

**BEFORE THE STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS**

In the Matter of the Application of Grain)
Belt Express, LLC for a Siting Permit for the)
Construction of Two 345 kV Transmission) Docket No. 24-GBEE-790-STG
Lines and Associated Facilities through)
Gray, Meade, and Ford Counties, Kansas.)

**REBUTTAL TESTIMONY OF
CARLOS RODRIGUEZ
ON BEHALF OF
GRAIN BELT EXPRESS LLC**

July 26, 2024

Contents

I. Introduction..... 3

II. Power Quality 5

III. Response to Staff’s Recommendation for a Power Quality Study and Mitigation..... 11

IV. Response to Sunflower’s comments Regarding Transmission Projects Connecting SPP and MISO..... 12

V. Conclusion 15

1 **I. INTRODUCTION**

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

3 A. My name is Carlos Rodriguez. I am Senior Vice President of Interconnections and
4 Grid Analysis at Invenergy LLC (“Invenergy”). My business address is One South Wacker Drive,
5 Suite 1800, Chicago, IL 60606.

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

7 A. My main responsibilities are leading and coordinating the electrical
8 interconnections for Invenergy at a global level, including projects in the United States, Canada,
9 Latin America and other parts of the world. This includes performing electrical studies for site
10 prospecting, submitting interconnection requests and associated technical data, reviewing power
11 system studies performed by utilities, Regional Transmission Organizations and Independent
12 System Operators and negotiating interconnection agreements.

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

14 A. I have a Bachelor of Science degree in electrical engineering from Universidad
15 Metropolitana in Caracas, Venezuela (1991) and also a graduate degree as Specialist in Electric
16 Power Systems from Universidad Central de Venezuela in Caracas, Venezuela (1998). I was
17 involved in generation and transmission planning in what used to be the largest private utility in
18 Venezuela, Electricidad de Caracas. I worked in Electricidad de Caracas for 8 years (1991–2000)
19 and when I left the company, I was the Manager of Generation and Transmission Planning,
20 responsible for producing mid-term and long-term expansion plans for the company. In 2000 I
21 immigrated to the United States and initially worked at a consulting company in Chicago called
22 MWH from 2000 to 2004, doing power system analysis and interconnection studies. From 2004–
23 2005, I worked at two different companies, Operations Technology, Inc. (a developer of a power
24 system software called ETAP) and at Citadel Investment Group (a hedge fund located in Chicago).

1 In 2006 I started at Invenergy and I have held several positions, including Manager,
2 Director, Vice President and now Senior Vice President. At Invenergy I have been involved in the
3 interconnection of close to 30 GW of projects across a range of technologies (such as wind, solar,
4 storage, thermal, offshore wind and HVDC).

5 **Q. Have you previously testified before the Kansas Corporation Commission**
6 **(“Commission”) or other public utility regulatory authorities?**

7 A. Yes. I previously provided testimony to the Illinois Commerce Commission in Case
8 No. 22-0499 and to the Missouri Public Service Commission in Case No. EA-2023-0017 on behalf
9 of Grain Belt Express on similar topics as those discussed in this testimony.

10 **Q. Has this testimony been prepared by you or under your direct supervision?**

11 A. Yes, it has.

12 **Q. What is the purpose of your rebuttal testimony?**

13 A. I am testifying on behalf of Grain Belt Express, LLC (“Grain Belt Express”), which
14 is requesting a siting permit to establish the route for two inter-related transmission lines and
15 associated facilities (1) a double-circuit¹ 345 kV transmission line of approximately 46 miles in
16 length across portions of Gray, Meade, and Ford Counties (the “Meade-Dodge City Line”),
17 potentially including a future switchyard² at the Meade origination point; and (2) a single or

¹ The Meade-Dodge City Line is currently planned as a double circuit transmission line, but further refinements to Grain Belt Express’ design and engineering may occur. Grain Belt Express will update the Commission throughout this proceeding regarding significant design and engineering modifications.

² The Meade Line and the Bucklin Line have been preliminarily sited and designed to be in proximity to renewable energy projects under development that have applied to the queue, and both transmission lines will be open to interconnection requests at those points. Initially, Grain Belt Express will maintain metering infrastructure at the origination points of the transmission lines. As projects interconnect, Grain Belt Express reserves the right to construct AC switchyards as needed. Because there are already multiple renewable energy projects seeking interconnection in the vicinity of Meade-Dodge City, Grain Belt Express will begin pursuing voluntary agreement for a switchyard location along the proposed route following the processing of this Application.

