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Witness:	Shashank Sane
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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO.

EA-2023-0017

SURREBUTTAL TESTIMONY

OF

SHASHANK SANE

ON

BEHALF OF

GRAIN BELT EXPRESS LLC

MAY 15, 2023

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I. INTRODUCTION

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

A. My name is Shashank Sane. I am the Executive Vice President of Transmission for Invenergy LLC ("Invenergy"). My business address is One South Wacker Drive, Suite 1800, Chicago, Illinois 60606.

Q. Have you previously submitted testimony in this proceeding?

Yes, I submitted direct testimony to the Missouri Public Service Commission ("Commission") on August 24, 2022 and accompanying exhibits/schedules identified as Schedules SS-1 through SS-3.

Q. What is the purpose of your surrebuttal testimony?

A. I am submitting this surrebuttal testimony in response to various statements and assertions made by Staff witnesses to clarify and correct the record and to ensure that the Commission is presented with accurate information. Specifically, my testimony supports the Grain Belt Express Project's ("Project") need, economic feasibility and promotion of the public interest consistent with the Tartan factors. My testimony also addresses the Amended Project's consistency with the Commission's Report and Order on Remand in File No. EA-2016-0358 ("CCN Order"). I further respond to Staff's recommendation that the Commission define "materially different," as that term is used in the Commission's CCN Order. Finally, I address Invenergy Transmission LLC's ("Invenergy Transmission") participation in Federal Energy Regulatory Commission ("FERC") proceedings identified by Staff and Staff's erroneous contention that the current status of interconnection brings doubt to the Project's feasibility.

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

A. Yes, I am sponsoring the following exhibit/schedule:

- Schedule SS-4 – Generation Data (Confidential)

II. PROJECT NEED, ECONOMIC FEASIBILITY AND PROMOTION OF PUBLIC INTEREST

Q. Commission Staff witness Dr. Krishna Poudel testified that Ameren Missouri and Evergy Missouri do not affirmatively state in their respective most recent Integrated Resource Plan ("IRP") filings and Preferred Resource Plans that Grain Belt Express or the Grain Belt Express Project are needed to achieve the goals of the Preferred Resource Plans. What is your response to Dr. Poudel's testimony?

A. As I set forth in my direct testimony at 13:7–15:2, Ameren Missouri's and Evergy Missouri's respective IRPs and Preferred Resource Plans state ambitious goals to retire fossil fuel generators and achieve net zero carbon emissions. Ameren Missouri plans to retire approximately 3,000 MW of coal-fired generation and 1,000 MW of gas-fired generation, and add 3,500 MW of renewable generation by the end of 2030. Evergy Missouri plans to retire 1,200 MW of coal-fired generation and add 3,200 MW of renewable generation in the next 10 years. Within the next three years, Evergy Missouri will retire its Lawrence (KS) Energy Center and add 700 MW of solar energy.

As Michael Goggin testified in his rebuttal testimony, lines 475–488, Ameren Missouri's 2020 IRP evaluated a scenario where the Project delivers 1,000 MW of wind-generated energy to Missouri. The 2020 IRP found that the scenario involving the Project offered a comparatively low cost to the preferred approach, which purchases the same amount of renewable energy, but the IRP scored the plan involving the Project slightly lower for regulatory uncertainty.

Since the 2020 IRP, Grain Belt Express has greatly reduced regulatory uncertainty. It obtained regulatory approvals to acquire, construct, own and operate the Project from the Indiana Utility Regulatory Commission in January 2020 and the Illinois Commerce Commission in March

2023. The Project now has initial approvals from state regulatory authorities for each of the four states through which it will pass.

Ameren Missouri's 2022 IRP Change in the Preferred Resource Plan does not update the supply side resource scenarios, maintaining the same portfolio rankings from the 2020 IRP. The 2022 IRP does note, however, that as "more and more renewable projects are executed in MISO, the challenges of ever greater needs for transmission infrastructure could limit the ability to connect new projects."[1] The 2022 IRP continued, "Transmission congestion issues can also fluctuate over time as new generation and transmission infrastructure are added to the grid."[2] at 24. Although not mentioned by name, the Project will impact the IRP analysis going forward as it minimizes transmission congestion and enables connectivity of new projects into the Ameren Missouri service area.

Evergy Missouri's 2021 IRP more directly addresses Grain Belt Express' service: "With regards to renewable resources in the southwest Kansas region, it is known that the total current firm transmission service requests to SPP exceed the total transmission service availability which will be provided by transmission construction projects. Until large scale investments in transmission upgrades are made, the timing of future renewable resource additions in that region will be difficult to determine with certainty. This could lead to output and/or delivery limitations on future renewable resource additions in the southwest Kansas region."[3] Grain Belt Express *is*

[1] *Ameren 2022 IRP Change in Preferred Plan*, at 23–24, available at https://www.ameren.com/-/media/missouri-site/files/environment/irp/2022/preferred-plan.ashx#:~:text=Ameren%20Missouri's%20new%20Preferred%20Resource,generation%2C%20total%20renewable%20generation%20of.

