DRAFT
Interconnection Feasibility Study Report
Request # GI-2010-19

120 MW Solar Photovoltaic Generation
Pueblo County, Colorado

Public Service Company of Colorado
Transmission Planning
March 26, 2013

Executive Summary

Public Service Company of Colorado (PSCo) received an interconnection request (GI-2010-19) for a 120 MW solar photovoltaic generation facility. The solar facility will be located at the Northeast corner of the Lime road and St.Charles road, immediately east of the Comanche Power plant, in Pueblo, Colorado. The interconnection request was received on November 16, 2010. The solar generation facility will consist of 0.5 MW Sunny Central SMA SC500HE-US inverters daisy chained in groups of twenty.

The Customer initially requested a primary Point of Interconnection (POI) on the Comanche – Midway 230 kV line, which was later changed to Comanche 230 kV Substation on January 23, 2012, during the feasibility study meeting for GI 2010-18. The solar facility will be located 0.25 miles from the Comanche Substation and connected to the POI using a 230 kV Customer owned underground transmission line. An alternative POI has been requested tapping the Boone - Lamar 230 kV line. The alternative POI will be evaluated only if the primary POI is not feasible. Both of the proposed POIs are shown in Figure 1 below. The Customer has initially proposed a November 2012 in-service date for this facility. In an email received on July, 25, 2012, the Customer has revised the in-service date to second quarter 2015. Since the Customer has not provided a specific in-service date, it was assumed to be July 1, 2015 and the backfeed date was assumed to be December 1, 2014

This request was studied as an Energy Resource only. The studies were performed using 2015 heavy summer conditions. These investigations included steady-state power flow and short circuit analyses. The steady state power flow included several single contingencies and one worst case contingency. Two scenarios were studied; the first scenario was modeled with the Lamar DC tie importing and the Lamar area wind at maximum capacity such that flows on the Boone – Lamar 230 kV line did not exceed PSCo's ownership capacity of the line, the second scenario was modeled with the Lamar DC tie exports at maximum capacity and wind in the Lamar area off. This request was studied as a stand-alone project only, with no evaluations made of other potential

new generation requests that may exist in the Generator Interconnection Request queue, other than the generation projects that are already approved and planned to be in service by July 2015. The main purpose of this Feasibility Study was to evaluate the potential impact on the PSCo transmission infrastructure as well as that of neighboring utilities when an additional 120 MW of generation is injected into the Comanche 230 kV substation or the Boone - Lamar 230 kV line, and delivering the additional generation to native PSCo loads. The affected parties for this GI would be Black Hills Colorado Electric (BHCE), Colorado Spring Utilities (CSU) and Tri-state Generation and Transmission Inc (TSGT).

Energy Resource (ER)

Scenario-1: Lamar Dc tie, Colorado Green and Twin Buttes wind farm generation dispatched to maximize Boone – Lamar 230 KV line flows for PSCo's ownership Capacity

For the primary POI (Comanche 230 kV), there were no new overloads in the PSCo system and none of the existing overloads in the PSCo system increased by more than 1%. Although they were no overloads on the PSCo system, the interconnection caused two new thermal overloads on the Black Hills Energy Corporation (BHEC) system: worst case line loading on the Desertcov – West station 115 kV line increased from 96.8% to 103.4% for the single contingency outage of Boone-Midway PS 230 KV line. Also thermal loading on the Portland – Skala 115 kV increased from 99.3% to 106.3% for the loss of MidwayBR- W Canon 230 kV line. The proposed generation has not caused any new voltage range violations or any new voltage deviations, and none of the existing voltage range violations and voltage deviations increased by 0.05p.u. **Customer should work with BHCE to resolve the thermal overloads.**

For the double contingency outage of Comanche – Daniels park 345 kV line, the proposed GI caused no new thermal violations, but increased the loading on some of the existing overloads.

The following existing thermal overloads on the PSCo system increased : Midway 230/115 kV transformer loading increased from 102.6% to 112.5%. PSCo is aware of this violation. The following existing BHCE system overloads are seen due to the proposed GI: Portland – Skala 115 kV line increased from 115.6% to 124.8%
Desert Cov – West station 115 kV line loading increased from 144.7% to 156%. These results are given in Table 6 below.

This double contingency caused no new voltage range violations or no new voltage deviations. Also, none of the existing voltage range violations or voltage deviation increased by 0.05p.u.

