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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO.

EA-2023-0017

SURREBUTTAL TESTIMONY

OF

MARK REPSHER

ON

BEHALF OF

GRAIN BELT EXPRESS LLC

MAY 15, 2023

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1 **I. INTRODUCTION**

2 **Q. Would you please state your name, business address, and current position?**

3 A. A. My name is Mark D. Repsher, and I work as a Member of PA’s
4 Management Group for PA Consulting Group, Inc. (“PA Consulting”). My business address is
5 1700 Lincoln Street, Suite 3550, Denver, CO 80203.

6 **Q. Have you previously submitted testimony in this proceeding?**

7 A. Yes, I submitted direct testimony on August 24, 2022 and accompanying
8 exhibits/schedules identified as Schedules MR-1 through MR-2.

9 **Q. What is the purpose of your surrebuttal testimony?**

10 A. I am responding to testimony filed by Staff Witnesses Michael Stahlman and
11 Krishna Poudel relating to economic analysis of the Project, Project need, economic feasibility,
12 and public interest.

13 **II. RESPONSE TO STAFF WITNESS MICHAEL STAHLMAN**

14 **Q. Can you briefly describe Staff’s position on construction the project in two**
15 **phases?**

16 A. Yes, several Staff witnesses, including Mr. Stahlman, recommend against
17 constructing the project in two phases. Staff believes that phasing the project adds more uncertainty
18 regarding the feasibility of the project.

19 **Q. How do you respond?**

20 A. I defer the issue to the surrebuttal testimonies of Grain Belt Express Witnesses
21 Shashank Sane, Kevin Chandler, and Rolanda Shine who each rebut Staff’s criticisms of project
22 phasing and explain why project phasing is in the public interest of Missouri.

1 **Q. Staff Witness Michael Stahlman notes that your study addresses benefits for**
2 **construction of the full 5,000 MW line rather than the project in two discrete phases. How**
3 **do you respond?**

4 A. Mr. Stahlman’s assertion is inaccurate. PA Consulting’s study did evaluate the
5 ratepayer impacts of the Project in two distinct phases and not just the full 5,000 MW line.
6 Specifically, PA Consulting modeled two separate scenarios: (i) the “Status Quo Case”, in which
7 the Project can deliver 500 MW to the Maywood – Spencer Substation in Missouri starting in 2027
8 (part of the MISO wholesale power market); and (ii) an “Expanded GBX Case” in which a larger
9 Project configuration is able to deliver approximately 5,000 MW in total. Specifically, the
10 Expanded GBX Case analyzes the Project in two phases, beginning with Grain Belt Express’s
11 Missouri points of interconnection (~2,500 MW) seeing deliveries starting in 2027 and then an
12 incremental 2,500 MW of deliveries into the PJM wholesale power market starting in 2030. Thus,
13 the analysis accounts for the Project’s two distinct phases as well as incorporates the time-delay
14 between the commencement of MISO and PJM deliveries.

15 **Q. Mr. Stahlman notes that your study assumes a ‘blend of generation that does**
16 **not exist’. How do you respond?**

17 A. Mr. Stahlman is correct that this blend of generation does not currently exist. This
18 is not surprising given the development cycles for solar and wind facilities are typically 3-5 years
19 in length and with battery energy storage system (“BESS”) projects having an only slightly faster
20 development timeline. Regardless, most of these projects are unlikely to start construction until
21 there is certainty regarding a transmission solution to export generation from this region.

22 Regardless, SPP’s current Generator Interconnection queue for Kansas alone suggests that
23 there are over 20 GW of new solar and wind resources in the region that have submitted initial

1 requests to come online. This potential influx of supply is driven by a combination of factors, such
2 as expected thermal retirements, load-serving entity and corporate demand for renewables,
3 improving economics in light of favorable federal policies (e.g., tax credits from the Inflation
4 Reduction Act), easing supply chain constraints, anticipated regional transmission expansion,
5 advantageous renewable resource quality vis-à-vis states further to the east, etc.

6 To be clear, PA Consulting’s analysis conservatively assumes that only a fraction of
7 generators in the queue will ultimately come online (as evidenced by history) and other generators
8 not currently in the queue will enter over the next few years. For example, PA Consulting’s
9 analysis projects that from 2022-29, the entire SPP RTO (not just Kansas) is expected to see the
10 entry of approximately 17 GW of new nameplate wind and solar resources, which is less than the
11 20 GW of new solar and wind resources currently in the Generator Interconnection queue for
12 Kansas alone.