[2] *Id.*

[3] Evergy Metro Supply-Side Resource Analysis Integrated Resource Plan, April 2021, at 40–14, available at https://www.efis.psc.mo.gov/mpsc/commoncomponents/viewdocument.asp?DocId=936352823.

the large-scale investment required to provide access to more renewable resources in the southwest Kansas region. The Amendment requested in this Application increases access to those resources for Missourians five-fold.

The absence of naming Grain Belt Express in Ameren Missouri's and Evergy Missouri's IRPs as a specific supply side resource at this time does not mean that Grain Belt Express cannot or will not provide benefit to Missouri utility customers, nor does it mean that Grain Belt Express will not be selected as a supply side resource at a later date. The Project is targeting the end of 2027 to be fully operational for Phase I and this timeline is aligned to assist Ameren Missouri and Evergy Missouri with achieving their milestones of significantly reducing fossil fuel generation and increasing renewable energy generation sources by 2030. See Direct Testimony of Aaron White at 15:8–9. Ameren has noted a target timeline of 2026 – 2030 to add 1,000MW of wind to their resource mix in their 2022 IRP. Further, as I outline later in my testimony, Grain Belt Express will provide Missouri utilities with a superior generating resource pool with higher capacity factors, better availability during times of need and the geographic diversity necessary to balance potential extreme grid conditions in the SPP, AECI and MISO regions.

Q. How will the Project help address resource adequacy needs for Ameren and Evergy?

A. Grain Belt Express effectively expands the geographic footprint of Midcontinent Independent System Operator, Inc. ("MISO") Zone 5 to include western Kansas and all of the renewable energy development potential there. That access materially increases generation and capacity capabilities in MISO. For example, to replicate the energy associated with 1,000 MW of wind/solar hybrid delivered by the Project, Ameren or Evergy would need to procure 2,700 MW of solar within territory. To replicate the capacity associated with 1,000 MW of a wind/solar

hybrid delivered over the Project, Ameren or Evergy would need to procure 2,700 MW of solar and 200 MW of four-hour battery storage in territory.

Local Solar Capacity Required for Same Energy as GBX

	Grain Belt Express	Missouri Solar
Capacity [MW]	1,000	2,700
Capacity Factor [%]	70%	26%
Energy [GWh]	6,132	6,150

Local Storage Required for Same Capacity as GBX

	Capacity Credit	Installed Capacity [MW]	Capacity Credit [MW]
Kansas Wind via GBX	26%	1,200	312
Kansas Solar via GBX	43%	600	258
Missouri Local Solar	14%	2,700	378
Storage (4-hour) Capacity Require	95%	200	190

Beyond providing outright access to a greater volume of renewable resources, the resources that are made accessible by the Project also provide a better fit to local capacity needs than local solar resources. The most pressing capacity need is for winter peak capacity. This typically occurs from 7:00 to 8:00 a.m. during the winter. While solar has not yet reached high capacity at this time, those early morning hours are typically the strongest for Kansas wind resources, providing on average 52% capacity factor. When paired with solar, this increases to 61%. The resources can provide year-round capacity value as well. When summer peak (4:00 to 6:00 p.m.) capacity is required, the wind/solar portfolio provided through the Project offers on average a 67% capacity factor during those hours. The value of time-shifted solar in Kansas provides superior load carrying capacity than local solar because it better aligns with system peak. In fact, 160 MW of solar in Kansas provides the same capacity value as 450 MW of local solar, saving Missouri ratepayers approximately $600 million just in avoided capital costs.

	Kansas Solar via GBX	Missouri Local Solar
Capacity Credit	43%	14%
Installed Capacity [MW]	163	500
Capacity Credit [MW]	70	70
Build Cost [$/kW]	1,800	1,800
Total Cost [$ million]	**293**	**900**

Additionally, renewable energy provided through the Project will provide an ideal complement to increasing solar penetration in MISO. There are currently 146,793 MW of solar in the queue in MISO, with 4,759 MW specifically within Zone 5. As these resources are built out, MISO will experience challenges similar to those experienced in other markets with high solar penetration, including high ramping needs in the evening and correlated supply risk with solar conditions. Grain Belt Express can deliver wind from Kansas which is uncorrelated to solar production within MISO. This relationship will reduce risk of supply shortfall and therefore reduce the need for backup generation. The Project can also deliver solar from Kansas, which will continue producing at a higher capacity factor for nearly 2 hours later than solar within Missouri, reducing the pace of ramping required in the evening.