1 double-circuit 345 kV transmission line of approximately 16 miles in length traversing a portion
2 of Ford County (the “Bucklin-Dodge City Line”), potentially including a future switchyard at the
3 Bucklin origination point. The Meade-Dodge City Line and the Bucklin-Dodge City Line are
4 collectively referred to as the “AC Collector Lines” and they will be used to deliver power from
5 generation interconnected to the Grain Belt Express system to the high voltage direct current
6 (“HVDC”) portion of the overall Grain Belt Express Project (the “Project”), which includes a
7 converter station in Ford County, Kansas.

8 The purpose of my testimony is to respond to portions of testimony submitted by Staff
9 witness Paul Owings and Sunflower Electric Cooperative, Inc. (“Sunflower”) witness Dr. Al
10 Tamimi. Specifically, I will address Mr. Owings and Dr. Tamimi’s concerns regarding power
11 quality and transient events, respectively. Additionally, I will address Staff’s recommendations
12 that Grain Belt Express should complete a power quality study and for Grain Belt Express to
13 provide any equipment necessary to mitigate power quality impacts, as determined by those
14 studies. Finally, I respond to comments made by Dr. Tamimi about the ability of the Grain Belt
15 Express Project to reverse flows and how that compares to seams projects connecting Southwest
16 Power Pool (“SPP”) & the Midcontinent Independent System Operator (“MISO”).

17 **Q. Are you sponsoring any exhibits as part of your direct testimony?**

18 A. Yes, I am sponsoring the following exhibits:

- 19 • Exhibit CR-1 – Carlos Rodriguez’s Curriculum Vitae

20 **II. POWER QUALITY**

21 **Q. What concerns are expressed by Staff Witness Paul Owings regarding power**
22 **quality?**

23 A. Staff expresses a concern that if there is a “sudden drop of 1000 to 1500 MW of
24 power could result in a transient effect on the local electric grid before the [Grain Belt Express]

1 control system has the ability to isolate the system,” which could “pass through the local
2 interconnect resulting in a decrease in power quality within the Kansas consumer electric service
3 areas.”³ However, Staff acknowledges that the risk of power quality problems is uncertain.⁴

4 **Q. Does Sunflower Witness Dr. Al Tamimi express similar concerns?**

5 A. Yes. Dr. Tamimi expresses similar concerns but refers to them as “transient
6 events.”⁵ Dr. Tamimi also states that “[e]ach AC Collector Line will carry a large amount of power
7 and any interruption that occurs may result in a transient event (i.e. flicker, voltage dips etc.),
8 which will be experienced by customers in and around Dodge City.”⁶

9 **Q. What is the difference between “power quality” and “transient events” as
10 those terms are used by Mr. Owings and Dr. Tamimi, respectively?**

11 A. Large HVDC projects like Grain Belt Express undergo a comprehensive set of
12 power system studies with the objective of achieving a reliable interconnection to the grid by
13 meeting or exceeding all applicable reliability criteria and standards. These studies typically
14 include steady state studies, short circuit studies, dynamic studies, electromagnetic transient
15 studies, harmonic studies, and control interaction studies, among others. All of these studies
16 guarantee the overall power quality of the system. Based on the descriptions that Mr. Owings and
17 Dr. Tamimi provided, I understand that they are concerned with the dynamic and transient
18 behavior of the system after a disturbance such as the loss of one of the AC Collector Lines, which
19 equates to the loss of a large amount of power (1,000 to 1,500 MW as stated by Mr. Owings).

³ Direct Testimony of Paul Owings, p. 14 (July 3, 2024) (“Owings Direct Testimony”).

⁴ *Id.* at p. 15.

⁵ Direct Testimony of Dr. Al Tamimi, at p. 6 (July 3, 2024) (“Tamimi Direct Testimony”).

⁶ *Id.* at p. 6.

1 **Q. What are Sunflower’s specific concerns?**

2 A. According to Dr. Tamimi, because the AC Collectors Lines carry large amounts of
3 power any interruption that occurs may result in transient events impacting customers in and
4 around Dodge City.⁷ Dr. Tamimi believes this is a particular issue because “the transmission
5 system around Dodge City is considered a weak system with little inertia to help mitigate large
6 flickers.”⁸

7 **Q. What is your response to Staff and Sunflower’s concerns regarding power
8 quality and transient event issues?**

9 A. The power quality and transient events described by Mr. Owings and Dr. Tamimi
10 are not concerns unique to the Grain Belt Express Project but are risks that are applicable to all
11 interconnections. Any loss of generation, in this case the loss of a line connecting that generation
12 source to the grid, could cause momentary issues under the right conditions. These risks are
13 identified and addressed during the interconnection study process.

