**BEFORE THE PUBLIC UTILITIES COMMISSION**
**OF THE STATE OF COLORADO**

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| **IN THE MATTER OF THE APPLICATION** | **)** | |
| **OF PUBLIC SERVICE COMPANY OF** | **)** | |
| **COLORADO FOR A CERTIFICATE OF** | **)** | |
| **PUBLIC CONVENIENCE AND** | **)** | |
| **NECESSITY FOR COLORADO'S POWER** | **)** | **PROCEEDING NO. 21A-XXXXE** |
| **PATHWAY 345 KV TRANSMISSION** | **)** | |
| **PROJECT REGARDING NOISE AND** | **)** | |
| **MAGNETIC FIELD REASONABLENESS** | **)** | |

# DIRECT TESTIMONY AND ATTACHMENTS OF JAMES F. HILL

**ON**

**BEHALF OF**

**PUBLIC SERVICE COMPANY OF COLORADO**

**March 2, 2021**

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO**

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| **IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR COLORADO'S POWER PATHWAY 345 KV TRANSMISSION PROJECT REGARDING NOISE AND MAGNETIC FIELD REASONABLENESS** | **)** | **PROCEEDING NO. 21A-XXXXE** |

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## GLOSSARY OF ACRONYMS AND DEFINED TERMS

| Acronym/Defined Term | Meaning |
|---|---|
| 2016 ERP | Public Service's Electric Resource Plan filed in May 2016 |
| 2021 ERP & CEP | Company's upcoming Electric Resource Plan and Clean Energy Plan filing |
| BOT | Build Own Transfer |
| CEP | Clean Energy Plan |
| CEPP | Colorado Energy Plan Portfolio |
| CPCN | Certificate of Public Convenience and Necessity |
| DER | Distributed Energy Resources |
| DSM | Demand Side Management |
| ERP | Electric Resource Plan |
| GDT | Greenwood to Denver Terminal Project |
| ITC | Investment Tax Credit |
| IPP | Independent Power Producer |
| kV | Kilovolt |
| MST | Million short ton |
| MW | Megawatt |
| PPA | Power Purchase Agreement |
| Pathway Project or the Project | Colorado's Power Pathway 345 kV Transmission Project |
| PTC | Production Tax Credit |
| Public Service or Company | Public Service Company of Colorado |

| **Acronym/Defined Term** | **Meaning** |
|---|---|
| RFP | Request for Proposal |
| Xcel Energy | Xcel Energy Inc. |
| XES | Xcel Energy Services Inc. |

**BEFORE THE PUBLIC UTILITIES COMMISSION**
**OF THE STATE OF COLORADO**

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## DIRECT TESTIMONY AND ATTACHMENTS OF JAMES F. HILL

## I. INTRODUCTION, QUALIFICATIONS, AND PURPOSE OF TESTIMONY

**Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

A. My name is James F. Hill. My business address is 1800 Larimer Street, Denver, Colorado 80202.

**Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?**

A. I am employed by Xcel Energy Services Inc., a wholly owned subsidiary of Xcel Energy Inc., the parent company of Public Service Company of Colorado ("Public Service" or the "Company"). My job title is Director, Resource Planning and Bidding.

**Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THE PROCEEDING?**

A. I am testifying on behalf of Public Service Company of Colorado.

**Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AND QUALIFICATIONS.**

A. As the Director of Resource Planning and Bidding, I am responsible for overseeing the Company's resource planning and competitive resource acquisition processes, as well as the various technical analyses on the generation resource options that are available to Xcel Energy's operating companies for meeting customer demand. A description of my qualifications, duties, and responsibilities is included at the end of my testimony.

**Q. ARE YOU SPONSORING ANY ATTACHMENTS AS PART OF YOUR DIRECT TESTIMONY?**

A. Yes, I am sponsoring the following five attachments:

- Attachment JFH-1 is a wind resource map relative to the location of the Pathway Project and the May-Valley Longhorn Extension;
- Attachment JFH-2 is a solar resource map relative to the location of the Pathway Project and the May-Valley Longhorn Extension;
- Attachment JFH-3 is map showing the existing geographic diversity of wind and solar generation resources on the Public Service system;
- Attachment JFH-4 is an example of transmission information requested from bidders in a typical Request for Proposal ("RFP"); and
- Attachment JFH-5 is a map of bids received in Public Service's 2017 All-Source Solicitation relative to injection capability on the transmission system in eastern Colorado.

**Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

A. The purpose of my Direct Testimony is to support the Company's Application for a Certificate of Public Convenience and Necessity ("CPCN") for Colorado's Power Pathway 345 kilovolt ("kV") Transmission Project ("the Project" or "the Pathway Project") from a resource planning perspective. In doing so, I discuss

the interrelationship and interdependency between adding generation to the Public Service system to meet State of Colorado emission reduction policy objectives as part of the Electric Resource Planning ("ERP") process and the need to add accompanying transmission to deliver the output of that generation to our customers. The Pathway Project is foundational to developing a cost-effective and reliable Clean Energy Plan ("CEP") as part of our forthcoming ERP, as required by Senate Bill 19-236. I explain the generation additions expected as part of our ERP and why this Project is needed.