Q. In addition to stabilizing capacity, will the Project also increase grid stability?

A. Yes. The HVDC converter, proposed to be located in Monroe County, itself can serve as a critical grid asset to ensure grid stability, especially in the case of high renewable penetration. Being a voltage sourced converter, it is a source of reactive power and voltage support to help maintain adequate voltage profiles in the system. As more fossil (synchronous) generation is retired, the result is a transmission system with a lower short circuit ratio, which may be prone to instability. The converter station has the capability of operating in systems with very low short circuit ratio, bringing significant benefits for system stability, including oscillation damping. Lastly, Grain Belt Express provides black start capability without dependency on local generation

and onsite fuel, as discussed in the Surrebuttal Testimony of Carlos Rodriguez. As confirmed in the Surrebuttal Testimony of Aaron White, the 3 DC/AC VSC converter stations in Kansas, Missouri, and Illinois will have the capability to inject or withdraw capacity to/from different markets, giving Grain Belt Express the ability to provide critical reliability services during periods of supply shortages. Grain Belt Express can provide Missouri with access to the vast pools of energy connected to SPP and PJM in addition to the resources connected directly to Grain Belt Express.

Q. Does the Project provide additional resilience in the occurrence of extreme weather events?

A. Yes. During extreme weather events, such as Winter Storm Uri and Winter Storm Elliot, the occurrence of generator issues tends to be highly correlated within a region. For example, while utilities in the east were shedding load during Winter Storm Elliot, wind energy in the Southwest Power Pool ("SPP") was actually being curtailed. The generation sources for the Project are located in southwest Kansas. There are approximately 530 miles between Grain Belt Express' Kansas and Missouri converter stations. This distance is a direct risk mitigant as the extreme weather event impacting eastern Missouri is unlikely to simultaneously be impacting western Kansas.

No generation resources within MISO, and certainly not the local solar resources that continue to serve as the supply side option of choice in recent utility IRP and CCN proceedings, can provide the resilience to extreme weather that can be provided by the Project. The Project provides Missouri ratepayers with an insurance policy against extremely high energy prices in MISO and catastrophic loss of load situations that have plagued multiple utilities in recent years. FERC has realized the importance of interregional transmission as shown through their open

docket AD22-8 on Establishing Interregional Transfer Capability Transmission Planning and Cost Allocation Requirements.

Additionally, beyond the generation that will directly interconnect into Grain Belt Express, the HVDC line will also provide connectivity to the broader SPP market in Phase I and eventually into the PJM Interconnection LLC ("PJM") once Phase II is built. Recent extreme weather events have shown the need for greater interregional transmission capacity to allow greater sharing of energy across regions during periods of grid challenges. Through Grain Belt Express, this interregional transfer capability will connect directly into MISO Zone 5, providing local ratepayers the most significant reliability benefit. Through its LRTP process, MISO estimated that new transmission pathways result in a 16-hour reduction in loss of load every three years and a value of $3,500/MWh of lost load. Applying the same assumptions to the new transmission pathways created by Grain Belt Expressrepresents a savings of $56 million every 3 years based on 1,000 MW of MISO interconnection. The MISO Independent Market Monitor ("IMM") actually places a much higher value on the cost of lost load at $23,000/MWh rather than the $3,500/MWh used by MISO. Using the higher IMM cost, the value of mitigated lost load from Grain Belt Express is $368 million every 3 years.

The ability of GBX to provide the operational flexibility necessary to respond to these types of extreme weather events is exactly why GBX is building its project with bi-directional capability in mind.

Q. Mr. Lange and Mr. Stahlman reference in their testimony a study commissioned by Invenergy Transmission LLC and authored by ICF International, Inc., filed in FERC Docket EL22-83-000 (the "ICF Study"). Can you briefly describe that proceeding?

A. Yes. Invenergy Transmission filed a complaint in FERC Docket No. EL22-83-000 against the Midcontinent Independent System Operator, Inc. In that docket, Invenergy Transmission requests that FERC revise MISO's existing tariff procedures to provide a transparent and well-defined process to incorporate advanced-stage merchant transmission projects (including Grain Belt Express) in *the base case analysis* that MISO undertakes each year as part of its Transmission Expansion Plan ("MTEP"). This is necessary because the amount of electricity merchant HVDC projects, and specifically GBX, will inject into MISO will necessarily impact modeled production cost savings, congestion and fuel savings and other benefits that MISO identifies in its analyses and ratepayers should only pay for MTEP lines of optimal design. MISO responded that it will only incorporate merchant HVDC projects with executed interconnection agreements into its planning assumptions, despite the fact that this is not typical indicia, nor the only indicia, of project advancement for merchant transmission projects. MISO has not commented on the benefits or merits of the Project. Also, Invenergy Transmission and Grain Belt Express are not requesting that the Project be selected as an MTEP project and later cost allocated via the MISO transmission tariff. The proceeding before FERC is irrelevant to the determination of whether this Commission should grant an Amendment to Grain Belt Express' CCN in this docket.

Q. Can you describe the ICF Study?

A. Yes. Invenergy Transmission commissioned ICF to review the modeling bases that led to MISO's recommendation for the LRTP Tranche 1 Portfolio of transmission projects and then overlay the impact from the Grain Belt Express Project. The ICF Study demonstrates that the Grain Belt Express Project, which will have either an earlier or parallel in-service date when compared to projects included in MISO's LRTP Tranches 1 and 2, will have a significant impact

on, and provide significant benefits to, the MISO system. (ICF Study ¶ 12.) The ICF Study analyzes those impacts and benefits and supports the position that MISO should consider advanced-stage merchant transmission projects in the base case analysis for its MTEP.

