



PUBLIC SERVICE COMPANY OF  
COLORADO

SENATE BILL 07-100  
DESIGNATION OF ENERGY  
RESOURCE ZONES AND  
TRANSMISSION PLANNING  
REPORT

October 31, 2007

Public Service Company of Colorado

Senate Bill 07-100 Designation of Energy Resource Zones

And Transmission Planning Filing

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**I. INTRODUCTION**

The Sixty Sixth General Assembly passed Senate Bill 07-100 upon recommendation by the 2006 Transmission Task Force on Reliable Electricity Infrastructure. In its November 1, 2006 Report, the Task Force recognized that “Colorado’s ability to ensure continued affordable, reliable electricity and to build a vibrant economy depends on sufficient transmission capability,” and “[t]oday the system is strained and, if current trends continue, there will not be adequate transmission to meet the needs.”

The Task Force also made four recommendations, including: establishing a transmission cost recovery rider to create a robust and reliable transmission system to meet Colorado’s future energy needs; increased governmental involvement with organizations like the Colorado Coordinated Planning Group; and appropriate adequate funding for the Public Utilities Commission to actively participate in regional electricity transmission planning, reliability and regulatory forums.<sup>1</sup> In addition, the Task Force recommended identification of renewable generation resource development areas:

In order to develop economic, safe, reliable, and low-cost renewable generated electric power for consumers, the Task Force recommends that the State identify renewable generation resource development areas that have potential to support competition among renewable energy developers for development of renewable resource generation projects.

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<sup>1</sup> The Report on the Task Force on Reliable Electricity Infrastructure is available at: <http://www.dora.state.co.us/puc/projects/ReliableInfrastructure/FinalTFReport11-01-2006.pdf>.

In response to these recommendations the Colorado Legislature passed SB 07-100, codified, in relevant part, at C.R.S. § 40-2-126, implementing measures to ensure the adequacy of Colorado’s electric transmission infrastructure. As relevant to this filing, SB 07-100 requires rate-regulated electric utilities, such as Public Service, on or before October 31 of each odd-numbered year, to do the following:

- (a) Designate “Energy Resource Zones”;
- (b) Develop plans for the construction or expansion of transmission facilities necessary to deliver electric power consistent with the timing of the development of beneficial energy resources located in or near such zones;
- (c) Consider how transmission can be provided to encourage local ownership of renewable energy facilities, whether through renewable energy cooperatives as provided in section 7-56-210, C.R.S., or otherwise; and
- (d) Submit proposed plans, designations, and applications for certificates of public convenience and necessity to the commission for simultaneous review.

Public Service hereby submits, per Section 40-2-126(2)(d), C.R.S.: (1) its designation of Energy Resource Zones; and 2) its proposed transmission plans that support access to and delivery of electric power in or near such energy zones, including transmission to encourage local ownership of renewable resources. Contemporaneous with this submission, Public Service is filing with the Commission a separate Application for a Certificate of Public Convenience and Necessity for the Pawnee – Smoky Hill 345kV Transmission Project, also in compliance with Section 40-2-126.

In the months between passage of SB 07-100 and this filing, Public Service met five times with stakeholders interested in the Company’s designation of Energy Resource Zones and

related transmission plans.<sup>2</sup> In addition, the Company provided all the materials presented in the stakeholder meeting on a public website. The stakeholder meetings, presentations, and summaries of comments are posted at [http://www.rmao.com/wtpp/SB 07-100.html](http://www.rmao.com/wtpp/SB_07-100.html). While SB 07-100 did not require an open stakeholder process for purposes of developing the transmission plans and designation of Energy Resource Zones, Public Service wanted to solicit input from stakeholders regarding both the its designation of Energy Resource Zones and its transmission plans for alleviating transmission constraints in each Zone. Public Service describes the public process more fully below.

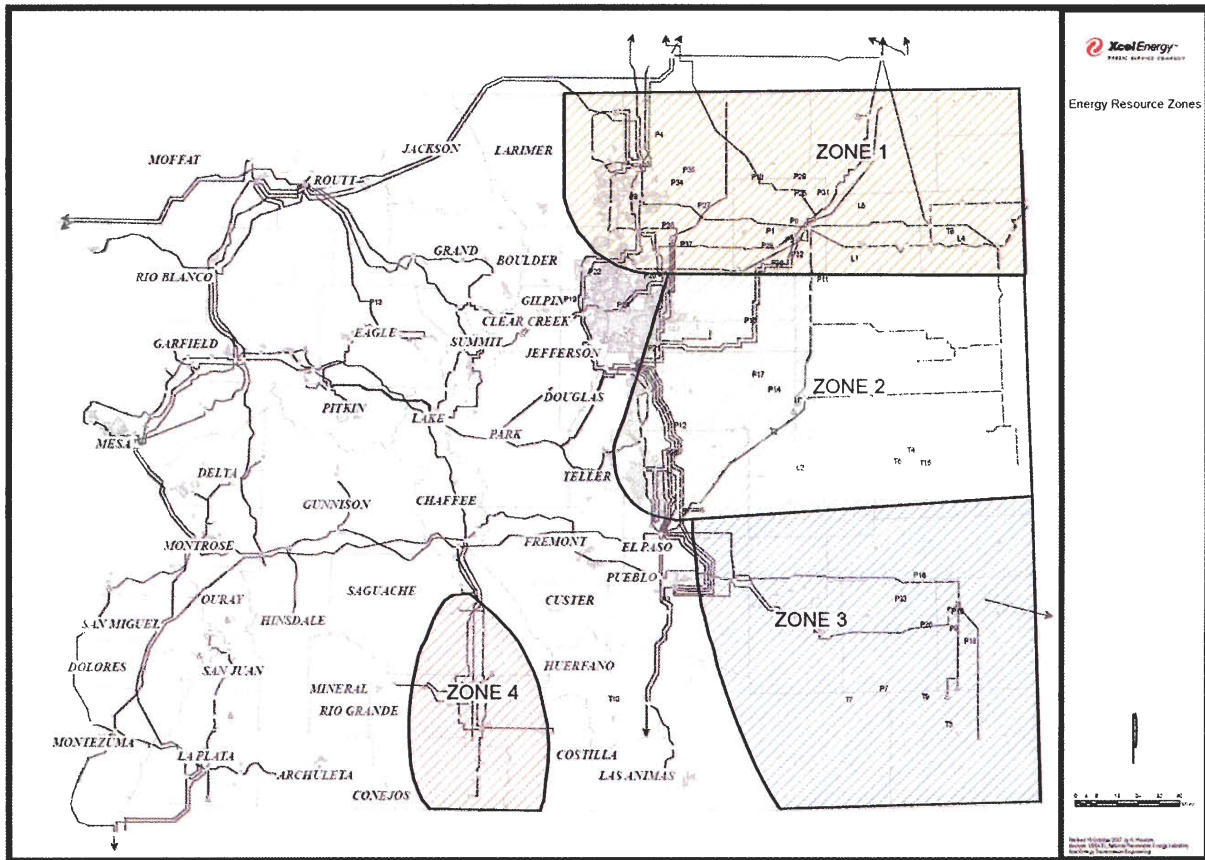
## **II. DESIGNATION OF ENERGY RESOURCE ZONES**

### **A. Four Colorado Energy Resource Zones**

C.R.S. 40-2-126(1) defines an Energy Resource Zone as “a geographic area in which transmission constraints hinder the delivery of electricity to Colorado consumers, the development of new electric generation facilities to serve Colorado consumers, or both.” In identifying the Energy Resource Zones, Public Service considered both electric transmission constraints across Colorado and where new electric generation resources are most likely to be located. In this, the first filing under SB 07-100, Public Service has designated, as Energy Resource Zones, four large geographic areas in the State of Colorado. Three of the Zones are in eastern Colorado and one is in southern Colorado in the San Luis Valley. The following map illustrates the four zones:

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<sup>2</sup> Stakeholder meetings were held on April 24, May 30, and July 26, 2007. Transmission study group meetings (open to all stakeholders) were held on May 31 and June 14, 2007.



Each Energy Resource Zone is described below:

**Zone 1:** In Northeast Colorado, Zone 1 includes all or parts of Sedgwick, Phillips, Yuma, Washington, Logan, Morgan, Weld and Larimer Counties.

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

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

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

## B. How Zones Were Determined

In determining where to designate Energy Resource Zones, Public Service looked at both electric transmission constraints across Colorado and where new electric generation resources are most likely to be located.

With increased availability and usage of electrical products for residential and business users, as well as population growth, electricity demand over the years has increased substantially, resulting in electric transmission constraints across major transmission paths over the last few decades. Historically, utilities have been the principal developers of local transmission systems that serve to deliver electricity from generation resources to large load centers, usually in urban areas and to large industrial users. As demand increased, utilities built larger generation plants, often long distances away from load centers, which required transmission systems to be built at higher voltages for greater capacity.

At the same time load was growing, market conditions changed so that independent generation developers were given a larger role in siting new generation facilities. Historically this was performed by the utility, allowing the utility to coordinate the development of transmission consistent with the timing of new generation. As utilities increasingly contracted with independent power producers for generation, transmission development has become less integrated with generation planning. By passing SB 07-100, the legislature recognized this disparity between generation development and corresponding transmission construction. Specifically, this legislation calls for the examination of areas in Colorado that have generation development potential compared to the availability of transmission, and encourages utilities to develop transmission facilities that are consistent with the timing of beneficial generation resources.

Public Service identified four geographic zones in which transmission constraints adversely affect the ability to develop new generation resources where development interest has been shown in the past, and where there is significant renewable generation potential for wind, solar, or geothermal resources. Next, Public Service identified both short-term and long-term transmission expansion plans that will alleviate transmission congestion in all four of these geographic zones. Mechanically, the Company utilized existing data to the extent possible to quantify where the Company might expect to acquire additional renewable resources, both renewable and non-renewable, in the future, and presented this geographically on maps that are presented below. To that extent, the primary sources of information used to quantify development opportunities were identified using the following sources of information:

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

1. Large Generator Interconnection Requests

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). Public Service gathered all the LGIP information for new generation proposals within Colorado, from three transmission providers: Public Service; Tri-State Generation and Transmission Association (Tri-State); and Western Area Power Administration, Rocky Mountain Region (WAPA). Platte River Power Authority

(PRPA) 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 in this filing in Appendices 2 and 3, described below.

## 2. All Source RFP

As a result of the 2003 Least Cost Planning docket, Public Service issued an All Source RFP in February 2005. Public Service received over 90 individual proposals in response to the RFP. However, a number of these proposals were eliminated from inclusion in the map, for the following reasons: (i) the project already had an LGIP request and was included as a result of that request; (ii) there were multiple proposals from a single supplier, in which case only the largest such proposal was mapped; and, (iii) the proposal was for extension of an existing purchase power agreement from an existing facility. As a result of these exclusions, there are 34 projects included in the maps from the 2005 All Source RFP. More detail on these selections is included in this filing in Appendices 2 and 4, described below.

## 3. SB 07-100 Stakeholder Comments

Beginning on April 24, 2007, Public Service held a series of three public meetings to discuss the analysis it was using on development of Zones, and asked the stakeholders to identify additional projects for inclusion into the Zone maps. Approximately 23 additional projects were included in the maps from this effort. More detail on these selections is included in this filing in Appendices 2 and 5, described below.



C. Colorado Maps and Supporting Materials for Zones 1-4

As noted above, Public Service is designating four Energy Resource Zones that have demonstrated a potential for resource development. The following appendices are included to show how the zones correlate with existing and future generation development opportunities:

Attachment 1 is a general map showing the outline of the four Zones overlaid on a state map with limited other information provided.

Attachment 2 is the same map as shown in Attachment 1, but with depictions of the LGIP requests, the All Source RFP bids, and additional locations submitted by stakeholders during the SB 07-100 stakeholder process. The actual locations of each of these “bullets” is not entirely accurate, particularly for the LGIP and SB 07-100 sources, as Public Service had only limited locational information from those sources.

Attachment 3 is a spreadsheet that depicts the data points compiled from review of the LGIP requests of Public Service, Tri-State and WAPA.

Attachment 4 is a spreadsheet that depicts the data points compiled from the proposals received in response to the 2005 All Source RFP.

Attachment 5 is a spreadsheet that depicts the data points compiled from the information provided by the SB 07-100 stakeholders.

To provide further detail, Table 1 is presented below to indicate the number of data points in each of the zones by generation technology:

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

Attachment 6 is a map depicting wind resources, including the three sources of information listed above, and overlaid on the 50 meter NREL wind map, which is included as Attachment 7.

Appendices 8 and 9 represent work done for Public Service by WindLogics. The purpose of the WindLogics study was to provide more detail on the net capacity factor associated with wind resources that could be expected by county, and within counties, in eastern Colorado. In other words, the WindLogics maps provide more granularity on the relative strength of wind within zones that, by using only the NREL data, appear to be practically identical.

Attachment 10 is an NREL map showing both direct normal solar radiation as well as concentrating solar power prospects state-wide. The data represented in Attachment 10 very closely aligns with the designation of Zone 4 which is described in further detail below.

Attachment 11 is a map prepared by the Idaho National Engineering and Environmental Laboratory depicting Colorado's geothermal resources. This data also very closely aligns with the designation of Zone 4.

#### D. Wind Capacity

Wind capability is strongest in Zones 1 and 3. During the stakeholder meetings, Public Service heard the suggestion that it should focus more on “where the wind is” than “where generators have asked to interconnect.” The Company has attempted, in the various maps, to determine the location of specific wind projects. However, without detailed knowledge of the

specific location of many of the wind projects, as previously discussed, there is a lack of absolute clarity about the location of each wind project under development.

To be responsive and 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 data bases. WindLogics created two capacity factor maps that are included in this submittal as Appendices 8 and 9.