13 **Q. In his rebuttal testimony, Mr. Stahlman states that the Project will not lower**
14 **capacity and energy prices by itself. How do you respond?**

15 A. The market price suppressive impacts from the Project are independent of the
16 upfront costs associated with the generation feeding Grain Belt Express. From a simplistic
17 economic lens, the addition of lower cost (i.e., near zero variable cost) supply will – all else equal
18 – lead to lower price outcomes compared to the counterfactual case. In fact, Mr. Stahlman’s
19 testimony acknowledges this reality when he states in his rebuttal testimony that “...using basic
20 supply curve shifts, it is obviously true that energy and capacity prices will go down. Any extra
21 generation, all else remaining the same, will reduce energy and capacity prices.”¹ Grain Belt

¹ Rebuttal Testimony of Michael Stahlman at 5:14-22.

1 Express, the *HVDC transmission project* being discussed in this proceeding, is the vehicle that
2 induces these savings.

3 The fixed capital costs associated with the renewable generation supply feeding the Project
4 will be borne by the respective owners and operators of these generators, which they will bear
5 upfront (with the help of debt and equity financing counterparties or through their own balance
6 sheets) and aim to recover (either through a contract and/or via the market) over the course of
7 operations through the sales of energy, capacity, environmental, and ancillary attributes. Here too
8 Mr. Stahlman appears to agree, stating later in his rebuttal testimony that “those costs [such as the
9 ones associated with constructing and interconnecting new generation] are not relevant to
10 Invenenergy and thus are properly excluded [by Mr. Repsher].”²

11 Of course, as Mr. Stahlman insinuates, the developers of these renewable projects will only
12 develop them if projected revenues exceed costs and internal hurdle recovery rates. Likewise,
13 customers (including utilities) will only enter into agreements to purchase power from these
14 renewable projects if it results in a better economic outcome than the alternative (for example,
15 compared with siting the same amount of lower quality renewable resources in Missouri).
16 However, this discussion is outside the scope of determining the value of Grain Belt Express as a
17 vehicle to deliver lower cost/higher quality renewable resources to Missouri.

18 **Q. Mr. Stahlman suggests that it is unclear whether generators in Kansas would**
19 **be incented to use Grain Belt Express to liquidate their attributes farther east, in markets**
20 **such as MISO. How do you respond?**

21 A. While each generator will ultimately evaluate—on a case-by-case basis—whether
22 it is more accretive to sell its attributes within SPP itself or rely on the Project to unlock access to

² *Id.* at 7:12-18.

1 eastern markets, it is plausible to assume that a proposition such as Grain Belt Express can lead to
2 higher revenues for those generators. Parts of SPP—such as Kansas—already experience periods
3 of low/negative power prices and unfavorable congestion/curtailment in several hours each year,
4 owing to the existing resource mix and lack of transmission capacity to export generation from
5 these resources to other areas. This serves to lower the expected revenues that new build resources
6 can realize from the SPP market (or through contracting with an SPP entity) primarily via lower
7 nodal pricing. However, eastern markets—including MISO Zone 5 (Missouri), AECI, and PJM
8 AEP—do not face the same issues at this scale, which results in meaningfully higher potential
9 power price outcomes (and, thus, renewable realized revenues) for resources that can deliver to
10 these areas.

11 Additionally, the time zone shift factor associated with resources selling from SPP to
12 MISO/PJM can serve to bolster the reliability value these generators can recognize. Moreover, and
13 as noted in the PA Consulting report, developing resources in parts of Kansas (such as Sunflower
14 Electric’s service area) can be economically favorable vis-à-vis eastern markets as resources in
15 Kansas tend to experience higher capacity factors relative to in-state Missouri resources and
16 thereby lowering their levelized costs on a \$/MWh basis (i.e., making them cheaper to construct,
17 relative to Missouri). Finally, the value of environmental attributes (e.g., renewable energy
18 certificates) tends to be higher in MISO and PJM, relative to SPP.

19 All of these factors collectively point towards there being adequate tailwinds for certain
20 resources constructed in SPP entering into an agreement with Grain Belt Express.