Q. Mr. Lange testifies, "GBX's expert alleges that including GBX in the MISO study would cause the calculation of resulting benefits for zones 1, 3, and 5 to be negatively affected by the inclusion of both the LRTP Tranche 1 and the proposed GBX project. While Staff cannot perform the same level of modeling because of data and software limitations, the allegation that the inclusion of both the LRTP Tranche 1 and the GBX project could cause ratepayers in Missouri to receive less benefits from Tranche 1 if both Tranche 1 and the proposed GBX project are constructed, is concerning and warrants further consideration." (Lange Rebuttal 5:4–11.) Can you respond to that testimony?

A. Yes. Mr. Lange's testimony references just a small part of the analysis in the ICF Study that focused on the impacts of MISO not including the Project (or other merchant transmission lines) in its LRTP analysis, which leads to a sub-optimal result. The ICF Study concludes, in part, "If MISO does not account for advanced-stage merchant transmission, its LRTP and MTEP analyses will not be accurate and planned transmission projects will provide neither the benefits that MISO claims nor the transmission solutions that are needed." (ICF Study ¶ 12.) In fact, modeling the Grain Belt Express Project with the Tranche 1 Portfolio *increases* the overall adjusted production cost ("APC") savings by 7%, which is $1.38 billion of additional benefits to MISO customers. (*Id.*) Although most Zones in MISO will experience more APC savings with the introduction of Grain Belt Express Project's injection of 2,500 MW of electricity into Missouri, MISO's failure to account for the Grain Belt Express Project and other advanced-stage merchant

transmission projects results in inefficient use of resources and may result in a decrease in APC savings in Zones 1 and 3.

Q. What is the significance of the ICF Study indicating decreased APC savings in Zones 1 and 3?

A. Tranche 1 and the Grain Belt Express Project both still deliver significant savings to Zones 1 and 3, it is just that the savings provided by Tranche 1 are less than advertised by MISO due to its failure to account for the Grain Belt Express Project. That is exactly the reason why Invenergy Transmission has requested that FERC require MISO to consider advanced-stage merchant transmission projects in its base case analysis for MTEP; doing so will help cure inefficiencies in transmission planning and assist the Grain Belt Express Project, other advanced-stage merchant transmission lines and the LRTP portfolio of projects realize the most benefit to Missourians and others. We hope this issue is addressed by FERC in short order.

Q. Is Mr. Lange's testimony regarding MISO Zone 5 accurate?

No. Mr. Lange's testimony that the ICF Report shows decreased savings in Zone 5 is wrong. The ICF Study projects that the Project will bring $2.12 billion in APC savings to Zone 5. (Hamil Aff. Fig. 11.) Considering the impacts of both the Project and MISO's LRTP portfolio, the ICF Study projects $3.38 billion in APC savings to Zone 5. (Hamil Aff. Fig. 12.) The ICF Study demonstrates that if MISO had correctly optimized its LRTP portfolio with the Project, then the benefits to Zone 5 would be even greater. The $2.12 billion in APC benefits that Grain Belt Express is expected to bring to Missouri—calculated using MISO's models and mirroring the MISO study process—is achieved without any cost recovery for the Project through Ameren's zonal transmission rate.

Even absent MISO's consideration of the Grain Belt Express Project in its base case analysis for MTEP, the Grain Belt Express Project *still* provides significant value and benefits to Missouri ratepayers, as set forth in the balance of my testimony.

Q. Mr. Lange testifies that the Grain Belt Express' only executed contract with the Missouri Joint Municipal Electric Utility Commission d/b/a Missouri Electric Commission ("MEC") does not interconnect in MISO, and thus concludes that the Project will not impact the capacity market in MISO. (Lange Rebuttal 14:6–10.) Do you agree?

A. No. Mr. Lange appears to draw the conclusion that the Project may not impact the MISO capacity market because the only executed contract is with MEC, but Mr. Lange completely ignores that the MEC contract is for delivery of 200 MW and that the Project will deposit a total of 1,500 MW into MISO and an additional 1,000 MW into AECI.[4] While the full capacity is not sold yet, there is demonstrable interest in it. Grain Belt Express has negotiated several Memoranda of Understanding ("MOUs") with major commercial and industrial customers, and electric utilities, related to transmission capacity. The marketplace is well-established, as set forth in my direct testimony at 10:6–16:18. The significant influx of electricity into MISO by the Project will place downward pressure on the MISO capacity markets, as explained in the PA Consulting Study and Repsher's testimony. (Repsher Direct 10:17–11:4.).

Q. Mr. Lange testifies that the MOUs are not evidence of need for the Project in part because they expired. (Lange Rebuttal 14:12–15:20.) Do you agree?

[4] Mr. Lange's assertion that the MEC contract does not interconnect to MISO is also not accurate. MEC is responsible for load within MISO, including Columbia Power & Water.