WindLogics performed a capacity factor analysis for the General Electric 1.5SL turbine for eastern Colorado. The WindLogics modeling system was utilized to generate wind speed data for one year at the typical turbine hub height of 80 meters. The wind speeds were normalized with 15 years of National Centers for Environmental Prediction/National Center for Atmospheric Research reanalysis data to represent the long-term mean wind resource. Wind power capability was calculated using the manufacturer power curve for the GS 1.5SL turbine and time dependent air density and hourly wind speed values produced from the model. Gross and net capacity factor maps were generated from the wind power statistics. Gross capacity factors were reduced by 13% to generate the net capacity factor statistics.

In Attachment 8, Net Capacity Factor by County, the full land mass 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 resources. To refine the visual interpretation of the county net capacity factor mapping, WindLogics produced the map included as Attachment 9. This map is different than Attachment 8 in that it displays the 50 percent of each county having the highest wind capacity factor.<sup>3</sup> The western portion of the maps represents the Front Range mountain ranges which, while having tremendous wind speeds in

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<sup>3</sup> In both Appendices 8 and 9, the wind capacity factors for the counties on the western portion of the maps can be misleading, as the averaging statistics were used only for those portions of those counties.

many cases, also have significant technical and environmental challenges to the development of commercial sized wind resources. These western counties are not included within any of the four Zones with the exception of Zone 4, which is characterized by predominately solar/geothermal resources.

This mapping exercise provided more detail as to where Public Service could expect to see viable, economic wind projects being developed in the future. Using Attachment 8 as a source, the top ten wind counties in eastern Colorado are the following:

<u>County</u>	<u>Wind Capacity Factor</u>	<u>Zone</u>
Sedgwick	40.29%	Zone 1
Phillips	39.49%	Zone 1
Baca	39.39%	Zone 3
Kit Carson	38.17%	Zone 2
Yuma	37.54%	Zone 2
Prowers	35.53%	Zone 3
Las Animas	34.76%	Zone 3
Washington	33.80%	Zones 1 and 2
Elbert	33.75%	Zone 2
Cheyenne	33.73%	Zone 2

Once again, this ranking does not include counties on the western (Front Range) portion of the eastern half of the state, as altitude, mountain ranges and partial county data provide a distorted view of viable wind development. In Attachment 9, a clearer picture can be seen, as the best 50% wind region within each County is mapped. This map shows a higher level of clarity about the significance of net capacity factor in the eastern Colorado counties. Of particular interest is the dark orange/light red captioning that indicates capacity factor ranges of 39.75% to 45.49%. Using this data, for example, while Baca County shows up as ranking fourth by net capacity factor across its entire land area, it appears to rank first in terms of the quantity of land area that could accommodate wind projects with a significant capacity factor. This sort of visual

view also holds true for neighboring Las Animas and Prowers Counties. Sedgwick, Phillips and Kit Carson also show up as having a significant land area available in this capacity factor range.

In sum, the mapping exercise undertaken by WindLogics provided Public Service with valuable information as to the relative strength of wind regions within the state. It complements and expands upon data widely distributed throughout the industry and available from any number of sources including the National Renewable Energy Laboratories and the American Wind Energy Association, among others. The data also correlates with locations requesting studies under the LGIP, and developers that have proposed wind projects to Public Service in the past. It highlights largely untapped wind zones in Sedgwick, Phillips and Baca Counties as well.

The data does not say what the price will be of a wind project developed in each zone, though logic dictates that the least expensive wind energy price should come from regions with the highest wind resource potential. The best counties in eastern Colorado are all included within the Zones Public Service has identified.

As described in more detail in the Transmission Planning section below, Colorado's Renewable Energy Standard ("RES") requires Public Service to acquire renewable energy credits equivalent to a minimum of 20% of its retail energy sales by 2020 from renewable (eligible energy) resources. With the 835 MW of wind resources recently acquired through the 2003 Least Cost Planning, Public Service projects it has sufficient non-solar resources to comply with the minimum RES until just past 2020. Public Service anticipates needing additional non-solar resources just beyond 2020 to comply with the RES, and will begin acquiring these additional resources incrementally over the next several years.

E. Solar and Geothermal Resources

As is obvious from looking at any solar map (see Attachment 8), Zone 4 contains the best solar resources in the state. Zone 4 also correlates well with the most concentrated locations for known geothermal production capability (see Attachment 9).

With the combination of on-site solar and the 8 MW of Central solar acquired from the Sun E Alamosa project, Public Service will still need to acquire additional solar renewable energy credits to comply with the RES. As Zone 4 has up to 200 MW of existing generation injection capability at summer peak load conditions, it is plausible that projects associated with these resources would originate in Zone 4.

### **III. TRANSMISSION PLANNING**

A. Introduction

In this section, Public Service Company of Colorado describes its short and long term transmission planning efforts that are currently being studied or evaluated as potential additions to the Colorado transmission system. Public Service identifies both short-term and long-term transmission expansion plans that will alleviate transmission congestion in all four of the Energy Resource Zones described above. It must be emphasized that, while these plans are being considered by the Company, it is far from certain that all of them will be implemented. A number of factors enter into the decision whether to go forward with a transmission project, including generation resource availability, community and local government concerns, cost, capital funding requirements, comparison with alternative resources, regulatory approval, and neighboring utility participation. The greater the project in terms of cost, development timeline, and community impact, the more time that must be devoted to studying and evaluating the merits of the project.

With respect to its short-term transmission plans, Commission Rule 4 CCR 723-3-3206 permits Public Service to make certain modifications to expand the capacity of existing transmission facilities without the need to file an application for CPCN because such modifications are deemed to be in the ordinary course of business. The short-term projects that are part of the Company's overall transmission expansion plan all fall within the scope of Rule 3206's exemption from the CPCN requirement.

Regarding its long term transmission plans, Public Service only had a few months between passage of SB 07-100 and this filing to study and determine whether any project could pass the myriad of requirements and concerns listed above. In order to assess the viability of a transmission project, numerous studies must be conducted concerning the feasibility, impact and reliability of the transmission project. The amount of time necessary to conduct these studies can be as much as six months, and then it takes an additional two months to develop the testimony, exhibits, and application needed to obtain a CPCN from the Public Utilities Commission.

Public Service was able to identify one project that is ripe for an application for Certificate of Public Convenience and Necessity (CPCN) – the Pawnee Smoky Hill 345kV Transmission Project (this application is being made in a companion filing). The Pawnee – Smoky Hill Project is consistent with the Company's vision of creating a transmission highway for delivering cost-effective and environmentally-friendly energy resources to Colorado consumers. Zone 1 has been identified as one of the Zones with significant potential for the development of wind resources in particular.

