TRANSMISSION UPGRADE ANALYSIS OF EL PASO ELECTRIC COMPANY 10-18-2006 REQUEST FOR PROPOSALS

REVISED FINAL REPORT

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1. Executive Summary

On October 18, 2006, the El Paso Electric Company (EPE) issued a Request for Proposals (RFP), seeking new potential generation resources to be sited within the EPE transmission grid. Seventeen applicants responded to EPE's RFP. Only seven of these applicants were deemed necessary to evaluate.[1] This report documents both the process and results associated with Utility System Efficiencies, Inc. (USE) analysis in determining the total cost of transmission network upgrades required for reliably interconnecting these seven Project Candidates to the EPE system.

Network Upgrade Analysis

As a starting point, USE utilized a WECC-approved powerflow basecase to electrically model El Paso Electric's transmission grid and surrounding transmission areas. This powerflow model was tuned to simulate 2008 heavy peak summer load conditions, representing a benchmark powerflow basecase. From this benchmark/reference case, seven scenario cases were then constructed, each modeling a single RFP generation project. A comprehensive contingency analysis (consisting of over 200 single element equipment outages) was applied to both the benchmark basecase and each scenario case. The powerflow results for each candidate scenario were compared directly to the benchmark results, in order to determine where transmission line or transformer overloads were found to be directly related to an RFP candidate's addition. In the event that such a transmission overload was identified, transmission network upgrades were then determined for mitigating the overload concern(s). The associated costs for each RFP candidate's associated network upgrades were then estimated, based on rough per unit reinforcement costs.

Total Network Upgrade Cost

Table 1 below provides the total estimated network upgrade costs to correct both normal and emergency transmission equipment rating violations directly resulting from each proposed RFP Project candidate.

Table 1: Network Upgrade Costs by RFP Project Candidate

RFP Project Candidate			Total Network
Project Name	Location	Output	Upgrade Costs
	Holloman Substation	**35MW**	**$2,475,100**
	Anthony Substation	**243MW**	**$5,220,852**
	Caliente Substation	**300MW**	**$23,426,038**
	Coyote Substation	**300MW**	**$24,760,974**
	Alamo Substation	**30MW**	**$0**
	25MWs at 4 Locations[2]	**100MW**	**$0**
	Airport Substation	**40MW**	**$0**

[1] Note –Out of the 17 applicants, 1 was not responsive, 2 were in the SPP Area with no way to bring power in, 3 were not generation projects, but rather demand side management projects, 1 was sited at the EPE Newman site where costs were already obtained and known, 2 were outside the EPE control area where no additional costs were deemed necessary, 1 was outside the EPE control area and it was indicated PNM already in the process of conducting a system impact study.

[2] Note – submitted an offer that required power-flow modeling 25MWs in 4 locations for a total offer of 100MWs. The 4 locations consisted of: Hatch substation 115kV, Clint 69kV substation, Airport 115kV substation, and Diablo 345kV substation.

2. Methodology

This section describes the methodology utilized in determining the rough cost of the transmission network upgrades required to reliably interconnect potential RFP Projects into the El Paso Electric Company's transmission grid. An outline of this process is depicted in Flowchart 1.

Benchmark Powerflow Basecase

A powerflow basecase model (the "benchmark case") was used as a platform for modeling each of the RFP Projects and accurately measuring their corresponding impacts to the El Paso Electric Company's transmission grid. The benchmark case was used as the comparative reference when evaluating the contingency analysis results for each of the RFP Projects. The benchmark case modeled all existing generation, expected topology and conditions expected for the EPE transmission grid; this case was tuned to match the projected summer 2008 load, generation and import conditions specified by EPE staff. A more detailed account of basecase tuning actions can be found in Section 5 (Power Flow Study Base Cases) of this report.

Scenario Powerflow Basecases

Seven separate scenario powerflow basecases (referred to as "RFP Candidate Scenario" cases) were constructed from the benchmark case. Each RFP Candidate Scenario case represented the individual addition to the benchmark case, of a single RFP Project. Each scenario basecase modeled the proposed RFP Project generation at its maximum power output. EPE's import levels were held constant when adding each new RFP generation project (i.e., local generation within EPE's control area was proportionally reduced to maintain the same level of EPE imports).

