Interconnection System Impact Study Report
REQUEST # GI-2004-5

402 MW Wind Generation Near Grover, Colorado
Interconnecting near Rocky Mountain Energy Center

Xcel Energy Transmission Planning
May 2005

Executive Summary

This Interconnection System Impact Study Report summarizes the analyses performed by the Transmission Planning group of Public Service Company of Colorado (PSCo) to interconnect 402 MW of wind powered generation located near Grover, Colorado to a new PSCo Cedar Point Tap 230 kV switching station located on the Rocky Mountain Energy Center (RMEC) to Green Valley 230 kV lines approximately 2 miles east of RMEC. The Customer proposed in-service date for commercial operation of the facility is December 1, 2006, with an assumed back-feed date of June 1, 2006. This request was studied as both an Energy Resource (ER) and as a Network Resource (NR) with the power going to PSCo customers. The request was studied primarily as a "stand-alone" project without modeling other projects in the Rocky Mountain Area OASIS queue[1].

Energy Resource:
The ER portion of this study determined that as a stand-alone project, no firm energy could be delivered to the system without the construction of network reinforcements. Additional non-firm capability may be available depending on marketing activities, dispatch patterns, demand levels and the status of transmission facilities.

The estimated cost to interconnect the project is approximately **7.6 million** and includes:

- $0.3 million for Customer Interconnection Facilities.
- $7.3 million for PSCo Network Upgrades for Interconnection.

The time required to engineer, permit, and construct all the required PSCo facilities for interconnection is estimated to be at least **23** months. Therefore, it is not feasible to implement the interconnection by the requested date.

Network Resource:
For the Project to be considered a Network Resource, other studies have indicated that the integration of the full 402 MW of new generation would require transmission additions and modifications in order to prevent unacceptable conditions on the regional system. The estimated cost of the recommended system upgrades to provide firm

[1] www.rmao.com

delivery as a stand-alone project is approximately **$77.7 million** (for a total project cost of $85.3 million) and consist of:

- From the new station to Green Valley, convert the existing 230kV double circuit lines from 230kV to 345kV operation.
- Upgrade the Green Valley – Spruce single-circuit 230kV line to double-circuit 345kV operation. This can be accomplished using existing right-of-way and structures. The new double circuit 345kV lines will not tie into the Spruce substation.
- From Spruce to Daniels Park, construct new double-circuit 345kV transmission, adjacent to the existing Spruce – Smoky Hill – Daniels Park double-circuit 230kV transmission.

The estimated time required to engineer, permit, and construct the Network Upgrade facilities for delivery is at least **56** months; therefore, it is not feasible to implement the interconnection or network upgrades for delivery of firm output by the proposed in-service date. According to the interconnection request, the Customer will engineer, permit, construct, and finance the 55-mile 230 kV transmission line to the proposed tap station.

A simple diagram of the Network Upgrades and the regional transmission system for this request is shown in Figure 1. Figure 2 shows the proposed interconnection layout.