Even though the Pawnee – Smoky Hill Project is located in Zone 1, Public Service has plans for transmission development for each of the designated Energy Resource Zones. As a Company policy and practice, Public Service considers various alternatives in developing

transmission plans and determines the most cost effective and efficient way of addressing its needs, as the Company has done in its CPCN application. In order to develop greater transmission access to Zones 2 and 3, Public Service is studying the feasibility of participating in the East Plains Transmission Project (EPTP) currently being developed by Tri-State Generation and Transmission Association, Inc. (TriState) and Western Area Power Administration (WAPA)<sup>4</sup>. Public Service has recently executed a Memorandum of Understanding with TriState to begin this assessment. Depending upon the results of the feasibility studies, Public Service expects to join in the EPTP to expand transmission into Zones 2 and 3. Although the Company has not had sufficient time since the enactment of SB 07-100 to complete the feasibility and other studies required to make a formal proposal for the expansion of transmission to Zones 2 and 3 at this time, the Company expects to join in an application for CPCN that TriState expects to file relating to the EPTP. Public Service believes it is in the best interests of Colorado consumers to pursue opportunities for joint transmission development and not pursue duplicative transmission facilities in and around these zones. Additionally, in order to expand transmission capacity to Zone 4 in Southern Colorado, the Company will pursue a short-term project that should facilitate the development of new solar generation from that area in the fairly near term.

#### B. Overview of Public Service's Transmission Needs

Public Service is a vertically integrated public utility engaged in the business of generating, transmitting, and distributing electricity in the state of Colorado in the Western Interconnect. Public Service's transmission planning process is intended to facilitate the

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<sup>4</sup> Partnering on the EPTP was suggested by the stakeholders during the stakeholder meetings, and there has been positive wind developer feedback about the proposal. See <http://www.harvestenergy.org/colorado/newsletterarchive/enewsletter-sept-07.pdf> (September 2007 Colorado Harvesting Energy newsletter) ("Wind developers see this pending agreement as a breakthrough that will allow Xcel and others to access wind energy from southeast Colorado").



development of electric infrastructure that both maintains reliability and meets load growth. The Company is committed to improving the efficiency of its electric system operations, including the provision of open and non-discriminatory access to the transmission facilities under its control. In addition, Public Service continually identifies and promotes new investment in transmission infrastructure through its planning function in a coordinated, open, transparent and participatory manner.

Senate Bill 07-100 recognizes that transmission constraints can have detrimental effects to Colorado, as stated in its Legislative Declarations:

The general assembly finds, determines, and declares that:

- (a) A robust electric transmission system is critical to ensuring the reliability of electric power for Colorado's citizens;
- (b) Colorado's vibrant economy and high quality of life depend on the continued availability of clean, affordable, reliable electricity; and
- (c) Therefore, Colorado utilities should continually evaluate the adequacy of electric transmission facilities throughout the state and should be encouraged to promptly and efficiently improve such infrastructure as required to meet the state's existing and future energy needs.

Further, the North American Electric Reliability Corp. (NERC) released an annual report this month that calls for “massive investments in transmission capacity” to keep up with growing electricity demand and the need to grow renewables as a significant source of power. The report also states that electricity use is growing twice as fast as the resources used to generate and transmit it, and that power companies will need significantly more transmission capacity to ensure high levels of service reliability.<sup>5</sup> Likewise, the Colorado Energy Forum recently released a White Paper entitled, “More Transmission Needed: Colorado’s Electric System and

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<sup>5</sup> See [http://ap.google.com/article/ALeqM5gwQYDSwAi1B26qklAYs8zv\\_IHsHgD8SA3Q9O1](http://ap.google.com/article/ALeqM5gwQYDSwAi1B26qklAYs8zv_IHsHgD8SA3Q9O1).

Why It Needs Expanding,” which concludes that “[e]xpanding transmission capacity... must be addressed soon if we are to avoid the next energy crisis.”<sup>6</sup>

Public Service is committed to relieving transmission constraints in Colorado to the extent beneficial and economic generation resources are precluded from being developed. In the same way, Public Service believes identification and relieving transmission constraints potentially allows for local ownership of renewable resources. To gain a better understanding of how transmission resources are selected and developed historically and in the context of SB 07-100, it is necessary to describe the history of transmission in Colorado, transmission constraints, existing transmission resources, how Public Service coordinates transmission with planning groups and other market participants, how transmission relates to the generation resource planning process, and the timeline of transmission projects. Public Service will then describe its transmission system associated with each designated Energy Resource Zone and plans to alleviate certain constraints.

### C. Transmission System History and Coordination

In the late 1960’s, the Western Interconnection started to take shape as utilities created control areas and interconnected with neighboring utilities. In the Rocky Mountain States, Public Service and Western Area Power Administration (WAPA) tied their systems together and utilized each other’s transmission to serve their customers. Public Service provides transmission service to some of WAPA’s wholesale customers, and WAPA provides transmission service to Public Service’s customers in Northeast Colorado. WAPA and Public Service have worked cooperatively for many years on joint transmission lines and substations as the transmission system has developed over the years.

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<sup>6</sup> [http://www.coloradoenergyforum.org/Portals/23/Studies/Transmission\\_White\\_Paper\\_Web.pdf](http://www.coloradoenergyforum.org/Portals/23/Studies/Transmission_White_Paper_Web.pdf).

In 1992 as a result of the bankruptcy of Colorado Ute Electric Association (CUEA), Public Service and Tri-State executed agreements that provided for joint ownership, operation, and maintenance of certain transmission and generation facilities formerly owned by CUEA. Tri-State and Public Service meets routinely to discuss operating and maintenance procedures, and budgeting of the jointly owned facilities. At the same time, the Colorado Coordinated Planning Group (CCPG) was created to enable the utility members in the Rocky Mountain to perform coordinated transmission planning.

Public Service has a history of coordinating its transmission planning activities in Colorado through the Colorado Coordinated Planning Group<sup>7</sup>. The CCPG is a forum to bring reliability study ideas for joint study purposes. The CCPG meetings are open to any interested party who wants to participate in the CCPG meetings and the scheduled meetings are posted on a website. The other transmission provider members in CCPG include Public Service, Tri-State, Western Area Power Administration, Colorado Springs Utilities, Platte River Power Authority, Basin Electric Power Cooperative, Black Hills Power, Inc., Aquila Networks, the 29 Colorado municipals electric utilities represented by the Colorado Municipal Energy Association, and other transmission customers.

From the operating perspective, the Rocky Mountain Reserve Group (RMRG) was formed to enable utilities to share operating and spinning reserves, and to work cooperatively on a daily basis to improve reliability and reduce cost by sharing generation reserves. Over time, individual owners/operators of the transmission systems interconnected their systems to gain access to regionally adjacent power plants. As these separately owned regional interconnected transmission systems grew, regional compacts or other oversight organization were formed and

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<sup>7</sup> See Joint Transmission Access Principles and Electric Transmission Policy Statement dated December 16, 1991, filed with the FERC, Docket No. EC92-8-000, 58 FERC 61,322 (1992).

assumed an increasingly greater role in the management, operation and new development of the transmission system. Still, for most of its the transmission system's history, there has been no central planning of the transmission system, and its foundation is a patchwork of independently built and designed small systems. To date, there is no national planning of the transmission system even though the Federal Energy Regulatory Commission (FERC) has broad oversight over transmission.