Single Element Contingency Input File

Performance of the EPE transmission system was evaluated using powerflow contingency analysis. Once the powerflow basecases were established, a contingency input file simulating single-element outages was constructed and tested against all the powerflow basecases. To provide a thorough screening of potential impacts from each of the proposed RFP Projects, the applied contingency file simulated single element outages for 69-345kV transmission elements (transmission lines and transformers) both within and connecting to, the El Paso Electric Company's transmission system. The resulting contingency file represented 213 different contingencies.

Powerflow Analysis

Both the benchmark case and each of the seven RFP Candidate Scenario cases were evaluated for an all-lines-in-service ("normal") condition, as well as performance under the applied contingencies. For both the normal condition and each simulated outage, the resulting powerflow solution from each of the individual RFP Candidate Scenario cases was monitored for potential overloads/reliability concerns and directly compared with the corresponding results from the benchmark case. Instances were identified, where the introduction of a new RFP Project directly resulted in a new (or increased) facility overload. Once the contingency analysis was completed and the results fully understood, overload mitigation measures (transmission network upgrades) were determined.

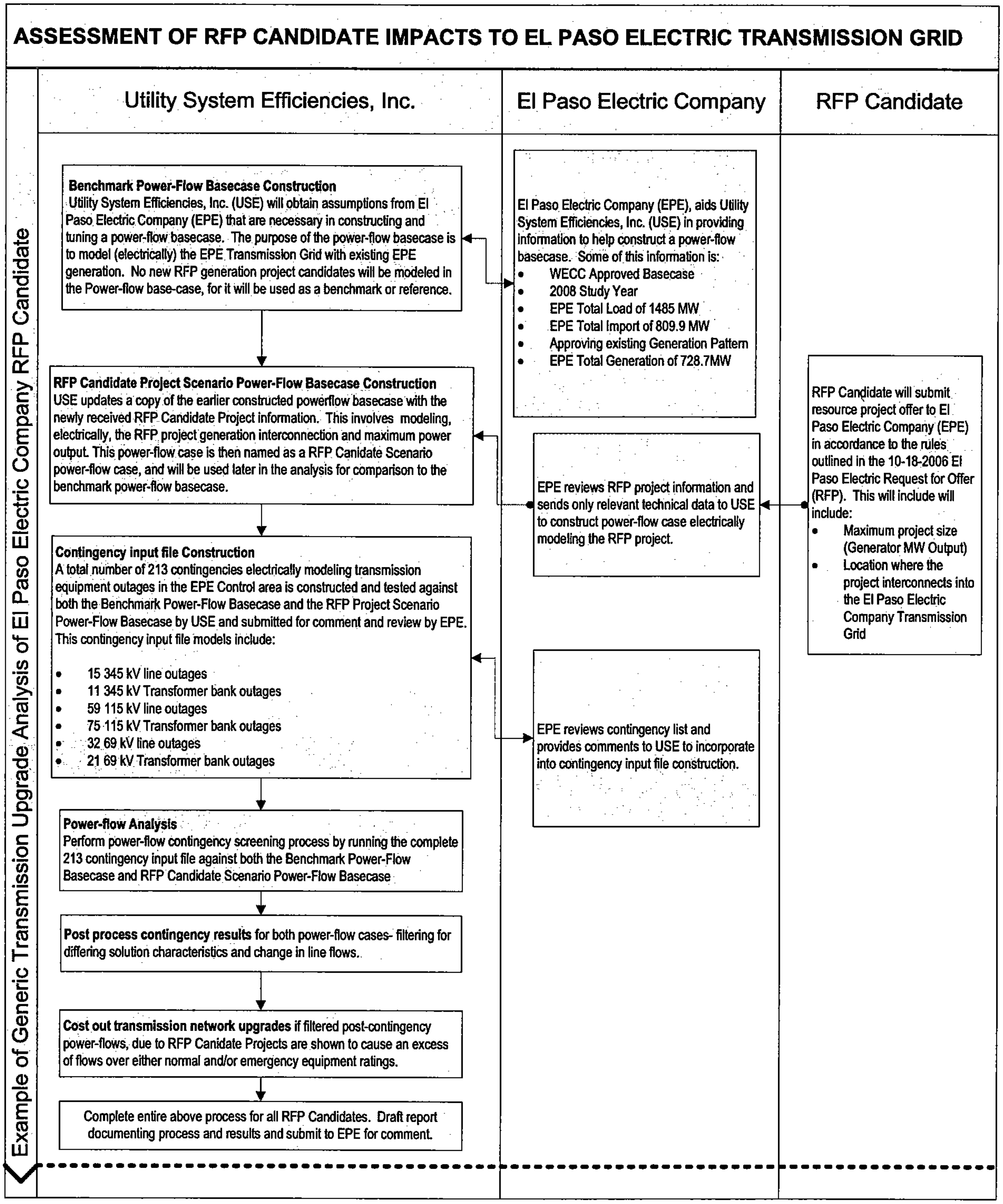
Transmission Network Upgrades

In this study, USE has identified specific Network Upgrades required to meet EPE's reliability criteria while interconnecting each RFP Project to EPE's system. Given that the benchmark case exhibited some latent contingency overloads/reliability concerns, USE has employed a "delta" overload approach to identify only those overloads and associated upgrades required for the addition of each individual RFP Project candidate. Transmission fixes or transmission network upgrades were determined only for correcting those overloaded facilities directly related to the RFP Projects.

Cost out Transmission Network Upgrades

Total cost for each RFP Project's associated upgrades were determined using rough per-unit project costs. For each RFP candidate's associated network upgrades, a standard set of rough cost parameters (e.g., "X" $/mile for a new or reconductored 115kV circuit in 2008) was applied to estimate upgrades in a fair and consistent manner. It should be noted that this study only estimated the costs for transmission *network upgrades*; costs associated with direct assignment transmission upgrades (cost of the interconnecting facilities) has been left for future, more detailed analyses.

Flowchart 1



3. Assumptions

