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Clean Line LLC
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MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. EA-2016-0358

DIRECT TESTIMONY OF

DAVID A. BERRY

CHIEF FINANCIAL OFFICER, EXECUTIVE VICE PRESIDENT

ON BEHALF OF

GRAIN BELT EXPRESS CLEAN LINE LLC

August 30, 2016

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1 **I. INTRODUCTION**

2 **Q. Please state your name and business address.**

3 A. My name is David Berry. My business address is 1001 McKinney Street, Suite 700,
4 Houston, Texas 77002.

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

6 A. I am Chief Financial Officer and Executive Vice President for Clean Line Energy Partners
7 LLC (“Clean Line”). Clean Line is the ultimate parent company of Grain Belt Express
8 Clean Line LLC (“Grain Belt Express” or “Company”), the Applicant in this proceeding.

9 **Q. Please describe your education and professional background.**

10 A. I received a Bachelor of Arts degree from Rice University with a major in economics and
11 a second major in history. Prior to joining Clean Line, I was employed by Horizon Wind
12 Energy as Finance Director. At Horizon Wind Energy, I was responsible for financing
13 transactions, investment analysis, power purchase agreement pricing and acquisitions. I
14 worked on and led over \$2 billion of project finance transactions, including a non-recourse
15 debt financing that was named North American Renewables Deal of the Year by *Project*
16 *Finance*, and several equity transactions for wind generation projects in development,
17 construction, and operations. I joined Clean Line as one of its first employees in late 2009.

18 **Q. What are your duties and responsibilities as Chief Financial Officer and Executive**
19 **Vice President of Clean Line?**

20 A. I am responsible for developing the transmission capacity products offered to Grain Belt
21 Express’ transmission customers and furthering relationships with those customers. I lead
22 a team responsible for ensuring that the transmission service offered by Clean Line results
23 in a compelling value proposition for both generators, utilities and utilities’ end-use

1 customers. I oversee and am responsible for the financing activities, accounting,
2 transaction structuring, and market analysis for Clean Line and its subsidiaries, including
3 Grain Belt Express. I have testified in support of Grain Belt Express' applications for
4 certificates to construct its proposed transmission project before the Indiana Utility
5 Regulatory Commission, the Kansas Corporation Commission, and the Illinois Commerce
6 Commission, as well as the Missouri Public Service Commission in the Company's
7 previous application for a certificate of convenience and necessity, No. EA-2014-0207
8 ("2014 Case"). On behalf of other Clean Line subsidiaries, I have testified before the
9 Illinois Commerce Commission, the Tennessee Regulatory Authority, the Oklahoma
10 Corporation Commission and the Georgia Public Service Commission.

11 **Q. What is the purpose of your direct testimony?**

12 A. My testimony supports the Company's request for a certificate of convenience and
13 necessity ("CCN") to operate in the state of Missouri. The Grain Belt Express Clean Line
14 transmission line ("Grain Belt Express Project" or "Project") is a major infrastructure
15 expansion that brings economic, market, policy and environmental benefits to Missouri
16 and the surrounding region. By installing a converter station in Missouri, the Project will
17 allow Missouri electric purchasers the opportunity to access the lowest-cost renewable
18 energy in the country without an increase in the rates paid by retail electric consumers.

19 I understand that the Missouri Public Service Commission ("Commission") uses
20 five criteria to evaluate applications for a CCN. Those criteria are: (1) there must be a need
21 for the service; (2) the applicant's proposal must be economically feasible; (3) the applicant
22 must have the financial ability to provide the service; (4) the applicant must be qualified to
23 provide the proposed service, and (5) the proposed service must promote the public interest.

1 In this testimony, I will provide evidence that the Application satisfies each of those
2 criteria.

3 **Q. How is your testimony organized?**

4 A. My testimony is organized into four additional sections.

5 • **Section II** describes the open access, point-to-point transmission service that the
6 Project will offer to transmission shippers or users who will pay for the costs of the line
7 through contracts with Grain Belt Express. This participant-funded business model
8 benefits Missouri end-use electric consumers because it does not result in an increase
9 in the transmission component of rates paid by these end-users. Further, this business
10 model protects the Missouri public from the financial risks of the Project, which are
11 born by Grain Belt Express and its investors.

12 • **Section III** addresses Grain Belt Express’s financial ability to provide service on the
13 Project. The Company will rely on specific revenue contracts with shippers or
14 transmission service customers in order to support the financing of the Project. The
15 proven financing model known as “project finance” is commonly used for electric
16 generation projects, natural gas pipelines, and electric transmission projects. The
17 management of Grain Belt Express and our investors both have substantial experience
18 in project finance and know how to develop the Project to meet the requirements of the
19 capital markets.

20 • **Section IV** addresses how the Project is economically feasible, why the Project is
21 needed, and why it serves the public interest. These three topics are closely linked and
22 are therefore best discussed together. The Project provides Missouri with a new source
23 of affordable, clean energy that can reduce costs for Missouri end-users of electricity,

1 including the customers of the Missouri Joint Municipal Electric Utility Commission
2 (“MJMEUC”), the municipal utility joint action agency which has agreed to purchase
3 up to 225 megawatts (“MW”) of transmission service from Grain Belt Express, with
4 an option to purchase an additional 25 MW. The Project can help meet the need for
5 renewable energy created by the Missouri Renewable Energy Standard (“RES”) and
6 the renewable portfolio standard (“RPS”) requirements of the other states served by the
7 Midcontinent Independent System Operator, Inc. (“MISO”) and PJM Interconnection,
8 LLC (“PJM”) regional transmission organizations (“RTOs”). In addition to RES and
9 RPS demand, the Project can meet the needs of large industrial and commercial users,
10 who increasingly demand clean energy as part of corporate policies and decisions to
11 make new investments in a state. Low-cost wind energy delivered by the Project will
12 benefit the State of Missouri by meeting the demand for clean energy specifically and
13 low-cost energy in general. The energy delivered by the Project is cheaper than
14 alternative sources of power, produces wholesale electric market savings and does not
15 affect the transmission component of rates paid by end-use customers.

- 16 • **Section V** notes Grain Belt Express’ commitment to agree to a set of conditions similar
17 to those agreed in the 2014 Case.

18 **II. NATURE OF SERVICE**

19 **Q. Please describe the service to be offered by the Grain Belt Express Project.**

20 A. The Project will offer three types of open access transmission service.

- 21 • The Project will offer transmission service from its western converter station in
22 Ford County, Kansas to the Project’s point of interconnection along the Ameren
23 Maywood-Montgomery 345 kilovolt (“kV”) transmission line in Missouri

1 (“Kansas-Missouri Service”). The Missouri converter station will allow the
2 delivery of 500 MW of power to the Project’s Missouri point of interconnection.

- 3 • The Project will offer transmission service from its western converter station in
4 Ford County, Kansas to PJM (“Kansas-PJM Service”). The PJM point of
5 interconnection for Kansas-PJM Service is the Sullivan substation, which is owned
6 by Indiana Michigan Power Company, a subsidiary of American Electric Power
7 Company. Located near the Illinois-Indiana border, this second point of
8 interconnection will enable the delivery of up to 3,500 MW of power to the PJM
9 energy market. The amount of power delivered to PJM is higher because the Project
10 interconnects to a 765 kV system in Indiana, which can manage a larger injection
11 than the 345 kV system in Missouri.

- 12 • Finally, the Project will offer up to 500 MW of transmission service from the
13 Missouri converter station to the Sullivan Substation in PJM (“Missouri-PJM
14 Service.”) The Missouri-PJM service provides opportunities for Missouri load-
15 serving entities to earn additional revenue from off-system sales, which can be used
16 to offset other costs to serve their Missouri electric customers.

17 **Q. How will the variability be managed from the wind generation connected to the**
18 **Project?**

19 A. High voltage direct current (“HVDC”) converters are fully controllable, meaning the
20 amount of power uptake and delivery can be set to match the output of the wind generators
21 from the Project on a near instantaneous time (four seconds or less). Therefore, one set of
22 wind farms using Kansas-Missouri service can deliver as-generated wind output to the
23 MISO system in Missouri. Another, much larger set of wind farms using Kansas-PJM

1 service can deliver as-generated wind output to the PJM system. The grid operators of
2 MISO and PJM will be responsible for balancing the variability from the Project's wind
3 generation. In MISO, where the Project will deliver 500 MW, the existing grid already
4 includes over 15,000 MW of wind generation. A new addition of 500 MW is a 5% increase
5 and will not be a major source of new variability.¹

6 **Q. Who will be the transmission service customers of the Project?**

7 A. The Project will connect the abundant and low-cost wind energy resources of western
8 Kansas to Missouri, Illinois, Indiana, and other states in the MISO and PJM footprints. In
9 light of this purpose, the customers or “shippers” that will buy transmission service on the
10 Project will generally fall into three categories. First, wind generators can buy transmission
11 service on the Project and then sell their output to the MISO and PJM energy markets (or
12 under a power purchase agreement (“PPA”) with MISO or PJM load serving entities).
13 Second, load serving entities can buy capacity on the Project and use this service to move
14 low-cost wind energy purchased from western Kansas to where the energy is needed by
15 their electric customers. Third, Missouri utilities may purchase service from Missouri to
16 PJM as a way of increasing off-system sales revenues. Grain Belt Express has received
17 requests for transmission service from all three types of shippers, as discussed in further
18 detail in Section IV.

