



IN THE MATTER OF THE
APPLICATION OF PUBLIC SERVICE
COMPANY OF COLORADO FOR A
CERTIFICATE OF PUBLIC
CONVENIENCE AND NECESSITY
FOR THE PAWNEE – SMOKY HILL
345KV TRANSMISSION PROJECT

DIRECT TESTIMONY
AND EXHIBITS
OF

JOSEPH C. TAYLOR

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

**IN THE MATTER OF THE APPLICATION OF)
PUBLIC SERVICE COMPANY OF)
COLORADO FOR A CERTIFICATE OF)
PUBLIC CONVENIENCE AND NECESSITY) DOCKET NO.
FOR THE PAWNEE – SMOKY HILL 345KV)
TRANSMISSION PROJECT)**

DIRECT TESTIMONY AND EXHIBITS OF JOSEPH C. TAYLOR

1 **Q. WHAT IS YOUR NAME AND BUSINESS ADDRESS?**

2 A. My name is Joe Taylor. My business address is 550 15th Street, Suite 1000,
3 Denver, Colorado 80202.

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

5 A. I am employed by Xcel Energy Services Inc., the service company subsidiary
6 of Xcel Energy Inc., the registered holding company parent of Public Service
7 Company of Colorado. My title is Manager, Transmission Access. My
8 primary responsibility is to obtain and maintain the transmission service rights
9 needed for delivery of existing and new generation and purchased power
10 resources.

11 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS DOCKET?**

12 A. I am testifying on behalf of Public Service Company of Colorado (“Public
13 Service” or the “Company”).

14 **Q. HAVE YOU PREPARED A STATEMENT OF YOUR EXPERIENCE AND
15 QUALIFICATIONS?**

16 A. Yes. The statement is included with my testimony as Attachment A.

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

2 A. The purpose of my testimony is to discuss the Pawnee – Smoky Hill
3 Transmission Line Project as it relates to Senate Bill 07-100 (“SB 07-100”)
4 codified in relevant part at C.R.S., § 40-2-126, which encourages utilities to
5 invest in transmission facilities to serve expected electric generation
6 resources. Specifically, I describe the filing Public Service is making
7 contemporaneously with this CPCN application, including designation of four
8 Energy Resource Zones (“ERZs” or “Zones”) in Colorado, and why the
9 Pawnee – Smoky Hill Project is an adequate first step to access Zone 1 and
10 further the goals of SB 07-100.

11 **Q. HOW DOES DESIGNATING ENERGY RESOURCE ZONES ENCOURAGE**
12 **UTILITIES TO INVEST IN TRANSMISSION FACILITIES TO SERVE**
13 **EXPECTED ELECTRIC GENERATION RESOURCES?**

14 A. SB 07-100 defines ERZs as geographic areas in which transmission
15 constraints hinder the delivery of electricity to Colorado consumers, the
16 development of new electric generation facilities to serve Colorado
17 consumers, or both. See C.R.S. § 40-2-126(2).