**Q. PLEASE PROVIDE A BRIEF DESCRIPTION OF THE PATHWAY PROJECT.**

A. The Pathway Project involves constructing an approximately 560-mile, 345 kV double circuit transmission network between seven substations. A vicinity map of the Pathway Project is provided as Attachment ARK-1 to the Direct Testimony of Company witness, Ms. Amanda R. King. The Project will connect the Front Range to areas of northeastern, eastern, and southeastern Colorado that are rich renewable energy resource development potential, but do not currently have a backbone[1] network transmission system that can integrate new clean energy resources. The northern terminus of the Pathway Project will be at the Company's existing Fort St. Vrain Substation (located at the Fort St. Vrain Generating Station) in Platteville in western Weld County. The Pathway Project then extends east to a new Canal Crossing Substation near the existing Pawnee

[1] A "backbone" system generally refers to bulk transmission lines networked together that can move large amounts of energy from a distant location to load areas. Backbone transmission systems support the reliability of the transmission system because of the networked nature of these systems. A grid supported by backbone transmission is better positioned to withstand outages without losing generation resource or load.

Substation and Pawnee Generating Station; then extends east/southeast to a new Goose Creek Substation south of the City of Burlington; then extends south to a new May Valley Substation northeast of the City of Lamar; then extends west to the planned Tundra Substation near the Comanche Generating Station. The Project then extends north to the Company's existing Harvest Mile Substation, located adjacent to the City of Aurora. The Project also involves expansion of the Fort St. Vrain, Pawnee, and Harvest Mile Substations; expansion of the planned but not yet in-service Tundra Substation; and construction of the new Canal Crossing, Goose Creek, and May Valley Substations. The transmission line and substation facilities are further detailed in the Direct Testimonies of other Company witnesses.

## II. ELECTRIC RESOURCE PLANNING BACKGROUND

**Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?**

A. In this section of my Direct Testimony, I provide an overview of the ERP process, the objectives of the Company's upcoming ERP, the projected timeline for the selection and in-service dates of new generation resources, and a discussion of the Company's last ERP process. The Company filed its last ERP in May 2016 ("2016 ERP") and expects to file its next, or forthcoming ERP and Clean Energy Plan, no earlier than March 31, 2021 ("2021 ERP & CEP").

**Q. DOES THE COMMISSION REQUIRE PUBLIC SERVICE TO DEVELOP AND FILE AN ERP?**

A. Yes. The Commission has established rules requiring electric utilities to develop and file ERPs generally on a four-year cycle. The Commission's rules specify what must be contained in electric utilities' ERPs and the process electric utilities must undertake to implement their ERPs. The Colorado ERP process is looked to nationally as a model for the acquisition of cost effective and increasingly clean generation resources. As I will describe in this section of my testimony, the Company intends to utilize this process to advance the State of Colorado toward its emission reduction goals. The transmission investment contemplated as part of this CPCN proceeding is foundational to moving forward and acquiring resources in pursuit of that goal.

**Q. WHAT IS THE GENERAL OBJECTIVE OF AN ERP?**

A. As specified by the Commission's rules, the ERP process focuses on identifying the need for additional generation resources or changes to existing generation resources that are needed to meet certain future objectives in a cost effect and reliable manner.[2] An ERP consists of two phases: Phase I and Phase II.

**Q. PLEASE DESCRIBE PHASE I OF THE ERP PROCESS.**

A. Phase I identifies generation resource needs (including quantities and generation resource types) that will meet specified objectives. Examples of objectives in an ERP include acquiring new generation to meet growing customer demand for power (i.e., the amount not served by Demand Side Management or Distributed Energy Resources), new resources to meet Renewable Energy Standard requirements, new resources to take advantage of Federal tax credits to help reduce costs to customers, and new resource additions or retirements to meet environmental objectives such as emission reduction or clean energy targets.

**Q. PLEASE DESCRIBE PHASE II OF THE ERP PROCESS.**

A. In Phase II, the Company implements a competitive acquisition process for new resources. Public Service evaluates and develops portfolios of bids that meet the Commission's Phase I directives (overseen by an independent evaluator) for Commission consideration. Through a Phase II decision, the Commission ultimately selects specific resources to satisfy the resource needs. The Company then pursues the acquisitions of those generation resources through

[2] *See* 4 CCR 723-3-3600, *et seq.*

follow-on CPCN proceedings and Power Purchase Agreement ("PPA") negotiations. I would also note that for this ERP, where specific legislation (i.e., Senate Bill 19-236) directs the inclusion of a Clean Energy Plan, Phase I will also evaluate potential actions with regard to the Company's remaining coal fleet. While this is an issue for the ERP and not this proceeding, the Company will seek approval of a specific set of actions to the existing coal fleet to ensure we seek to fill the right resource need in the Phase II competitive solicitation.

**Q. DOES THE ERP PROCESS SELECT TRANSMISSION FACILITIES?**

A. No. While the generation resources selected through the ERP process certainly inform what transmission facilities will ultimately be needed to deliver the output of the new resources to customer load, those specific transmission facilities are approved through a separate CPCN proceeding before the Commission. The Joint Transmission Proposal currently before the Commission in Proceeding No. 19R-0096E, if approved, would better align transmission planning and resource planning by allowing for bidding into bid-eligible planned transmission projects in the Phase II competitive solicitation. Moreover, to the extent a planned transmission project was needed to implement the portfolio of projects approved by the Phase II decision that should increase the influence of the ERP process on transmission development. That is why we are bringing forward the Pathway Project ahead of the ERP, with the objective of obtaining a CPCN for the Project ahead of a Phase I decision so bidders have certainty if they want to bid to interconnect to this Project.

**Q. IS THE 2021 ERP & CEP DIFFERENT IN ANY REGARD IN COMPARISON TO THE 2016 ERP THAT RESULTED IN THE COLORADO ENERGY PLAN?**

A. Yes. The 2021 ERP & CEP is the first ERP cycle with specific clean energy targets that our generation portfolio(s) must meet as a result of the passage of Senate Bill 19-236. Specifically, the Company is required to file a plan that achieves an 80 percent carbon dioxide emission reduction from 2005 levels by 2030, which equates to a plan that emits approximately 5.4 million short tons ("MST") of carbon dioxide emissions in 2030.