¹ In its prior case before the Commission, Grain Belt Express commissioned a study by the Brattle Group to study the effects of the additional wind variability the Project brings to the MISO system. The study found (1) integrating wind from Western Kansas introduced less variability than additional wind from other MISO states due to the geographic diversity of the wind resource, (2) based on existing MISO rules, there would be no additional reserve costs from the Project's injection in MISO and (3) even if these rules were to change, the estimated impact would be only about 0.1 cent per MWh of load in MISO. See Supplemental Exhibit 14 to Grain Belt Express Response to Order for Supplemental Information in Case No. EA-2014-0207

1 **Q. Will load serving entities in Missouri be able to contract for power delivered by the**
2 **Project even if they do not purchase transmission service from Grain Belt Express?**

3 A. Yes, Missouri utilities can choose to purchase power delivered by the Project from the
4 MISO market, or sign a PPA with a wind generator located in western Kansas.

5 **Q. Does the HVDC converter station provide other commercial opportunities for**
6 **Missouri utilities?**

7 A. Yes. Since the 2014 Case, Grain Belt Express has offered Missouri-PJM service to
8 interested transmission customers. Missouri utilities will now have the ability to purchase
9 transmission capacity from Missouri to PJM on the line and export power in order to
10 increase off-system sales revenues. For example, in hours when locational marginal prices
11 (“LMPs”) are higher in PJM than Missouri, and Missouri utilities have excess generation,
12 they will be able to sell power into the PJM market. They will also have the option of
13 bidding into the PJM capacity market. The net effect of increased revenues from off-system
14 sales reduces the overall costs for utilities to serve their Missouri electricity customers.

15 **Q. What is your estimated price of transmission service from Kansas to Missouri?**

16 A. In its agreement with MJMEUC, Grain Belt Express agreed to a “first-mover” rate equal
17 to an average of \$1.60 per kilowatt-month (“kW-mo”) levelized for 25 years. The Kansas-
18 Missouri rate should remain at a substantial discount to the Kansas-PJM rate based on the
19 shorter distance to Missouri and the smaller market size. Because no generator or utility
20 is required to purchase service from the Project, Grain Belt Express’ rates are disciplined
21 by market forces. Therefore, the total cost of wind energy delivered to Missouri by Grain
22 Belt Express must be a better value for Missouri utilities and their customers than both
23 other renewable resources and other sources of power generally in order to be contracted.

1 **Q. Who will pay for the costs of the Grain Belt Express Project?**

2 A. Grain Belt Express will pay for the development, construction and operation of the Project,
3 and it will recover these costs by selling transmission service to shippers. As a result, the
4 Project will offer broad benefits to the public but will impose costs only on shippers who
5 use the Project. None of these shippers will have an obligation to buy service and will only
6 buy service because they find our service economically beneficial. Because the Project
7 employs a “shipper pays” or participant-funded model, none of its costs will be recovered
8 through the cost allocation process of MISO, PJM or SPP. Accordingly, none of these costs
9 will be passed through to Missouri ratepayers under a regional transmission tariff paid by
10 load serving entities or retail ratepayers.

11 **Q. How does participant funding compare to other rate methods for new transmission
12 to promote wind energy?**

13 A. The Project is different from cost-allocated transmission lines, such as MISO’s Multi-
14 Value Projects (“MVPs”) or SPP’s Priority Projects, which recover their costs under a
15 regional transmission tariff approved by the Federal Energy Regulatory Commission
16 (“FERC”) where users of those systems pay according to a cost-allocation formula. The
17 Project’s participant-funded model assures that parties who do not benefit from new lines
18 do not pay for them. The MVP and Priority Projects are alternating current (“AC”), and
19 the participant-funded model used by the Project is usually not appropriate for such AC
20 projects. Unlike HVDC lines, AC projects cannot limit the flows of electricity to those who
21 pay for service. In AC lines, power flows over the path of least resistance, regardless of the
22 rate recovery mechanism or the contracts in effect. In contrast, HVDC converters function
23 like “toll booths” that control the entry and exit of cars to the turnpike. Only cars that pay

1 for entrance and exit can use the turnpike. Similarly, only shippers that buy service on the
2 Project will be able to use the HVDC line. Because only specific users of the line will pay
3 Grain Belt Express' transmission charge, the Grain Belt Express Project will not cause any
4 increase in transmission rates for entities that do not directly benefit from the line.

5 **Q. Will Grain Belt Express commit not to seek recovery of costs for the Project from**
6 **Missouri ratepayers through MISO or SPP regional cost allocation unless the**
7 **Commission agrees?**

8 A. Yes. Grain Belt Express will not seek to recover costs from Missouri ratepayers through
9 MISO or SPP regional cost allocation without Commission authorization. As the Company
10 agreed in the 2014 Case, such a commitment could be reflected in a condition in the
11 Commission's Order. Absent Commission approval, Grain Belt Express will not recover
12 costs from Missouri ratepayers through regional cost allocation, and will only construct
13 and operate the Project under a participant-funded business model.

14 To be clear, Grain Belt Express is not seeking – and has no plans to seek – regional
15 cost allocation. SPP, MISO and PJM do not currently have a process in place that would
16 allow for the cost-allocation of an interregional project across their three footprints.

17 **Q. How will Grain Belt Express allocate the transmission capacity on the Project?**

18 A. On January 20, 2015, the Company commenced the formal capacity allocation process or
19 “open solicitation” pursuant to FERC's Order Conditionally Authorizing Proposal and
20 Granting Waivers, issued in Grain Belt Express Clean Line LLC, No. ER14-409-000, 147
21 FERC ¶ 61,098 (May 8, 2014), which granted it authority to negotiate bilateral agreements
22 for 100% of the capacity of the Project.

1 The respondents to the open solicitation indicated in their Transmission Service
2 Requests the amount of capacity they wish to purchase, their preferred term of service, and
3 their preferred rate. Respondents also provided information regarding their
4 creditworthiness and the status of their generation projects. Most respondents proposed
5 paying a deposit in order to reserve service on the Project. As described in further detail in
6 Section IV, these transmission service requests indicate that demand for the Project's
7 transmission service to Missouri and to PJM exceeds the size of the Project. The Company
8 will rank bids in order to prioritize negotiations of commercial terms with potential
9 capacity customers based on the information submitted, and will ultimately sign
10 transmission service agreements with one or more of the respondents.

11 In addition, Grain Belt Express opened a supplemental window for transmission
12 service requests in February 2016. MJMEUC submitted two requests, one for 200 MW for
13 transmission from Kansas to Missouri, and the other for 50 MW from Missouri to PJM.

14 **Q. Will entities who do not receive an initial allocation of capacity be able to request**
15 **service on the Project?**

16 A. Yes. The negotiated capacity allocation process described above determines only the initial
17 allocation of the Project's capacity. Any future sale of capacity will be governed by the
18 Company's Open Access Transmission Tariff ("OATT"), just as is the case for traditional,
19 cost of service transmission providers.

20 **Q. Has Grain Belt Express updated FERC since receiving negotiated rate authority**
21 **based on the fact that the delivery capacity of the line has increased?**

22 A. Yes. Grain Belt Express' 2013 application to FERC in Docket Number ER14-409-000
23 contemplated a Project with a total 3,500 MW delivery capacity to both PJM and Missouri.

1 Based on demand for the service, Grain Belt Express revised the Project design to provide
2 for 500 MW of delivery to Missouri and 3,500 MW of delivery to PJM, for a total of 4,000
3 MW of delivery capacity. In May 2016, Grain Belt Express notified FERC of this change.
4 The Company also notified FERC that it is now offering transmission service from Missouri
5 to PJM, as described above. This notification to FERC is attached as **Schedule DAB-01**.

6 **Q. Please describe Grain Belt Express' transmission tariff.**

7 A. Transmission service will be sold under an OATT. Similar to the transmission tariffs of
8 SPP, MISO, and PJM, the Grain Belt Express OATT will take as its starting point the *pro*
9 *forma* OATT created by FERC.

10 **Q. What obligations will Grain Belt Express have in offering and providing transmission**
11 **service pursuant to an OATT?**

12 A. Grain Belt Express will be obligated to provide non-discriminatory, open access
13 transmission service to all “eligible customers,” as defined by the FERC pro forma OATT.
14 Pursuant to its negotiated rate authority from FERC, Grain Belt Express must transfer
15 “functional control” to a third-party operator.² In practical terms, this means that Grain
16 Belt Express must turn over the administration of the OATT to a third party. Grain Belt
17 Express intends to turn over functional control of the Grain Belt Express Project, to PJM.

18 **III. FINANCING PLAN**

19 **Q. Has the Commission previously found that Grain Belt Express is capable of financing**
20 **the Project?**

21 A. Yes. The Commission's Order in the 2014 Case states: “With regard to GBE's
22 qualifications and financial ability to provide the service, GBE has provided competent and

² *Grain Belt Express Clean Line LLC*, 147 FERC ¶ 61,098 at P 29.

1 substantial evidence to support its claim. No party seriously disputed these two factors, so
2 the Commission concludes that GBE has met its burden of proof demonstrating that GBE
3 is qualified and has the financial ability to provide the service described in its application
4 for a certificate of convenience and necessity.”

5 **Q. Have there been any significant changes to Clean Line’s financing plan or financing**
6 **capabilities in the 2014 Case?**

7 A. No. The most significant change is the addition of Bluescape Resources Company LLC
8 (“Bluescape”) as an investor in Clean Line. This only strengthens the Company’s
9 financing capabilities as Bluescape can provide financing for the development, and
10 potentially the construction, of the Project. Other than the addition of Bluescape, Clean
11 Line’s financing plan remains the same, and the capital markets remain strongly supportive
12 of transmission lines like the Project.