Figure 1 Regional Transmission Network with Recommended Upgrades

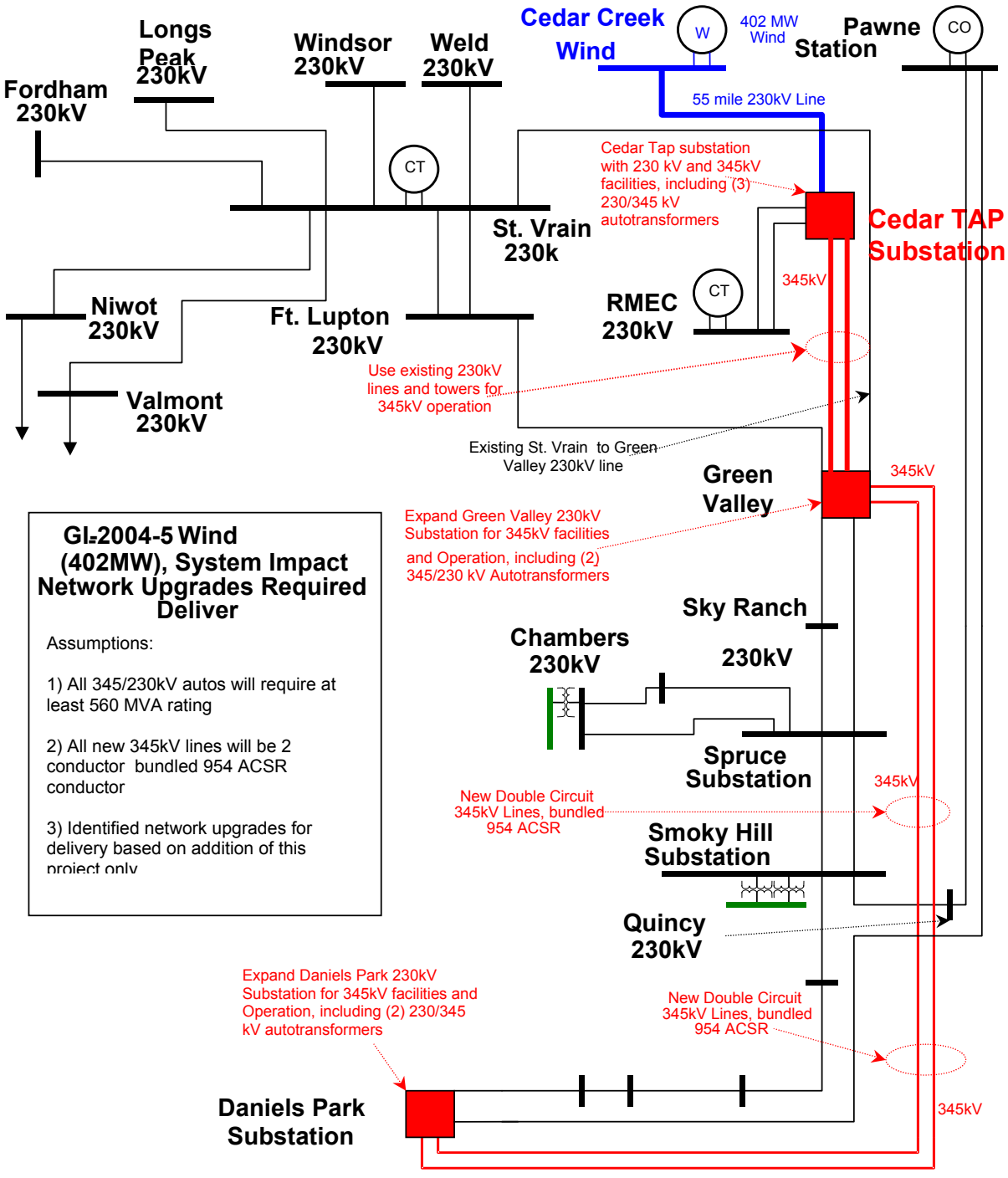
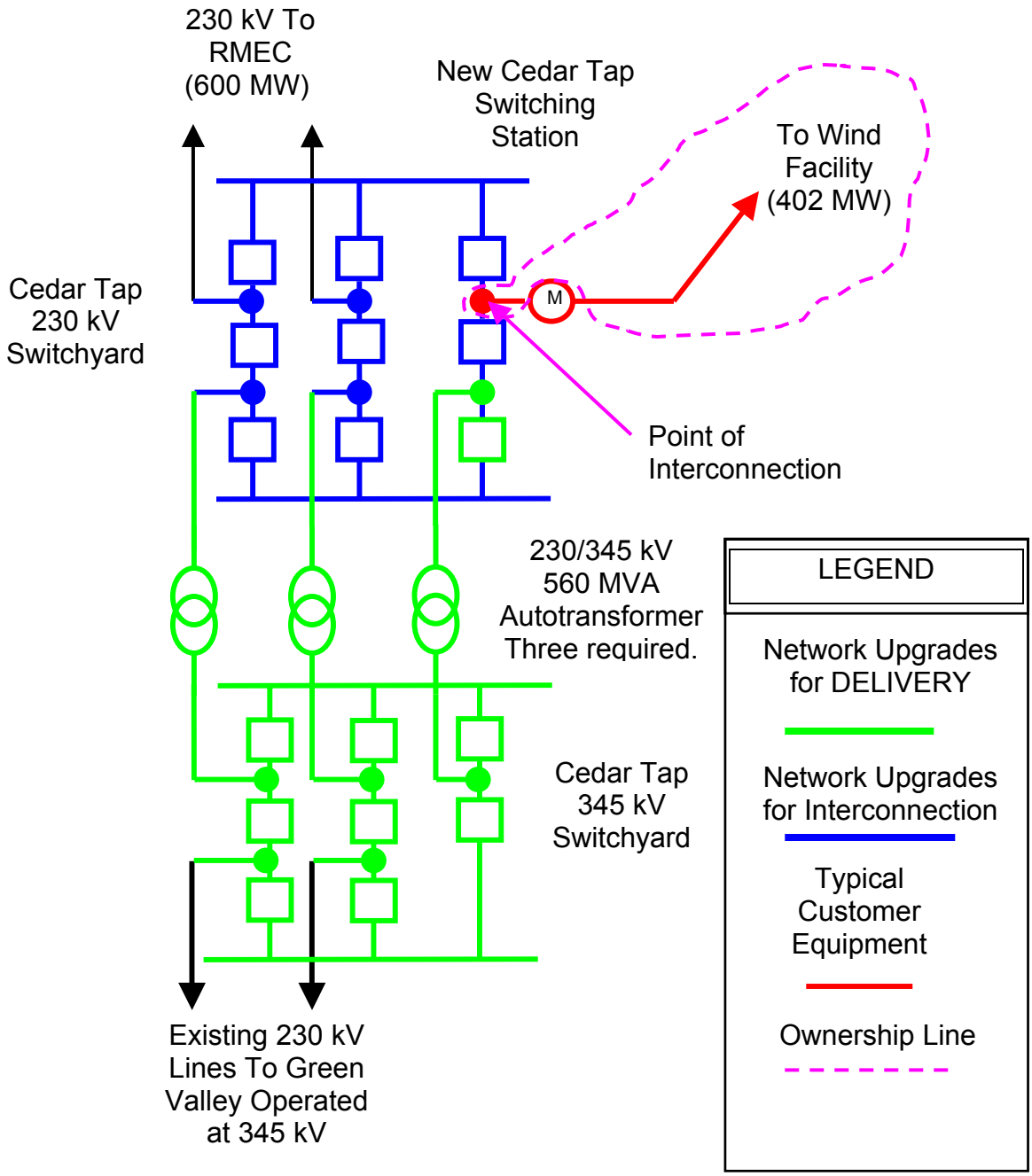