No. First, Mr. Lange admits that the MOUs and Letter of Intent demonstrate interest in the Project. (Lange Rebuttal 14:20.) Mr. Lange also observes that the Letter of Intent is current and that GBX is in the process of disclosing commercial terms of the Project to the counterparty.

Second, the MOUs are demonstrable efforts of major customers to negotiate transmission contracts in good faith. Mr. Lange notes that the MOUs were executed in September 2021, March 2021 and November 2021. The MOUs expired while the Project moved towards requesting an amended CCN, but they are still relevant to demonstrate demand for the Project, which correlates to "need." The customers that entered MOUs continue to express interest in the Project and demand for the transmission of renewable energy provided by the Project. While MOUs establish a baseline understanding at the outset of commercial decisions, as those discussions mature, the focus of the parties shift to negotiating binding agreements and there is no need to extend the effective date of the MOUs.

Third, as set forth in my direct testimony at 13:7–14:18, in addition to the MOUs, Ameren Missouri and Evergy Missouri have adopted aggressive carbon emission reduction goals that will increase the demand for renewable energy resources and transmission capabilities from southwest Kansas to MISO.

Q. The Staff Report views the first Tartan criteria of "need" and "economic feasibility" as linked: in order for a company to be successful, it must offer a good or service that is desired at a given price point that also provides a reasonable return above its cost of manufacture. The Staff report expresses concern that the MEC contract fails to establish

"need" for the Project because it was not priced in a way to allow a reasonable rate of return. (Staff Report at 1.) How do you respond to Staff's analysis?

A. The Commission previously found that the MEC contract was evidence of "need" under the first Tartan criteria and that has not changed. The Commission's finding on that basis is still accurate.

Even if the MEC contract was a "sweetheart deal," it is for a 200 MW portion of the total delivery capacity that the Project will transmit to Missouri. The price agreed to in the MEC contract is not reflective of pricing that has been discussed with current potential customers, as demonstrated by information provided in response to DR No. SS-22, issued by the Missouri Landowners Association. The remaining 2,300 MW will be sold to other offtakers at rates allowing for a reasonable rate of return. As explained in my surrebuttal testimony above, Grain Belt Express executed a number of MOUs with potential offtakers, which are evidence of this demand and need. Such transmission will deliver low-cost renewable energy from southwest Kansas to Missouri and will put downward pressure on capacity auction prices as projected in the PA Consulting study and Mr. Repsher's Direct Testimony 10:17–11:4. Further, utilities have adopted carbon emission reduction goals, which the Project will help achieve. There is also significant demand outside of Missouri, as demonstrated by the vast majority of large utilities and commercial and industrial customers having net-zero equivalent targets or moving to comply with aggressive carbon emission reduction mandates.

Also, Mark Repsher testified that the Amended Project is projected to lower energy and capacity costs in Missouri by approximately 6.1% over the 2027–2066 period, resulting in over $17.6 billion of savings for Missouri residents, on an undiscounted basis. The Amended Project is also projected to result in $7.6 billion in social benefits from avoided emissions in the 2027–66

period. This evidence, alone and taken together, amply supports "need" under the first Tartan factor.

Q. Mr. Stahlman testifies that Staff does not support constructing the Project in two phases because the Commission previously found that the economic feasibility of the Project is dependent on the Project's ability to sell in the PJM market. (Stahlman Rebuttal 2:2–20.) Do you agree that phasing the Project creates additional uncertainty about the feasibility of the Project?

A. No. Mr. Stahlman's analysis is not accurate and does not account for updates to the Project, including increased capacity. The market environment has changed substantially since the initial findings of economic feasibility based on the ability to sell into PJM. The demand for the renewable resources and reliability benefits to which Grain Belt Express provides access has increased substantially in MISO and AECI as discussed in my Direct Testimony at pp. 11-15. Phase I of the Project will deliver 2,500 MW into Missouri, including 1,500 MW into MISO and an additional 1,000 MW into AECI. That delivery, once contracted, supports Phase I construction and is sufficient for Phase I to remain economically viable throughout the Project life without any additional delivery into PJM. This is reflected in Schedule RS-3, attached to the Surrebuttal Testimony of Rolanda Shine.

Phase II will comprise construction from the converter station in Missouri terminating at the substation in Sullivan County, Indiana and will deliver an additional 2,500 MW into PJM. Per the Certificate of Public Convenience and Necessity ("CPCN") granted by the Illinois Commerce Commission, construction of Phase II is conditioned on the Project having secured financing for both Phase I and Phase II, which is consistent with Grain Belt Express constructing Phase I first and Phase II being physically reliant on the construction of Phase I infrastructure. However, Phase

I is not physically reliant on the construction of Phase II, nor is Phase I's economic viability reliant on the construction of Phase II.

As stated in my Direct Testimony at pp. 11-15 and above, there is ample evidence of demand for Phase I of the Project. Staff's concern that phasing the Project may sacrifice the feasibility of Phase I is not supported by the evidence.