13 **Q. Please describe how Grain Belt Express will fund the development and construction**
14 **of the Project.**

15 A. Clean Line, through a holding company, Grain Belt Express Clean Line Holding LLC,
16 owns 100% of the membership interests in Grain Belt Express, the Applicant in this
17 proceeding. During the development stage of the Project, in which Grain Belt Express will
18 seek the regulatory approvals to construct the Project and sell its transmission capacity,
19 Clean Line will continue funding equity to the Company. Clean Line is able to fund Grain
20 Belt Express’ development stage expenditures because of investments made by National
21 Grid USA (“National Grid”),³ Bluescape, ZAM Ventures, L.P. (“ZAM Ventures”), and

³ National Grid invests in Clean Line through its 100% owned subsidiary GridAmerica Holdings, Inc., a Delaware corporation.

1 Clean Line's other investors, as well as Clean Line's ability to raise more money from
2 these or new investors. Once the Project reaches the point of beginning construction, it will
3 be financed at the project level against the strength of its future, contracted revenues. Clean
4 Line's existing investors may make additional investments in Grain Belt Express, or Clean
5 Line may seek outside investment capital, which as I describe below, is widely available
6 for transmission line projects.

7 **Q. Does Clean Line currently have equity investors?**

8 A. Yes. The three largest shareholders in Clean Line are Bluescape; ZAM Ventures; and
9 National Grid. Michael Zilkha, an individual and experienced energy investor, and Clean
10 Line Investment LLC, a company owned by Clean Line employees and service providers,
11 are also investors in Clean Line.

12 **Q. What is the business of Bluescape?**

13 A. Bluescape is a private independent oil and gas holding company primarily focused on
14 unconventional hydrocarbon opportunities and energy-related private equity investments.
15 Bluescape is a seasoned energy investor, making and managing investments in the energy
16 space in a variety of geographic areas, primarily in the United States. Through its various
17 subsidiaries, Bluescape directly holds hundreds of thousands of net acres across several
18 U.S. oil and gas plays, including working interest and mineral acres in the Marcellus Shale
19 and working interest acres in the Kansas portion of the Mississippi Lime. Bluescape also
20 holds oil and gas interests in West Texas and Louisiana through two additional
21 partnerships. Additionally, Bluescape and its subsidiaries provide bankruptcy and energy
22 advisory services, and work with oil and gas private equity companies. The investment in

1 Clean Line is consistent with Bluescape's long-term strategy of developing, acquiring, and
2 exploring energy resources vital to the world's economy, health and welfare.

3 **Q. What is the business of ZAM Ventures?**

4 A. ZAM Ventures focuses on long-term investments in the energy sector. Many of ZAM
5 Ventures' investments are in the oil and gas industry around the world. It has invested in
6 several private conventional and unconventional oil and gas investments in the United
7 States, Canada and elsewhere in the world. ZAM Ventures has also invested in an oilfield
8 services company doing business in various parts of the United States and has made other
9 investments in alternative energy companies.

10 **Q. Does Clean Line or its subsidiaries have any debt?**

11 A. No, they do not.

12 **Q. What is the nature of the equity investment in Clean Line to date?**

13 A. The initial equity investors are providing capital to enable Clean Line to undertake the
14 development, permitting and pre-construction work for its transmission line projects,
15 including the Grain Belt Express Project, which is to be constructed and owned by Grain
16 Belt Express. The funding provided by the equity investors will enable Clean Line and its
17 subsidiaries to bring the Project, and the other transmission line projects being developed
18 by other subsidiaries of Clean Line, to a point of development at which long-term
19 transmission service agreements can be signed with transmission customers and, on the
20 basis of these agreements, project-specific financing arrangements can be entered into with
21 lenders and with equity investors and/or other partners. The additional capital obtained
22 through these financing arrangements will allow Grain Belt Express to construct the

1 Project. The initial equity investors may participate in the project financings by making
2 debt or additional equity investments along with new lenders, investors and/or partners.

3 **Q. At what point will Grain Belt Express put into place the financing to construct the**
4 **Project?**

5 A. We will obtain construction financing once we have obtained the major regulatory
6 approvals necessary to proceed with the Project, and we have sold a majority of the capacity
7 on the Project. Grain Belt Express has already obtained certificates to operate as a public
8 utility in Kansas and to construct Kansas portion of the HVDC Line from the Kansas
9 Corporation Commission. Grain Belt Express also received certificates to operate as a
10 public utility from the Indiana Utility Regulatory Commission and the Illinois Commerce
11 Commission. Grain Belt Express still needs to obtain the requisite approval of this
12 Commission. In addition to obtaining regulatory commission approvals, we will need to
13 enter into additional contracts for a portion of the remaining transmission capacity on the
14 Grain Belt Express Project prior to obtaining full financial commitments for the Project.
15 The exact percentage of capacity that needs to be under contract prior to obtaining full
16 financing commitments will depend on the price, counterparty creditworthiness, and term
17 in years of the signed transmission contracts. Grain Belt Express then intends to issue
18 project-specific debt secured by the revenue stream from the transmission capacity
19 contracts to raise the capital necessary to complete the remaining development activities,
20 construct the Project, and place it into operation. Additional equity capital may also be
21 raised to help finance construction of the Project, or Clean Line's existing investors may
22 make additional equity investments in the Project.

1 **Q. Please describe the nature of these transmission capacity contracts and why they are**
2 **necessary to support the Project’s financing.**

3 A. Grain Belt Express intends to offer long-term transmission capacity contracts to its
4 potential customers. These contracts will provide for a reservation charge, which will
5 require the transmission customer to pay regardless of what percentage of the time the
6 customer uses the reserved capacity. This pricing arrangement is typical for transmission
7 lines operated by the transmission owner members of SPP, MISO and PJM. It is also
8 similar to the contractual arrangements for natural gas pipelines. Grain Belt Express will
9 impose credit requirements on its transmission customers. The credit requirements will
10 require each transmission customer to have investment grade credit ratings or the
11 equivalent creditworthiness, or post additional security in the form of cash, a letter of credit,
12 or a parent guarantee from an entity with investment grade credit ratings. These credit
13 requirements will provide revenue certainty, which will allow lenders to be comfortable
14 that Grain Belt Express can repay its debt.

15 **Q. If Grain Belt Express is able to obtain the regulatory approvals and the transmission**
16 **contracts as you describe, do you foresee any difficulty in obtaining the necessary**
17 **financing to build the Project?**

18 A. No. Other similar transactions have demonstrated that project finance for transmission
19 lines is a viable model. Further, Clean Line has developed a database of lenders and equity
20 investors who have either made past investments in transmission projects or have expressed
21 an interest in investing in one of Clean Line’s projects once it has secured the key permits
22 and contracts. My Clean Line colleagues and I have worked with many of these lenders
23 and equity investors on prior transactions.

1 **Q. Is it typical for energy projects using project finance to obtain full financing prior to**
2 **obtaining the necessary permits and other regulatory approvals?**

3 A. No. In my experience project lenders require the necessary permits and approvals as a
4 condition precedent to funding a project loan. Project-based equity investors typically have
5 the same requirement. While I am aware of certain transactions in which debt and equity
6 investors have made commitments conditioned on obtaining remaining permits and
7 approvals, this model is not appropriate for projects such as the Grain Belt Express Project.
8 First, banks and other lending institutions will not make conditional commitments until
9 they have a very high degree of certainty that the project will actually be approved by the
10 applicable regulatory agencies. Second, the time horizon of the Grain Belt Express Project
11 is such that construction will not begin for at least a year, depending on the time frame in
12 which this Application is approved. Conditional commitments to project finance are made
13 where there is a much shorter period of time anticipated between the commitment being
14 made and the anticipated date of the event that will trigger the release of the funds. Third,
15 lenders typically charge a commitment fee on future loan commitments, which can be quite
16 costly to the project. In summary, debt providers would not make such a long-term
17 commitment to finance the Project before key approvals are in place.

18 **Q. How does project finance differ from the general corporate finance approach that**
19 **many utilities use to finance new transmission lines and other additions to their plants**
20 **and equipment?**

21 A. The key distinction between general corporate finance and project finance is the revenues
22 and assets investors rely upon to recover (and secure, in the case of secured debt) their
23 investment and to earn their required return. When utilities issue corporate debt or equity

1 to fund new construction, the issued securities typically are supported by, and the buyers
2 typically rely on, all the assets and revenues of the issuer, and not just the assets and
3 revenues of the new project that is being financed. Project finance, on the other hand, relies
4 principally (and in some cases exclusively) on the assets and revenues of a particular
5 project as the source of security. Project finance typically relies less on historical operating
6 results or the current financial condition of the company issuing securities, and more on
7 the quality and certainty of future revenues. Compared to corporate finance, the advantage
8 of project finance is that unrelated liabilities do not diminish the claims of investors to
9 receive revenues from the project to be constructed and financed.

10 **Q. Is project finance a proven model for financing the development and construction of**
11 **projects such as the Grain Belt Express Project?**

12 Yes. Many successful transmission projects have followed the same model in which initial
13 equity investors fund development and the project is later refinanced at the project level to
14 fund construction. Utilities and developers have applied this model to traditionally rate-
15 based transmission lines, like the Path 15 project in California and the Trans Bay Cable
16 project crossing the San Francisco Bay. This model is also common for participant-funded
17 transmission lines, like the Grain Belt Express Project. Other participant-funded
18 transmission projects that have used this financing model include the Neptune underwater
19 HVDC project between New Jersey and Long Island, the Hudson underwater HVDC
20 project between New Jersey and New York City, and the Cross-Sound Cable HVDC
21 project between Connecticut and Long Island. Many of the Competitive Renewable
22 Energy Zone (“CREZ”) transmission lines in Texas followed the project-specific finance
23 model, as well.