Because this GI request caused no thermal and voltage violations on PSCo system, Energy resource capability of the proposed generation is 120 MW

Scenario-2: Lamar DC tie scheduled to export at 200 MW

For the primary POI (Comanche 230 kV), there were no new thermal overloads and none of the existing thermal overloads increased by more than 1%. There were no new

thermal violations in BHCE system as well. The proposed generation has not caused any new voltage range violations or any new voltage deviations, and none of the existing voltage range violations and voltage deviations increased by 0.05p.u.
For the double contingency outage of Comanche – Daniels park 345 kV line, the proposed GI caused no new thermal violations, but increased the existing thermal overload on BHEC's Desert Cov – W Station 115 kV line from 100.9% to 114%. This double contingency caused no new voltage range violations or no new voltage deviations. Also, none of the existing voltage range violations or voltage deviation increased by 0.05p.u. The double contingency violations for scenario -2 are given in Table -7 below.

Because this GI request caused no thermal and voltage violations on PSCo system, Energy resource capability of the proposed generation is 120 MW

ER = 120 MW (at Comanche 230 kV POI)

Since the primary POI was feasible, the secondary POI was not studied

Short Circuit

The short circuit study results showed no new circuit breakers overdutied due to the proposed solar generation facility.

Cost Estimates

Comanche 230 kV Primary POI

The cost for the transmission interconnection (in 2012 dollars):

Transmission Proposal
The total estimated cost of the recommended system improvements to interconnect the project is approximately **$2.75 Million** and includes:

- $ 1.158 million for PSCo-Owned, Customer-Funded Interconnection Facilities
- $ 1.589 million for PSCo-Owned, PSCo-Funded Network Upgrades for Interconnection
- $ 0.000 million for PSCo Network Upgrades for Delivery to PSCo Loads

This work can be completed in 12 months following receipt of authorization to proceed.

The Interconnection Agreement (IA) requires that certain conditions be met, as follows:

1 The conditions of the Large Generator Interconnection Guidelines (LGIG) are met.

2 PSCO will require testing of the full range of 0 MW to 120 MW operational capability of the facility to verify that the facility can safely and reliably operate within required power factor and voltage ranges.

3 A single point of contact needs to be provided to PSCo Operations to facilitate reliable management of the transmission system.