Figure 2: PSCo Proposed Interconnection: New 230/345 kV Cedar Tap Switching Station located between RMEC and Green Valley



Study Scope and Analysis

The Interconnection System Impact Study evaluated the transmission requirements associated with the proposed interconnection to the PSCo Transmission System.

The Study consisted of power flow, short circuit, and dynamic stability analyses. The power flow analysis identified thermal or voltage limit violations resulting for the interconnection, and identified Network Upgrades required to deliver the proposed generation to PSCo loads. The short circuit analysis identified circuit breaker short circuit capability limits exceeded because of the Interconnection, and the delivery of the proposed generation to PSCo loads. The dynamic stability analysis identified any limitations due to angular instability of the system for regional disturbances.

PSCo adheres to NERC / WECC Reliability Criteria, as well as internal Company criteria for planning studies. During system intact conditions, criteria are to maintain transmission system bus voltages between 0.95 and 1.05 per-unit of system normal conditions, and steady state power flows within 1.0 per-unit of all elements thermal (continuous current or MVA) ratings. Operationally, PSCo tries to maintain a transmission system voltage profile ranging from 1.02 per-unit or higher at generation buses, to 1.0 per-unit or higher at transmission load buses. Following a single contingency element outage, transmission system steady state bus voltages must remain within 0.90 per-unit to 1.10 per-unit, and power flows within 1.0 per-unit of the elements continuous thermal ratings.

Study results showed no significant impacts to neighboring utilities. The results of the study have been shared with Platte River Power Authority (PRPA) and Western Area Power Administration (WAPA).

Powerflow Study Models

For this analysis, a power flow model was developed to reflect 2007 heavy summer loading conditions. Data representation in the area of study was reviewed and modified to accurately reflect the Rocky Mountain regional transmission system. To evaluate the capabilities and system requirements for firm transfer levels, the power flow models were modified to simulate high TOT 3 and TOT 7 path flows. The TOT 3 path flows were modeled with a North to South flow of approximately 1515 MW along with TOT 7 near 640 MW (TOT 3 Summer 2004 Limit = 1544 MW, TOT 7 Limit = 890 MW)). Transmission projects expected to be in-service for the 2007 summer season were represented in the models.