Q. Given your previous answer, would Grain Belt Express construct Phase I if it did not also have approval for Phase II?

A. Potentially no. While Phase I is not physically reliant on the construction of Phase II and does not need Phase II to be economically *viable*, Phase I is a significantly better investment with the construction of Phase II. Demand for both renewable generation and additional capacity resources continues to be strong in PJM. Furthermore, many of the reliability and resiliency benefits of the Project are significantly greater for a Project that interconnects with three RTOs rather than two.

Q. Mr. Stahlman notes from the CCN Order the Commission's observation that power prices are generally $10/MWh higher in PJM than prices paid for the energy sold into the MISO market in Missouri. (Stahlman Rebuttal 2:6–11.) Does that impact your analysis of the economic feasibility of Phase I?

A. No. As stated above, construction of Phase I, with the increased capacity and delivery to MISO and AECI, is not dependent on Phase II construction or PJM delivery. As explained further in the Direct and Surrebuttal Testimonies of Rolanda Shine, each Phase will be financed separately. (Shine Direct at 5:9; Shine Rebuttal at 7:13). The contracts for capacity on Phase I will be security for the debt capital to construct Phase I. (Shine Direct at 7:16-8:13). Staff

witness Seoung Joun Won found that Grain Belt Express and its affiliates have the financial ability to construct, operate, and maintain the Amended Project. (Won Rebuttal at 6:1-7:2).

Further, the power prices are not the only determinative factor in economic feasibility. Contracting parties with the Project can access additional value beyond just the electricity price. Grain Belt Express provides customers connected to AECI and MISO with access to high quality, highly diversified renewable resources at scale, in addition to access to the broader SPP market initially during Phase I and PJM eventually for Phase II. Access to these attributes creates significant economic value for potential customers beyond the price difference between SPP and MISO or PJM. These economic values include lower cost zero carbon energy, higher capacity value (particularly following greater penetration of renewable resources within MISO or AECI), increased reliability with an uncorrelated source of energy, increased resilience with access to the SPP market during tight local energy market conditions, and increased grid stability with a local HVDC converter.

Q. Mr. Stahlman challenges Grain Belt Express' estimation of a 74% capacity factor, which Mr. Stahlman testifies unreasonably assumes that generation will operate consistent with normalized wind and solar generation curves where the peak solar is equal to the peak wind capacity for a single day. Mr. Stahlman also testifies that the 74% capacity factor is much higher than what MISO or SPP accredit for a renewable source, and he references the rebuttal testimony of Ms. Eubanks, at 15:5–11, which cites MISO's "assumed accreditation" for capacity as 35% for solar and 16.6% for wind. (Stahlman Rebuttal 6:7–17.) How do you respond?

Mr. Stahlman appears to conflate the concept of capacity *factor* and capacity *accreditation*. Capacity factor refers to the energy a generator produces on average over time

relative to the maximum possible energy production. Capacity accreditation refers to expected power production as a percent of the maximum potential output specifically during peak demand periods. Any comparison of these values is flawed from the start because the metrics are not the same and one cannot compare apples with oranges.

With regard to capacity factor, 74% represents a realistic expectation of average energy production for resources expected to be interconnected to Grain Belt Express, based on actual observed data over a year.[5] Grain Belt Express projected actual wind and solar energy production for each hour of the year based on measured wind speed from met masts in southwest Kansas, and solar irradiance data from SolarAnywhere for a site in southwestern Kansas, for the capacity factor calculations. Grain Belt provided the same historical generation data to PA Consulting and used the same data for the year 2018 as presented in response to Staff Data Requests 33 and 34, attached hereto as Confidential Schedule SS-4.[6] Such an approach is a much more accurate measure of capacity factor than the use of normalized data for a day.

With regard to capacity accreditation, it is true that the fleetwide averages for wind and solar accreditation in MISO are 16.6% and 35%, respectively, however this is not an accurate measure of the expected capacity accreditation for Grain Belt interconnected resources located in southwest Kansas. First, MISO does not simply award wind and solar resources with the fleetwide average for the life of the project. MISO's calculation also takes into account the historical performance of individual assets and assigns accreditation accordingly.[7] It is

[5] The 74% capacity factor assumes a 2% line loss.

[6] Schedule SS-4 is marked Confidential in its entirety pursuant to 20 CSR 4240-2.135(2)(A)(6) because it contains information that Grain Belt Express classifies as Confidential as trade secrets and relating to strategies employed in contract negotiations.

[7] Solar Capacity Accreditation can be found in BPM 11 at .Section 4.2.1.5.2, available at https://cdn.misoenergy.org/2022%20Wind%20and%20Solar%20Capacity%20Credit%20Report618340.pdf

reasonable to assume that wind resources delivered via Grain Belt will have a higher capacity accreditation than MISO wind resources due to the superior wind resource in southwest Kansas versus within the MISO footprint. It is also reasonable to assume that capacity credit for southwest Kansas solar would be higher than the capacity credit for MISO solar because southwest Kansas solar is not only uncorrelated to local MISO resource but also delayed by over an hour. With additional solar expected to come online in MISO system, the net-peak summer demand will shift to late evening hours, when local solar production is declining rapidly, leading to high-capacity credit value for southwest Kansas solar.