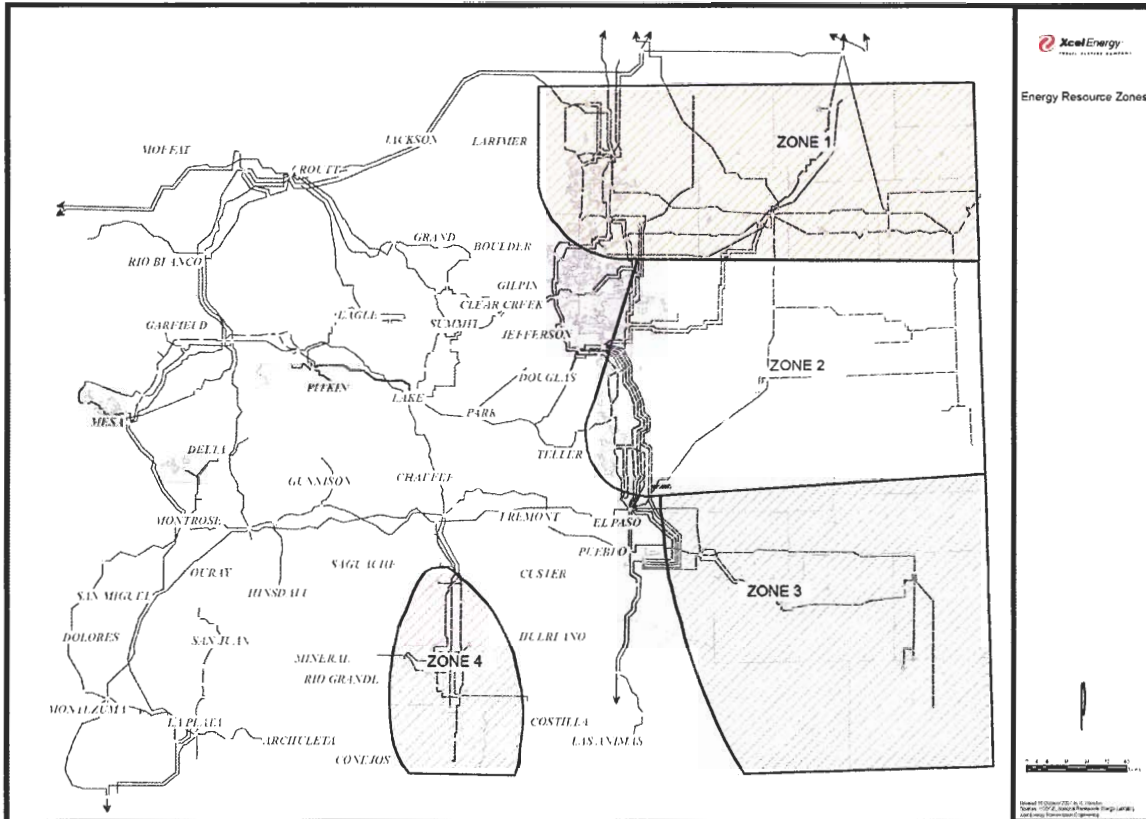
18 This legislation recognizes that it is difficult to develop new electric
19 generation facilities where there are transmission constraints that prevent the
20 generated electricity from being delivered to populated areas, or load centers.
21 For example, as detailed later in my testimony, the Colorado counties that
22 have the best wind generation capacity are generally located in the eastern
23 plains. However, Public Service cannot build or contract for such generation

1 unless there is sufficient transmission capacity to carry wind generation to
2 load centers. While it might take two years to develop wind generation
3 facilities, it often takes more than five years to build or upgrade a high voltage
4 transmission line.

5 SB 07-100 addresses this timing mismatch by requiring the Company
6 to designate energy resource zones that have transmission constraints, as
7 well as filing transmission plans with the Commission that address those
8 constraints.

9 **Q. PLEASE DESCRIBE EACH ENERGY RESOURCE ZONE DESIGNATED**
10 **BY PUBLIC SERVICE COMPANY.**

11 A. In its first SB 07-100 filing, Public Service has identified four very large Zones,
12 three along the eastern part of the State of Colorado and one in the San Luis
13 Valley. The following map illustrates the four zones (a larger version of this
14 map is included as Exhibit No. JCT-1).



1 Each Zone was designated based on the characteristics required in SB 07-100;
 2 those characteristics defined as a geographic area in which transmission constraints
 3 hinder the delivery of electricity to Colorado consumers, the development of new
 4 electric generation facilities to serve Colorado consumers, or both. More specific
 5 locational information on each Zone follows:

6 **Zone 1:** In Northeast Colorado, Zone 1 includes all or parts of
 7 Sedgwick, Phillips, Yuma, Washington, Logan, Morgan, Weld
 8 and Larimer Counties. Zone 1 has the most diverse resource
 9 development opportunities of any of the four zones. While
 10 containing some of the best wind potential in the state, Zone 1
 11 also boasts existing gas infrastructure including pipelines and
 12 storage capabilities. Public Service received a number of gas-
 13 fired proposals originating in this zone in its 2005 All Source
 14 RFP, as well as a number of coal-fired and wind proposals.
 15