The 402 MW wind generation was modeled as a conventional generator with a 0.95 per unit (p.u.) lagging power factor (overexcited) and a 0.90 p.u. leading power factor (under-excited) capability to simulate the VAR requirements of the generators, indicated by the Customer to be GE 1.5 MW DFIG turbines.

The proposed project was connected to a new Cedar Tap Substation 230 kV bus, via a single 55-mile 230 kV line, according to Customer provided data. The project generation was scheduled to PSCo peaking units located in and around the Denver-metro area.

Study Results

Power Flow Analysis

Energy Resource (ER) Study Results:

The results of the ER study indicate that with only the Customer Wind Facilities considered, no firm energy could be delivered to the system without the construction of network reinforcements. Additional non-firm transmission capability on the PSCo system may be available depending on marketing activities, dispatch patterns, customer demand levels and the status of transmission facilities.

Table 1 shows the limiting element that restricts the delivery capability of the system at the point of injection for the proposed generator. The limiting element is the overload of one of the Smoky Hill to Spruce 230 kV line due to the contingency of the adjacent circuit. The results shown are benchmark results before the project is added. This shows there is not any capacity on the delivery path into the PSCo System.

Table 1 Critical Contingency ER Results

Critical Contingency	Limiting Element	Rating (MVA)	Pre-Load %	Cont-Load %
Smoky Hill-Spruce 230 Ckt1	Smoky Hill-Spruce 230 Ckt2	637	68	119
Smoky Hill-Spruce 230 Ckt2	Smoky Hill-Spruce 230 Ckt1	637	67	119

Network Resource (NR) Study Results:

The NR study determined the network upgrades that will be required to deliver the full 402 MW from the proposed project on a firm basis. Modeling the customer wind generation at 402 MW created local contingency overloads on the PSCo system. Table 2 shows contingency results with the full 402 MW injected at the point of interconnection.

Table 2 Critical Contingency Results

Critical Contingency	Limiting Element	Rating (MVA)	Pre-Load %	Cont-Load %
Smoky Hill-Spruce 230 Ckt1	Smoky Hill-Spruce 230 Ckt2	637	75	133
Smoky Hill-Spruce 230 Ckt2	Smoky Hill-Spruce 230 Ckt1	637	75	133
Grn Valley-Cedar Ck Tap 230 Ckt1	Green Vall- Cedar Ck Tap 230 Ckt2	834	58	117

Critical Contingency	Limiting Element	Rating (MVA)	Pre-Load %	Cont-Load %
Grn Valley- Cedar Ck Tap 230 Ckt2	Green Vall - Cedar Ck Tap 230 Ckt1	834	58	117
Buckley1-SmokyHill 230 Ckt1	Smoky Hill-Meadow Hill 230 Ckt #1	428	90	117
Buckley1-SmokyHill 230 Ckt1	Meadow Hill-Orchard 230 Ckt1	428	73	100
Ft. Lupton-Henry Lake 230 Ckt1	Green Valley-Barr Lake 230 Ckt1	495	92	106
Ft. Lupton-JLGreen 230 Ckt 1	Green Valley-Barr Lake 230 Ckt1	434	92	106

From Table 1, the addition of the Cedar Creek Project into the PSCo system creates numerous overloads resulting in the requirement of network upgrades.

The following is a general description of the recommended network upgrades required to alleviate the overloads and accommodate the generation for delivery:

- From the new station to Green Valley, convert the existing 230kV double circuit lines from 230kV to 345kV operation.
- Upgrade the Green Valley – Spruce single-circuit 230kV line to double-circuit 345kV operation. This can be accomplished using existing right-of-way and structures. The new double circuit 345kV lines will not tie into the Spruce substation.
- From Spruce to Daniels Park, construct new double-circuit 345kV transmission, adjacent to the existing Spruce – Smoky Hill – Daniels Park double-circuit 230kV transmission.

Other delivery alternatives were analyzed in this study to accommodate the 402MW wind generation but were determined to be more costly than the recommended upgrade.

The total estimated cost for the recommended upgrades is $85.3 million.

