage Source Converter ("VSC") type HVDC converters, similar to those proposed for the Project, which can be used for black-start resources that are traditionally fossil fuel powered generating units that can start without an outside electrical supply. Given its unique HVDC technical properties, geographically diverse points of interconnection and low ongoing variable maintenance expenses, the Project provides a cost-effective system restoration tool for SPP, AECI, MISO and PJM that does not depend on the economic and operational viability of a coupled power generation facility. This capability drastically increases the system's reliability and resiliency, especially during extreme weather conditions.

Further, the VSC HVDC technology planned for the Project provides transmission operators with power quality control properties typically provided by the rapidly retiring

synchronous generator fleet. VSC converter stations for HVDC can independently and quickly control active and reactive power, which enables the HVDC converter to adjust the output and provide active and reactive support to the connected AC power system when necessary.

Also, as renewable generators, which are mainly inverter-based, increase as a percentage of the total generation on the electric grid, the system inertia traditionally provided by synchronous generators decreases and this makes the grid vulnerable to rapid changes in supply and demand. This may lead to concerning swings in the grid's frequency. VSC HVDC can provide fast frequency support due to its electrical characteristics. This will provide another source for fast frequency support in the power system and may decrease the required amount of spinning reserve to ensure the reliable operation of the grid. The Project will make more resources available for fast frequency response in the regions that have ties with AC systems with a converter station and this alleviates required spinning reserves in the ISO/RTO's territories.

Also, considering that VSC HVDC can control active and reactive power independently, the Project can provide dynamic voltage support and improve stability. The dynamic voltage support offered by VSC HVDC can increase the capability of the adjacent AC transmission as well.

Further, in severe transient disturbances in a power system, the kinetic energy in the rotors of the synchronous generators may not be released in the first power swing and may cause generators to go out of step from the grid when the fault is cleared. The fast power run-back capability of the VSC HVDC can help mitigate this impact by releasing the excess kinetic energy to the healthy part of the grid.

Finally, power can be controlled very rapidly by VSC HVDC and this can provide strong damping to disturbances, which is essential to improving power system stability.

III. THE PROJECT IS NEEDED ON A RELIABILITY AND RESILIENCY BASIS

Q. In your opinion does the Guidehouse Report support a finding that the Project is needed?

A. Yes. For the reasons set forth in this testimony and in the Guidehouse Report, the Project is needed to provide adequate, reliable and efficient service to Grain Belt Express' customers in the current operating environment. Specifically, the Project will increase the reliability of electricity provided to customers and the resiliency of the electric grid based on current observed market and operating conditions.

IV. CONCLUSION

Q. Does this conclude your testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Grain Belt Express LLC for an Amendment to its Certificate of Convenience and Necessity Authorizing it to Construct, Own, Operate, Control, Manage, and Maintain a High Voltage, Direct Current Transmission Line and Associated Converter Station	)))))))	File No. EA-2023-0017

AFFIDAVIT OF ANTHONY PETTI

1. My name is Anthony Petti. I am a Managing Consultant in the Energy, Sustainability & Infrastructure Practice at Guidehouse, Inc. ("Guidehouse"). My business address is 333 S. Hope Street, Suite 1125, Los Angeles, California 90071.

2. I have read the above and foregoing Direct Testimony and the statements contained therein are true and correct to the best of my information, knowledge, and belief.

3. Under penalty of perjury, I declare that the foregoing is true and correct to the best of my knowledge and belief.

/s/ Anthony Petti
Anthony Petti
Managing Consultant
Guidehouse, Inc.

Date: 8/23/2022