1 **Q. Mr. Stahlman notes that you relied on unreasonable capacity factors; do you**
2 **agree?**

3 A. No, I disagree. As noted in PA Consulting’s report, Invenergy provided me with
4 expected 8,760 production profiles for the wind and solar facilities associated with Grain Belt
5 Express, which equated to net AC capacity factors (pre-curtailment) of 47% and 30% respectively.
6 While the details (e.g., specific sources) of these values are addressed by witness Shashank Sane
7 in his surrebuttal testimony, in my professional experience they are generally reasonable for
8 resources located in Kansas.

9 The 74% capacity factor value cited in PA Consulting’s report represents the “blended”
10 capacity factor for the Grain Belt Express Project. This is calculated by summing the hourly
11 generation from the renewable resources feeding its western terminus (with the generation
12 ‘clipped’ as appropriate when total generation feeding the Project exceeds the Project’s rated
13 capacity), and dividing by the Project’s rated capacity and multiplied by 8,760 hours.³ Given the
14 combined capacity of generators feeding the line (approximately 9,300 MW) far exceeds the
15 instantaneous takeaway capacity of the line (5,000 MW), this allows for a higher optimized
16 utilization of the line and lowers the overall cost (on a \$/MWh or \$/kW-year basis) for the
17 renewable generators to access the Project.⁴ In addition, this serves to offer a “firmer” product (i.e.,
18 more reliable and less intermittent), which can afford the Project a higher capacity accreditation
19 value that can be recycled back to interconnecting generators.

³ The underlying data is provided in Schedule SS-4, attached to the Surrebuttal Testimony of Shashank Sane. The 74% capacity factor cited in PA Consulting’s report assumes 2% line losses.

⁴ Values noted for the Expanded GBX Case. In the Status Quo Case, which assumes a lower line capacity as well as associated generator buildout, the Project’s capacity factor is 71%.

1 **Q. Further to the above, Mr. Stahlman cites Claire Eubanks’s testimony, noting**
2 **that the 74 percent capacity factor is much higher than what MISO or SPP accredit for a**
3 **renewable resource. How do you respond?**

4 A. As explained by witness Shashank Sane in his Surrebuttal Testimony, Ms. Eubanks
5 and Mr. Stahlman appear to be conflating capacity factor with capacity accreditation, which are
6 fundamentally different metrics. Capacity factor represents the ratio between the actual generation
7 of a resource relative to its maximum possible generation, typically measured over *all hours* in a
8 year.⁵ For renewables, a key determinant of capacity factor is resource availability in each hour
9 (e.g., solar irradiance, wind speeds, etc.). Capacity accreditation, on the other hand, represents the
10 reliability value of a given unit, measured as its availability during a subset of hours (i.e., the
11 “tightest” system condition hours) over the course of a year. Capacity factor more directly “maps”
12 to energy price outcomes, while capacity accreditation relates more directly to capacity price
13 outcomes.

14 **Q. It is asserted that lower energy and capacity prices would not necessarily**
15 **translate to ratepayer savings. How do you respond?**

16 A. I disagree. Both of Mr. Stahlman’s concerns as to why lower market prices would
17 not translate to ratepayer savings have already been addressed within PA Consulting’s
18 fundamental analysis. First, he suggests that lower generator margins (from depressed power
19 prices) will result in a higher ‘net need’ for generator fixed cost recovery. While this statement is
20 accurate, PA Consulting’s study does account for a higher net need, wherein long-term capacity

⁵ This can be illustrated via a simplified example: a hypothetical 100 MW wind facility with a 50% capacity factor can be thought of as simplistically generating at 100 MW in half of all hours in a year (*regardless of when those hours occur*) with no generation whatsoever in the remaining half of all hours in that year. Of course, in reality, output does not tend to be binary between all or nothing.

1 prices are greater in the Expanded GBX Case relative to the Status Quo Case.^{6,7} Second, Mr.
2 Stahlman (rightly) notes that there may be hour-to-hour variances in emissions and power prices
3 that are not universally favorable/desirable, based on what resource is marginal at any given point
4 in time. As noted in PA Consulting’s report, PA Consulting conducts a chronological hourly
5 dispatch simulation of the entire Eastern Interconnection, mimicking real-world grid operations
6 and capturing periods when higher-emitting/higher-cost resources would be marginal, including
7 the impact of ramping needs when wind or solar resources do not generate. The ratepayer costs
8 and emissions benefits cited within my testimony and PA Consulting’s report are inclusive of those
9 hours. Said differently, the unfavorable impacts from those periods have already been accounted
10 for.