In 1996 FERC finalized Order 888, a generic rule ordering all jurisdictional utilities to provide open access to their transmission system. Order 888 also set out rules for trading arrangements and separation of trading and system operations.

There are approximately 140 different control areas in the United States, and considerably more owners of transmission facilities. This geographic fragmentation of transmission was broadly seen as inhibiting trade and the kind of efficiency, fairness, and reliability contemplated in Order 888. In 1999, FERC concluded that the remedies and guidance established in Order 888 were not sufficient, in and of themselves, to create more competitive markets. As a result, FERC issued Order No. 2000. FERC declined to mandate corporate unbundling of transmission in Order 2000 and stated instead that efforts to remedy undue discrimination should begin by requiring a less intrusive functional unbundling, Standards of Conduct and through the establishment of Regional Transmission Organizations.

The Energy Policy Act of 2005 expanded FERC's authority over interstate transmission by effectively giving FERC the ability to set and enforce reliability standards, act as a backstop federal siting authority for transmission projects denied state approval, and setting incentive-based rates for new transmission development. In July 2006, FERC approved NERC's application to be the Electric Reliability Organization for North America. As such, NERC has

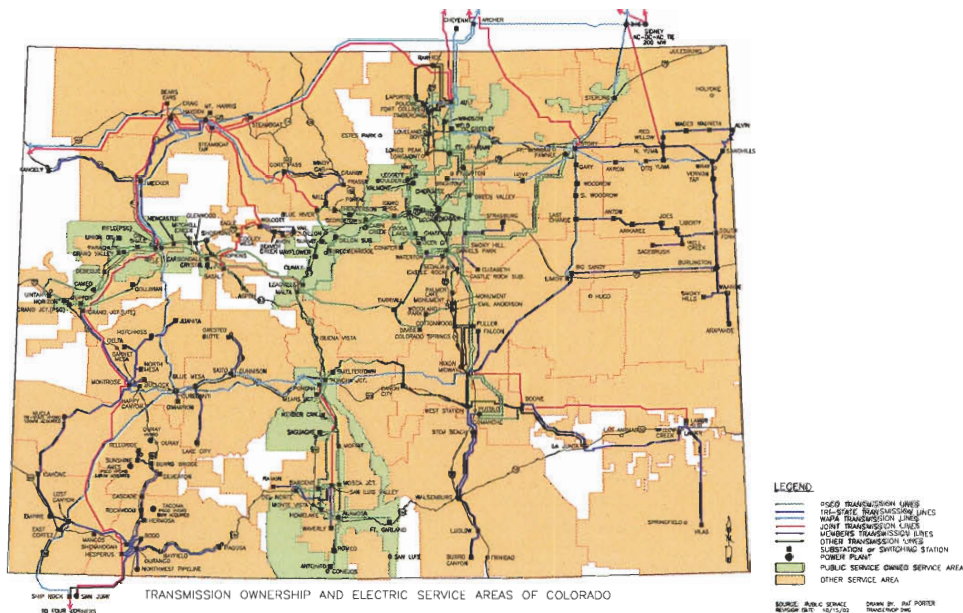
the legal authority to enforce reliability standards on all owners, operators and users of the bulk power system, rather than relying on voluntary compliance.

Recently, FERC amended its regulations in Order No. 890 and adopted reforms to the *pro forma* open access transmission tariff in order to increase transparency in the rules applicable to planning and use of the transmission system. In compliance with FERC Order No. 890, Public Service is continuing to work with other transmission providers in developing transmission planning policies. In addition, Public Service is a transmission provider within the Western Interconnection under the Western Electricity Coordination Council (WECC). WECC is the NERC Reliability Council in the West. WECC is geographically the largest of the ten NERC Regional Councils, with approximately a 1.8 million square mile service territory equivalent to more than half the contiguous area of the United States, roughly running west from a north-south line at the eastern border of Colorado to the Pacific Ocean. WECC's 127 members represent all segments of the electric industry, providing electricity to 71 million people in 14 Western states, two Canadian provinces, and portions of one Mexican State. Membership is comprised of 19 investor owned utilities, 18 municipal utilities, 21 public power agencies, 4 federal agencies, 5 Canadian and 1 Mexican agency, with the balance of membership from Independent Power Producers, marketers and regulators.

There are four sub-regions in the WECC: the Northwest Power Pool Area; California-Mexico Power Area; Arizona; New Mexico, Southern Nevada Power Area; and the Rocky Mountain Power Area ("RMPA"). Each of these sub-regions addresses the adequacy of supply and resources within its own area through coordination of regional planning activities. The WECC is also responsible for coordinating and promoting electric system reliability, which includes coordinating the operating and transmission planning activities within the region.

The Public Service transmission network is located within RMPA. Figure 1 below depicts the PSCo service territory.

FIGURE 1



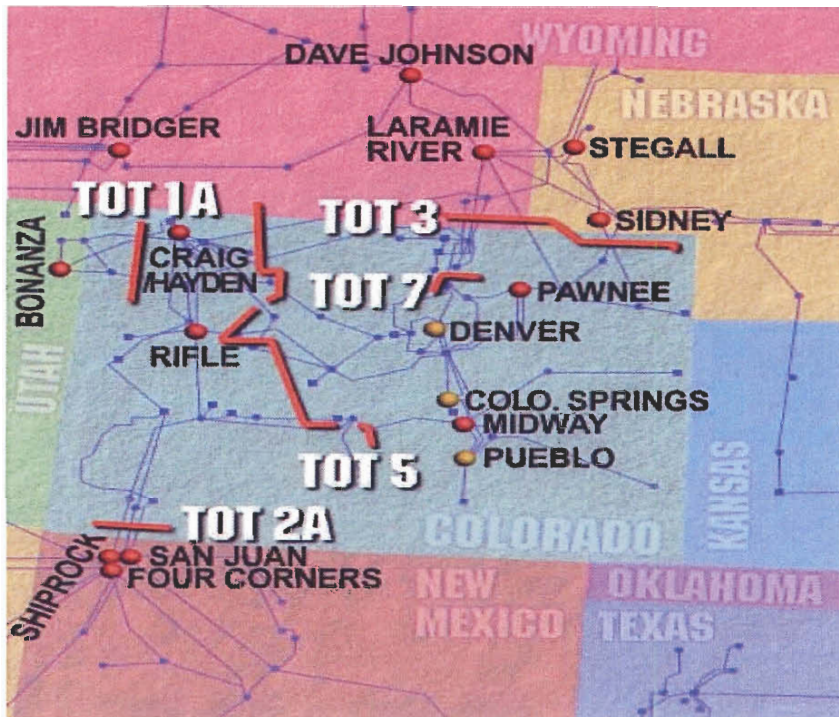
As depicted in Figure 1, Public Service’s transmission network runs primarily along the Front Range of Colorado with transmission being utilized across the entire state to bring generation resources to load centers. Public Service’s service territory is the Denver-Boulder metro area, as well as service territory covering the I-70 corridor to Grand Junction, the San Luis Valley, Greeley, Sterling and Brush. Public Service also serves the following wholesales customers: Aquila, Holy Cross Energy, Yampa Valley Electric, Grand Valley Rural Power Lines, Intermountain Rural Electric Association and the cities of Center, and Burlington. The transmission voltages of its transmission system are 345-kV, 230-kV and 115-kV. The neighboring transmission providers adjacent to Public Service are Western Area Power

Administration-Rocky Mountain Region, Western Area Power Administration-Colorado River Storage Project, Tri-State, Platte River Power Authority (PRPA), Colorado Springs Utilities (CSU), Aquila, Arkansas River Power Authority, Black Hills Power & Light, and Basin Electric Power Cooperative. In addition, Public Service has ownership in the jointly owned western slope transmission facilities extending from the Craig/Hayden area in Northwestern Colorado south to the Four Corners area.