Short Circuit Analysis

The short circuit analysis was conducted at the affected switchyards in the study area including faulting the 230kV busses at the St. Vrain, Customer Wind Tap, and other busses with three-phase and phase-to-ground faults. Due to the lack of Customer-supplied, or other available wind-turbine generator short circuit model data, all fault values calculated for this Feasibility Study assume no fault current contribution from the Customer wind-turbine generators. More detailed short circuit models, and associated possible Customer generation fault contribution may need to be addressed in the Facilities Study.

For all of the fault cases studied, the wind turbines were modeled as conventional synchronous generators. A more accurate short circuit model is not currently available for such short circuit programs as Aspen or CAPE. This study was

performed on CAPE. Table 3 shows how the fault currents change with the addition of the Customer Wind project.

Table 3 – Short Circuit Results Existing System Plus Network Upgrades

Case[1]	Wind Gen[2] (MW)	Fault Location[3]	Fault Type[4]	Fault Current[5] (A)
Existing	0	230kV Green Valley	3 phase	27,653
Existing	0	230kV Green Valley	SLG	19,168
Existing	0	230kV Daniels Park	3 phase	25,336
Existing	0	230kV Daniels Park	SLG	20,374
Existing	0	230kV Spruce	3 phase	26,198
Existing	0	230kV Spruce	SLG	23,931
Existing	0	230kV St. Vrain	3 phase	32,775
Existing	0	230kV St. Vrain	SLG	34,023
Existing	0	230kV Niwot	3 phase	9221
Existing	0	230kV Niwot	SLG	6891
Existing	0	230kV Smoky Hill	3 phase	27,316
Existing	0	230kV Smoky Hill	SLG	24,333
Existing	0	230kV Pawnee	3 phase	19,298
Existing	0	230kV Pawnee	SLG	22,213
Interconnect	0	230kV Customer Wind Tap	3 phase	19,003
Interconnect	0	230kV Customer Wind Tap	SLG	17,496
Interconnect	0	230kV Green Valley	3 phase	28,324
Interconnect	0	230kV Green Valley	SLG	19,467
Delivery	0	230kV Customer Wind Tap	3 phase	15,841
Delivery	0	230kV Customer Wind Tap	SLG	19,308
Delivery	0	230kV Green Valley	3 phase	27,701
Delivery	0	230kV Green Valley	SLG	27,752
Delivery	0	230kV Daniels Park	3 phase	28,563
Delivery	0	230kV Daniels Park	SLG	29,063
Delivery	0	230kV Spruce	3 phase	24,443
Delivery	0	230kV Spruce	SLG	23,081
Delivery	0	230kV St. Vrain	3 phase	37,253
Delivery	0	230kV St. Vrain	SLG	37,766
Delivery	0	230kV Niwot	3 phase	12,432
Delivery	0	230kV Niwot	SLG	9337
Delivery	0	230kV Smoky Hill	3 phase	27,035
Delivery	0	230kV Smoky Hill	SLG	24,568
Delivery	0	230kV Pawnee	3 phase	25,809

[1] Existing case is for current Xcel Energy system configuration. Interconnect case is for connecting customer only, without infrastructure upgrades. Delivery case is for customer interconnected and infrastructure upgrades in service.
[2] Initial cases were studied with the wind generators offline. Wind generation only introduced after infrastructure upgrades in service.
[3] Customer Wind Tap is the location where the wind generation from the customer ties into the Xcel Energy system (see Figure 1). In addition the Customer Wind tap sectionalizes two 230kV transmission lines between the Calpine Rocky Mountain Energy Center generation plant and Xcel Energy's Green Valley substation.
[4] SLG stands for single line to ground fault.
[5] Fault current for 3 phase faults is represented as positive sequence current. Fault current for single line to ground faults is represented as 3Io (where Io is zero sequence current). These fault studies were performed assuming all customers higher in the queue have been placed in-service.