1 **Zone 2:** Zone 2 is in East Central Colorado, and includes all or
2 parts of Yuma, Kit Carson, Washington, Adams, Arapahoe,
3 Elbert, El Paso, Lincoln and Cheyenne Counties.
4

5 **Zone 3:** Zone 3 is in Southeast Colorado, and includes all of
6 parts of Baca, Prowers, Bent, Kiowa, Crowley, Otero, Las
7 Animas and Pueblo Counties.
8

9 **Zone 4:** Zone 4 is in the San Luis Valley, and includes all or
10 parts of Costilla, Conejos, Rio Grande, Alamosa and Saguache
11 Counties.
12

13 **Q. HOW DID PUBLIC SERVICE CHOOSE ENERGY RESOURCE ZONES?**

14 A. C.R.S. 40-2-126(1) defines an Energy Resource Zone as “a geographic area
15 in which transmission constraints hinder the delivery of electricity to Colorado
16 consumers, the development of new electric generation facilities to serve
17 Colorado consumers, or both.” In identifying the Energy Resource Zones per
18 this definition, Public Service started by identifying those geographic areas
19 where the future development of new electric generation facilities would likely
20 be in the absence of transmission constraints. The Company then examined
21 whether transmission constraints existed that we believed would hinder the
22 development of new resources or the delivery of reliable electricity from such
23 areas. These geographic areas were identified based on factual, existing
24 information to quantify where we might expect to acquire additional
25 resources, both renewable and non-renewable, in the future. This information
26 is geographically presented on a series of maps which are presented and
27 described later in my testimony. The following sources of information were
28 used to quantify development opportunities:

- 29 • Generation interconnection requests

- Bids received in response to Public Service's 2005 All Source Request For Proposals ("RFP")
- Information provided to us by developers through the SB 07-100 stakeholder process

Q. PLEASE DESCRIBE GENERATION INTERCONNECTION REQUESTS.

A. Transmission Service Providers, including Public Service, use their Open Access Same Time Information System (OASIS) as a repository for posting information related to generator interconnection requests governed by the Large Generator Interconnection Process (LGIP) portion of the Open Access Transmission Tariff (OATT). We gathered all the LGIP information for new generation proposals within Colorado, from the following transmission providers:

- Public Service Company
- Tri-State Generation and Transmission Association
- Western Area Power Administration, Rocky Mountain Region

Platte River Power Authority and Aquila Networks are transmission providers within the state as well, and maintain OASIS sites; however, neither company has any posted LGIP requests. Use of these LGIP requests results in a total of 54 data points on the map. More detail on these selections is included further in my testimony.

Q. PLEASE DESCRIBE THE 2005 ALL-SOURCE RFP.

A. As a result of the 2003 Least Cost Planning Docket, Public Service issued an All Source RFP for generation resources in February 2005. Public Service received over 90 individual proposals in response to the RFP. A number of

1 these proposals were eliminated from inclusion in the map, for the following
2 reasons: (i) the project already had an LGIP request and was included as a
3 result of that request; (ii) there were multiple proposals from a single supplier
4 in the same location, in which case only the largest such proposal was
5 mapped; and, (iii) the proposal was for extension of an existing purchase
6 power agreement from an existing facility. As a result of these exclusions,
7 there are 34 projects included in the maps from the 2005 All Source RFP.

8 **Q. PLEASE DESCRIBE THE STAKEHOLDER COMMENTS PUBLIC SERVICE**
9 **RECEIVED AS A RESULT OF THE SB 07-100 STAKEHOLDER**
10 **MEETINGS.**

11 A. Beginning on April 24, 2007, Public Service held a series of three public
12 meetings to discuss the analysis we were using on development of ERZs,
13 and asked the stakeholders to identify additional projects for inclusion into the
14 ERZ maps. There are 23 additional projects included in the maps from this
15 effort.