14 **Q. Describe the physical interconnection of the Grain Belt Express Project?**

15 A. The Grain Belt Express Project will interconnect to the existing Saddle 345kV
16 substation, which is owned by ITC Great Plains (“ITC”), not Sunflower. However, the Saddle
17 substation is electrically close to the Sunflower system, in fact, the Saddle substation and the
18 Sunflower system are directly connected via 345kV lines that go from the Saddle substation to the
19 Clark County and Ironwood substations. Therefore, impacts of the Grain Belt Project on the
20 Sunflower system need to be considered due to its electrical proximity.

⁷ See *id.* at p. 4.

⁸ See *id.* at p. 4.

1 **Q. What processes are currently in place to address the concerns expressed by**
2 **Mr. Owings and Dr. Tamimi?**

3 A. The Southwest Power Pool has completed a Feasibility Study for the
4 interconnection, which has been accepted by the SPP Transmission Working Group (“TWG”).
5 The Feasibility Study is required to determine if the transfer is achievable and is the first of three
6 study phases that are part of the SPP HVDC Criteria.

7 The two other studies, which are pending, are 1) the Planning Study, which is currently
8 underway and 2) the Design Study, which is set to begin after completion of the Planning Study.
9 The Planning Study will specify the technical requirements of the HVDC Project. The Design
10 Study is performed by the HVDC customer’s vendor in close collaboration with SPP.

11 The scope of work of the ongoing Planning Study includes steady state analysis, short
12 circuit analysis, dynamic stability analysis, harmonic impedance studies, and control interactions
13 screening studies. The specific disturbances described by Mr. Owings and Dr. Tamimi (the loss of
14 an AC Collector Line) will be analyzed in detail and results will be shared with SPP, Sunflower
15 and other affected parties for review and comments. Any mitigation required to ensure reliability
16 and power quality of the system, including for loads in the Sunflower system will be identified in
17 the Planning Study.

18 In addition to the loss of an AC Collector Line, other contingencies will be analyzed in the
19 Planning Study, including the loss of one HVDC pole that would represent the loss of half of the
20 power being transferred, and the loss of both HVDC poles, which would represent the loss of the
21 totality of the power being transferred. The impacts of these contingencies on the SPP system will
22 be thoroughly studied and any mitigation required to ensure reliability and power quality of the
23 system, including for loads in the Sunflower system will be identified.

1 After the Planning Study is completed, the last study (the Design Study) will include
2 dynamic and electromagnetic transient analysis (EMT) performed with design-level models from
3 the HVDC’s customer vendor and all of the contingencies will be repeated.

4 **Q. What will happen if there is an unplanned outage in which the Grain Belt**
5 **Express Project goes out of service or an unplanned outage in which a collector transmission**
6 **lines goes out of service and how will it impact the Sunflower/SPP system?**

7 A. If the Grain Belt Express Project goes out of service due to a fault or disturbance
8 on the HVDC line, such as the loss of a pole (loss of half of the transfer capacity) or the loss of
9 both poles (loss of the totality of the transfer capacity) there will be a mismatch between the energy
10 generated for transfer across the HVDC line and the amount of energy being transferred across the
11 HVDC line. This in theory would result in momentary injection of energy into SPP, in order to
12 maintain the power balance between generation and load. In other words, the power from the
13 generation in Kansas was going West to East on the HVDC line and with the sudden interruption
14 of transfer capability, the power needs to go somewhere momentarily and this “somewhere” is the
15 SPP system. In working with its HVDC vendor Siemens, our understanding is that this temporary
16 injection will only last one second or less, depending on the HVDC outage (outage of a single pole
17 or outage of the bipole).

18 The main objective of the Planning Study and the Design Study is to model the system in
19 detail to simulate these disturbances and make sure that while there is momentary injection to the
20 SPP system, there are no violations to the reliability criteria and if there are, to identify the proper
21 mitigation to meet or exceed the required reliability criteria. All of these simulations and results
22 will be shared with SPP and all affected parties (including Sunflower), for their review and
23 comments.