Case[1]	Wind Gen[2] (MW)	Fault Location[3]	Fault Type	Fault Current[5] (A)
Delivery	0	230kV Pawnee	SLG	27,262
Delivery	0	345kV Customer Wind Tap	3 phase	11,225
Delivery	0	345kV Customer Wind Tap	SLG	12,068
Delivery	0	345kV Green Valley	3 phase	15,439
Delivery	0	345kV Green Valley	SLG	14,224
Delivery	0	345kV Daniels Park	3 phase	13,781
Delivery	0	345kV Daniels Park	SLG	12,879
Delivery	402	230kV Cedar Wind	3 phase	9973
Delivery	402	230kV Cedar Wind	SLG	6970
Delivery	402	230kV Customer Wind Tap	3 phase	18,032
Delivery	402	230kV Customer Wind Tap	SLG	20,860
Delivery	402	230kV Green Valley	3 phase	28,419
Delivery	402	230kV Green Valley	SLG	28,111
Delivery	402	230kV Daniels Park	3 phase	28,855
Delivery	402	230kV Daniels Park	SLG	29,216
Delivery	402	230kV Spruce	3 phase	24,700
Delivery	402	230kV Spruce	SLG	23,196
Delivery	402	230kV St. Vrain	3 phase	37,403
Delivery	402	230kV St. Vrain	SLG	37,845
Delivery	402	230kV Niwot	3 phase	12,451
Delivery	402	230kV Niwot	SLG	9342
Delivery	402	230kV Smoky Hill	3 phase	27,442
Delivery	402	230kV Smoky Hill	SLG	24,758
Delivery	402	230kV Pawnee	3 phase	25,839
Delivery	402	230kV Pawnee	SLG	27,280
Delivery	402	345kV Customer Wind Tap	3 phase	12,375
Delivery	402	345kV Customer Wind Tap	SLG	12,706
Delivery	402	345kV Green Valley	3 phase	16,170
Delivery	402	345kV Green Valley	SLG	14,528
Delivery	402	345kV Daniels Park	3 phase	13,958
Delivery	402	345kV Daniels Park	SLG	12,956

The above table shows how the fault currents change with the addition of the Customer Wind project. Of particular interest is the noticeable increase in fault current with the infrastructure upgrades in service and the wind generation offline (producing 0 MW) at St. Vrain, Pawnee, Niwot, and Daniels Park. Also the removal of the Green Valley line at Spruce appears to lower the available fault current at the 230 kV bus.

Stability Analysis

Transient stability analyses of the Northeast Metro Denver area were performed by modeling three-phase fault contingencies in the region of study. Dynamic models for the proposed project were prepared using Customer supplied data that modeled GE 1.5 MW DFIG turbines with low voltage ride through (LVRT) capability of 30% of nominal voltage. The analysis indicated that the project and the proposed

transmission modifications do not impact the transient stability of the region. The results are shown in Table 4 and Table 5.

Studies did show that for faults at REMC, Green Valley, and Cedar Creek Tap buses the Cedar Creek Wind generation would trip from low voltage during the fault period. However, the generator tripping did not affect system stability.

Table 4: Transient Stability Results – Base Case without Network Upgrades (Cedar Creek Off)

FAULT LOCATION	CKT OPEN	Fault #	RESULT
RMEC	RMEC - Green Valley #1	1	System Stable
Spruce	Smoky – Spruce #1	2	System Stable
	Spruce – Green Valley #2	3	System Stable
Daniels Park	Pawnee - Daniels Park	4	System Stable
	Daniels Park - Greenwod	5	System Stable
Ft. Lupton	Pawnee – Ft. Lupton	6	System Stable
	Green Ft. Lupton - Valley	7	System Stable
	Ft. Lupton -St. Vrain	8	System Stable
Smoky Hill	Smoky Hill - Pawnee	9	System Stable
	Smoky Hill – Spruce #1	12	System Stable
	RMEC-Green Valley #1	13	System Stable
Green Valley	Green Valley – St. Vrain	14	System Stable
	Spruce – Green Valley	15	System Stable

Table 5: Transient Stability Results – Case with 402 MW Cedar Creek Wind and Network Upgrades

Fault Location	Action	Fault #	Result
RMEC	RMEC-Cedar Tap#1	1	System Stable Cedar Creek Trips
	RMEC-Cedar Tap#1 & 2	1A	System Stable Cedar Creek Trips
Spruce	Smoky Hill – Spruce #1	2	System Stable
	Smoky Hill – Spruce #1 & 2	2A	System Stable
	Spruce – Green	3	System Stable