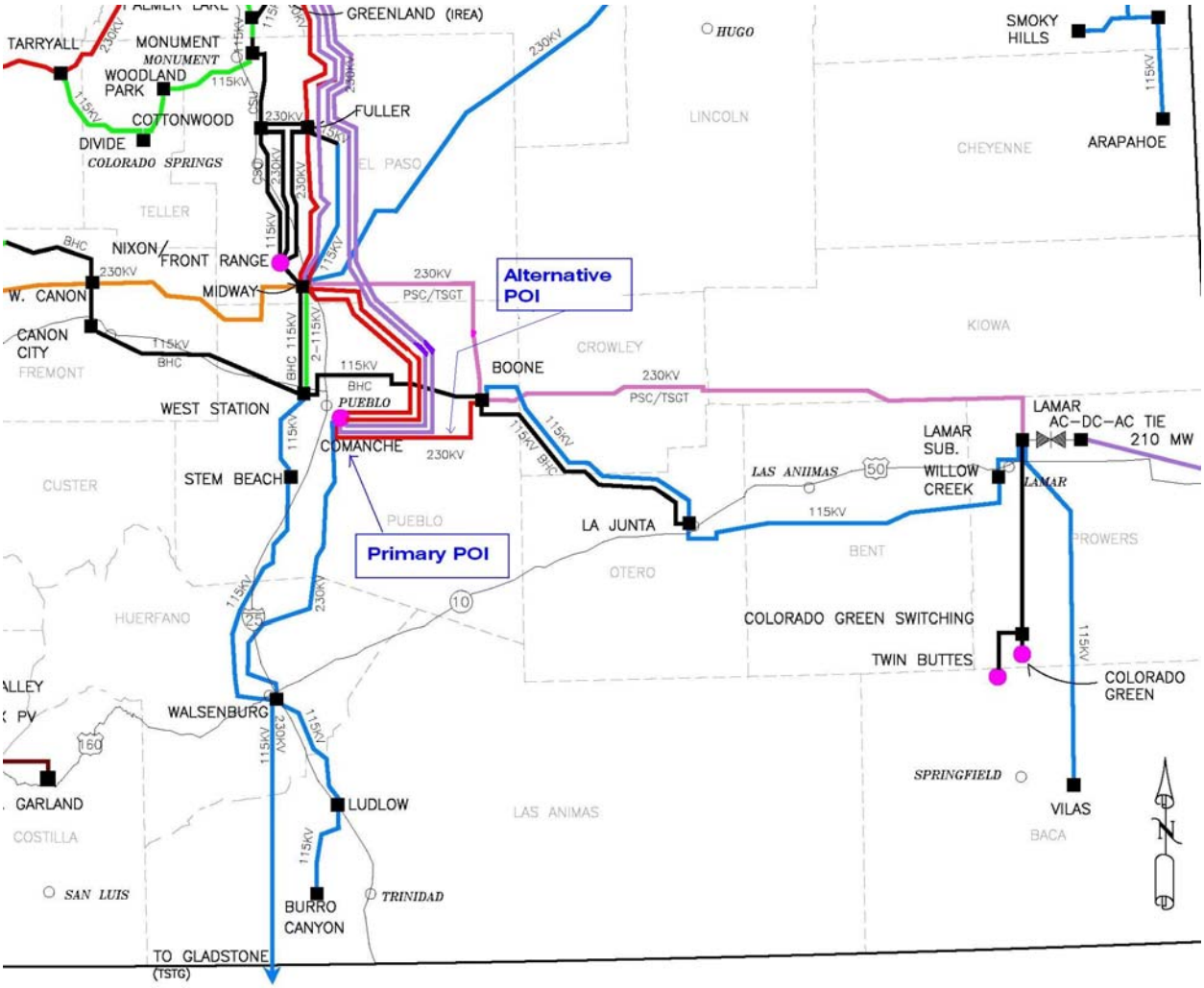

Figure 1 Comanche, Midway, Boone and Surrounding Transmission System

Introduction

Public Service Company of Colorado (PSCo) received an interconnection request (GI-2010-19) for a 120 MW solar photovoltaic generation facility in Pueblo County, Colorado. The solar facility will be located at the Northeast corner of the Lime road and St.Charles road, immediately east of the Comanche Power plant. The interconnection request was received on November 16, 2010. The solar generation facility will consist of 0.5 MW Sunny Central SMA SC500HE-US inverters daisy chained in to groups of twenty.

The Customer has initially requested a primary point of interconnection on one of the Comanche – Midway 230 kV lines, which was later changed to Comanche 230 kV Substation. The solar facility will be located 0.25 miles from the Comanche Substation and connected to the POI using a 230 kV Customer owned underground transmission line. An alternative POI has been requested tapping the Boone – Lamar 230 KV line. The alternative POI will be evaluated only if the primary POI is not feasible. Both of the proposed POIs are shown in Figure 1 above. The Customer has initially proposed a November 2012 in-service date for this GI in the Interconnect Request. In an email received on January 19, 2012, the Customer has revised the in-service date to second quarter 2015. Since the Customer has not provided a specific in-service date, it was assumed to be July 1, 2015 and the backfeed date was assumed to be December 1, 2014.

Study Scope and Analysis

The Feasibility Study evaluated the transmission impacts associated with the proposed solar generation facility. It consisted of power flow and short circuit analyses. The power flow analysis identified any thermal or voltage limit violations resulting from the installation of the proposed generation and an identification of network upgrades required to deliver the proposed generation to PSCo loads. Several single contingency outages and one worst case contingency were studied. Based on experience and observations from the past studies in the area, the worst case contingency for the study area would be the double circuit outage of Comanche – Daniels park 345 kV line. The short circuit analysis identified any new circuit breakers overdutied due to the proposed generation and the short circuit levels at the primary POI.

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 nominal and steady-state power flows below the thermal ratings of all facilities. Operationally, PSCo tries to maintain a transmission system voltage profile ranging from 1.02-1.03 per unit at regulating (generation) buses to 1.0-1.03 per unit at transmission load buses in the Southeast Colorado area. Following a single contingency, transmission system steady state bus voltages must remain within 0.90 per unit to 1.05 per unit, and power flows

within 100% of the facilities' continuous thermal ratings. Also, voltage deviations should not exceed 5%.