1 We also understand Dr. Tamimi’s concerns regarding the system around Dodge City being
2 a weak system with low inertia. Grain Belt Express is modeling the system around Dodge City in
3 great detail and the simulations will evaluate the behavior of this weak system under different
4 disturbances. It is important to note that the HVDC converter stations will be of the “grid forming”
5 type, which can operate in very weak systems and can provide enhanced system support during
6 disturbances. If there is the need for mitigation to meet the required reliability criteria, it will be
7 identified and Grain Belt Express, along with SPP and the affected parties, will agree on the best
8 mitigation measure.

9 In the case of a fault or disturbance on one of the AC Collector lines, similar to the case
10 when there is a disturbance on the HVDC line, there will be a mismatch between the energy
11 generated for transfer across the HVDC line and the actual amount of energy being transferred
12 across the HVDC line. In this specific case, instead of a momentary injection, there will be a
13 momentary withdrawal of energy from SPP to maintain the targeted energy transfer across the
14 HVDC line. In working with its HVDC vendor Siemens, it is Grain Belt Express’s understanding
15 that this momentary withdrawal will last just a few hundreds of milliseconds. The control systems
16 for the HVDC line would be monitoring the generators (including the AC Collector lines) as well
17 as the SPP interface. The control system would see the loss of generation occur (including under
18 a loss of an AC Collector line) and would automatically adjust the HVDC transfer schedule to
19 match the energy available, including the impacts of the generation-related contingency. This
20 operation will only last a few hundreds of milliseconds and it will also be simulated in detail in the
21 Planning Study and the Design Study to make sure that all reliability criteria and standards are
22 met. The ongoing SPP TWG studies will test these contingencies, as well as other high impact
23 contingencies, to ensure that the interconnection of Grain Belt Express does not degrade the

1 reliability of the grid and meets all established planning criteria and reliability standards. As
2 indicated above, Sunflower and ITC are active participants in the SPP TWG studies.

3 **Q. Are retail electric customers in the Dodge City area at risk of losing power if**
4 **Grain Belt Express goes out of service?**

5 A. No, in case of a fault or disturbance on the HVDC line, the appropriate protection
6 systems and any additional mitigation that may be identified as part of the SPP TWG studies will
7 be in place to prevent adverse impacts to electric customers in SPP, including in the Dodge City
8 area.

9 **III. RESPONSE TO STAFF’S RECOMMENDATION FOR A POWER QUALITY**
10 **STUDY AND MITIGATION**

11 **Q. What is Staff’s recommendation regarding power quality?**

12 A. Staff recommends “[Grain Belt Express] shall complete a power quality study to
13 evaluate the potential for decreased power quality in Kansas service areas near the converter station
14 that may occur as a result of the [Grain Belt Express] Project and propose measures to mitigate
15 decreases in power quality.”⁹ Staff also recommends “[Grain Belt Express] shall provide any
16 equipment to mitigate power quality impacts if the power quality study determines such equipment
17 is necessary.”¹⁰

18 **Q. What is Grain Belt Express’ position on whether it should complete a power**
19 **quality study?**

20 A. As discussed above, the Project, including the AC Collector Lines, is undergoing
21 robust analyses with the SPP to ensure reliable operation of the Grain Belt system and surrounding

⁹ Owings Direct Testimony, p. 35.

¹⁰ *Id.* at p. 35.

1 systems. Staff’s recommended analyses are part of the SPP study process and will be addressed.
2 As a result, conducting a power quality study as recommended by Staff would be duplicative of
3 the process that already exists, and so is unnecessary.

4 **Q. What do you recommend regarding Staff’s recommendation for a power**
5 **quality study?**

6 A. While Grain Belt Express could provide a copy of the feasibility study to Staff it
7 would not address the specific concerns from Staff or Sunflower. The Planning Study and Design
8 Study does address the specific concerns of Staff and Sunflower. Thus, Grain Belt Express will
9 share these studies with Staff when they are available.

10 **Q. What is your response to Staff’s recommendation that Grain Belt Express**
11 **provide any equipment to mitigate power quality impacts, if determined to be necessary?**

12 A. Any mitigative actions, including providing equipment, will be addressed in the
13 SPP studies. Pursuant to the SPP Tariff, to the extent that they are necessary, Grain Belt Express
14 will pay for all capital costs of the interconnection to ITC’s system, including any identified
15 upgrades associated with the SPP analyses to ensure stable and reliable operation of the regional
16 grid in Kansas. Accordingly, there is no need for a KCC-imposed condition regarding mitigative
17 equipment.