The following section outlines the assumptions utilized in analyzing the individual RFP Project impacts to the El Paso Electric Company transmission grid, as well as the limitations applied in determining the costs for associated transmission network upgrades.

Network Upgrades not Direct Assignment Upgrades

EPE commissioned USE, an external consultant, to fairly and consistently assess the *transmission network upgrades*, if any, required to reliably interconnect each RFP project to the EPE transmission grid. These network upgrade costs are intended for use in EPE's economic evaluation of the various proposed RFP Projects. It should be noted that the cost estimates cited in this analysis do not include costs associated with "direct assignment" facilities; that is, the cost of the each RFP Project's interconnection facilities.

Model Heavy Peak-Summer 2008 Conditions

Each RFP Project was evaluated under the same stressed/peak system condition. The selected powerflow model represented the EPE system and surrounding WECC system under a 2008 "heavy summer" (peak) condition.

Detailed Powerflow Analysis

Analysis of EPE RFP Projects and their associated impact to the EPE grid was only assessed with (single-element) contingency powerflow analysis. Detailed study of transient stability, reactive margin and voltage stability were not within the scope of this analysis. Identification of network upgrades (if required) was based purely on powerflow analysis. It is expected that future detailed system impact studies of selected RFP Projects would include transient stability, reactive margin and/or voltage stability analysis, and could potentially identify the need for additional network upgrades.

Separate Scenarios to Represent RFP Projects

System overload impacts for each of the RFP Projects were examined individually and not in combination with one another. The analysis of EPE RFP Projects studied each proposed generation addition separately, using individual scenario basecases. In other words, each RFP Candidate Scenario case only modeled one RFP Project at a time.

RFP Project MW Output Modeling

The analysis modeled RFP Projects at their maximum MW output.

4. RFP Project Interconnection Information

This section briefly summarizes each EPE RFP Project's proposed point of electrical interconnection and corresponding peak MW output. For the purpose of this study, each of these projects was modeled in simple form in the powerflow basecase; more detailed modeling of these RFP Projects has been reserved for subsequent detailed system impact studies, when interconnection details and specific generator parameters are better known.

is proposing the Project. The interconnection point for is at Holloman Substation (115kV) with a maximum output of 35MW.