The proposed facility was studied as an Energy Resource only. Energy Resource Interconnection Service shall mean an Interconnection Service that allows the Interconnection Customer to connect its Generating Facility to the Transmission Provider's Transmission System to be eligible to deliver the Generating Facility's electric output using the existing firm or non-firm capacity of the Transmission Provider's Transmission System on an as available basis. Energy Resource Interconnection Service in and of itself does not convey transmission service.

For this project, potential affected parties are BHCE, CSU and TSGT.

Power Flow Study Models

The proposed solar facility interconnection was studied using 2015 heavy summer loading conditions. The 2015HS case was built using the WECC approved 2017HS1 base case. PSCo loads in the case were adjusted to reflect the most recent (September 2011) PSCo load forecast for 2013. The topology was also updated to reflect current project plans and rating changes for 2013. Updates were included for CSU, TSGT, BHE, WAPA and zone 121 of New Mexico systems per the review comments received from the utilities. One of the planned projects modeled is the Boone – Nyberg 115 kV second circuit and phase shifters at Glad stone. The Phase shifters were adjusted to keep the flow on the Gladstone – Walsenburg 230 kV line at approximately 136 MW.

Two main power flow generation dispatch scenarios were evaluated. First scenario included maximum generation at the Colorado green and Twin buttes wind farms, and maximum generation imports on the Lamar DC tie such that flows on the Boone – Lamar 230 kV are at PSCo's maximum ownership capacity of this line. The second scenario was modeled with heavy exports on the Lamar DC tie with wind at Colorado green and twin buttes off, this scenario modeled heavy flows through the BHCE system around Boone. Both the scenarios were studied with and without the proposed GI.

To assess the impact of the proposed generation on the transmission system, both the power flow models were modified to simulate higher flows from southern Colorado to the north. To accomplish this, generation in south-central Colorado was dispatched at maximum. In scenario -1 generation increase at Colorado Green wind farms, Twin Buttes wind farm and Lamar DC tie were offset by decreasing generation at Fort Saint Vrain Units 5 & 6. PSCo control area (Area 70) wind generation facilities except for Colorado Green and Twin Butte were dispatched to 21%. In Scenario -2, Colorado green and Twin buttes wind farms were modeled off line and the Lama DC tie was set to export 210 MW, Appendix B shows the generation changes.

The PSSE raw equivalent model for the lumped equivalent representation of the proposed GI submitted by the Customer was used for modeling the GI. The 230 kV

transmission tie line was modeled using the 230 kV line parameters provided by the Customer. The secondary alternative will be evaluated only if the primary POI is not feasible. In scenario -1, generation increase due to the proposed GI was offset by decreasing 130 MW at St.Vrain # 5 unit and increasing St. Vrain #4 by 13 MW. In Scenario -2, generation increase due to the proposed generation was offset by decreasing 60 MW at St. Vrain #5 and 56 MW at St. Vrain #6.

Power Flow Study Process

Contingency power flow studies were completed on the reference power flow case and the power flow case with the proposed new generation using PTI's PSSE Ver. 32.1.0 program. Results from each of the two cases were compared and new overloads or existing overloads that increased by atleast 1% in the case with the new generation were noted. Any new voltage deviations or increase in the voltage deviations of 5% or more are noted. PSSE's ACCC activity was used to perform the load flow contingency analysis. Areas 70 and 73, and zone 121 were used for the contingency files (single branches and tie lines). Monitored elements included branches and ties in zones 700, 704, 705, 709, 712, 757, 790, 791 and 121.

Power Flow Results

Scenario -1 -Comanche 230 kV POI

The proposed GI caused no new overloads in the PSCo system and none of the existing overloads in the PSCo system increased by more than 1%. Although they were no overloads on the PSCo system, the interconnection caused two new thermal overloads on the Black Hills Energy Corporation (BHEC) system: worst case line loading on the Desertcov – West station 115 kV line increased from 96.8% to 103.4% for the single contingency outage of Boone-Midway PS 230 KV line. Also thermal loading on the Portland – Skala 115 kV increased from 99.3% to 106.3% for the loss of MidwayBR- W Canon 230 kV line. The proposed generation has not caused any new voltage range violations or any new voltage deviations, and none of the existing voltage range violations and voltage deviations increased by 0.05p.u. Customer should work with BHEC to resolve the thermal overloads.
For the double contingency outage of Comanche – Daniels park 345 kV line, the proposed GI caused no new thermal violations, but increased the loading on some of the existing overloads.
The following existing thermal overloads on the PSCo system increased: Midway 230/115 kV transformer loading increased from 102.6% to 112.5%. PSCo is aware of this violation and has plans to fix it.
The following existing BHCE system overloads are seen due to the proposed GI:
Portland – Skala 115 kV line increased from 115.6% to 124.8%
Desert Cov – West station 115 kV line loading increased from 144.7% to 156%.