18 **IV. RESPONSE TO SUNFLOWER’S COMMENTS REGARDING**
19 **TRANSMISSION PROJECTS CONNECTING SPP AND MISO**

20 **Q. How does Sunflower’s direct testimony address transmission projects that**
21 **connect SPP and MISO?**

22 A. In one of Dr. Tamimi’s responses regarding transmission needs between MISO and
23 SPP he states that it is his “understanding that SPP and MISO have approved transmission projects

1 that are already intended to strengthen the tie between SPP and MISO for many scenarios,
2 including emergencies.”¹¹

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

4 A. Based on Dr. Tamimi’s response, I believe he refers to the MISO-SPP Joint
5 Targeted Interconnection Queue Study (JTIQ). The JTIQ portfolio is an evolutionary way to
6 address chronic transmission issues along the seam between MISO and SPP, particularly those
7 issues that are inhibiting the interconnection of new generation. By working jointly, the two RTOs
8 are looking to address these chronic issues through a larger scaled approach for transmission
9 development that can be shared across a larger group of interconnection customers. This approach
10 will mitigate the historical issues of having network upgrade costs that are too burdensome for
11 smaller groups of customers. The projects are depicted below in Figure 1 in red.

12 SPP and MISO conducted a transmission planning study to facilitate the interconnection
13 of new generator capacity to try and solve the transmission issues along the seam (East NE, West
14 IA, East KS and West MO borders) in both the SPP Region and the MISO Region. While part of
15 this portfolio is DOE funded, the remaining cost of the portfolio is 100% allocated to the
16 interconnection customers connecting to the grid.

¹¹ Tamimi Direct Testimony, p. 7.



1

2 *Figure 1 – JTIQ Projects Designed to Address Transmission Issues Along the SPP-MISO Seam*

3 As explained above, the JTIQ projects are intended to address affected system study issues
 4 in the MISO and SPP footprints and are focused on generation interconnection. The Grain Belt
 5 Express Project has a different scope and objective, which is to facilitate the transfer of power over
 6 a long distance to bring renewable generation from the West (KS) to markets in the East (MISO,
 7 AECI, PJM) and also to facilitate West to East and East to West transfers between three RTOs
 8 (SPP, MISO, PJM) and one utility (AECI) that can be key for assistance under emergency
 9 conditions and can also facilitate economic transactions.

1 **Q. How does Sunflower’s direct testimony address Grain Belt’s capabilities to**
2 **reverse power flow?**

3 A. Dr. Tamimi states in one of his responses that to the best of his knowledge, SPP,
4 MISO, and PJM have not studied the issue of Grain Belt reversing power flow.¹²

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

6 A. Studies that address reversing power flow have not been performed yet, however,
7 Grain Belt has the technical capability to reverse power flow. At the appropriate time in the future,
8 withdrawal studies to allow reversing power to assist the different RTOs under emergency
9 conditions will be conducted in coordination with the different RTOs. Also, reversing power for
10 economic reasons is also possible and these economic transactions will likely be handled via
11 transmission service requests.

12 **V. CONCLUSION**

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

14 A. Yes, it does.

¹² *Id.* at p. 7.

VERIFICATION

I, Carlos Rodriguez, do solemnly, sincerely and truly declare and affirm that I am Senior Vice President of Interconnections and Grid Analysis for Invenergy Transmission, LLC, that I have read the foregoing testimony and know the contents thereof, and that the facts set forth therein are true and correct to the best of my knowledge and belief, and this I do under the pains and penalties of perjury.

By: /s/ Carlos Rodriguez
Carlos Rodriguez

July 26, 2024

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing document was served upon the parties listed below by email or U.S. mail, postage prepaid, this 26th day of July, 2024.