Fault Location	Action	Fault #	Result
	Valley		
Daniels Park	Pawnee-Daniels Park	4	System Stable
	Daniels Park - Greenwood	5	System Stable
	Daniels Park - Fuller	6	System Stable
Ft. Lupton	Pawnee – Ft. Lupton	7	System Stable
	Ft. Lupton - St. Vrain	8	System Stable
	Ft. Lupton - St. Vrain 1 & 2	8	System Stable
	Ft. Lupton – Green Valley	9	System Stable
Smoky Hill	Smoky Hill - Spruce	10	System Stable
	Smoky Hill -Pawnee	11	System Stable
	Smoky – Spruce #1	12	System Stable
Green Valley	St. Vrain - Green Valley #1	13	System Stable
	Green Valley – Ft. Lupton	14	System Stable
	Spruce – Green Valley	15	System Stable
	Green Valley – Barr Lake	16	System Stable
Cedar Tap 230	RMEC - Cedar Tap #1	17	System Stable Cedar Creek Trips
	Cedar Tap – Cedar Creek	18	System Stable Cedar Creek Trips
Cedar Tap 345	Cedar Tap – Green Valley	19	System Stable Cedar Creek Trips
	Cedar Tap – Green Valley 1 & 2	19a	System Stable Cedar Creek Trips
Green Valley 345	Cedar Tap – Green Valley	20	System Stable Cedar Creek Trips
	Cedar Tap – Green Valley 1 & 2	20A	System Stable Cedar Creek Trips
	Daniels Park – Green Valley	21	System Stable Cedar Creek Trips
	Daniels Park – Green Valley 1 & 2	21	System Stable Cedar Creek Trips
Daniels Park 345	Daniels Park – Green Valley	22	System Stable
Cedar Tap 345	Cedar Tap – 1 and 2 – Green Valley	23	System Stable Cedar Creek Trips

Cost Estimates and Assumptions

The estimated total cost for the network upgrades for interconnection and delivery is $85.3 Million.

The estimated costs shown are "indicative" (+/-30%) preliminary budgetary costs in 2006 dollars and are based upon typical construction costs for previously performed similar construction. These estimated costs include all applicable labor and overheads associated with the engineering, design, and construction of these new PSCo facilities. The estimates do not include any costs for any Customer-owned, supplied, and installed equipment and associated design and engineering, other than the transmission line between the generation and Corner Point. This estimate also does not include any costs that may, or may not be required for other entities' systems. The cost responsibilities associated with these facilities shall be handled as per current FERC guidelines

Based upon the System Impact Study performed here, in order for PSCo to provide an interconnection for the Customer, the Corner Point facilities must be constructed.

PSCo Network Upgrades for Interconnection:
Table 6 and Table 7 describe the costs associated with providing an interconnection and network upgrades to PSCo's system for interconnection. This does not include all of the costs required for full delivery of the generation.

Table 6 - Customer Interconnection Facilities

Location	Description	Cost (millions)
New 230kV Switching Station (Cedar CK TAP)	Interconnect Customer's 230kV line to a new 230kV switchyard. The new equipment required includes: • 230kV bi-directional revenue metering • required steel supporting structures • associated metering control and relaying	**$335k**
	Total Estimated Cost for Interconnection Facilities	**$335k**

Table 7- PSCo Network Upgrades for Interconnection

Location	Description	Cost (millions)
New 230kV Switchyard	Install a new Breaker-and-Half 230kV switchyard, which will sectionalize PSCo's two 230kV RMEC-Green Valley Transmission Lines. The following equipment will be required: • site development • control building • eight (8) 230kV 3000 amp 50kA circuit breakers • sixteen (16) 230kV switches	**$6.634**

Location	Description	Cost (millions)
	• CCVT's • misc. supporting steel • electrical bus work • associated metering, control and relaying	
	Transmission line tap structures & tap	**$0.409**
	Siting and Land Rights acquisition & permitting	**$0.243**
	Total Estimated Cost for Network Upgrades for Interconnection	**$7.286**
	Total Estimated Cost for Interconnection	**$7.621**
Time Frame		**23 Months**

Table 8 describes the costs associated with providing network upgrades for full firm delivery to PSCo Customers.