This double contingency caused no new voltage range violations or no new voltage deviations. Also, none of the existing voltage range violations or voltage deviation increased by 0.05p.u.

Because this GI request caused no thermal and voltage violations on PSCo system, Energy resource capability of the proposed generation is 120 MW

Table 5 gives the single contingency thermal overloads and Table 6 gives the double contingency thermal overloads

Scenario -2 -Comanche 230 kV POI

For the primary POI (Comanche 230 kV), there were no new thermal overloads and none of the existing thermal overloads increased by more than 1%. There were no new thermal violations in BHCE system as well. The proposed generation has not caused any new voltage range violations or any new voltage deviations, and none of the existing voltage range violations and voltage deviations increased by 0.05p.u.
For the double contingency outage of Comanche – Daniels park 345 kV line, the proposed GI caused no new thermal violations, but increased the existing thermal overload on BHEC's Desert Cov – W Station 115 kV line from 100.9% to 114%. This double contingency caused no new voltage range violations or no new voltage deviations. Also, none of the existing voltage range violations or voltage deviation increased by 0.05p.u.

Because this GI request caused no thermal and voltage violations on PSCo system, Energy resource capability of the proposed generation is 120 MW

ER = 120 MW (at Comanche 230 kV POI)

Since the primary POI was feasible, the secondary POI was not evaluated

Table 7 gives the double contingency thermal overloads

Short Circuit

For the Customer proposed interconnection at the Comanche 230 kV primary POI, no new circuit breakers are expected to exceed their capabilities following installation of the new generation. The calculated short circuit parameters for the POI at the Comanche 230 kV substation are shown in Table 1 below.

Table 1 – Short Circuit Parameters at the Comanche 115 kV POI

System Condition	Three-Phase Fault Level (Amps)	Single-Line-to-Ground Fault Level (Amps)	Thevenin System Equivalent Impedance (R +j X) (ohms)
All Facilities in Service	25000	29100	Z1(pos)= 0.31252+j5.28518 Z2(neg)= 0.33447+j5.29192 Z0(zero)= 0.19571+j3.0604

Costs Estimates and Assumptions

GI-2010-19 (Feasibility Study Report)

Scoping level cost estimates for Interconnection Facilities and Network/Infrastructure Upgrades for Delivery (+/- 30% accuracy) were developed by PSCo Engineering. The cost estimates are in 2012 dollars with escalation and contingencies applied (AFUDC is not included) and are based upon typical construction costs for previously performed similar construction. These estimated costs include all applicable labor and overheads associated with the siting support, engineering, design, and construction of these new PSCo facilities. This estimate does not include the cost for any other Customer owned equipment and associated design and engineering.

The estimated total cost for the required upgrades is **$2.75 Million.** Figure 2 below represents a conceptual one-line of the proposed interconnection at the Comanche 230kV Substation. These estimates do not include costs for any other Customer owned equipment and associated design and engineering. The following tables list the improvements required to accommodate the interconnection and the delivery of the Customer's 120MW solar generation output. The cost responsibilities associated with these facilities shall be handled per current FERC guidelines. System improvements are subject to change upon completion of the Facility Study.