Public Service's ability to import power is restricted by the Available Transmission Capacity ("ATC") over transmission paths know as "TOTs". Public Service has ownership in four jointly owned transmission corridors within the Colorado Wyoming area - TOTs 2A, 3, 5, and 7. The respective transfer capability across these TOTs are developed seasonally and coordinated and agreed to by the owners of the TOT facilities, and approved through the WECC Operating Transfer Capability (OTC) Policy Committee. WAPA is the operator or these TOTs, except for TOT 7. The transmission paths that make up each TOT are depicted below in Figure 2:



FIGURE 2



PSCo's rights on such transmission paths are limited and are fully utilized at this time. Thus, importing and exporting power to/from Colorado are constrained by TOT 1A (between northwestern Colorado and Utah); TOT 2A (between southwestern Colorado and New Mexico); and TOT 3 (between northeast Colorado and Wyoming). In addition, there are two transmission constraints within Colorado between western Colorado and the central mountains (TOT 5), and between the Fort Collins area and Denver (TOT 7). For purposes of the designation of Energy Resource Zones and transmission planning set forth in this filing, the most relevant TOT transmission constraints are TOT 3 and TOT 7.

In addition to its participation in WECC and the RMPA, Public Service participates in an organization called WestConnect<sup>8</sup>. As a part of a joint effort with the other WestConnect

<sup>8</sup> The parties to the WestConnect Amended and Restated Memorandum of Understanding, effective February 14, 2007, are participating in and committing resources to joint efforts to identify, develop and implement cost-effective wholesale market enhancements on a voluntary basis that add value for wholesale users of the Western Grid in transmission accessibility, wholesale market efficiencies and reliability.



participants, WestConnect has initiated the coordination of certain sub-regional transmission planning activities conducted by CCPG, the Southwest Area Transmission Planning Group (SWAT), and the transmission providers in the Sierra Nevada region in order to produce an annual coordinated transmission plan for the WestConnect footprint<sup>9</sup>. The WestConnect members invite participation in this coordinated planning process from other interested parties in these sub-regions that are not WestConnect members. The coordinated WestConnect sub-regional planning processes are then further coordinated with the Western Electricity Coordinating Council Transmission Expansion Planning Policy Committee (WECC TEPPC) regional transmission planning process. This voluntary, transparent coordinated and open transmission planning process complies with the nine principles for transmission planning now mandated by FERC Order No. 890<sup>10</sup>. Public Service's participation and experience in these planning organizations helped to support the open stakeholder planning process used to gain input for SB 07-100 implementation.

D. Coordination of SB 07-100 and Resource Planning

The Colorado Public Utilities Commission rules require Public Service to file every four years a plan for the acquisition of resources that meet the forecasted loads and resource requirements for the utility during the acquisition planning period. Included in this filing is a discussion of the existing transmission capability of the system, transmission plans, and associated costs (if known). Because the next Resource Plan will be filed within approximately two weeks of this SB 07-100 filing, the Resource Plan can include the public information shared with stakeholders on the transmission plans presented in the SB 07-100 filing. Below, Public

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<sup>9</sup> See the WestConnect website for a listing of WestConnect initiatives: <http://www.westconnect.com/>.

<sup>10</sup> See WestConnect Strawman Regarding Compliance with the Nine Planning Principles from Commission Order 890 at [http://www.oatiaoasis.com/PUBLIC\\_SERVICE/PUBLIC\\_SERVICEdocs/WestConnect\\_890\\_Strawman\\_Parts\\_1\\_3.pdf](http://www.oatiaoasis.com/PUBLIC_SERVICE/PUBLIC_SERVICEdocs/WestConnect_890_Strawman_Parts_1_3.pdf).

Service presents transmission plans developed under SB 07-100 and addresses transmission expansion plans that allow for the delivery of beneficial resources and the local development of renewable energy resources.

Public Service has communicated to the stakeholders participating in the SB 07-100 transmission planning meetings that, to the extent these transmission plans require the approval from the PUC via a Certificate of Public Convenience and Necessity (CPCN), there is sufficient lead time in the construction of said transmission facilities which would take approximately 65 or more months, which should correspond to the acquisition schedule of the Resource Plan.

E. Generation Resource Acquisition

Public Service will be filing in mid-November its electric generation acquisition plan consistent with the Commission's Resource Planning rules. The acquisition period for new generation resources shall begin in 2007 and extend to 2015. Therefore, transmission plans that may take five years to construct fit with the longer term needs that Public Service may pursue under the 2007 Resource Planning activities.

For example, the Company must meet the Renewable Energy Standard (RES) established by Colorado voters through Amendment 37, as modified by HB07-1281. The RES requires Public Service to acquire renewable energy credits equivalent to a minimum of 20% of our retail energy sales by 2020 from renewable (eligible energy) resources. Additionally, the RES allows for the majority of that requirement to be met with non-solar resources; only 4% of the 20% must be met with solar with half of the solar by On-Site solar resources.

Although the Company will not file its 2007 Colorado Resource Plan until November 16, it expects to propose to acquire new renewable resources beginning as early as 2010. It is anticipated that the short-term plans to relieve transmission congestion in Zones 1 and 3 will

generally be sufficient, with proper dispatch, to accommodate new renewable resources that would be added through 2012. The Pawnee – Smoky Hill Project is necessary to accommodate any further additions of renewable or other generation resources in Zone 1 after 2012.

To address Zones 2 and 3, Public Service has proposed expanding its transmission to southeast Colorado through a partnership in the Eastern Plains Transmission Project. In Public Service's planning studies, this project is projected to take 65 months after Commission approval of a CPCN to be in service. Working back from the 2013 summer peak, Public Service would need approval from the Commission by June of 2008, and thus it is anticipated that an application for a CPCN for the EPTP will be filed in the future.

As explained below, prior to 2013 there are short term projects that will provide additional injection capability on the transmission system from zones 1, 3 and 4 that will become available to support resource modifications to these zones prior to 2013. These projects will accommodate the continuous maximum output of existing resources without redispatching such resources.