**Q. HOW WILL THE COMPANY'S CO2 REDUCTION GOALS IMPACT THE COMPANY'S EXPECTED RESOURCE NEEDS IN THE 2021 ERP & CEP?**

A. I expect that this emission constraint will result in the need for additional accelerated retirements of coal-fired generating units and other changes to our coal fleet. It will also result in the continued addition of renewable energy resources and dispatchable generation resources, the latter of which are necessary to reliably integrate the variable output of the renewable resources. Unlike coal-fired resources, in which the fuel (coal) is delivered to the plant location, renewable resources such as utility-scale wind and solar must be located where the generation fuel (e.g., wind or solar) is of sufficient quality and quantity for generating electricity. This dynamic is one of the major drivers of the need for the early transmission investment at issue in this CPCN.

**Q. ARE UTILITY-SCALE RESOURCES THE ONLY TYPES OF RESOURCES THE COMPANY CONSIDERS IN THE ERP PROCESS IN ITS EFFORTS TO MEET THE STATUTORY CLEAN ENERGY TARGETS?**

A. No. The Company will utilize multiple avenues to make progress towards its clean energy targets through: (1) demand-side management ("DSM") programs; (2) Distributed Energy Resource ("DER") programs; (3) retirement or reduced operation of existing generation; and (4) procurement of new utility-scale generation resources. While the size and nature of achievements through DSM and DER programs are adjudicated separately from the ERP, the Company does incorporate projections for future growth of DSM and DERs into its ERP process.

**Q. ARE CONTINUED EFFORTS IN DSM AND DERS PART OF THE COMPANY'S EMISSIONS REDUCTION STRATEGY?**

A. Yes. Both DER and DSM will play important supporting roles, but these programs cannot achieve all of the Company's emission reduction objectives; rather, Public Service will also need to continue to take action to accelerate the retirement and change the operation of its coal fleet, as well as add utility-scale clean energy resources. For the Company to achieve the aggressive goal of reaching 80 percent emission reductions from 2005 levels by 2030, we will need to employ multiple tools, including DSM, development of DERs, actions with regard to our coal fleet, deployment of utility-scale clean energy resources, and building new transmission. We will also need further innovation in clean energy technologies to allow for cost-effective, low to zero-emission, dispatchable generation resources that can operate continuously for several days. But

notwithstanding these other actions, the procurement of energy from cost-effective utility-scale clean energy resources is a core part of the Company's emission reduction strategy.

**Q. WHAT FACTORS WILL INFLUENCE WHEN NEW WIND AND SOLAR RESOURCES MIGHT BE ADDED TO THE PUBLIC SERVICE GENERATION PORTFOLIO AS A RESULT OF THE 2021 ERP & CEP?**

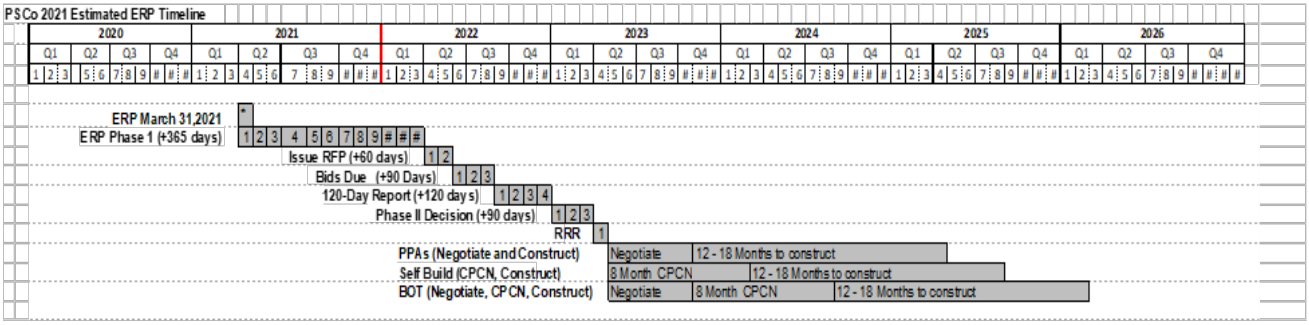
A. Aside from the time required to go through the regulatory process of approving the ERP itself, I see two key factors: (1) the time required to design, permit and construct new wind and solar facilities after they have been approved by the Commission in the ERP process; and (2) the timing of when new wind and solar facilities need to be placed in-service in order to qualify for any Federal tax credits such as the production tax credit ("PTC") and investment tax credit ("ITC").

**Q. WHAT IS THE OVERALL TIMEFRAME FOR WHEN NEW WIND OR UTILITY-SCALE SOLAR RESOURCES MIGHT BE ADDED THROUGH THE NEXT ERP?**

A. If the 2021 ERP & CEP plays out on a similar schedule as the 2016 ERP, I would expect the Commission would issue a final decision as to the resources to be acquired sometime in the first half of 2023. From that decision, the earliest that new wind and solar generation facilities could be built, and placed in-service would likely be mid-2025 to early 2026. This makes the timing imperative for both: (1) steady progress through the ERP process without delay; and (2) timely development of transmission resources necessary to bring the new resources to

load. Figure JFH-D-1 shows an estimated timeline for key milestones of the 2021 ERP & CEP that the Company currently anticipates will be filed no earlier than March 31, 2021.