11 **Q. Mr. Stahlman argues that PA Consulting incorrectly apply economic**
12 **feasibility by counting benefits to non-Invenenergy parties. How do you respond?**

13 A. I disagree. Generally speaking, economic feasibility determinations entail looking
14 at the costs and benefits associated with the Project in question. In doing so, it is critical to
15 appropriately apportion the costs and benefits to relevant parties. Moreover, it is imperative to
16 define whom that analysis ultimately applies to / is germane for. Specifically, in my testimony, I
17 note that the savings to Missouri ratepayers from the Project will provide “*plenty of headroom for*
18 *ratepayers to absorb the Grain Belt Express Investment.*”⁸ Thus, I am clearly comparing both the

⁶ See Schedule MR-2, Section 3.3 of my Direct Testimony.

⁷ In the near-term, the effect of higher reserve margins from additional supply outweighs the effect from lower energy margins, wherein capacity prices in the Expanded GBX Case are somewhat lower.

⁸ While Invenenergy and any of its debt/equity partners will bear the upfront costs of the Project, ultimately, it is my understanding that those costs will be recovered (over the life of the Project) through entering into offtake agreements with third parties, including (but not limited to) load-serving entities (that will plausibly themselves look to recover those costs from their ratepayers).

1 costs borne by—and benefits enjoyed by—ratepayers (and not other entities). In this case, the costs
2 are capital expenditures associated with the Project, and the benefits are those induced by the
3 Project acting as a vehicle to deliver renewable energy to consumers.

4 **III. RESPONSE TO STAFF WITNESS KRISHNA POUDEL**

5 **Q. Have you reviewed the sections of Staff Witness Krishna Poudel’s Rebuttal**
6 **Testimony on environmental aspects of the project?**

7 A. Yes, I have.

8 **Q. Can you summarize his positions as they relate to your analysis?**

9 A. Yes. Staff witness Poudel’s positions can be summarized into two distinct but
10 related categories. First, Dr. Poudel questions PA Consulting’s assumed carbon prices in relation
11 to those within Ameren Missouri’s latest IRP. Second, Dr. Poudel caveats the carbon reduction
12 benefits to Missouri residents induced by Grain Belt Express. I will address both of these concerns
13 below in a manner wherein his concerns should be alleviated without the need for conducting any
14 additional analyses.

15 **Q. Dr. Poudel insinuates that PA Consulting’s analysis has overestimated carbon**
16 **prices relative to Ameren’s IRP. Is that accurate?**

17 A. No. Dr. Poudel appears to be conflating units. Ameren’s IRP notes carbon prices
18 on a real 2021 dollars per metric tonne basis, while PA Consulting’s study notes carbon prices on
19 a nominal dollars per short ton basis. Once adjusted for a consistent reporting of units, and
20 assuming an (arguably conservative) inflation rate of 2.20% per year, PA Consulting’s 2040
21 carbon price falls between Ameren’s probability-weighted average case, and high case.

1 **Q. Could you please elaborate on PA Consulting’s rationale behind deviating**
2 **(positively or negatively) from Ameren’s carbon price assumptions?**

3 A. PA Consulting never intended to solely mimic Ameren’s carbon price assumptions.
4 My assumed starting point carbon price was an approximate average of the bookend prices used
5 by MISO in its 2022 Long-Range Transmission Planning process (that ranged from \$12.55/metric
6 tonne to \$49.51/metric tonne, in real 2022 dollars),⁹ which I held flat in real dollar terms for my
7 analysis. The intent of this assumption was to efficiently capture broad regional trends; for
8 example, my assumed carbon prices fall well within the range of values used by Midwestern
9 utilities such as Ameren Missouri, SWEPCO Arkansas,¹⁰ DTE Michigan,¹¹ NIPSCO
10 Indiana/Kentucky,¹² Duke Energy Indiana,¹³ etc.