Q. Mr. Stahlman notes in footnote 3 of his testimony that the MEC contract specifies a point of interconnect at the Maywood station, which will change should the amended project be approved. Staff is unclear on whether the MEC contract will remain in effect with the same proposed terms of service once the interconnection point is updated. Can you address this concern?

A. We have had discussions with MEC regarding changing the point of interconnection under the MEC contract to the Burns Substation. MEC has noted in writing that they do not have concerns moving the point of interconnection from the Maywood Substation to the Burns Substation. We expect to modify the contract if the proposed configuration is approved.

Q. Mr. Lange testifies that the Guidehouse study overstates known impacts of the Project to the capacity auction prices in MISO because the only executed contract does not interconnect into MISO. (Lange Rebuttal 14:6–10.) How do you respond?

A. First, I note that Mr. Lange concludes that the Project "fulfills the need requirement of the tartan criteria." (Lange Rebuttal 16:18.) Second, Mr. Lange does not dispute that delivery of 1,500 MW of renewable energy from southwest Kansas to a MISO interconnection in Missouri

will impact capacity auction prices. Mr. Lange instead suggests that there is not sufficient evidence of demand to impact capacity auction prices. Mr. Lange ignores the robust evidence of demand as described in my direct testimony at pages 13:7–15:2, including the MOUs executed with potential offtakers. If that demand is served by the Project, then the Project's injection of electricity in the MISO grid is expected to impact capacity auction prices as projected in the Guidehouse study.

III. BIDIRECTIONALITY AND CONSISTENCY WITH THE COMMISSION'S REPORT AND ORDER ON REMAND

Q. Staff witness Alan Bax notes in his testimony that Grain Belt Express acknowledged in response to Staff Data Request No. 54 that it is not currently planning to undertake the incremental investment necessary to allow for bidirectional operation. (Bax Rebuttal 6:1–4.) Is that accurate?

A. No. Aaron White's Surrebuttal Testimony explains that Grain Belt Express is investing in technology with the inherent capability for the bidirectional flow of energy. At this time, Grain Belt Express has applied only for injection rights with MISO at the Burns Substation. Grain Belt Express has not received any requests from customers or potential customers for long-term bidirectional capability and so Grain Belt Express has not applied with MISO for withdrawal rights from the Burns Substation. Long-term firm withdrawal rights from MISO would be inconsistent with the fundamental value of Grain Belt Express to generally be bringing energy from Kansas into MISO. There will, however, be opportunities for a Grain Belt Express customer to withdraw energy from MISO for export to SPP or PJM during times of economic opportunity or reliability needs. These withdrawals can be accomplished by future GBX customers through transmission service arrangements with MISO as specified in Module B their OATT.

Q. Farm Bureau President Garrett Hawkins testifies that the Tiger Connector is a "new project" and that the Commission should not "amend its prior approval" for the Project but should scrutinize the Tiger Connector "as the new project that it clearly is." (Hawkins Rebuttal 5:7–12.) Do you agree that the Tiger Connector is a "new project"?

A. Although an AC connector line has always been a component of the Project, Grain Belt Express acknowledges that the Tiger Connector constitutes a "material change" to the project for which a CCN was approved in File No. EA-2016-0358 because it is longer and will be constructed in different counties than originally anticipated. As such, Grain Belt Express filed its Application to Amend the Existing CCN in this File No. EA-2023-0017. The "material change" is analyzed by the Commission according to the same Tartan factors as it would analyze a new project, just like Mr. Hawkins suggests, including local public hearings, a full procedural schedule with time for discovery, and an evidentiary hearing. Accordingly, there is no material impact on the Commission's or stakeholders' ability to scrutinize the Tiger Connector.

However, the balance of and purpose for the Project remains the same and the Commission reviewed a thorough administrative record in File No. EA-2016-0358 to make the findings in its CCN Order. Those findings are still true and relevant to this proceeding. The Commission can, and should, rely on its work in File No. EA-2016-0358 when evaluating the Application in this File. This issue is also addressed in Grain Belt Express' Application at Paragraphs 17-18 and 105-107.

Q. Mr. Hawkins also criticizes Grain Belt Express for not "shar[ing] profits with the landowners who will house its infrastructure on their property," and distinguishes the

Project from wind and solar projects that "create[] annual and ongoing payments, and definitive termination points." (Hawkins Rebuttal 5:15–22.) How do you respond?

A. As described in detail in the direct testimony of Kevin Chandler, the Project has already made payments to landowners totaling over $11 million in upfront easement signing payments on voluntary agreements representing over $84 million in total contract value including future easement and structure payments. (Chandler Direct 6:9–11). Grain Belt Express will offer a payment equal to 150% of the fair market fee value of the easement area for voluntary easements for the Tiger Connector. (Chandler Direct 14:14–15). After a 20% initial payment at the time of signing the easement, the landowner has the option to receive the balance as a lump sum prior to construction or as an annual payment for as long as the easement remains in effect with a 2% annual escalator. (Chandler Direct 14:15–20). This payment structure is better than fair.