1 **Q. Are you confident that the project finance markets will support the construction of**
2 **the Grain Belt Express Project?**

3 A. Yes. Large amounts of liquidity exist in the capital markets for transmission projects that
4 have reached an advanced stage of development. The capital markets have a substantial
5 history of supporting transmission projects, including merchant transmission projects,
6 through debt and equity financings. **Schedule DAB-02** contains a list of such transactions
7 that have occurred in both the equity and debt markets. For example:

- 8 • In 2003 the Path 15 project, an 83-mile stretch of 500 kV lines in Southern California,
9 closed \$209 million in debt financing spread across the bank and bond markets.
- 10 • In 2005 the Neptune Project, a +500 kV HVDC underwater transmission line, raised \$600
11 million in a private placement at a competitive spread to LIBOR.
- 12 • In early 2008 Trans Bay Cable LLC successfully closed an approximately \$500 million
13 transaction in the project finance market to fund a 53-mile underwater HVDC project.
- 14 • In 2008 the Trans-Allegheny Interstate Line project closed a \$550 million senior secured
15 loan; in 2010 that project closed an additional \$900 million of financing comprised of \$450
16 (increased from \$350) million in floating bank debt and \$450 million in fixed coupon
17 bonds; in 2012 the project was refinanced in a \$1 billion revolving credit facility and in
18 2014 raised \$550 million in fixed coupon bonds.
- 19 • The Hudson transmission line raised \$691 million in 22-year bond financing in 2011.
- 20 • In 2014, Texas Nevada Transmission, a holding company of two regulated utility
21 transmission businesses, raised \$318 million in the bank market.
- 22 • In 2015, Hunt Utility Services raised \$400 million in a public offering of shares in its
23 InfraREIT, a real estate investment trust for its transmission assets, primarily in Texas.

1 Additionally, significant institutional investors such as the California Public Employees
2 Retirement System, John Hancock Financial Services, and TIAA-CREF have made major
3 equity investments in transmission lines, as have the private equity firms ArcLight Capital
4 Partners, Energy Investors Fund, Energy Capital Partners, and Starwood Energy. All of
5 these examples confirm that debt and equity financing is in plentiful supply for projects
6 like the Grain Belt Express Project. Texas' recent experience with the CREZ lines provides
7 further confirmation of the viability of project finance applied to transmission lines.

8 **Q. How does the financing approach that Clean Line plans to employ compare to the**
9 **financing methods used for other kinds of energy projects?**

10 A. Developers of new independent power generation projects have long relied on project
11 finance to fund their construction. For example, the U.S. wind power industry has raised
12 tens of billions of dollars of project-level debt and equity over the last five years. Horizon
13 Wind Energy (now EDP Renewables), one of the leading developers of wind generation
14 facilities in the U.S., successfully used this approach to develop, finance, construct, and
15 place into operation a number of significant wind generation projects . When I worked at
16 Horizon, I led over \$2 billion of project finance transactions using this approach. In
17 addition to electric generation, natural gas pipelines have commonly used project finance
18 to fund the construction of new pipeline projects.

19 **Q. How will lenders size the debt they lend to Grain Belt Express?**

20 A. Lenders typically look at project finance borrowing capability based on debt service
21 coverage ratios, where the numerator is contracted cash flow available to service debt, and
22 the denominator is principal and interest owed. In my experience, typical coverage ratios
23 for project finance are 1.25 to 1.50 times. These coverage ratios allow projects like the

1 Grain Belt Express Project to raise substantial amounts of debt financing to fund
2 construction costs, while maintaining a margin of safety on debt repayment in the event of
3 unforeseen operational or commercial problems.

4 **Q. Do the equity investors in Clean Line have the commitment and experience to support**
5 **this plan?**

6 A. Yes. Along with managing its current investments in oil and gas assets throughout the
7 United States, the Bluescape management team has substantial experience investing in and
8 managing public utility assets, including transmission infrastructure and power plants.
9 ZAM Ventures and the Zilkha family have deep experience in the energy field, including
10 in electric power and renewable energy, and in project finance, specifically. ZAM Ventures
11 and its affiliates and the Zilkha family have previously made significant investments in
12 start-up companies in the energy industry, including companies developing renewable
13 resources projects, and are quite familiar with our development and financing model.
14 National Grid is a very experienced investor in electric infrastructure projects and has
15 substantial capabilities to support Grain Belt Express' financing efforts. In addition,
16 National Grid has the financial capability to make additional investments in Clean Line
17 and Grain Belt Express as the Project meets the necessary regulatory milestones.

18 **Q. Does Clean Line have the management expertise to successfully execute its**
19 **development and financing model?**

20 A. Yes. Along with several other members of our management team, including Michael
21 Skelly, our President and CEO, and Jayshree Desai, our Chief Operating Officer, I was
22 previously employed by Horizon Wind Energy, where we worked to bring a number of
23 wind energy projects into operation using project financings. Additionally, other members

1 of our management team, including Mario Hurtado, our Executive Vice President –
2 Development, have many years of experience in developing independent power generation
3 projects. Cary Kottler, our General Counsel, was a corporate attorney at a large law firm
4 where he was involved in a number of significant financial transactions encompassing
5 many sectors of the renewable energy industry. More complete descriptions of the
6 qualifications and experience of the primary members of the Clean Line/Grain Belt Express
7 management team are provided in Michael Skelly’s direct testimony.

8 **Q. What conditions will project lenders place on Clean Line before they advance the**
9 **money to build the Project?**

10 A. Lenders will scrutinize construction contracts and will only advance money once the
11 appropriate conditions exist. Those conditions include (a) having all necessary permits, (b)
12 having procured sufficient financing commitments to complete construction, and (c)
13 having a high degree of certainty on budget and timeline. While this due diligence creates
14 challenges for the transmission developer, it ensures that projects proceed prudently.
15 Construction lenders will not release funds to begin construction unless Grain Belt Express
16 demonstrates that it has commitments for sufficient financing to construct the entire
17 Project. Lenders will not take the risk that additional necessary financing cannot be
18 obtained, resulting in an incomplete project with limited collateral value. Therefore, Grain
19 Belt Express will not begin to construct major physical facilities until it has obtained
20 adequate funding to complete the Project.

21 **Q. Will Grain Belt Express commit not to build the Project until the necessary financing**
22 **is in place?**

1 A. Yes. In the 2014 Case, Staff members Daniel Beck (in pages 18-19 of his rebuttal
2 testimony) and David Murray (on page 10 of his rebuttal testimony, which Mr. Beck
3 mentioned on page 22 of his rebuttal testimony) proposed conditions related to the timing
4 of construction and financing of the Project. Grain Belt Express found the suggested
5 conditions to be reasonable and is willing to commit not to install transmission facilities
6 until obtaining commitments for funds sufficient to cover the total Project cost, and to file
7 documentation necessary for the Commission to verify that Grain Belt Express has fulfilled
8 this condition. Grain Belt is willing to work with Staff to develop a similar condition in
9 this proceeding.

10 This condition recognizes that there is a necessary sequence to the development of
11 a large transmission line following the participant-funded model, and that it is essential that
12 Grain Belt Express obtain a CCN as a necessary precondition for obtaining financing to
13 construct the Project. Requiring the filing of financing agreements with the Commission
14 after a CCN is granted allows the Commission and Staff to monitor Grain Belt Express
15 without unduly delaying the development of the Project.

16 **IV. ECONOMIC FEASIBILITY, NEED, AND PUBLIC INTEREST**

17 **a. Description of Western Kansas Wind Resource**

18 **Q. What is the cost of the wind generation in western Kansas that the Project will**
19 **unlock?**

20 A. Wind energy can be produced in western Kansas at an extremely competitive cost. A PPA
21 executed in 2015 for the output of the Cedar Bluff Wind Farm in western Kansas provides
22 a data point supporting pricing in this range. Westar Energy contracted with NextEra
23 Energy resources to procure energy from the Cedar Bluff Wind Farm at \$19.15/MWh

1 escalating at 2% per year over 20 years.⁴ Recent wind procurements have trended
2 downward from this already low level.

3 Since there is no inflation factor (other than a fixed contractual escalator) or fuel
4 cost for wind energy, the price of generation is not subject to unpredictable fluctuation.
5 Based on my experience in developing and building wind farms around the United States,
6 I can confirm that the western Kansas region produces wind-generated electricity at a cost
7 as low as or lower than any other region of the country.

8 **Q. Have you independently confirmed the price of generating wind energy in western
9 Kansas?**

10 A. Yes. In January 2014, the Company completed a Request for Information (“RFI”) to wind
11 generators in western Kansas. The response to the RFI included 14 wind developers
12 developing 26 wind farms totaling more than 13,500 MW. As part of their responses,
13 generators provided indicative PPA pricing, which is their own calculation of their
14 levelized cost of energy. The lowest-priced 4,000 MW of new wind generation was an
15 average of 2.0 cents per kWh flat for 25 years.

16 **Q. Do you believe that there is sufficient demand from generators in western Kansas to
17 fill the line’s capacity?**

18 A. Yes. The results of the open solicitation for capacity conducted by Grain Belt Express and
19 launched in 2015 show strong demand for transmission service to Missouri.

20 Grain Belt Express has received requests for Kansas-Missouri service, Kansas-PJM
21 service, and Missouri-PJM service in the original open solicitation window held in early

⁴ Power Purchase Agreement pricing information accessed via FERC’s EQR Database:
<http://eqrreportviewer.ferc.gov/> (last accessed August 25, 2016).