Table 8- PSCo Network Upgrades for Delivery

Location	Description	Cost (millions)
New Tap (Cedar TAP) 345kV Switchyard	Install a new Breaker-and-Half 345kV switchyard, which will interconnect with the New Tap 230kV Switchyard via 345/230kV autotransformers. The following equipment will be required: • site development • (3) 345/230kV 560MVA autotransformers • (8) 345kV 3000 amp 40kA circuit breakers • (16) 345kV switches • (1) 230kV 3000 amp 50kA circuit breaker • (2) 230kV switches • CCVT's • misc. supporting steel • electrical bus work • associated control and relaying	**$18.715**

Location	Description	Cost (millions)
Green Valley 345kV Switchyard	Install a new Breaker-and-Half 345kV switchyard, which will interconnect with the existing Green Valley 230kV Switchyard via 345/230kV autotransformers. The following equipment will be required: • site development • two (2) 345/230kV 560MVA autotransformers • nine (9) 345kV 3000 amp 40kA circuit breakers • eighteen (18) 345kV switches • CCVT's • misc. supporting steel • electrical bus work • associated control and relaying	**$15.760**
Spruce 230kV Switchyard	• Remove one existing 230kV line termination for transmission line from Green Valley.	**$0.051**
Daniels Park 345kV Switchyard	Install a new Breaker-and-Half 345kV switchyard, which will interconnect with the existing Daniels Park 230kV Switchyard via 345/230kV autotransformers. The following equipment will be required: • site development • (2) 345/230kV 560MVA autotransformers • (4) 345kV 3000 amp 40kA circuit breakers • (10) 345kV switches • one new bay in 230kV switchyard with two (2) 230kV 3000 amp 50kA circuit breakers and four (4) 230kV switches • upgrade one existing bay in 230kV switchyard with two (2) 230kV 3000 amp 50kA circuit breakers and five (5) 230kV switches • CCVT's • misc. supporting steel • electrical bus work • associated control and relaying	**$18.489**
Transmission	String one new 345kV circuit from Green Valley to Spruce. New conductor to be strung on existing double circuit structures.	**$2.364**
	Install new double circuit 345kV transmission line from the Spruce Switchyard to the Daniels Park Switchyard (approx. 30 miles). 954 kcmil "Cardinal" conductor on tubular steel poles with foundations.	**$18.845**
Siting, Permitting and Acquisition	Siting and Land Rights activities including siting study, necessary acquisition & permitting.	**$3.484**
	Total Estimated Cost for PSCo Network Upgrades for Delivery	**$77.708**
	Total Estimated Cost for all PSCo Network Upgrades	**$84.994**

Location	Description	Cost (millions)
	TOTAL ESTIMATED COST OF PROJECT	**$85.329**
Time Frame		**56 Months**

Assumptions

- The estimated costs provided are "Scoping Estimates" with an accuracy of ± 30%.
- Estimates are based on 2006 dollars.
- PSCo (or its contractor) crews will perform all construction and wiring associated with PSCo-owned and maintained equipment.
- It is anticipated that to construct the Network Upgrades required for the interconnection (switchyard only) a Certificate of Public Convenience and Necessity (CPCN) will not be required from Colorado Public Utility Commission (CPUC). The estimated time for siting, permitting, acquisition, design and construction for the PSCo network upgrades required for the interconnection (230kV switchyard only) is at least **23 months** after the Interconnection Agreement has been signed.
- It is anticipated that a Certificate of Public Convenience and Necessity (CPCN) will be required from Colorado Public Utility Commission (CPUC) for the network upgrades required for delivery. The application for a CPCN will not be submitted until after the Customer has executed an Interconnection Agreement.
- A siting study and public involvement will be required for the network upgrades required for delivery. Land use permits will be required from multiple local jurisdictions. Permitting is expected to be difficult and potentially controversial. Local permit denial has been assumed for the portion of new double circuit 345kV transmission line from Spruce to Daniels Park. This will require an appeal of the denial decision to the PUC. No further litigation has been assumed.
- The estimated time for siting, permitting, acquisition, design and construction for the PSCo network upgrades required for delivery is at least **56 months** after the Interconnection Agreement has been signed, and based upon other identified assumptions for Siting and Land Rights, Substation Engineering and Transmission Engineering (see below).
- New switchyard for the projectinterconnection will be located adjacent to or under the existing 230kV RMEC to Green Valley transmission lines.
- The last span into the new 230kV project switchyard from the Customer owned 230kV line will be a slack span between the PSCo substation dead-end and the Customer's last structure, which is assumed to be a dead-end structure.
- Acquire a 35-40 acre site in fee for the ultimate general arrangement anticipated for the new Customer Wind Switchyard.