**Figure JFH-D-1: Estimated 2021 ERP Timeline**




**Q. HOW DOES THE TIMING OF FEDERAL TAX CREDITS INFLUENCE WHEN NEW WIND AND SOLAR FACILITIES MAY BE ADDED IN THE 2021 ERP & CEP?**

A. The Consolidated Appropriations Act, 2021 passed by Congress and signed into law at the end of 2020 included legislative aspects that affect resource acquisition timing in the ERP. The legislation extended the in-service date when wind and solar facilities need to be placed in service from end-of-year 2024 to end-of-year 2025. More specifically, wind and solar facilities placed in-service by December 31, 2025 can qualify for 60 percent PTC and 26 percent ITC, respectively, so long as the project has begun construction by January 1, 2022 for the PTC and January 1, 2023 for the ITC.[3] Prior to the passage of the

[3] The start of construction requirement can be met by safe harboring (e.g., spending 5% of the project's cost) before January 1, 2022 and January 1, 2023 for the PTC and ITC respectively.

legislation, wind facilities placed in-service after December 31, 2025 would not receive any PTCs. Solar facilities placed in-service after December 31, 2025 would receive 10 percent ITC. The ability of a generation facility to qualify for these tax credits provides considerable cost savings to customers. I recognize this is not the first time we have been in this situation, but yet again we appear to have a sense of urgency in working through the ERP process to be able to have tax-advantaged projects participate in our Phase II competitive solicitation. In addition, and as explained in the Direct Testimony of Company witness Mr. Brian J. Richter, we will sequence the construction of the Pathway Project in order to put customers in the best position to benefit from these tax credit extensions through the acquisition of tax-advantaged clean energy resources.

**Q. PLEASE EXPLAIN HOW THESE TAX CREDITS BENEFIT CUSTOMERS.**

A. If a project qualifies for either the PTC or the ITC, it reduces the cost or price passed forward to customers. These cost savings occur with new projects that are Company-owned (self-build or build-own-transfer ("BOT")) or projects owned by an independent power producer ("IPP") where the output is acquired by the Company through a PPA. The potential magnitude of these customer savings is significant. For example, the estimated present value of customer savings associated with acquiring 1,000 Megawatts ("MW") of new wind resources that qualify for the 60 percent PTC is over $300 million compared to that same 1,000 MW of new wind receiving no PTCs. Similarly, the estimated present value of customer savings associated with acquiring 1,000 MW of new solar resources

that qualify for the 26 percent PTC is over $100 million compared to that same 1000 MW of new solar receiving a 10 percent ITC.

**Q. DOES THE COMPANY NEED THE PATHWAY PROJECT TO MEET THE CAPACITY NEEDS OF THE 2021 ERP & CEP?**

A. Not in the early years of the resource acquisition period. Currently, the Company projects no need for additional generation capacity from 2021 through 2024 and a small (less than 50 MW) capacity need in summer of 2025 in order to meet our planning reserve margin target. The existing transmission system should have sufficient capacity to allow the Company to acquire the capacity it would need to fill this less than 50 MW need for summer 2025. As a result, I do not see the small capacity need in summer 2025 as being the primary driver of the schedule for the proposed transmission facilities. Rather, I see the primary driver of the schedule for the Pathway Project being the current date for when there is a large drop in the Federal tax credits for which new wind and solar generation facilities can qualify—December 31, 2025. In other words, to meet the emission reduction targets in the most cost-effective way, the Company needs to be in a position to add tax-advantaged renewable resources that can come on-line in the 2025 timeframe.

## III. TRANSMISSION NEED TO SUPPORT NEW CLEAN ENERGY RESOURCES

**Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?**

A. In this section of my Direct Testimony, I discuss the need for the construction of new large scale transmission facilities that will arise from the Company's 2021 ERP & CEP.

### A. Anticipated Resource Acquisitions

**Q. WHAT LEVELS OF ADDITIONAL GENERATION ARE CONTEMPLATED TO BE ADDED TO THE PUBLIC SERVICE SYSTEM IN THE 2021 ERP & CEP TO RELIABLY ACHIEVE THE 2030 CLEAN ENERGY TARGET?**

A. The Company is still evaluating the details of our plan to be filed no earlier than March 31, 2021. The planning assumptions for the ERP include approximately 600 MW and approximately 1,300 MW (nameplate) of additional DSM measures and DERs, respectively, that will be achieved outside the ERP by 2030. With regard to additional utility scale generation, we currently anticipate the Company may add roughly 2,300 MW of additional wind, 1,600 MW of additional utility scale solar resources, 400 MW of storage, and 1,300 MW of additional dispatchable resources (i.e., generation resources that can run continuously for multiple days). Together with actions on our existing coal fleet, (e.g., reduced operations, fuel conversion, or early retirement), we believe these additions will put the Company in a position to meet and potentially exceed the 2030 statutory clean energy target. The mix and amounts of resource technologies we ultimately end up with will depend on the makeup of the bids we receive in the

Phase II competitive solicitation process of the ERP, as well as the outcome of this transmission CPCN proceeding.

**Q. GENERALLY, WHAT LOCATIONS ARE MOST SUITABLE FOR DEVELOPING NEW WIND AND SOLAR RESOURCES?**

A. Aside from locations that have adequate existing or planned transmission injection and delivery capability, there are several factors that generally render locations suitable for developing new utility-scale wind and solar resources, namely:

- High quality/premium wind and solar resource (i.e., the wind blows a lot and sun shines a lot);
- Terrain that is suitable for the construction of wind and solar farms (the availability of flat land is better for constructing the generation facilities); and
- Available land that is needed to accommodate the large footprint that utility scale wind and solar farms can occupy.