Figure 2: Proposed Comanche Station One-line with Project Interconnection

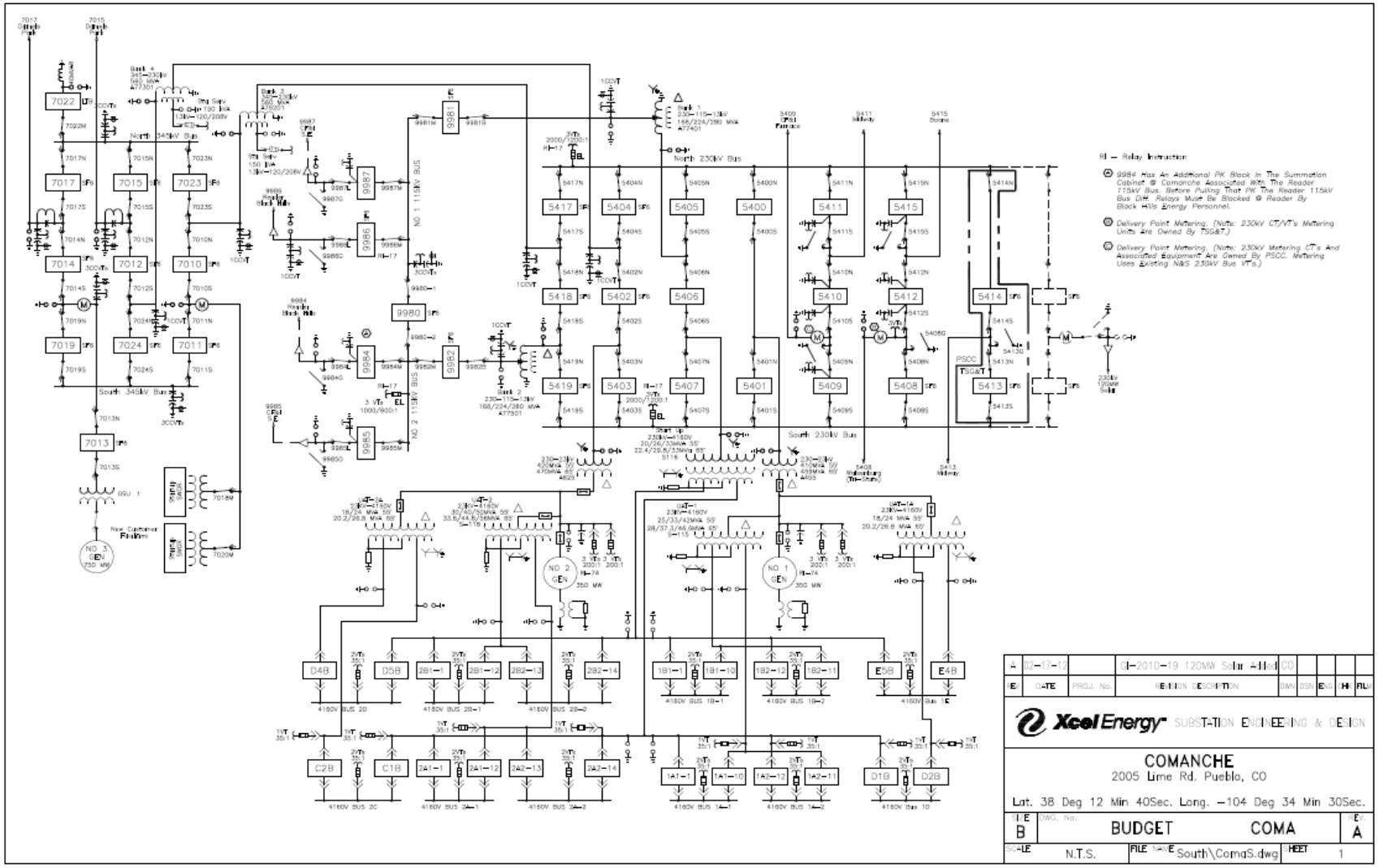

Table 2 – PSCo Owned; Customer Funded Transmission Provider Interconnection Facilities

Element	Description	Cost Est. (Millions)
PSCo's Comanche 230kV Transmission Substation	Interconnect Customer to the 230kV bus at the Comanche 230kV Substation. The new equipment includes: • Extend the 230kV Bus at to a new bay location • One new underground transmission line transition structure • One 230 kV gang switch and one grounding switch • Three 230 kV line arresters • Connect the new 230kV position to the bus • New relaying for the new transmission line. • Power Quality Metering (230kV line from Customer) • Three 230kV lightning arresters • One relay panel (transformer breaker panel) • One new underground transmission line transition structure • Associated communications, supervisory and SCADA equipment • Associated line relaying and testing • Associated bus, wiring and equipment • Associated foundations and structures • Associated transmission line communications, relaying and testing	**$0.930**
Customer's 230kV Substation	Load Frequency/Automated Generation Control (LF/AGC) RTU and associated equipment. Install a new relay panel at the customer generation site. Connect SCADA from the site to the Lookout Control Center.	**$0.228**
	Total Cost Estimate for PSCo-Owned, Customer-Funded Interconnection Facilities	**$1.158**
Time Frame	**Design, procure and construct**	**12 Months**