16 **Q. SB 07-100 RELATES TO TRANSMISSION CONSTRAINTS. DID PUBLIC**
17 **SERVICE CONSIDER TRANSMISSION CONSTRAINTS IN ITS**
18 **DESIGNATION OF ERZS?**

19 A. Yes. Each of the Zones is different from the others because of the topology
20 and ownership of the transmission system and the ability of the system in
21 each Zone to accommodate more generation. Zone 1 has a transmission
22 constraint that hinders the delivery of additional generation resources to the
23 Denver-metro area. For this reason, no additional generation resources can

1 be accommodated on a continuous basis without either re-dispatching
2 existing Pawnee-area generation or pursuing transmission upgrades.
3 Another example is in Zone 3. Here, no additional generation resources can
4 be accommodated at Lamar without either re-dispatching existing local wind
5 generation or the Lamar DC Tie or pursuing the next phase of high-voltage
6 transmission development. The short-term improvements to both of these
7 Zones will allow Public Service not only to accommodate additional
8 generation resources, but to provide more flexibility in system dispatch
9 between now and the time that major new transmission facilities are placed
10 into service.

11 **Q. HAVE YOU SPONSORED ANY EXHIBITS IN ASSOCIATION WITH THE**
12 **DESIGNATION OF ENERGY ZONES?**

13 A. Yes. Exhibit No. JCT-1 is a general map showing the outline of the four
14 Zones overlaid on a state map with limited other information provided.

15 Exhibit No. JCT-2 is the same map as shown in Exhibit No. JCT-1, but with
16 depictions of the LGIP requests, the All Source RFP bids, and additional
17 locations submitted by stakeholders during the SB 07-100 stakeholder
18 process. The actual locations of each of these “bullets” is not exact,
19 particularly for the LGIP and SB 07-100 sources, as we had only limited
20 locational information from those sources.

21 Table 1 below is presented to identify the number of data points, by
22 generation technology, that are graphically illustrated in Exhibit No. JCT-2.

23

Table 1
Number of Data Points by Generation Technology

Zone	Gas	Coal	Wind	Solar	Geothermal	Biomass, Landfill	Zone Totals
1	15	9	31	0	0	4	59
2	9	1	13	0	0	2	25
3	0	3	22	0	0	0	25
4	1	0	0	1	0	0	2
Totals	25	13	66	1	0	6	111

Q. IN DETERMINING ENERGY RESOURCE ZONES, DID PUBLIC SERVICE LOOK AT WIND CAPACITY IN COLORADO?

A. Yes. During the stakeholder meetings Public Service was asked to look at “where the wind is” rather than only “where generators have asked to interconnect.” To more closely define the goals of “where the wind is”, Public Service contracted with WindLogics, Inc. to perform a county-by-county capacity factor analysis of eastern Colorado using existing wind data in the WindLogics databases. WindLogics created two capacity factor maps that are included in this submittal as Exhibit No. JCT-3 and Exhibit No. JCT-4.

In Exhibit No. JCT-3, Net Capacity Factor by County, the full landmass of each county was used in the averaging process. Low county average values can, in some cases, be misleading given that parts of a county could have considerable wind resource. Therefore, to refine the visual interpretation of the county net capacity factor mapping, WindLogics produced the map included as Exhibit No. JCT-4. This map is different than Exhibit No. JCT-3 in that it displays the 50 percent of land area in each county having the highest wind capacity factor. In both Exhibit No. JCT-3 and Exhibit No. JCT-4, the

1 wind capacity factors for the counties on the western portion of the maps can
 2 be misleading, as the averaging statistics were used only for those portions of
 3 those counties. Furthermore, the western portion of the maps represent the
 4 Front Range mountain ranges which, while having tremendous wind speeds
 5 in many cases, also have significant technical and environmental challenges
 6 to the development of commercial sized wind resources. These western
 7 counties are not included within any of the Zones, with the exception of Zone
 8 4 as a solar/geothermal zone.