IV. INVENERGY TRANSMISSION'S PARTICIPATION IN FERC PROCEEDINGS DO NOT IMPACT THE PROJECT'S ECONOMIC FEASIBILITY

Q. The Staff Report, Mr. Lange's Rebuttal Testimony, and Ms. Eubanks' Rebuttal Testimony each assert that Invenergy Transmission's exploration of a reliability product at FERC undermines the "shipper pays" model relied upon by the Commission in the CCN Order. Can you respond to this line of testimony?

A. Staff overstates the impact of Invenergy Transmission's exploration of a reliability product at FERC. To start, Mr. Lange correctly quotes a Request for Technical Conference filed by Invenergy Transmission in FERC Docket No. AD2022-17-000, which requested a technical conference to explore ways to make available and compensate certain grid reliability and resilience benefits associated with interregional HVDC transmission provided on a merchant basis.

However, Mr. Lange incorrectly commingles that request and analysis with Grain Belt Express' commitment to operate a participant-funded transmission line, as set forth in Commission CCN Order in EA-2016-0358.

The reliability products that Invenergy Transmission refers to in the Request for Technical Conference are based on unique HVDC asset characteristics allowing for fast acting, controlled responses during a time of emergency need—such as during extreme weather events. For example, the Project is expected to have the functional ability to dispatch reserves in one zone for delivery to another zone to accommodate for the loss of generation, to deliver energy during an Energy Emergency Alert or to deliver energy to a blacked-out area to aid in its restoration. The HVDC assets could also aid in providing voltage support if one of its points of intertie were in need. These reliability and resiliency features are part of the package of benefits that Grain Belt Express may be able to provide as an interregional four-state HVDC transmission line.

The reliability and resilience services are distinguishable from the day-to-day operations of the Project transmitting electricity from southwest Kansas to buyers of electricity in Missouri and surrounding regional transmission organizations. As explained in the testimony of Rolanda Shine, the Project will use a "project finance" model to finance the Project and agreements for the transmission of electricity with buyers will serve as collateral. (Shine Direct 7:14–8:2, 9:10–14.) That participant-funded model (also referred to as a "shipper's pay" or "merchant" model) endures.

If capacity exists on the line to provide additional reliability and resiliency services to the RTOs/ISOs, especially in time of emergency, then the appropriate treatment and compensation for such services needs to be studied. Invenergy Transmissions' Request for a Technical Conference has requested such a study. It should be noted that the reliability and resiliency products are entirely conceptual at this point subject to FERC approval. Any potential for additional revenue

for the provision of such products or interregional transfer capability would also require further approval by FERC and any entity contracting for that product or capability. Presumably, if such reliability and resiliency capabilities exist and are approved and functional, then participants in all impacted RTOs/ISOs—including residents in Missouri—will benefit. Cost allocation for services that customers need, procure and use does not result in a mandatory payment by load and retains the participant-funded model of the Project.

V. THE PROJECT'S INTERCONNECTION STATUS IS NOT RELEVANT TO THE NEED OR ECONOMIC FEASIBILITY OF THE PROJECT

Q. The Staff Report notes that the RTO final studies remain incomplete and asserts that the Project scope is unclear with four interconnection requests currently pending with MISO. The Staff Report states, "Invenergy [sic] can sign an interconnection agreement based on any one or combination of these studies, perhaps even none. Until Grain Belt specifies its project in an interconnection agreement, Staff cannot tell the Commission how much generation will be interconnected with Missouri nor is it clear which party would be responsible for the costs of injecting various amounts of energy at the interconnection point(s)." (Staff Report at 2.) How do you respond to this assertion?

A. Among other things, Grain Belt Express is requesting an amendment to the CCN to increase the converter station size from 500 to 2500 MW and the converter station location from Ralls to Monroe County. This amendment is consistent with Grain Belt Express' intent to deliver 1,000 MW into AECI and 1,500 MW into MISO, which is further consistent with the interconnection requests and studies that are ongoing. Staff's criticism that Grain Belt Express may sign a combination of interconnections, or none at all, is entirely inconsistent with the demonstrated purpose and intent of the Project. Carlos Rodriguez addresses the current status of

the interconnection studies and costs in his Surrebuttal Testimony. To the extent the Commission is concerned with the lack of finality of interconnection agreements, there is an existing condition to address that concern [refer to original CCN Order, Exhibit 206].

VI. VII. 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 SHASHANK SANE

1. My name is Shashank Sane. I am the Executive Vice President of Transmission for Invenergy LLC ("Invenergy"). My business address is One South Wacker Drive, Suite 1800, Chicago, Illinois 60606.

2. I have read the above and foregoing Rebuttal 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.

DocuSigned by:
Shashank Sane
F8477BE2851C419...

Shashank Sane
Executive Vice President of Transmission
Invenergy LLC

Date: 5/15/2023