Table 3: PSCo Owned; PSCo Funded Interconnection Network Facilities

Element	Description	Cost Estimate (Millions)
PSCo's Comanche 230kV Transmission Substation	Interconnect Customer to the 230kV bus at the Comanche 230kV Substation. The new equipment includes: • Three 230 kV gang switches • Install a new 230 kV bay by extending the busses to the east • Five 230 kV gang switches • Two 230 kV breakers • Modify the relaying for the new bay position	**$1.589**
		$0.0
	Total Cost Estimate for PSCo-Owned, PSCo-Funded Interconnection Facilities	**$1.589**
Time Frame	**Site, design, procure and construct**	**12 Months**

Table 4 – PSCo Network Upgrades for Delivery

Element	Description	Cost Est. (Millions)
	Not Applicable	
	Total Cost Estimate for PSCo Network Upgrades for Delivery	**$0.0**
	Design, procure and construct	**N/A**
	Total Project Estimate	**$0**

Cost Estimate Assumptions

- Scoping level cost estimates for Interconnection Facilities and Network/Infrastructure Upgrades for Delivery (+/- 30% accuracy) were developed by PSCo Engineering.
- Estimates are based on 2011 dollars (appropriate contingency and escalation applied).
- AFUDC has been excluded.
- Labor is estimated for straight time only – no overtime included.
- Lead times for materials were considered for the schedule.
- The Solar Generation Facility is not in PSCo's retail service territory. Therefore, no costs for retail load metering are included in these estimates.
- PSCo (or it's Contractor) crews will perform all construction, wiring, testing and commissioning for PSCo owned and maintained facilities.
- The estimated time to design, procure and construct the interconnection facilities is approximately 12 months after authorization to proceed has been obtained.
- This project is completely independent of other queued projects and their respective ISD's.
- A CPCN will not be required for the interconnection facilities construction.
- Customer will string OPGW fiber into substation as part of the transmission line construction scope.
- Breaker duty study determined that no breaker replacements are needed in neighboring substations.
- Line and substation bus outages will be authorized during the construction period to meet backfeed. Could potentially be problematic and extend requested backfeed date due to summer construction window.
- Power Quality Metering (PQM) will be required on the Customer's 230 kV line terminating into Comanche Substation.
- Costs for fixing overloads on the BHCE system are not included. Customer should work with BHCE to mitigate thermal overloads on BHCE system.

A. Load Flow Thermal Results

Table 5 – Scenario -1 - Summary Listing of Differentially Overloaded Facilities (Comanche 230 kV Substation POI)[1]

				Branch N-1 Loading Without GI-2010-19		Branch N-1 Loading With GI-2010-19			
Monitored Facility (Line or Transformer)	Type	Owner	Branch Rating MVA	N-1 Flow in MVA	N-1 Flow in % of Rating	N-1 Flow in MVA	N-1 Flow in % of Rating	% Change	N-1 Contingency Outage
DesertCov – W Station 115 kV	Line	BHE	80	116.2	96.8	82.72	103.4	6.6	Boone – Midway PS 230 KV Line
Portland – Skala 115 kV	Line	BHE	80	79.44	99.3	85.04	106.3	7	Midway BR – W Canon 230 kV

Table 6 – Scenario -1 – Double contingency outage summary Listing of Differentially Overloaded Facilities (Comanche 230 kV Substation POI)[2]

				Branch N-2 Loading Without GI-2010-19		Branch N-2 Loading With GI-2010-19			
Monitored Facility (Line or Transformer)	Type	Owner	Branch Rating MVA	N-2 Flow in MVA	N-2 Flow in % of Rating	N-2 Flow in MVA	N-2 Flow in % of Rating	% Change	N-2 Contingency Outage
Midway 230/115 kV	Xfmr	PSCo	97	99.52	109.1	109.1	112.5	9.9	Comanche – Daniels Park 345 kV #1 & 2
Portland – Skala 115 kV	Line	BHE	80	92.48	115.6	9.84	124.8	9.2	Comanche – Daniels Park 345 kV #1 & 2
DesertCov – W Station 115 kV	Line	BHE	80	115.8	144.7	124.8	156	11.3	Comanche – Daniels Park 345 kV #1 &