#### F. Stakeholder Process

As discussed above, establishing open and transparent transmission planning processes is required by FERC Order No. 890. Public Service believes the SB 07-100 transmission planning activities should also be open to stakeholder input, which the Company carried over to the entire zone designation and transmission planning effort.

Stakeholder meetings were held on April 24, May 30, and July 26, 2007, and transmission study group meetings were held on May 31, and June 14, 2007. The stakeholder meetings, presentations, and summaries of comments are posted at <http://www.rmao.com/wtpp/SB07-100.html>. Going forward, Public Service anticipates that the

Commission will address this SB 07-100 filing and rule on the associated CPCN by May 2008, after which the Company will begin a review of the Energy Resource Zones and further its transmission planning effort. Because Public Service will have more time before the October 2009 SB 07-100 filing than it did with respect to this filing, going forward the Company will be able to coordinate its transmission plans with both CCPG members as well as SB 07-100 stakeholders.

G. Timeline for Developing Transmission Projects

There are several reasons why many transmission projects take five years or more to develop once a decision is made to move forward with a project.

First, in many cases utilities must obtain a certificate of public convenience and necessity (CPCN) from either the state Public Utilities Commission or the Federal Energy Regulatory Commission (FERC). If contested, this process can last six months or longer. Transmission projects are often contested at the relevant government agency by nearby landowners and residents, cities or counties affected, or by ratepayer groups.

If agency approval is obtained, utilities must then begin the local government approval process. In Colorado, permits must be obtained from the local governments of cities or counties that will be crossed by a proposed transmission line. While this process has been shortened by recent legislation (C.R.S. § 29-20-108), negotiations and hearings with affected landowners, as well as the local governments, can delay the timeline. If the local government either denies the requested permit or imposes unreasonable conditions on the permit, the utility then must decide whether to file an appeal with the Public Utilities Commission under C.R.S. § 29-20-108, which itself delays the process by several months or longer. Also, if a proposed transmission line crosses federal or state land, additional permitting is necessary.

The transmission line siting process often involves public meetings and workshops with affected landowners and government agencies. After evaluating and selecting an appropriate transmission corridor for a proposed line, utilities often must obtain necessary right-of-way rights over the corridor. This requires negotiations with affected landowners or, if necessary as a last resort, condemnation proceedings.

Finally, after all necessary approvals have been obtained, utilities then order and procure the necessary materials for the project, often with long lead times. (For much of the equipment, utilities must wait for permits to be issued because such permits can require certain types of poles, pole coverings, conductors, or configurations.) Utilities need to schedule the construction of transmission lines and associated facilities at appropriate times designated by local governments, and sometimes during construction “windows” – low demand or maintenance periods when associated electric lines or generation can be taken off line.

#### H. Transmission Plans Associated with Each Designated Energy Resource Zone

##### 1. Zone 1 – Northeast Colorado

- (a) Short Term (expected in 2008): Pawnee Region Upgrade 230kV Pawnee–Smoky Hill and Pawnee – Daniels Park lines to 735 MVA (\$3.54 million)

Considering the current transmission constraints from the Pawnee area to the Denver Load center, Public Service has initiated a project to upgrade two 230 kV lines mentioned above. The upgrade of the Pawnee to Smoky Hill and the Pawnee to Daniel Park 230 kV lines has been evaluated from the Transmission Planning standpoint. The current transmission system demonstrates constraints under certain conditions which were evaluated during planning studies as well as during the course of various Generation Interconnection Requests in the Pawnee area. This project was evaluated during the studies and it was concluded that by raising structures and replacing termination equipment, the Pawnee Substation can accommodate at a simultaneous

level all existing generation resources at maximum output capacity and deliver electrical power to the Denver-metro area loads reliably. The cost for these upgrades is \$3.5 million and the work is in the Public Service capital budget process. The work has been started with completion expected in 2008.

(b) Long Term:

(i) Pawnee to Smoky Hill 345 kV Transmission Project

Contemporaneous with this filing, Public Service is filing an Application for CPCN for the Pawnee to Smoky Hill 345 kV Transmission Project. The details of and justification for this Project are contained in the Application.

(ii) Plans for generation up to 600 MW to be interconnected at Ault substation (northeast of Ft. Collins)

Public Service studied generation interconnection request GI-2007-4, which was a proposed 600 MW wind project in Northern Colorado that would serve customers in metro Denver. A summary of the transmission Study plan is as follows:

The recommended network upgrades for delivery that will accommodate the full 600 MW from this combined project has an estimated total cost of the upgrades at approximately \$69.57 million. The required network upgrade for delivery includes constructing a new 85-mile 230 kV transmission line using 2 conductor bundle of 954 kcmil "Cardinal" conductor per phase from the Ault Substation to Cherokee Substation rated at 800 MVA. This will consist of a single 59-mile line from Ault to just outside of Ft. Lupton. From this point the existing 115 kV line from Ft. Lupton to Cherokee will be rebuilt such that one side will continue to operate at 115 kV for the TriState load serving substations, and the other side will operate as a 26-mile double circuit 230 kV line, completing the circuit from Ault to Cherokee.

The estimated cost is an “indicative” (+/-30%) preliminary cost in 2007 dollars, and is based on typical construction costs for previously performed similar construction. The estimated length of time required to complete the project is 60 months.

(iii) Public Service received a generation Interconnection request (GI-2007-6) for 200 MW additional wind at Cedar Creek that would be interconnected to the Keenesburg Substation (northeast of Rocky Mountain Energy Center (RMEC))

Public Service evaluated the Public Service transmission network to determine the upgrades required to deliver the full 200 MW expansion of wind generation to Public Service native load customers during peak periods. One transmission proposal has been recommended. The total estimated cost of the recommended system upgrades to accommodate the project is approximately \$37.50 million. The basic upgrades including interconnection would consist of constructing a new 230 kV transmission line from the Keenesburg Substation to the Cherokee Substation, which can be divided into two sections: 1) a 20-mile, 230 kV line from Keenesburg to Ft. Lupton Substation, and 2) a 26-mile, 230 kV line from Ft. Lupton to Cherokee Substation. The new transmission line construction can be described as follows:

- String a 3<sup>rd</sup> circuit, approximately 4-miles long, using the existing 345 kV triple circuit steel structures in the existing right-of-way for the Ft. St. Vrain to Green Valley 230 kV transmission line.
- Rebuild 16-miles of the existing Ft. Lupton to Pawnee 230 kV transmission line to double circuit 800 MVA rated from Ft. Lupton to the point adjacent to the new 3<sup>rd</sup> circuit described above.
- Rebuild the existing 26-mile 115 kV transmission line from Cherokee to Ft. Lupton to double circuit: operate the existing circuit at 115 kV and operate the 2<sup>nd</sup> circuit at 230 kV (this circuit will be a new 230 kV Ft. Lupton to Cherokee transmission line)

The estimated time required to engineer, permit, and construct the 230 kV transmission expansion for the Network Upgrade facilities for delivery of power to Public Service’s loads as a Network Resource (NR) is at least 54 months after approval of a CPCN.