9 Exhibit Nos. JCT-3 and JCT-4 provide more detail regarding where
 10 Public Service could expect to see viable, economic wind projects being
 11 developed in the future.

12 **Q. WHAT DO THESE MAPS REVEAL WITH RESPECT TO WIND CAPACITY**
 13 **IN COLORADO?**

14 A. Using Exhibit No. JCT-3 as a source, the top ten wind counties in eastern
 15 Colorado are the following:

		<u>Net Capacity</u>	
	<u>County</u>	<u>Factor</u>	
18	Sedgwick	40.29%	Zone 1
19	Phillips	39.49%	Zone 1
20	Baca	39.39%	Zone 3
21	Kit Carson	38.17%	Zone 2
22	Yuma	37.54%	Zone 2
23	Prowers	35.53%	Zone 3
24	Las Animas	34.76%	Zone 3
25	Washington	33.80%	Zones 1 and 2
26	Elbert	33.75%	Zone 2
27	Cheyenne	33.73%	Zone 2

28 This ranking does not include counties on the western (Front Range) portion
 29 of the eastern half of the state, as altitude, mountain ranges and partial

1 county data provide a distorted view of viable wind development. It would
2 appear, however, that portions of the counties located within Zone 4 could be
3 developable for wind, and this development will not be discouraged simply
4 because Zone 4 is being viewed primarily as a solar/geothermal zone.

5 Looking to Exhibit No. JCT-4, a clearer picture can be seen. In this
6 map, the best 50% wind region within each County is mapped. This map
7 shows a higher level of clarity about the significance of a net capacity factor in
8 the eastern Colorado counties. Of particular interest is the dark orange/light
9 red captioning that indicates capacity factor ranges of 39.75% to 45.49%.
10 Using this data, for example, while Baca County shows up as ranking fourth
11 by net capacity factor across its entire land area, it appears to rank first in
12 terms of the quantity of land area that could accommodate wind projects with
13 a significant capacity factor. This sort of visual view also holds true for
14 neighboring Las Animas and Prowers Counties. Sedgwick, Phillips and Kit
15 Carson also show up as having a significant land area available in this
16 capacity factor range.

17 The mapping exercise undertaken by WindLogics provided us with
18 valuable information as to the relative strength of wind regions within the
19 state. It complements and expands upon data widely distributed throughout
20 the industry and available from any number of sources including the National
21 Renewable Energy Laboratories and the American Wind Energy Association,
22 among others. The data also correlates with locations requesting studies
23 under the LGIP, and developers that have proposed wind projects to Public

1 Service in the past. It highlights largely untapped wind zones in Sedgwick,
2 Phillips and Baca Counties as well.

3 **Q. IS WIND CAPACITY THE ONLY FACTOR RELEVANT TO WHERE WIND**
4 **GENERATION RESOURCES WILL BE DEVELOPED?**

5 A. No. The data does not say what the price is of a wind project developed in
6 these zones. Logic dictates that the cheapest wind energy price will come
7 from the regions with the highest wind resource potential. The counties in
8 eastern Colorado with the best wind capacity are all included within the ERZs.
9 As transmission plans are developed in response to this SB 07-100 filing, and
10 future SB 07-100 filings, Public Service will choose wind projects that have
11 the lowest delivered cost in terms of both the energy cost of the wind
12 generation itself, and the delivery costs associated with expanding the
13 transmission grid into the zones.

14 **Q. WHAT ABOUT SOLAR RESOURCES?**

15 A. As is obvious from looking at any solar map (refer to Exhibit No. JCT-5), Zone
16 4 contains the best solar resource in the state. Zone 4 also correlates well
17 with the most concentrated locations for known geothermal production
18 capability (refer to Exhibit 4). As Zone 4 has up to 200 MW of existing
19 generation injection capability at summer peak load conditions, it is this region
20 Public Service will look to first when fulfilling its renewable energy needs from
21 these technologies.