Keith A. Brock, Attorney
Anderson & Byrd, L.L.P.
216 S Hickory
PO Box 17
Ottawa, KS 66067
kbrock@andersonbyrd.com

James G. Flaherty, Attorney
Anderson & Byrd, L.L.P.
216 S Hickory
PO Box 17
Ottawa, KS 66067
jflaherty@andersonbyrd.com

Kirk Thompson,
C. M. S. Electric Cooperative, Inc.
509 E Carthage
P O Box 790
Meade, KS 67864-0790
kthompson@cmselectric.com

James P Zakoura, Attorney
Foulston Siefkin LLP
7500 College Boulevard, STE 1400
Overland Park, KS 66201-4041
jzakoura@foulston.com

Kevin Chandler
Grain Belt Express LLC
One South Wacker Drive, STE 1800
Chicago, IL 60606
kchandler@invenergy.com

Nicole Luckey
Grain Belt Express LLC
One South Wacker Drive, STE 1800
Chicago, IL 60606
nluckey@invenergy.com

Brad Pnazek
Grain Belt Express LLC
One South Wacker Drive, STE 1800
Chicago, IL 60606
bpnazek@invenergy.com

Brian G. Fedotin, General Counsel
Kansas Corporation Commission
1500 SW Arrowhead RD
Topeka, KS 66604
Brian.Fedotin@ks.gov

Carly Masenthin, Litigation Counsel
Kansas Corporation Commission
1500 SW Arrowhead RD
Topeka, KS 66604
Carly.Masenthin@ks.gov

Kyler C. Wineinger, Assistant General
Counsel
Kansas Corporation Commission
1500 SW Arrowhead RD
Topeka, KS 66604
Kyler.Wineinger@ks.gov

Tim J. Larson
Larson, Brown & Ebert, PA
7570 W 21ST ST N., STE 1026A
Wichita, KS 67205
tim@larsonbrown.law

James Brungardt,
Mid-Kansas Electric Company, Llc
301 W 13th ST
PO Box 980
Hays, KS 67601
jbrungardt@sunflower.net

Leah M. Davis
Morgan Williamson LLP
500 S. Taylor, Suite 900
Amarillo, TX 79101
ldavis@mw-law.com

Anne E. Callenbach, Attorney
Polsinelli PC
900 W 48TH Place STE 900
Kansas City, MO 64112
acallenbach@polsinelli.com

Jared R. Jevons, Attorney
Polsinelli PC
900 W 48TH Place STE 900
Kansas City, MO 64112
jjevons@polsinelli.com

Andrew O. Schulte, Attorney
POLSINELLI PC
900 W 48TH Place STE 900
Kansas City, MO 64112
aschulte@polsinelli.com

Clarence Suppes,
Sunflower Electric Power Corporation
301 W. 13th
PO Box 1020
Hays, KS 67601-1020
cdsuppes@sunflower.net

Al Tamimi, SVP & COO - Transmission
Sunflower Electric Power Corporation
301 W. 13TH
PO Box 1020
Hays, KS 67601-1020
atamimi@sunflower.net

Amanda Wray, Corporate Paralegal
Sunflower Electric Power Corporation
301 W. 13th
PO Box 1020
Hays, KS 67601-1020
awray@sunflower.net

Taylor P. Calcara, Attorney
Watkins Calcara Chtd.
1321 Main St STE 300
PO Drawer 1110
Great Bend, KS 67530
TCALCARA@WCRF.COM

Jeffrey M Kuhlman, Attorney
Watkins Calcara Chtd.
1321 Main St STE 300
PO Drawer 1110
Great Bend, KS 67530
jkuhlman@wcrf.com

/s/ Anne E. Callenbach

Attorney for Grain Belt Express, LLC

Carlos A. Rodriguez
crodriguez@invenergy.com

SUMMARY OF QUALIFICATIONS

Electrical engineer with extensive domestic and international experience in the electrical interconnection of utility scale power generation and transmission projects, including thermal, wind, solar, storage, offshore wind, and HVDC transmission. Familiar with the interconnection processes for different ISOs, RTOs, and TOs in the US, as well as international experience in Latin America and other parts of the world.

PROFESSIONAL EXPERIENCE

Invenergy LLC

Senior Vice President Interconnections and Grid Analysis

June 2021 - Present

Lead and coordinate the electrical interconnection strategy and process for generation and transmission projects in the US, Canada, Latin America, and Europe for thermal, solar, wind, storage, offshore wind, and HVDC projects from prospecting to submission of interconnection requests, to negotiation and execution of interconnection agreements.

- Manage interconnection process and strategy for a growing pipeline of 100GW+ projects
- Anticipate and research opportunities and risks related to interconnection activities and processes
- Lead and coordinate the electrical transmission service process for point-to-point transmission
- Work closely with the Regulatory team on interconnection related matters and policy
- Work closely with the Engineering team in project's conceptual design
- Serve as liaison with the different RTOs, ISOs, and TOs throughout the interconnection and transmission service processes
- Represent Invenergy in key stakeholder groups, industry working groups, and conferences related to interconnection processes in different regions
- Manage a team of 9 people

Invenergy LLC

Vice President Transmission

March 2018 – June 2021

Lead and coordinate the electrical interconnection strategy and process for generation and transmission projects in the US, Canada, Latin America, and Europe for thermal, solar, wind, storage, offshore wind, and HVDC projects from prospecting to submission of interconnection requests to negotiation and execution of interconnection agreements.