2. Zone 2 – East Central Colorado

Public Service is actively working with TriState in partnering on the EPTP. The EPTP is joint transmission project between TriState and Western Area power Administration. The EPTP project would consist of approximately 1100 miles of high voltage backbone electric transmission facilities and associated substations. Public Service and TriState have executed an MOU providing the commitment for joint planning and ultimately the ability to co-own new transmission facilities. The MOU will involve stakeholder-managed studies and planning to assess the preliminary feasibility of joint ownership of the Project.

The benefits to a joint project would be Transmission for Public Service to gain access to the Energy Zone 2 and 3 and the potential generation resources in those area. Currently Public Service has transmission constraints from the southeast portion of the state, which limits the ability to transfer additional resources from there, including from the HVDC tie which can transfer power from the eastern interconnection, as well as two current wind project that can produce 237 MW of capacity. Currently those resources depend on a single 230 kV line from Lamar to Boone substation. When this line is unavailable Public Service has no method to transmit those resources to customer load.

Participation in the project will provide several benefits to electric customers, including:

- lower cost access to firm power customers in southern Colorado
- access to more diverse and less expensive generation
- increased usage of Western's transmission system, which decreases costs for all users
- improved transmission system reliability and flexibility
- new interconnection opportunities for transmission customers.

3. Zone 3 – Southeast Colorado



- (a) Short-Term (potential in-service by end of 2008): Boone/Lamar Substation: Upgrade terminations at Boone and Lamar to increase line rating from 478 to 620 MW

Public Service has limited Transmission capability into the Southeast energy zone, one transmission line from the Lamar area into the Midway Substation. The major line is the Boone to Lamar 230 kV line which Public Service jointly owns with TriState. The thermal capability of this line is 478 MVA, and capacity is limited by termination equipment. Public Service has proposed a project to uprate the termination equipment at Lamar and Boone substations. These upgrades would increase the capacity to 620 MVA. This can be accomplished by capital budget expenditures at Lamar substation of \$90,000 and an Expenditure of \$893,000 at Boone substation. Boone is jointly owned and TriState and Public Service have an approved budget item to uprate the terminal equipment at Boone. Once these uprates have been completed the thermal rating of the line will be 620 MVA, but the operational limit of the line will be much less, approximately 300 MVA. Based on normal operational flows Public Service will have additional transfer capability from the Lamar area into Denver.

- (b) Long-Term:

- (i) EPTP: Possibility of Partnership with Tri-State and WAPA: Eastern Plains Transmission Project - Public Service would own up to 1000 MW interest in EPTP. (See description in Zone 2, above.)

- (ii) Lamar Substation: 57 miles of new 230 kV transmission into area south of Lamar to gain access to Baca County wind resources, and new switching station, costing approximately \$27 million. This would be the next phase after the implementation of the EPTP project.

#### 4. Zone 4 – San Luis Valley, Colorado

Public Service has evaluated system capacity of injection of generation resources at San Luis Valley Substation (jointly owned by Public Service and Tri-State) with the existing transmission system. Stakeholder input indicated that there is potential solar capacity in this area

and potential for large generation in the next 5 to 10 years. Preliminary studies indicate that Public Service could accept approximately 200 MW at the San Luis substation, located near Moffat, CO. The proposal would be to add a 230 kV terminal to the San Luis valley substation, in which case a potential generation resource or Public Service would build a 230 kV line from the resource to the San Luis substation. The San Luis substation is a joint facility between Public Service and TriState. During the annual capital budget process, a budget item was approved (Attached) that would add two 230 kV terminals to the substation. The first would be for TriState's proposed Walsenburg to San Luis 230 kV line; the second would be a terminal for Public Service. The estimated cost for both terminals would be \$1.9 million, and Public Service and TSG&T would split the cost evenly.

#### I. High Plains Express Project

Long term, Public Service is discussing with other members of the CCPG the High Plains Express Project (HPX), a plan that could expand the transmission grid in the states of Wyoming, Colorado, New Mexico, and Arizona. HPX would be a high voltage "backbone" transmission line capable of enhancing electric reliability in Colorado, and increasing the potential to develop renewable and other generation resources in Zones 1, 2, and 3. The first stakeholder meeting on HPX was held in Denver on March 23, 2007. While this project is tentative and many years away from a potential application, it is part of the Company's long-term transmission planning efforts.

### **CONCLUSION**

During the seven months from the time SB 07-100 was signed into law and the October 31, 2007 filing date, Public Service Company utilized an open process to identify four geographic areas with beneficial resource potential for purposes of designating Energy Resource

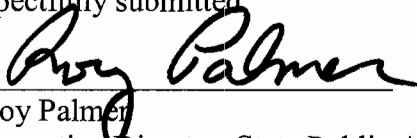
Zones. Public Service also has set forth within this filing short term and long term transmission planning proposals to relieve transmission constraints for each of the four Zones, some of which would require an application for CPCN with the Public Utilities Commission if the Company decides to move forward with a proposal. In evaluating the existing transmission capacity in and around each zone, the Company determined that the first transmission project ripe for a CPCN application pursuant to SB 07-100 is within Zone 1. The Company also has set forth short-term transmission proposals for each of the four Zones.

Going forward, Public Service will continue utilizing the SB 07-100 stakeholder process and internally evaluate its transmission planning proposals and designated Energy Resource Zones. SB 07-100 provides an additional opportunity to file a CPCN associated with new transmission that is needed under the SB 07-100 transmission plans, but there is nothing that precludes Public Service from filing a CPCN for new transmission facilities identified by the SB 07-100 transmission plans between SB 07-100 filings (i.e., between October 31, 2007 and October 31, 2009). Indeed, the Company is exploring the feasibility of participating in the East Plains Transmission Project, which will help relieve transmission constraints preventing the development of beneficial resources in Zones 2 and 3. Through these and other efforts, Public Service expects wind, solar, and other resources to be developed in the four Zones, consistent with the Colorado Legislature's goals of a robust electric transmission system, and the continued availability of clean, affordable, and reliable electricity.

Dated this 31st day of October, 2007.

Respectfully submitted

By:

  
Roy Palmer

Executive Director, State Public Affairs

**CERTIFICATE OF SERVICE**

I hereby certify that on this 31<sup>st</sup> day of October 2007, the original and ten (10) copies of the foregoing **“PUBLIC SERVICE COMPANY OF COLORADO SENATE BILL 07-100 DESIGNATION OF ENERGY RESOURCE ZONES AND TRANSMISSION PLANNING REPORT”** were hand delivered to:

Doug Dean, Director

Colorado Public Utilities Commission

1560 Broadway, Suite 250

Denver, CO 80202

and a copy was hand delivered to:

James Greenwood  
Director, Office of Consumer Counsel  
1560 Broadway, Suite 200  
Denver, CO 80202

and a copy was delivered via U.S. Mail to:

Bill Vidal  
Manager of Public Works  
201 W. Colfax, Dept. 608  
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