1 2015 and in a subsequent window held in early 2016 to allow additional requests. Fourteen
2 of the fifteen requests submitted are from wind generators who require new transmission
3 infrastructure to deliver low-cost wind energy from projects under development in and
4 around western Kansas to Missouri, Illinois, and Indiana customers in MISO and PJM. Ten
5 wind generators and one load serving entity have submitted Transmission Service Requests
6 for Kansas-Missouri converter station. The total amount of transmission service that has
7 been requested is 3,524 MW, representing more than six times the available Kansas-
8 Missouri service offered by Grain Belt Express.

9 Fourteen wind generators submitted Transmission Service Requests for 17,301
10 MW of service to the Illinois converter station, or approximately 4.5 times the available
11 Kansas-PJM capacity offered by the Project. The total capacity requested to both MISO
12 and PJM delivery points of the Project was 20,825 MW, almost five times the total
13 available capacity of the Project.

14 A summary of the responses to the open solicitation is attached as **Schedule DAB-**
15 **03.**

16 **Q. Why is it so inexpensive to generate wind power in western Kansas?**

17 A. Western Kansas possesses an excellent wind resource that is among the country's best.
18 Attached as **Schedule DAB-04** is a wind map of the United States prepared by the National
19 Renewable Energy Laboratory ("NREL"), a federal research laboratory that operates under
20 the direction of the U.S. Department of Energy ("DOE"), and AWS Truepower, a leading
21 meteorology firm. The wind map shows that western Kansas has some of the highest wind
22 speeds in the country—routinely between 8.5-9.0 meters per second at 80 meters above the
23 ground, a typical hub height for wind turbines. The map demonstrates that average wind

1 speeds in western Kansas are substantially higher than in Missouri, Illinois, Indiana and
2 other states to the east of Kansas that will be served by the Project. By way of confirmation,
3 Grain Belt Express RFI respondents reported an average wind speed of 8.75 meters per
4 second at 80 meters above the ground.

5 Higher wind speeds lead to a higher capacity factor, meaning that the wind
6 generator runs at a higher average percentage of its maximum power output. For example,
7 a wind turbine with a 2 MW capacity rating can produce a maximum of 2 MW of power
8 under ideal circumstances. The actual power produced varies with wind speed. A wind
9 turbine might produce at a portion of its maximum output if the wind speed at its hub height
10 is 8.0 meters per second (“m/s”). The same turbine might produce at its full power rating
11 with a wind speed of 15.0 m/s and might produce no power with a wind speed of 4.0 m/s.

12 **Q. Do even small differences in wind speed have important consequences for the amount**
13 **of power produced?**

14 A. Yes. The kinetic power potential of wind varies with the cube of the wind velocity. In
15 other words, the power potential varies proportionally to the wind velocity raised to the
16 third power. Consequently, an 8.8 m/s average wind speed site will have, other things being
17 equal, 1.99 times the power potential of a 7 m/s site. This exponential effect substantially
18 reduces the cost of wind energy produced by facilities located in areas with higher average
19 wind speeds. As more energy is produced by a wind turbine, the unit cost of energy
20 decreases, since the upfront capital cost and operating costs can be recovered over a larger
21 number of MWh.

22 **Q. Are there any other factors responsible for the low cost to produce wind energy in**
23 **western Kansas?**

1 A. Yes. The State of Kansas offers two tax incentives, a ten-year property tax exemption and
2 a sales tax exemption, that reduce the tax burden on generators in western Kansas and allow
3 them to produce energy at lower cost. Further, construction costs in Kansas are lower than
4 in many other regions of the country. According to a DOE study, the average construction
5 cost of a wind farm in the “Interior Region” of the United States that includes western
6 Kansas was \$1,640 per kilowatt (“kW”) installed, compared to average costs in other
7 regions of the country of \$2,290 per kW.⁵ This lower construction cost is consistent with
8 my own experience and the experience of other members of the Clean Line management
9 team in constructing wind farms in many different regions in the country. Because of these
10 advantages, western Kansas wind farms can generate electricity at a lower cost than wind
11 farms located farther east in Missouri, Illinois, Indiana, and other target markets for the
12 Grain Belt Express Project.

13 b. Cost Comparison of the Project’s Delivered Wind Energy to Other Alternatives

14 **Q. Have you compared the cost of wind energy delivered by Grain Belt Express with**
15 **other sources of energy available to Missouri utilities?**

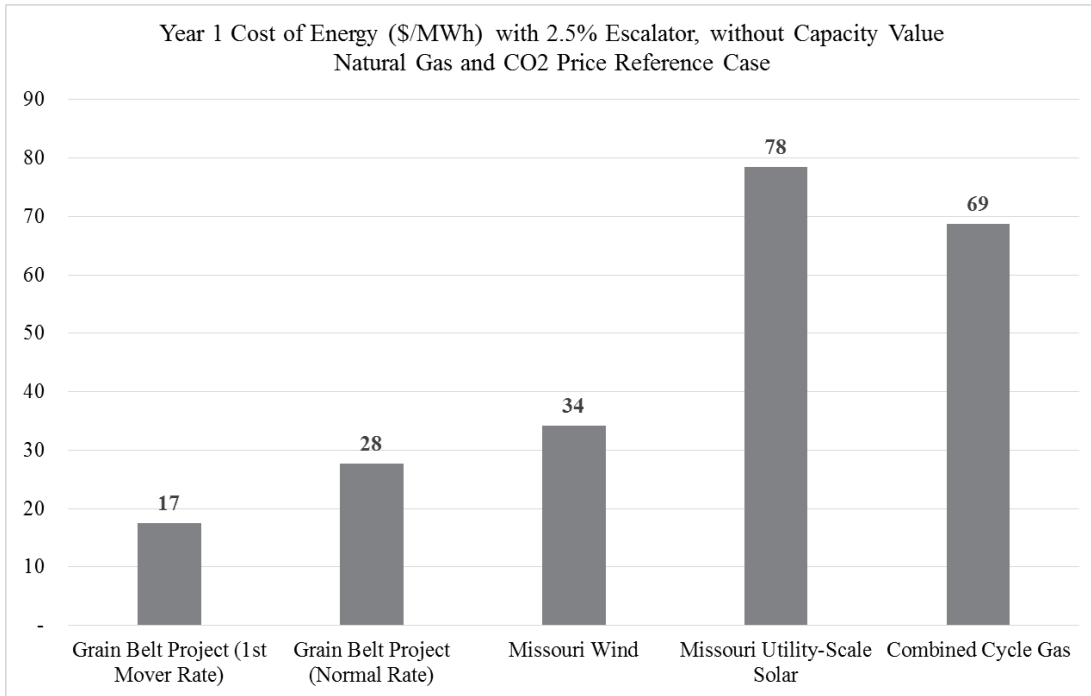
16 A. Yes. I performed a levelized cost of energy (“LCOE”) analysis to compare the Project’s
17 delivered cost of wind energy to Missouri with other alternatives. Levelized cost of energy
18 (“LCOE”) analysis is the best financial technique to compare different generation sources.
19 LCOE analysis takes into account all costs of generating electricity, including capital costs,
20 operating costs, taxes, the cost of debt, the return on equity, any available subsidies, and
21 necessary transmission additions. The analysis produces a levelized cost per unit of energy

⁵ Lawrence Berkeley National Laboratory, 2015 Wind Technologies Market Report (“2015 Wind Report”), p. 55 & 56, Report PDF and Data File XLS (Figure 43) available at <https://emp.lbl.gov/publications/2015-wind-technologies-market-report> (last accessed on August 25, 2016).

1 that is a proxy for a PPA that a utility would enter into, or the cost for a utility to own and
2 operate a generation asset. LCOE allows the comparison of different alternatives using a
3 single analytical method. Some alternatives may have higher initial capital costs, while
4 other alternatives may have higher ongoing operating or fuel costs. A levelized cost
5 analysis condenses all the costs of a given alternative in a single figure, which facilitates
6 the comparison of different alternatives. In addition, it is possible to run sensitivities on
7 different input variables to test the conclusions of a levelized cost analysis.

8 **Q. What are the results of your LCOE analysis?**

9 A. Across multiple assumption scenarios, the Project's total delivered cost of energy is less
10 than other renewable or conventional energy alternatives. The cost of delivered energy is
11 equal to the cost to generate wind energy in western Kansas plus the cost to move power
12 on the Grain Belt Express Project. I have considered two Grain Belt Express Project
13 scenarios. The first scenario includes the cost to generate wind plus the "first mover"
14 transmission rate offered to MJMEUC for the first 200 MW of wind power delivered to
15 Missouri. The second scenario is the cost to generate wind plus a transmission rate equal
16 to two-thirds of the Project's published rate for Kansas-PJM service. The results of the
17 LCOE analysis are summarized below:

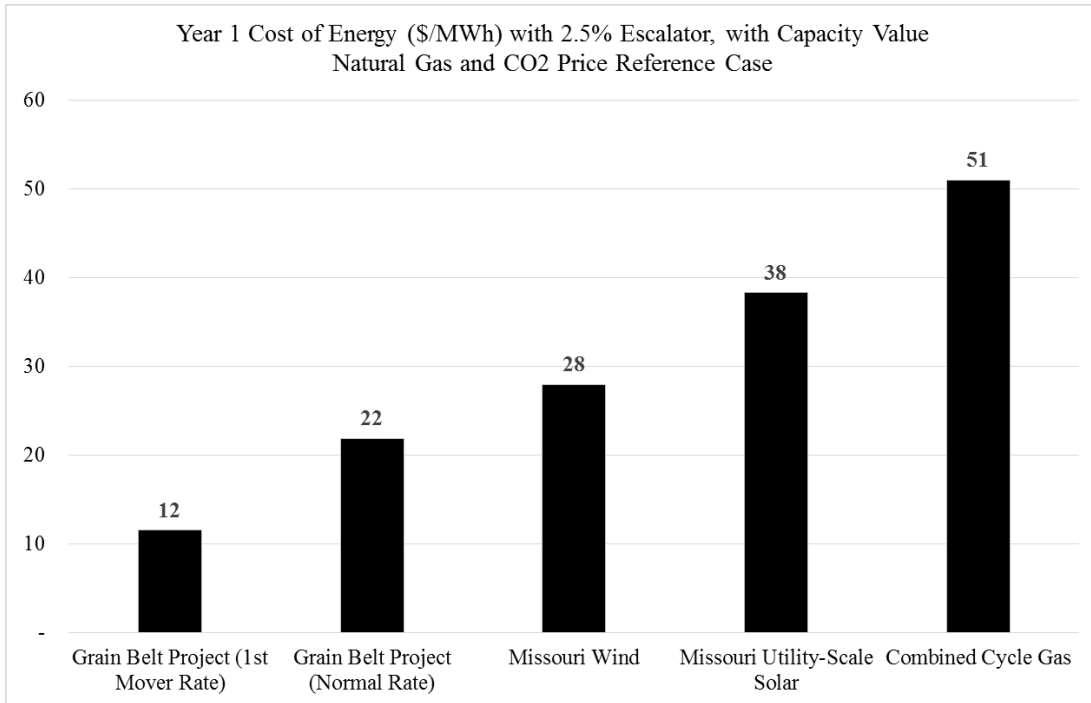


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Schedule DAB-05 contains a complete list of assumptions underlying this analysis, along with sources for these assumptions.

Q. How do your results change if you adjust different generation types for their dependable capacity value?

A. The results of the above comparison are only for the cost of energy. They do not account for resources' differing capacity value, or the ability to supply electricity with certainty during times of peak demand on the grid. The comparison below adjusts for capacity value, using the assumptions described in **Schedule DAB-05**. The value of dependable capacity (expressed as the avoided cost of a simple combustion turbine) is treated as a reduction to the cost of energy of the resource.



1

2 **Q. How do your results change if you adjust your assumptions about natural gas prices**
 3 **and the cost of carbon dioxide emissions?**

4 A. I have tested the results of my LCOE analysis using a range of assumptions on natural gas
 5 prices and the cost of carbon dioxide emissions (including a case with no price on carbon
 6 dioxide emissions). Since wind and solar do not use fuel or emit carbon dioxide, changing
 7 these two assumptions only affects the LCOE result for natural gas generation. The results
 8 of the sensitivity on assumptions are below.

Year 1 Cost of Energy (\$/MWh) with 2.5% Escalator, with Capacity Value				
Carbon Price Scenario	Natural Gas Price Scenario	Combined Cycle Gas	Grain Belt Project (1st Mover Rate)	Grain Belt Project (Normal Rate)
No Carbon Price	Low	27	12	22
Mid	Low	37	12	22
High	Low	44	12	22
No Carbon Price	Mid	41	12	22
Mid	Mid	51	12	22
High	Mid	58	12	22
No Carbon Price	High	64	12	22
Mid	High	75	12	22
High	High	82	12	22

9

Year 1 Cost of Energy (\$/MWh) with 2.5% Escalator, without Capacity Value				
Carbon Price Scenario	Natural Gas Price Scenario	Combined Cycle Gas	Grain Belt Project (1st Mover Rate)	Grain Belt Project (Normal Rate)
No Carbon Price	Low	44	17	28
Mid	Low	55	17	28
High	Low	62	17	28
No Carbon Price	Mid	58	17	28
Mid	Mid	69	17	28
High	Mid	76	17	28
No Carbon Price	High	84	17	28
Mid	High	92	17	28
High	High	100	17	28

While the price of natural gas generation varies, Grain Belt Express’ delivered wind energy remains less expensive in all cases. Because wind generation has no variable fuel costs or emissions, its cost is much more certain over a 25-year period than natural gas generation. Reducing portfolio fuel risk is a major benefit that wind power provides utilities.

Q. Why is your levelized cost of energy analysis of different generation alternatives relevant to the findings the Commission must make in a CCN case?

A. The analysis is relevant because it shows that the Project is economically feasible, that there is a need for the Project, and that it serves the public interest.

Because the Project’s delivered cost of energy is lower than alternative ways to meet demand, the Project is economically feasible. Wind generators in western Kansas or load serving entities in Missouri will be able to pay the Project’s transmission charge and still deliver energy to Missouri at an attractive price.

Second, because the Project is the lowest-cost way to meet renewable energy and other electric demand, the Project is needed to meet the goals of the Missouri RES and to serve utilities not subject to the RES like MJMEUC. Further, the cost cap within the RES makes it clear that *low-cost* renewable energy is required.

1 Finally, because the Project’s delivered energy is cheaper than other sources of
2 electricity, Missouri consumers will benefit. A lower cost of energy will result in
3 Missourians paying lower electric rates. Inexpensive generation alternatives offering clean,
4 renewable energy promote the public interest.

5 **Q. Why is the Grain Belt Express Project’s delivered cost of energy lower than**
6 **generating wind energy in Missouri?**

7 A. The main cost advantages are the higher wind speeds and the plentiful sites for wind
8 development in western Kansas. As evident in **Schedule DAB-04**, which is a wind map of
9 the United States, only the very northwest corner of Missouri has average wind speeds
10 between 7.0-7.5 meters per second—about 1.5 meters per second less than in western
11 Kansas. The wind speed advantage contributes greatly to the lower cost due to the power
12 production equation explained earlier in my testimony, whereby the power potential
13 increases with velocity raised to the third power and is therefore exponentially impacted
14 by even a small increase in wind speed. Further, building a substantial number of wind
15 farms in this relatively unpopulated corner of the state would require a substantial
16 expansion of Missouri’s transmission infrastructure. Because this wind resource area is not
17 located in the MISO footprint, Ameren Missouri and any other MISO participants in
18 Illinois would have to pay an additional transmission charge to access that resource using
19 the SPP transmission system.

20 **Q. Has your levelized cost analysis changed since the similar analysis presented in the**
21 **2014 Case?**

22 A. Yes. I have updated my analysis in several respects. First, I have updated the cost of wind
23 energy based on recent technology and cost improvements. Second, I have updated the

1 value of the federal production tax credit to 80% of its full value, reflecting the fact that
2 construction of wind farms connected to the Project is unlikely to begin until 2017. This
3 is because wind farms that are commercially dependent on the line will not have the
4 certainty they need to place turbine orders or take other steps to demonstrate start of
5 construction to the Internal Revenue Service until Grain Belt Express has obtained all of
6 the regulatory permits the Project requires, including a Missouri CCN. Third, I have
7 specifically included a discounted transmission service price from Kansas to Missouri
8 based on the first-mover price offered to MJMEUC and our intention to offer a discounted,
9 though higher, price to other customers moving low-cost wind power to Missouri. Fourth,
10 I have updated all assumptions, both those related to the Grain Belt Express Project and
11 those based on government and other publicly available data sources.

12 **Q. Is HVDC the most economically feasible technology to move western Kansas wind**
13 **power to Missouri and other markets farther to the east?**

14 A. Yes. As discussed more extensively in the direct testimony of Dr. Wayne Galli (Clean Line
15 Executive Vice President – Transmission & Technical Services), HVDC is the lowest-cost
16 way to move large amounts of power over distances longer than 300 miles. HVDC requires
17 a narrower right-of-way than a comparable AC system, incurs lower electric losses, and
18 has lower capital costs per mile. As a result of these advantages, the Grain Belt Express
19 Project is more economically feasible than an AC line or lines that would serve the same
20 purpose.

1 **Q. Does the scale of the Project make it more economically feasible, given that it enables**
2 **over 4,000 MW⁶ of new wind generation?**

3 A. Yes. By building a single transmission project that serves the renewable energy needs of
4 both the MISO and PJM footprints, it is possible to achieve an economy of scale that is
5 significantly less expensive than serving the needs of Missouri alone. This is reflected in
6 the competitive cost of transmission to deliver western Kansas wind energy to Missouri,
7 Illinois, Indiana and other states in the region.

8 c. Demand for Renewable Energy Delivered by Grain Belt Express

9 **Q. Is there demand in Missouri for the renewable energy to be delivered by the Grain**
10 **Belt Express Project?**

11 A. Yes. Major Missouri utilities including Ameren, Associated Electric Cooperative, Inc.
12 (“AECI”), and MJMEUC all intend to procure a significant amount of additional renewable
13 capacity in 2016-2020. MJMEUC has entered into a Transmission Service Agreement with
14 Grain Belt Express, receiving firm, congestion-free access to low-cost western Kansas
15 wind resources for 25 years. MJMEUC will procure up to 200 MW of wind power
16 delivered to Missouri based on this contract, and will utilize 25 MW of capacity from Grain
17 Belt Express’ Missouri converter station to its Illinois converter station in order to sell
18 excess energy and capacity into the PJM market, providing further savings for Missouri
19 consumers. MJMEUC is also entitled to sign up for an additional 25 MW of Missouri-PJM
20 service.

⁶ The capacity of wind farms is likely to be slightly higher than the maximum delivered capacity of the line for two reasons. First, electric losses along the line mean less power will be delivered to MISO and PJM than is converted in Kansas. Second, because multiple wind farms rarely produce at their maximum output simultaneously, additional wind farm capacity above 4,000 MW can increase utilization of the transmission line, and therefore reduce the delivered cost of energy.