**Q. WOULD THE PATHWAY PROJECT FACILITATE ACCESS TO THESE TYPES OF LOCATIONS?**

A. Yes. The Pathway Project would establish a 345 kV transmission system in areas of the State of Colorado that would facilitate access to premium wind and solar resource areas. Attachment JFH-1 and Attachment JFH-2 attached to my Direct Testimony show wind and solar resource maps, respectively relative to the location of the Pathway Project (and the May Valley-Longhorn Extension which I discuss later in my testimony). These maps provide a helpful visual to evaluate the potential benefits of the Pathway Project. Further, I would add that there are almost certainly potential projects in the more remote regions of Colorado that

may bid into the Phase II ERP competitive solicitation as a result of the Commission granting a CPCN for the Pathway Project. For example, we believe the Lamar area is one of the highest quality wind resource areas in the State of Colorado but due to the lack of transmission in this region of the state, it has seen minimal wind development. The Pathway Project provides the ability to unlock these potential wind resources in the Company's Phase II competitive solicitation. Regarding the second and third bullet point I mentioned above, the Pathway Project would facilitate transmission access to land that is well-suited for wind and solar development. Company witness, Ms. Carly R. Rowe discusses the constraints and opportunities in developing these transmission lines from a land use perspective in her Direct Testimony.

**Q. ARE THERE BENEFITS TO SITING NEW WIND AND SOLAR IN THE 2021 ERP & CEP AT LOCATIONS THAT ARE GEOGRAPHICALLY DISPERSED IN PARTS OF THE STATE WHERE THE COMPANY DOES NOT CURRENTLY HAVE SIGNIFICANT AMOUNTS OF WIND AND SOLAR RESOURCES?**

A. Yes. Geographically dispersed wind and solar generation has two key benefits: (1) reduction in variability, and (2) additional capacity. The reduction in variability is due to the dispersed exposure to changes in wind speeds and solar irradiance. For example, cloud cover or drops in wind speeds in one region is mitigated if solar and wind plants are not concentrated in that region. It bears mention that the variability associated with sporadic cloud cover is mitigated with geographic dispersion on the order of tens of miles, where mitigating the variability associated with drops in wind speeds require greater distance between the wind

farms on the order of up to one hundred miles or more. The second benefit of geographically dispersed wind and solar is capacity. The concentration of wind and solar in a particular region reduces the capacity credit afforded to those resources. Effective Load Carrying Capability studies have established that new solar and wind facilities co-located near existing solar and wind plants receive lower capacity credit than those to be built in regions with low to no existing wind and solar generation. Attachment JFH-3 shows the geographic dispersion of existing wind and solar generation resources on the Public Service system and the opportunity for the Pathway Project to unlock further geographic diversity of wind and solar resources in southeastern Colorado.

## B. The Existing Transmission System and Need for Additional Injection Capability

**Q. HOW MUCH NEW GENERATION HAS BEEN ADDED TO THE PUBLIC SERVICE TRANSMISSION SYSTEM OVER THE LAST THREE ERP CYCLES?**

A. Over 3,000 MW of new generation facilities collectively have been added to the system as a result of the 2007, 2011, and 2016 ERP processes. By new generation, I mean generation facilities that that did not previously exist on the Public Service system, i.e., facilities that were newly constructed as a result of being selected through the ERP process. In contrast, about 700 MW of resource need identified in the last three ERPs have been met from existing resources (where there was already existing transmission) whose pre-existing contracts were terminating within the resource acquisition period of those ERPs. Additionally, the Company added 600 MW of wind generation with the

construction of the Rush Creek Wind Project that was approved outside of the ERP process through an application filed pursuant to Rule 3660(h). The point here is that over the last three ERP cycles, we have been steadily increasing the delivery burden placed on the Company's transmission system.

**Q. HAVE THERE ALSO BEEN GENERATION RETIREMENTS OVER THE LAST THREE ERP CYCLES?**

A. Yes, there has been approximately 900 MW of coal generation retired since 2007 with 660 MW more planned and approved by 2026. Some of the retired generation, however, has already been replaced with new generation resources at the same site (e.g., a new 576 MW gas combined cycle was built at the Cherokee generation site in 2016).

**Q. DO THE COAL GENERATION FACILITY RETIREMENTS FREE UP TRANSMISSION THAT NEW GENERATORS SELECTED IN THE 2021 ERP & CEP CAN USE?**

A. To a degree, yes. Generation technologies such as natural gas-fired combustion turbine facilities or storage technologies such as battery storage are often good candidates to utilize the transmission injection capability that might be freed up as a result of a coal unit retiring. The majority of the retiring coal units in previous ERP cycles were located within the Denver metro area which, as I discussed above, is not a suitable place to build large scale wind or solar farms that will be needed to achieve the emission reduction targets of the 2021 ERP & CEP.

**Q. IN THE COMPANY'S 2016 ERP, WAS THERE A NEED FOR TRANSMISSION INVESTMENT TO ACCOMMODATE NEW GENERATION RESOURCES?**

A. Yes. The Company's last ERP was filed in May 2016 and the Commission issued a Phase II Decision in September 2018 approving the Preferred Colorado Energy Plan Portfolio ("CEPP").[4] The approved CEPP includes the early retirement of two coal-fired generating facilities with a combined generating capacity of approximately 660 MW, the addition of approximately 1,100 MW of wind generation, approximately 800 MW of solar, 275 MW of storage, and 383 MW of existing gas generation. Some of these resources are already in-service, while others are still under construction.[5]

As part of its 120-Day Report, the Company identified approximately $204 million in transmission investment necessary to accommodate the CEPP. The total transmission investment was summarized in three categories, including: Voltage Control Facilities, Network Upgrade Costs for Delivery, and Interconnection Facilities. In its 2016 ERP Phase II Decision, the Commission directed the Company to file a CPCN application(s) for the total transmission investment associated with the CEPP. To date, the Commission has granted CPCNs for two of the three transmission investment categories, including Voltage Control Devices and Network Upgrade (specifically, the Greenwood-

[4] *See* Decision No. C18-0761, Proceeding No. 16A-0396E (mailed date Sept. 10, 2018).
[5] In Proceeding No. 19A-0530E, the Company procured replacement resources for two failed solar bids included as part of the CEPP.