11 **Q. As Dr. Poudel notes, are the takeaways of PA Consulting’s study contingent**
12 **on using – what he suggests is – an aggressive carbon price assumption?**

13 A. No, I disagree. I am using the *same* carbon pricing assumptions (among other
14 drivers) between the two cases being compared (i.e., the “Status Quo Case” and the “Expanded
15 GBX Case”), with resultant differences in ratepayer and emissions impacts between the two being
16 attributable to a larger Project configuration. As noted in the PA Consulting report, the use of an

⁹ See LRTP Tranche 1 Portfolio Detailed Business Case, MISO (Mar. 29, 2022): <https://cdn.misoenergy.org/20220329%20LRTP%20Workshop%20Item%2002%20Detailed%20Business%20Case623671.pdf>.

¹⁰ See <https://www.swepco.com/lib/docs/community/projects/SWEPCOLADataInputsandAssumptions1-31-2022.pdf>.

¹¹ See <https://mi-psc.force.com/sfc/servlet.shepherd/version/download/0688y000004qW9sAAE>.

¹² See <https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/2021-nipsco-integrated-resource-plan.pdf?sfvrsn=6>.

¹³ See <https://www.in.gov/iurc/files/REVISED-PUBLIC-DUKE-ENERGY-INDIANA-2021-IRP-VOLUME-I.pdf>.

1 alternative carbon price assumption (either higher or lower) will still result in directionally
2 consistent outcomes (i.e., ratepayer savings), albeit with differences in specific benefit values.

3 In addition, it is important to note that my outlook of regional supply stacks for both cases
4 here reflect a “cleaner”/more decarbonized forecast, relative to a worldview sans carbon pricing
5 (i.e., *both* cases assume carbon pricing). Assuming a grid with greater renewables penetration (as
6 I have here, owing to my assumed carbon pricing regime) in fact serves to *limit* the potential energy
7 savings induced by a project such as Grain Belt Express, relative to the counterfactual case,
8 because there are fewer “dirtier” (and costlier) resources available to be displaced by Grain Belt
9 Express.

10 **Q. While Dr. Poudel acknowledges that the projected emissions reductions from**
11 **the Project are likely to be beneficial to the State of Missouri, he qualifies that outcome based**
12 **on factors such as how economic welfare will be distributed. How do you respond?**

13 A. It is generally irrefutable that the projected emissions reductions (i.e., tonnage)
14 attributable to Grain Belt Express will benefit Missourians (and Midwesterners more broadly).
15 Reducing CO₂, SO₂, and NO_x emissions helps limit the adverse impacts of climate change,
16 improves air quality, and induces health benefits. I agree that Dr. Poudel’s caveat *is* applicable to
17 the economic welfare distribution of monetary/financial societal benefits associated with Grain
18 Belt Express (i.e., \$7.6 billion from 2027-66, as projected within the PA Consulting study), which
19 is why I conservatively *excluded* that value when comparing the ratepayer benefits of the Project
20 (i.e., \$17.6 billion) relative to its associated costs (i.e., \$5.7 billion). Had I included those benefits,
21 ratepayer benefits would be higher than stated.

1 **Q. Are key takeaways from your study corroborated by any of the other**
2 **independent witnesses (i.e., not filing on behalf of Grain Belt Express)? If so, please explain.**

3 A. Yes, independent witness Michael Goggin corroborates the findings of my study.
4 Specifically, Mr. Goggin through his own research and analysis also notes that the Project would
5 lower Missouri ratepayer costs and GHG emissions.¹⁴

6 **Q. In light of all your responses above, how do you respond to Staff Witness**
7 **Poudel’s recommendation that PA Consulting provide an updated cost-benefit analysis using**
8 **Ameren Missouri’s assumed carbon prices from its most recent preferred resource plan?**

9 A. I believe I have established and substantiated that there is no need for an updated
10 analysis, since the takeaways will remain largely unchanged relative to the existing analysis.

11 **IV. CONCLUSION**

12 **Q. Does this conclude your testimony?**

13 A. Yes, it does.

¹⁴ *See generally* Rebuttal Testimony of Michael Goggin.

**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) File No. EA-2023-0017
Maintain a High Voltage, Direct Current)
Transmission Line and Associated Converter)
Station)

AFFIDAVIT OF MARK D. REPSHER

1. My name is Mark D. Repsher, and I work as a Member of PA’s Management Group for PA Consulting Group, Inc. (“PA Consulting”). My business address is 1700 Lincoln Street, Suite 3550, Denver, CO 80203.

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.



Mark D. Repsher
Member
PA Consulting Group, Inc.

Date: May 12, 2023