1 **Q. PLEASE EXPLAIN THE TIMING OF GENERATION VERSUS**
2 **TRANSMISSION PROJECTS, AND THE IMPACTS OF THESE**
3 **DIFFERENCES ON PUBLIC SERVICE.**

4 A. Mr. Jaeger and Mr. Stellern explain that major new transmission facilities
5 require five years or more to construct. On the other hand, a wind farm can
6 be built in 12-18 months, a combustion turbine gas facility in 18-24 months,
7 and a combined cycle gas facility in 24-30 months.

8 As Public Service acquires new resources in accordance with the
9 Colorado Resource Plan, the addition of the Pawnee-Smoky Hill 345kV line
10 will be factored into the timing of the acquisition of those resources. The near
11 term upgrades described in Mr. Stellern's testimony will allow additional
12 generation resources to be accommodated but only by re-dispatching existing
13 generation or pursuing the next phase of the transmission plan.

14 Although the Company will not file its 2007 Colorado Resource Plan
15 until November 16, we expect to propose to acquire new renewable
16 resources beginning as early as 2010. It is expected that the short-term plans
17 to relieve transmission congestion in Zones 1 and 3 will generally be
18 sufficient, with proper dispatch, to accommodate new renewable resources
19 that would be added through 2012. The Pawnee – Smoky Hill Project is
20 necessary to accommodate any further additions of renewable or other
21 generation resources in Zone 1 after 2012, and the Eastern Plains
22 Transmission Project or other plans are necessary to accommodate any
23 further additions in Zones 2 and 3.

1 **Q. WHAT CAN YOU CONCLUDE FROM PUBLIC SERVICE'S EFFORTS TO**
2 **DEVELOP ENERGY RESOURCE ZONES?**

3 A. Public Service took the task of developing ERZs very seriously, and used
4 existing data, as well as stakeholder input and advice, in determining the
5 relative location of the four ERZs. Colorado is blessed with a wide array of
6 natural resources. Nowhere is that evident more than in Zone 1, where
7 substantial wind, gas and coal-fired generation exist today, and constraints in
8 the capability of the transmission system hinder the ability to add more
9 generation without transmission upgrades. Zone 1 also shows, as can be
10 seen in Table 1 described earlier in this testimony, the most active interest for
11 developing new generating resources. Expanding the transmission grid to be
12 able to import more power from Zone 1 will provide Public Service the ability
13 to take advantage of these future opportunities in northeast Colorado, as well
14 as potential expansion into Wyoming and Nebraska.

15 Zone 3 also contains an excellent source for new wind generation in
16 Colorado. As discussed by Mr. Jaeger, Public Service expects to participate
17 in the development of the Eastern Plains Transmission Project. Future SB
18 07-100 filings, and associated CPCN applications, will address Public
19 Service's efforts to expand the grid to tap this resource Zone.

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

21 A. Yes.

Attachment A

Statement of Qualifications

Joseph C. (Joe) Taylor

Mr. Taylor received a Bachelor of Science degree in Petroleum Engineering in December 1984 from Texas A&M University, and a Master of Business Administration in May 1992 from the University of Texas-El Paso.

Since 1985, Mr. Taylor has held a number of marketing, power contracts and transmission-related positions in the electric utility industry. During this time, he has been employed by El Paso Electric Company (1985-1995), Plains Electric Generation and Transmission Cooperative (1995-2000) and Tri-State Generation and Transmission Association (2000-2004).

In November 2004, Mr. Taylor joined Xcel Energy as Manager of Transmission Access, with responsibility for obtaining and maintaining the transmission services required for the native and wholesale loads of Public Service Company of Colorado and Southwestern Public Service Company, two of the operating companies of Xcel Energy.

Mr. Taylor has served on numerous committees in the Western Interconnection and the Southwest Power Pool, and has filed testimony before the New Mexico Public Regulation Commission and the Federal Energy Regulatory Commission.