1 Ameren Missouri’s latest utility Integrated Resource Plan (“IRP”), filed with this
2 Commission on October 1, 2014, found that “wind energy resources exhibit the lowest cost
3 on an LCOE [levelized cost of energy] basis among all candidate resource options.” The
4 IRP called for the purchase of 400 MW of new wind power beginning in 2019 based on an
5 estimated cost for regional wind resources of 7.67 ¢/kWh, which is considerably higher
6 than the cost of wind delivered by Grain Belt. At their estimates of the cost of renewable
7 resources, Ameren was constrained by the 1% cost cap; in order to actually meet the RES
8 requirement, Ameren determined that they would need to install 1,003 MW of wind by
9 2024.

10 In December 2015, Ameren Missouri issued an RFP for wind generation and is
11 currently reviewing and evaluating responses. Ameren is seeking to source a minimum of
12 50 MW of wind in 2019.⁷

13 AECI issued an RFP in April 2016 and is seeking to procure up to 300 MW of wind
14 power for a minimum term of 20 years.⁸

15 **Q. Is there demand from commercial and industrial load in Missouri for renewable**
16 **energy?**

17 A. Yes. Many corporations have adopted ambitious renewable energy goals whose successful
18 achievement depends on large-scale, off-site wind energy procurement. Forty-three percent
19 of Fortune 500 companies and 60 percent of Fortune 100 companies have set climate and

⁷ 2016 Ameren Missouri Integrated Resource Plan Annual Update Report, https://www.efis.psc.mo.gov/mpsc/commoncomponents/view_itemno_details.asp?caseno=EO-2016-0273&attach_id=2016020160, p. 4 (last accessed August 25, 2016).

⁸ <http://www.aeci.org/docs/default-source/RFPs/2016-renewables-rfp.pdf?sfvrsn=0> (last accessed August 25, 2016).

1 clean energy targets.⁹ In 2015, non-utility purchases (corporate buyers, universities and the
2 military) accounted for 52 percent of the megawatts contracted under wind power PPAs.¹⁰
3 In recent years, Illinois has seen a substantial increase in the purchases of wind energy by
4 such customers. IKEA owns and sources 98 MW of wind power from the Hoopeston Wind
5 Project in Hoopeston, Illinois. Microsoft purchases 175 MW of wind power from the Pilot
6 Hill wind farm, located near Chicago, where one of the company’s data centers is sited.

7 Because major corporations have a strong manufacturing presence in Missouri but
8 limited options for low-cost renewable energy, they require expanded options such as wind
9 power delivered by Grain Belt Express. A number of firms have expressed their support
10 for the delivery to Missouri of low-cost wind energy through Grain Belt Express. Michael
11 Skelly further describes this support in his direct testimony.

12 **Q. What existing and possible future regulatory requirements drive demand for**
13 **renewable energy in Missouri?**

14 A. Missouri’s Renewable Energy Standard (“RES”) in Sections 393.1020 and 393.1030
15 requires the generating portfolios of investor-owned electric utilities to include renewable
16 generation of at least 15% by 2021. A higher percentage of renewable energy in Missouri’s
17 electric mix can lower fuel price volatility, create jobs, improve air and water quality, and
18 reduce the rate and reliability impacts of greenhouse gas and other environmental
19 regulations. However, in order to realize these benefits, cost-effective renewable energy

⁹ WWF, Ceres, Calvert Investments, David Gardiner & Associates, “Power Forward 2.0: How American Companies Are Setting Clean Energy Targets and Capturing Greater Business Value,” http://www.dgardiner.com/wp-content/uploads/2014/06/power_forward_2-0_FINAL.pdf (last accessed August 25, 2016).

¹⁰ Greg Alvarez, American Wind Energy Association, “Making a deal: wind energy power purchase agreements,” March 14, 2016, <http://www.aweablog.org/making-a-deal-wind-energy-power-purchase-agreements/> (last accessed August 25, 2016.)

1 resources must be available for utilities to purchase. In that respect, new transmission lines
2 like the Grain Belt Express Project play an essential role.

3 In addition, should the Clean Power Plan withstand judicial review and come into
4 effect, Missouri will require a substantial amount of renewable energy in order to comply
5 cost effectively. Under the Final Plan that the Environmental Protection Agency issued in
6 August 2015, Missouri is required to reduce its carbon emissions by 22.6 million tons per
7 year by 2030 from 2012 levels.¹¹ Grain Belt Express will provide approximately 3 million
8 tons of reductions if it displaces coal generation.¹²

9 **Q. Will the wind energy delivered by the Project be eligible to meet the Missouri RES?**

10 A. Yes. The Missouri RES does not impose any geographic restrictions on the location of the
11 generation facilities. The RES does provide that 2% of the renewable requirements must
12 be met by solar, but western Kansas wind is eligible to meet the remaining 98% of the RES
13 requirement.

14 In addition to the state-level RES, some municipalities have enacted renewable
15 energy standards. A resolution adopted by the City Council of Columbia, Missouri on
16 October 6, 2014 expresses the Council's support for the Project as an economically feasible
17 renewable energy option to serve the City's customers and to help the City fulfill its
18 Renewable Energy Ordinance. The ordinance also increased the percentages of required
19 renewable energy increased from 10% to 15% by 2018 and from 15% to 25% by 2023, and

¹¹ <https://www3.epa.gov/airquality/cpptoolbox/missouri.pdf> (last accessed August 25, 2016)

¹² The Project's carbon emissions displacement is calculated based on 2.6 million MWh of delivered energy displacing coal generated at the 2012 Missouri baseline coal emissions rate published in EPA Technical Support Document "CO2 Emission Performance Rate and Goal Computation Technical Support Document for CPP Final Rule" *Appendix 1* <https://www.epa.gov/cleanpowerplan/clean-power-plan-final-rule-technical-documents> (last accessed August 25, 2016).

1 set a new goal of 30% by 2029. The City Council approved the resolution upon the
2 recommendation of the city's municipal utility, Columbia Water & Light Department. See
3 **Schedule DAB-06.**

4 **Q. Why is it important that Missouri utilities have access to the lowest cost renewable**
5 **energy to meet the RES?**

6 A. The RES imposes a cost cap that compliance with the RES cannot increase rates paid by
7 Missouri ratepayers by more than one percent. This means that renewable energy cannot
8 be substantially more expensive than energy from other generation resources. The cost cap
9 mandates that Missouri's utilities have access to the cheapest renewable energy resources.
10 If they do not have this access, the RES may not be met, and the public will be deprived of
11 the benefits of cost-effective renewable energy compliance, which were supported by
12 Missouri's voters in 2008 when they approved the RES by referendum.

13 **Q. How much renewable energy will be required to meet the Missouri RES, and how**
14 **does that compare to current supply?**

15 A. Approximately 9 million MWh per year of renewable electricity will be needed by 2021
16 for Missouri's investor-owned utilities to meet their RES requirements. I am basing my
17 estimates on information from the RES statute, utility compliance reports and the U.S. EIA.
18 Detail supporting these calculations is attached as **Schedule DAB-07.** While other
19 Missouri utilities are further along in meeting their RPS goals, Ameren still has a
20 significant need, as discussed in their most recent IRP described above.

21 **Q. How much renewable energy can the Grain Belt Express Project deliver to Missouri?**

1 A. The Project can supply Missouri with 2.2-2.6 million MWh per year of renewable energy.
2 As I noted above, the Project’s delivery point in Missouri will be capable of delivering up
3 to 500 MW of power to the grid in Missouri at any one time.

4 **Q. Is the market for renewable energy a state-by-state market or a regional market?**

5 A. The market for renewable energy and renewable energy credits (“RECs”) is regional in
6 nature,¹³ with active trade of RECs occurring among states in each region.

7 **Q. Does Missouri have an interest in other states having adequate resources available to
8 meet their state RPS goals?**

9 A. Yes, as a result of the regional nature of power and REC markets, states will be able to
10 satisfy their renewable energy goals at a lower cost if other states also have access to
11 adequate supplies of the lowest cost renewable energy. Shortfalls in other states in
12 renewable energy resources to meet RPS requirements will tend to increase REC prices
13 throughout the region and therefore increase the cost of meeting the portfolio standard
14 mandated by Missouri’s requirement.

15 It may help to consider the following scenario. Let us assume there was a REC
16 shortfall in State X, so REC prices were higher in State X compared to prices in Missouri.
17 The same REC is eligible to meet each state’s RPS. Owners of RECs would sell them in
18 State X’s market until Missouri REC prices rose to a level equal to State X’s prices. As a
19 result, Missouri would pay more for RECs because there is a shortfall in another state and
20 low-cost supply migrates from Missouri to higher-priced State X until prices equalize
21 across the two states.

¹³ A REC is an allowance representing the environmental attributes of one MWh of renewable electricity. RECs can be traded and used to show compliance with RPS statutes.

1 **Q. In addition to Missouri, do other states in MISO and PJM have RPS requirements?**

2 A. Yes. Within the PJM footprint, the District of Columbia, Delaware, Maryland, New Jersey,
3 West Virginia, North Carolina, Ohio, Pennsylvania and Virginia all have enacted RPSs,
4 goals, or targets, as have Indiana, Illinois, and Michigan, which have service territories in
5 MISO, as well as PJM.¹⁴ The Project’s second delivery point in Indiana will be able to
6 serve many of the RPS requirements in the PJM footprint. Several additional states in the
7 MISO footprint—Iowa, Minnesota, Montana, North Dakota, Wisconsin, and of course
8 Missouri—also have RPS requirements.