[1] **Detailed thermal violations due to the proposed 120 MW generation increase at Comanche 230 kV Substation for Sceneario -1**

[2] **Detailed thermal violations due to the proposed 120 MW generation increase at Comanche 230 kV Substation for Sceneario -1 for double contingency outage of Comanche – Daniels Park 345 kV lines**

Table 7 – Scenario -2 – Double contingency outage summary Listing of Differentially Overloaded Facilities (Comanche 230 kV Substation POI)[3]

				Branch N-2 Loading Without GI-2010-19		Branch N-2 Loading With GI-2010-19			
Monitored Facility (Line or Transformer)	**Type**	**Owner**	**Branch Rating MVA**	**N-2 Flow in MVA**	**N-2 Flow in % of Rating**	**N-2 Flow in MVA**	**N-2 Flow in % of Rating**	**% Change**	**N-2 Contingency Outage**
DesertCov – W Station 115 kV	Line	BHE	80	80.72	100.9	91.2	114	13.1	Comanche – Daniels Park 345 kV #1 &

[3] **Detailed thermal violations due to the proposed 120 MW generation increase at Comanche 230 kV Substation for Sceneario -2 for double contingency outage of Comanche – Daniels Park 345 kV lines**

B. Generation Dispatch

Dispatch of Major Generating Units in the Vicinity of GI-2010-19 Scenario-1:

PSCo:

Bus	LF ID	MW
Comanche	C1	360
Comanche	C2	365
Comanche	C3	804.0
Lamar DC Tie	DC	101.0 Import
Fountain Valley	G1	0.0
Fountain Valley	G2	30 (allocated to BHEC)
Fountain Valley	G3	0.0
Fountain Valley	G4	0.0
Fountain Valley	G5	0.0
Fountain Valley	G6	0.0
Colorado Green	1	67
Colorado Green	2	67
Twin Butte	1	62
Ft. Lupton	G1	0
Ft. Lupton	G2	0
Manchief	G2	0
Brush 4	G4	0
Brush 4	G5	0
Brush 3	ST	0
Plains End	G0	0
Plains End	G1	0
Plains End	G2	0
Plains End	G7	0
Plains End	G8	0
Plains End	G9	0
ST Vrain	G5	40
ST Vrain	G6	130

ARPA:

Bus	LF ID	MW
City of Lamar	G1	0
City of Lamar	G2	0

BHE:

Bus	LF ID	MW
BUSCHWRTG1	G1	28.8
BUSCHWRTG2	G2	28.8
E Canon	G1	8.0
PP_MINE	G1	3.0
Pueblo Diesels	G1	10.0
Pueblo Plant	G1	0
Pueblo Plant	G2	0.0
R.F. Diesels	G1	0.0
Airport Diesels	G1	0.0
Canyon City	C1	0
Canyon City	C1	0
Baculite 1	G1	90.6
Baculite 2	G1	90.6
Baculite 3	G1	40.0
Baculite 3	G2	40.0
Baculite 3	S1	24.8
Baculite 4	G1	40.0
Baculite 4	G2	40.0
Baculite 4	S1	24.8

CSU:

Bus	LF ID	MW
Birdsale 1	1	0.0
Birdsale 2	1	0.0
Birdsale 3	1	0.0
Nixon	1	225
Tesla	1	28.0
Drake 5	1	49
Drake 6	1	82.3
Drake 7	1	139.1
Nixon CT 1	1	0.0
Nixon CT 2	1	0.0
Front Range CC 1	1	150
Front Range CC 2	1	150
Front Range CC 3	1	94

Dispatch Chagnes of Generating Units For Scenaio-2 Comapred to GI-2010-19 Scenario-1:

Bus	LF ID	MW
Ft. Lupton	G1	50
Ft. Lupton	G2	50
Manchief	G2	140
Brush 4	G4	24
Brush 4	G5	25
Brush 3	ST	50
Lamar DC Tie	DC	-200
Plains End	G0	5
Plains End	G1	5
Plains End	G2	5
Plains End	G7	5
Plains End	G8	5
Plains End	G9	5
ST Vrain	G5	140
ST Vrain	G6	147
Colorado Green	1	0
Colorado Green	2	0
Twin Butte	1	0