Denver Terminal 230 kV Transmission Project).[6] The Company is still preparing its CPCN application(s) for the Interconnection Facilities, which it expects to file later in 2021.

**Q. ARE THESE NEW TRANSMISSION FACILITIES SUFFICIENT FOR THE NEW GENERATION CONTEMPLATED IN THE FORTHCOMING ERP?**

A. No. The transmission facilities I described above are designed to accommodate the new generation and generation retirements associated with the approved CEPP. These transmission facilities do not provide transmission capacity headroom for future additional generation resources. As noted by Company witness, Mr. Thomas W. Green in Proceeding No. 20A-0063E, the 230 kV Greenwood to Denver Terminal Project ("GDT") will allow the Company to implement the addition of the Colorado Energy Plan generation resources but will not provide capability for adding more utility scale-generation resources along the 345 kV system in the Front Range.[7] The GDT Project enables over 1,800 MW of new renewable resources approved as part of the Colorado Energy Plan.[8]

[6] *See* Decision No. C20-0648 in Consolidated Proceeding Nos. 19A-0728E and 20A-0063E in which the Commission granted CPCNs for the Voltage Control and Greenwood-Denver Terminal 230 kV Transmission Project and approved the Settlement Agreement establishing a total portfolio cost of $160.05 million related to the two CPCNs.
[7] *See* Proceeding No. 20A-0063E, Hr. Ex. 101, Direct Testimony of Thomas W. Green, at 7:17-22, 10:1–11:14, and 36:3-8 (Feb. 21, 2020).
[8] *Id.* at 10:9-13, 36:6-8.

**Q. DOES THE COMPANY'S EXISTING TRANSMISSION SYSTEM HAVE AVAILABLE CAPACITY AND CAPABILITY TO INTERCONNECT AND DELIVER THE GENERATION THAT THE COMPANY BELIEVES WILL BE NEEDED TO MEET THE STATUTORY CLEAN ENERGY TARGETS?**

A. As discussed in the Direct Testimony of Company witness, Ms. Amanda R. King, the existing transmission system does not have the capacity to accommodate these expected levels of new generation resources. Company witness, Ms. Alice K. Jackson also addresses this issue at a high level. As I have indicated, the majority of the expected new resources are solar and wind generation resources. The areas of the State of Colorado best suited for utility-scale solar and wind generation are not located near Public Service's traditional population and load centers or coal-generation facilities where our existing transmission system has been built out. As such, the Company's existing transmission system was not planned or built around carrying significant levels of electricity produced from remote wind and solar resources to our customers. The Pathway Project helps to remedy that issue.

**Q. WHAT LEVEL OF WIND ON THE SYSTEM WAS STUDIED THROUGH THE LAST FLEX RESERVE STUDY IN PROCEEDING NO. 16A-0396E?**

A. The last Flex Reserve Study utilized in the 2016 ERP studied a 4 gigawatt ("GW") level of wind on the system.

**Q. DID THE COMPANY STUDY A WIND RESOURCE LEVEL HIGHER THAN 4 GW IN THE 2016 ERP FROM A FLEX RESERVE PERSPECTIVE?**

A. Yes. We studied a 4.5 GW level. The 4.5 GW study was ultimately not approved for use in the Phase II competitive solicitation for the 2016 ERP based on concerns from the Commission that it was introduced as part of the Company's rebuttal case and therefore not fully vetted through the discovery and evidentiary process.

**Q. IS THE COMPANY PREPARING A NEW FLEX RESERVE STUDY FOR USE IN THE UPCOMING ERP?**

A. Yes. As part of the Phase I decision in the 2016 ERP, the Commission "direct[ed] Public Service to complete an updated Flex Reserves Study and file this study with the Company's 2019 ERP filing." The Commission also provided specific parameters for the study, and we are conducting the study consistent with Commission directives. We will file the updated Flex Reserve Study as part of our upcoming 2021 ERP & CEP.

**Q. DID THE PRIOR FLEX RESERVE STUDY ESTABLISH A "CAP" ON THE AMOUNT OF FUTURE WIND OR OTHER VARIABLE ENERGY RESOURCES THAT CAN BE INSTALLED ON THE COMPANY'S SYSTEM?**

A. No. In fact, the portfolio of generation resources approved by the Commission in the 2016 ERP brought the Company's wind portfolio to over 4,100 MW. For context, a Flex Reserve study is not intended to establish a "cap" on the amount of nameplate wind that can be installed on the system. This study instead looks at wind generation down ramps on the system and seeks to determine the MW

level of responsive generation that is required to reliably integrate the wind generation levels. To that point, the Commission found that "it is appropriate for Public Service to retain the right to make decisions regarding the reliability of its system" in discussing the Flex Reserve issue as part of the 2016 ERP in its Phase I decision. The Company will use our forthcoming updated study to evaluate the Flex Reserve requirements associated with different resource portfolios as part of the ERP that both meet the SB 19-236 emission reduction objectives *and* maintain system reliability. The results of the 2016 ERP Flex Reserve study were for purposes of the last solicitation and should not be interpreted as representing a "cap" on future wind additions. As I discussed above, in the 2021 ERP & CEP, we will need additional wind resources to achieve the SB 19-236 clean energy target, and the Pathway Project is foundational to adding those resources

### C. The Importance of Available Transmission in the Bid Evaluation Process

**Q. HOW DOES THE AVAILABILITY OR LACK THEREOF OF TRANSMISSION FACTOR INTO THE EVALUATION AND SELECTION OF NEW GENERATION RESOURCES IN AN ERP?**

A. As part of the Phase II competitive solicitation process, the Company requires all new generation bids to provide a detailed transmission plan for how they will interconnect and deliver output to the Public Service transmission system. An example of the information that is required is provided in Attachment JFH-4.