9 **Q. Based on state renewable energy standards and goals, what is the total demand for**
10 **renewable energy in the MISO and PJM regions?**

11 A. I estimate that the demand for renewable energy from states in the MISO and PJM regions
12 will be 115.23 million MWh in 2016, 159.08 million MWh in 2020, and 200.04 million
13 MWh in 2025. These figures were obtained by using the statutory requirements or goals,
14 and applying them to the load forecasts from the EIA’s 2015 Annual Energy Outlook.¹⁵
15 The calculations to obtain these figures are provided in **Schedule DAB-08**.

16 **Q. How does this total volume of renewable energy demand compare with existing**
17 **supply?**

18 A. According to data published by Monitoring Analytics (PJM’s market monitor) and by
19 MISO, total renewable energy generation in the MISO and PJM states during 2015 was

¹⁴ Indiana and Virginia have voluntary renewable energy goals.

¹⁵ EIA, “Annual Energy Outlook 2016.” Available online at <https://www.eia.gov/forecasts/aeo/index.cfm> (last accessed August 25, 2016).

1 about 90 million MWh.¹⁶ This figure likely overestimates the RPS-eligible supply since it
2 includes conventional hydro generation, which is not eligible to meet many state RPS
3 requirements. Regardless, the current level of supply in MISO and PJM states falls far short
4 of the projected demand over the next ten years, based on state RPS requirements and
5 renewable energy goals. This shortfall underlines the need for new transmission
6 infrastructure like the Project to enable low-cost wind energy.

7 **Q. Why is the Grain Belt Express Project a beneficial way to meet the RPS requirements**
8 **in MISO and PJM states?**

9 A. The Project does not impose any costs on ratepayers in general. Only the specific users of
10 the line would pay for the service offered by the Project. This creates greater transparency
11 in transmission costs and eliminates the risk that specific states or users will pay more than
12 their fair share of the costs of regional RPS compliance. Wind is the lowest-cost renewable
13 energy resource, and Kansas produces the cheapest wind energy in the country. By
14 accessing the cheapest resource, it is possible to meet demand driven by RPS's at the lowest
15 cost. Western Kansas wind generation connected to an HVDC transmission line offers a
16 large-scale, low-cost, efficient solution to meeting renewable energy standards which ramp
17 up considerably over the coming years.

18 **Q. Will there be additional demand for renewable energy beyond that called for by the**
19 **MISO and PJM state RPS requirements?**

¹⁶ For MISO, includes energy generation from hydro, wind and waste sources. MISO, "Monthly Market Assessment Reports: Fuel Mix Section." Available at <https://www.misoenergy.org/MarketsOperations/MarketInformation/> (last accessed August 25, 2016). For PJM, includes energy generation from hydro, wind, biomass, landfill gas, waste and solar sources. Monitoring Analytics, "2015 State of the Market Report for PJM: Volume 2." Available at http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2015.shtml (last accessed August 25, 2016).

1 A. Yes. The RPS requirements described above are a floor, not a ceiling, on the amount of
2 renewable energy to be procured. Given the declining cost of renewable energy and the
3 cost parity between the high capacity factor wind power and other sources, actual
4 renewable energy purchases will exceed the RPS requirements. This is especially true
5 because of the growing numbers of cooperatives, municipalities and large industrial
6 customers that buy substantial amounts of renewable energy, even though they are not
7 obligated to make these purchases. For example, AECI sources 750 MW, or about 12% of
8 its electricity, from wind power.¹⁷

9 City Utilities of Springfield entered into a 50 MW PPA with the Smoky Hills Wind
10 Farm in Salina, Kansas, and offers its retail customers a voluntary green switch program
11 to buy this power.¹⁸ In 2004, the City of Columbia passed a local ordinance requiring
12 increased levels of renewable energy purchases by its municipal utility, which now
13 purchases wind power from Next Era Energy's Crystal Lake wind farm in Iowa.¹⁹
14 MJMEUC, in addition to its Transmission Service Agreement with Grain Belt Express,
15 also has purchased wind power on behalf of its members from the Loess Hills Wind Farm.²⁰
16 Together these purchases demonstrate that wind power is a cost-effective resource. There
17 is no state regulatory mandate for these purchases since municipal utilities and cooperatives
18 are not bound by the Missouri RES. Demand for wind power from municipals and
19 cooperatives is in addition to the statutory demand from the RES.

¹⁷ <http://www.aeci.org/docs/default-source/documents/2015-annual-report-with-fact-book-2.pdf?sfvrsn=0>
(last accessed on August 25, 2016).

¹⁸ <https://www.cityutilities.net/corporate/aboutcu/annual-report/> (last accessed August 25, 2016).

¹⁹ <https://www.como.gov/WaterandLight/Documents/RenewReport.pdf> (last accessed August 25, 2016).

²⁰ http://www.mpu.org/Loess_Hills_Wind_Farm.php (last accessed August 25, 2016).

1 **Q. Can the wind energy delivered by the Project be used to comply with Clean Power**
2 **Plan requirements should they come into effect?**

3 A. Yes. The EPA clarified in the Final Rule that the state that drives the investment in a
4 renewable resource can take credit for the associated carbon emission reductions,
5 regardless of the location of the renewable energy facilities.²¹ The Missouri utilities that
6 contract to purchase power from the Grain Belt Express Project will drive the investment
7 for the new Kansas wind farms. As a result, credit for the reduced carbon emissions
8 reductions will accrue to Missouri.

9 **Q. Are fossil fuel generation assets subject to any other major environmental**
10 **regulations?**

11 A. Yes. The EPA has issued multiple environmental regulations pertaining to waste and
12 pollution that fossil fuel generators must comply with over the next several years. There
13 will be costs associated with installing pollution control equipment and waste disposal that
14 will increase the cost of fossil fuel generation for utilities and ratepayers. The Effluent
15 Limitations Guidelines and Standards for the Steam Electric Power Generating Units are
16 designed to reduce toxic metals and other harmful pollutants discharged in the wastewater
17 from steam electric power plants.²² The final rule became effective January 4, 2016, and
18 compliance with this rule begins on November 1, 2018. The Coal Combustion Residual
19 Rule regulates the disposal of coal ash materials generated from coal fired power plants

²¹ Clean Power Plan Final Rule, Federal Register Vol. 80 No. 205, at pages 227, 235, and 252.
<https://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf> (last accessed August 25, 2016).

²² Federal Register Vol. 80 No. 212, <https://www.gpo.gov/fdsys/pkg/FR-2015-11-03/pdf/2015-25663.pdf>
(last accessed August 25, 2016).

1 and took effect on October 19, 2015.²³ The Mercury and Air Toxics Standards (MATS)
2 Rule regulates toxic air emissions from coal and oil-fired power plants, and was finalized
3 on March 17, 2016. EPA has continued to enforce MATS despite several legal
4 challenges.²⁴

5 d. Other Benefits of Grain Belt Express

6 **Q. What other benefits will Grain Belt Express offer to Missouri and the surrounding**
7 **region?**

8 A. Beyond offering a low-cost source of renewable energy to meet RPS targets and the
9 demand for clean energy generally, Grain Belt Express creates a number of other benefits:

- 10 • The Project's participant-funded business model protects Missouri electric customers from
11 costs and risks inherent in traditional, rate-based transmission (see direct testimony of
12 Grain Belt Express witness Suedeem Kelly);
- 13 • The Project meets the clear need for interregional transmission while avoiding the
14 contentious and problematic cost allocation processes across multiple RTOs (see direct
15 testimony of Grain Belt Express witness Suedeem Kelly);
- 16 • The Project will reduce wholesale electricity prices and the cost for Missouri utilities to
17 serve their electric load, savings which will ultimately passed along to Missouri customers
18 through rate cases (see direct testimony of Company witness J. Neil Copeland);
- 19 • The Project provides Missouri utilities access to lower cost power supply than would
20 otherwise be available, with an estimated savings to MJMEUC of \$10 million per year and

²³ <https://www.gpo.gov/fdsys/pkg/FR-2015-07-02/pdf/2015-15913.pdf> (last accessed August 25, 2016).

²⁴ <https://www.epa.gov/mats/regulatory-actions-final-mercury-and-air-toxics-standards-mats-power-plants>
(last accessed August 25, 2016).

1 additional savings possible for other Missouri utilities (see direct testimony of Grain Belt
2 Express witness Mark Lawlor);

- 3 • The Project will reduce the emissions of carbon dioxide, nitric oxides, and sulfur dioxides
4 (see direct testimony of Grain Belt Express witness J. Neil Copeland);
- 5 • The Project will enable Missouri utilities to diversify their fuel portfolios, and hedge their
6 exposure to possible future increases in the cost of fuel since wind has zero fuel cost
- 7 • The Project allows Missouri and other states to cost-effectively meet their state renewable
8 energy standards or goals;
- 9 • The Project provides a major new source of electric generation and links three major RTOs,
10 which increases reliability during times of peak load or generator outages (see direct
11 testimony of Grain Belt Express witness Edward Pfeiffer);
- 12 • The Project will be a source of economic development to Missouri through increased
13 property taxes (see direct testimony Grain Belt Express of Richard Trenago); construction
14 jobs (see direct testimony of Grain Belt Express witness Thomas Shifflett); and
15 manufacturing jobs (see direct testimony of Grain Belt Express witness Wayne Galli).

16 **V. CONDITIONS ON CERTIFICATE**

17 **Q. Is Grain Belt Express willing to agree to the conditions similar to those negotiated in**
18 **the 2014 Case?**

19 A. Yes. Grain Belt Express will agree to a set of conditions similar to those negotiated in the
20 2014 case, with appropriate updates given the advancements in the Project.

21 **Q. Does this conclude your direct testimony?**

22 A. Yes.