- Manage interconnection process and strategy for a growing pipeline of up to 80GW+ projects
- Anticipate and research opportunities and risks related to interconnection activities and processes
- Lead and coordinate the electrical transmission service process for point-to-point transmission
- Work closely with the Regulatory team on interconnection related matters and policy
- Work closely with the Engineering team in project's conceptual design
- Serve as liaison with the different RTOs, ISOs, and TOs throughout the interconnection and transmission service processes
- Represent Invenergy in key stakeholder groups, industry working groups, and conferences related to interconnection processes in different regions
- Manage a team of 7 people

Invenergy LLC
Director Transmission

March 2016 – March 2018

Lead and coordinate the electrical interconnection strategy and process for generation projects in the US, Canada, and Latin America for thermal, solar, wind, and storage from prospecting to submission of interconnection requests to negotiation and execution of interconnection agreements.

- Manage interconnection process and strategy for a growing pipeline of up to 50GW+ projects
- Anticipate and research opportunities and risks related to interconnection activities and processes
- Lead and coordinate the electrical transmission service process for point-to-point transmission
- Work closely with the Regulatory team on interconnection related matters and policy
- Work closely with the Engineering team in project's conceptual design
- Serve as liaison with the different RTOs, ISOs, and TOs throughout the interconnection and transmission service processes
- Represent Invenergy in key stakeholder groups, industry working groups, and conferences related to interconnection processes in different regions
- Manage a team of 4 people

Invenergy LLC
Manager Transmission

April 2006 – March 2016

Lead and coordinate the electrical interconnection strategy and process for generation projects in the US, Canada, and Latin America for thermal, solar, wind, and storage from prospecting to submission of interconnection requests to negotiation and execution of interconnection agreements.

- Manage interconnection process and strategy for a growing pipeline of up to 30GW+ projects
- Anticipate and research opportunities and risks related to interconnection activities and processes
- Lead and coordinate the electrical transmission service process for point-to-point transmission
- Work closely with the Regulatory team on interconnection related matters and policy
- Work closely with the Engineering team in project's conceptual design
- Serve as liaison with the different RTOs, ISOs, and TOs throughout the interconnection and transmission service processes
- Represent Invenergy in key stakeholder groups, industry working groups, and conferences related to interconnection processes in different regions

Citadel Investment Group, LLC. Chicago, IL
Electrical Engineer/Quantitative Research Analyst

Jan 2005-Dec 2005

- Participated as a key member in a team who developed production cost models (using PROMOD) of the Midwest ISO, expanded PJM, and ISO New England systems. Facilitated power pricing estimation.
- Performed available transfer capability (ATC) analysis to identify congested paths within the system, in support of Financial Transmission Rights (FTR) trading.
- Investigated the generating unit bid files in the PJM and ISO-New England systems, in an effort to better understand generating unit bidding procedures and improve accuracy of price predictions.

Operation Technology, Inc. Irvine, CA

2004-2005

Electrical Engineer

- Engaged in power system analysis software sales and testing, as well as in the development of power system studies.

MWH (Montgomery Watson Harza), Chicago, Illinois

2000-2004

Electrical Engineer and Consultant

- Electrical engineer and consultant in power system planning and asset management; engaged in development of power system and feasibility studies and power plant site location investigations.

ELECTRICIDAD DE CARACAS, Caracas, Venezuela

Energy Planning Manager – Generation and Transmission

1998-2000

Responsible for generation and transmission expansion planning for the city of Caracas. Developed power purchase and sell requirement estimates to manage deficit/surplus conditions in Caracas, recommended timing for maintenance of generating units.

Section Leader – Generation Planning

1994-1998

Engineer – Generation and Transmission Planning

1991-1994

EDUCATION

Specialist in Electric Power Systems (equivalent to M.Eng. in the U.S.)

Universidad Central de Venezuela, Caracas, Venezuela 1998

Bachelor of Science, Electrical Engineering, Universidad Metropolitana, Caracas, Venezuela 1991