**Q. WHAT LESSONS HAVE YOU LEARNED FROM THE EVALUATION OF GENERATION RESOURCE BIDS IN PREVIOUS ERP PROCESSES WITH RESPECT TO AVAILABLE TRANSMISSION INJECTION CAPABILITY?**

A. It has been my experience that developers of generation will propose projects at locations where they can utilize existing transmission or where they know additional transmission is planned to be built with enough capability to deliver the output of their generation project to Public Service's customers. A lack of available or planned transmission injection capability in a given area serves to discourage developers from proposing projects in that area. This trend is depicted on the map attached to my Direct Testimony as Attachment JFH-5, which shows the location of bids received in the Company's 2017 All-Source Solicitation relative to the injection capability at various locations on the Public Service transmission system at the time of the competitive solicitation (map is limited to eastern Colorado). Notably, the lack of bids received in the Lamar area is attributable, in part, to the lack of transmission availability in the southeastern part of the state, despite the high quality wind generation areas nearby.

**Q. WHAT HAPPENS IF THE COMPANY'S DUE DILIGENCE REVIEW DETERMINES THAT A BID'S TRANSMISSION PLAN DOES NOT PROVIDE ASSURANCE THAT THE NECESSARY TRANSMISSION FACILITIES WILL BE IN-SERVICE WHEN THE NEW GENERATOR IS PLACED IN SERVICE?**

A. In these instances, the bid is deemed to be infeasible and no longer considered in the bid evaluation process.

**Q. WHAT HAPPENS IF A BID IS ULTIMATELY APPROVED AS PART OF A RESOURCE PLAN, BUT THE PROJECT LATER FAILS AS A RESULT OF THE BIDDER'S OR THE COMPANY'S INABILITY TO DEVELOP THE TRANSMISSION FACILITIES NEEDED TO INTERCONNECT AND DELIVER THE PROJECT OUTPUT TO CUSTOMERS?**

A. In the event that a bid fails for any reason, the Company and Commission would typically assess whether there is a need to select a replacement bid within that ERP proceeding or if replacing that bid can be postponed and addressed in the next ERP.

**Q. IF IT IS DETERMINED THAT THE FAILED BID SHOULD BE REPLACED, HOW INVOLVED IS THE PROCESS TO SELECT A REPLACEMENT BID?**

A. It depends on when it becomes known that the bid cannot be developed as planned and whether the Commission approved a backup bid for the failed project as part of their final Phase II decision approving a preferred portfolio of bids. The most recent example of a bid failure and replacement involved two solar bids from the 2016 ERP. These projects did not fail due to transmission issues; rather, it was a result of project financing issues. Nevertheless, the lengthy replacement timeline is instructive here, and in my view the risk of failure due to lack of transmission increases in the absence of new transmission investment as our resource portfolios get larger. In that instance, it was approximately eight months after the Commission's Phase II decision approving the Colorado Energy Plan that it was made known that the bidder was unable to develop the projects at the bid price. The decision was then made to seek

replacement bids for solar projects. Given the passage of time between when 2016 ERP Phase II bids were received and when this bid failure became known, the pool of Phase II bids were stale. As a result, the Company initiated an entirely new competitive acquisition process to solicit replacement bids. This process took a total of nine months from RFP issuance to final Commission approval of replacement bids. This process was further complicated due to the fact that the replacement bids needed to be designed, permitted, and constructed before December 31, 2022 in order to qualify for Federal tax credits.

**Q. WHILE THE PATHWAY PROJECT DOES NOT MITIGATE THE RISK THAT A DEVELOPER CANNOT FINANCE PROJECTS, DOES IT MITIGATE RISK OF BID FAILURE DUE TO LACK OF TRANSMISSION?**

A. Yes. It will mitigate the risk of failure for projects using the Pathway Project if it is approved in a timely fashion and its construction proceeds without major schedule disruptions.

**Q. HOW DO YOU BELIEVE DEVELOPERS WILL RESPOND TO THE DEVELOPMENT OF THE PATHWAY PROJECT?**

A. It is never possible to predict how exactly bidders will react to transmission project development, but I think the development of the Joint Transmission Proposal and the dynamics around it indicate that the development community will welcome additional transmission to unlock renewable-rich areas of the state and make their projects more cost-effective. The reason that utilities, IPPs, and other stakeholders got together to develop the Joint Transmission Proposal in the first place was to try and solve the “chicken and egg” dilemma, and the Pathway

Project goes toward the same objective. In addition, the timing of the Project will also benefit developers and the Company in making decisions and taking action to secure safe harbor treatment of their projects to capture the full value of available Federal tax credits, which reduce costs to customers. These benefits are in addition to the competition that the Project will facilitate in the Phase II competitive solicitation, and I believe it will result in a robust pool of competitively priced bids across the eastern/southeastern portion of the State of Colorado. Moreover, and as explained in the Direct Testimony of Company witnesses Ms. King and Ms. Jackson, respectively, the May Valley-Longhorn Extension is being brought forward for Commission consideration as an optional extension to the Pathway Project. The May Valley-Longhorn Extension is a 90-mile, 345 kV double circuit transmission line that would extend from the southeastern corner of the Pathway Project at the new May Valley Substation south to the new Longhorn Substation near Vilas. A vicinity map of the May Valley-Longhorn Extension is provided as Attachment ARK-2 to the Direct Testimony of Company witness, Ms. King. This addition would provide access into the southeastern portion of the State of Colorado, where I anticipate there may be cost-effective projects to be brought forward. This is a wind-rich area of the state that has not seen the same levels of wind generation development as have other parts of eastern Colorado and as a result, would provide additional geographic diversity benefit to our wind fleet. The May Valley-Longhorn Extension is not part of the Pathway Project. However, considering the MW volume of new wind and solar resources that I expect will be part of the 2021 ERP (over twice that added in the

Colorado Energy Plan) there could be value in pursuing this option. This extension also has the added benefit of avoiding construction of multiple lengthy gen-ties from this area of the State to connect with the Project Pathway 345 kV transmission backbone.

**Q. HOW DO YOU KNOW THAT THE TRANSMISSION FACILITIES PROPOSED IN THIS CPCN WILL BE THE RIGHT ONES FOR THE RESOURCES ULTIMATELY SELECTED IN THE 2021 ERP & CEP?**

A. There is no way to know for sure but based on our current analyses, we anticipate the ERP process will result in approximately 2,300 MW of additional wind and 1,600 MW of additional utility-scale solar resources. As I discussed above, given that the proposed transmission facilities will traverse areas of the State of Colorado with rich wind and solar resources, I expect that the Commission approved portfolio of bids from this 2021 ERP & CEP to include generation projects that rely on the new transmission lines being proposed in order to interconnect and deliver their electrical output to our customers.

## IV. CONCLUSION

**Q. PLEASE EXPLAIN WHY THE PATHWAY PROJECT WILL ADVANCE THE COMPANY'S EFFORTS TO COST EFFECTIVELY ACHIEVE THE GOAL OF EIGHTY PERCENT CARBON REDUCTION BY 2030.**

A. I have been doing resource planning for nearly three decades and have seen a significant evolution in the ERP process over my career. With this ERP, the Company will face its most significant challenge yet in bringing online thousands of megawatts of clean energy resources, many of which I expect will be sited in remote areas of Colorado. The Pathway Project is a tool we need to unlock cost-effective generation in areas of the State that have traditionally been economically "off-limits" due to transmission constraints. While the Joint Transmission Proposal pending in Proceeding No. 19R-0096E is a step forward in addressing the "chicken and egg" issue that has plagued the development generation resources in certain areas, that proposal alone will not ensure the timing of new transmission that we need to unlock tax advantaged resources as part of this 2021 ERP & CEP. The Pathway Project, on the other hand, will get us there. The risk to not approving the Project is likely to be higher costs, fewer options, and more difficult timelines, all of which jeopardize the Company's ability to achieve its 2030 clean energy target and advance the State of Colorado's energy policy objectives. There is a need for the Project from a resource planning perspective and the Commission should grant a CPCN for the Project to allow for its timely development.

**Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

A. Yes, it does.

## Statement of Qualifications

## James F. Hill

As the Director of the Resource Planning and Bidding Group, I am responsible for overseeing the Company resource planning and competitive resource acquisition processes as well as the various technical analyses on the generation resource options that are available to Xcel Energy's operating companies for meeting future customer demand. I graduated from Colorado State University with a Bachelor of Science degree in Natural Resource Management and from the University of Colorado with a Bachelor of Science degree in Mechanical Engineering. I have been employed by Public Service Company of Colorado, New Century Services, Inc., and now Xcel Energy Services Inc. for over 30 years. I have testified before the Colorado Public Utilities Commission regarding electric resource planning issues in numerous proceedings.

**BEFORE THE PUBLIC UTILITIES COMMISSION**
**OF THE STATE OF COLORADO**

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|---|---|---|
| **IN THE MATTER OF THE APPLICATION** | ) | |
| **OF PUBLIC SERVICE COMPANY OF** | ) | |
| **COLORADO FOR A CERTIFICATE OF** | ) | |
| **PUBLIC CONVENIENCE AND NECESSITY** | ) | |
| **FOR COLORADO'S POWER PATHWAY** | ) | **PROCEEDING NO. 21A-XXXXE** |
| **345 KV TRANSMISSION PROJECT** | ) | |
| **REGARDING NOISE AND MAGNETIC** | ) | |
| **FIELD REASONABLENESS** | ) | |

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**AFFIDAVIT OF JAMES F. HILL**
**ON BEHALF OF**
**PUBLIC SERVICE COMPANY OF COLORADO**

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I, James F. Hill, being duly sworn, state that the Direct Testimony and attachments were prepared by me or under my supervision, control, and direction; that the Direct Testimony and attachments are true and correct to the best of my information, knowledge and belief; and that I would give the same testimony orally and would present the same attachments if asked under oath.

Dated at Denver, Colorado, this 2nd day of March, 2021.

James F. Hill
Director, Resource Planning and Bidding

Subscribed and sworn to before me this 2nd day of March, 2021.

Amanda Clark
Notary Public

My Commission expires 3/25/2024

AMANDA CLARK
Notary Public
State of Colorado
Notary ID # 20164004880
My Commission Expires 03-25-2024