– is proposing the Project. The proposed electric interconnection point is at Anthony substation (115kV) with a maximum output of 243MW.

is proposing the Project. The proposed point of interconnection may entail construction of a new 345kV transmission line from the project site directly to the Caliente substation. For purposes of this analysis, the was modeled as directly tied to Caliente substation at 345kV, with a maximum output of 300MW.

is proposing the Project. The proposed point of interconnection may entail construction of a new 115kV transmission line from the project site tying directly to Coyote substation. For purposes of this study, the was modeled as directly tied to Coyote substation at 115kV, with a maximum output of 300MW.

is proposing the . The proposed point of interconnection is between Sierra Blanca and Van Horn on EPE's 69kV line with a maximum output of 30MW.

is proposing to connect to four locations, each at 25MW, for a total of 100MW. For this study, was modeled as 25MWs in the following locations: Hatch substation 115kV, Clint 69kV substation, Airport 115kV substation, and Diablo 345kV substation for a maximum output of 100MW used for total project's size.

is proposing LM6000 simple cycle power plant to be tied to the Airport 115kV Substation (located in Las Cruces, New Mexico), with a maximum output of 40MW.

5. Powerflow Study Basecases

This report section provides further details regarding the powerflow basecase models used in this analysis. A total of eight powerflow basecases were used to evaluate the transmission system impacts associated with the EPE RFP Projects. It is impossible to study all combinations of system load and generation levels during all seasons and at all times of the day. However, these eight powerflow basecases represent extreme loading and generation conditions for the EPE study area, and generally represent a stressed or pessimistic system condition.

Benchmark Powerflow Basecase

The benchmark powerflow basecase used in the analysis models only existing generation internal to the EPE area and does not model potential EPE RFP Projects. The benchmark case provides a representative model for performance of the existing EPE area under both normal and contingency conditions, while establishing a reference for measuring any potential criteria violations/reliability concerns. After tuning this case to represent 2008 summer peak conditions, this case was used as the basis for constructing seven basecases representing each of the individual EPE RFP Projects.

Heavy Summer 2008 Conditions

A Western Electricity Coordinating Council (WECC) approved full-loop powerflow basecase (08hs3sa.sav) was used as the starting basecase. This powerflow basecase represents a 2008 summer peak condition. Table 2 summarizes the 2008 summer conditions for the EPE portion of the powerflow case. Table 3 shows a detailed breakdown of the existing EPE generation pattern. Table 4 shows a detailed breakdown of the existing EPE load pattern.

Table 2: Summary of EPE 2008 Summer Conditions

EPE Zone 110 Representation	
Total Generation	728.7 MW
Total Imports	809.9 MW
Total Load	1485 MW
Total Losses	53.62 MW

Table 3: EPE Existing Generation Pattern

BUS-NO	NAME	KV	PGEN
11010	AMRAD	345.0	0 MW
11051	COPPER_G	13.8	47 MW
11112	NEWMANG1	13.8	77 MW
11113	NEWMANG2	13.8	79.9 MW
11114	NEWMANG3	13.8	83.8 MW
11115	NEWMN4G1	13.8	58 MW
11116	NEWMN4G2	13.8	65 MW
11117	NEWMN4S1	13.8	75 MW
11133	RIOGD_G6	13.8	48 MW
11134	RIOGD_G7	13.8	45 MW
11135	RIOGD_G8	17.5	150 MW

Table 4: Detailed Breakdown of EPE Load Pattern.

BUS-NO	NAME	KV	PLOAD	BUS-NO	NAME	KV	PLOAD
11207	AIRPORT1	24.9	17.8	11092	LEO	14.4	16.9
11002	ALA_5	115.0	2.4	11095	MANN_1	13.8	18.6
11004	ALAMO	23.9	2.1	11096	MANN_2	14.4	19.8
11007	AMERICAS	14.4	20.7	11098	MAR	4.2	3.1
11009	AMRAD	24.9	0.2	11100	MESA_1	13.8	16.7
11012	ANTHONY1	24.9	9.0	11101	MESA_2	13.8	16.8
11013	ANTHONY2	24.9	20.7	11102	MILAGRO	69.0	0.5
11015	ARROYO	115.0	3.8	11104	MILAGRO1	13.8	16.4
11016	ARROYO1	23.9	37.1	11176	MILAGRO2	13.8	17.4
11016	ARROYO1	23.9	37.1	11182	MILAGRO3	13.8	18.6
11018	ASARCO_S	69.0	0.5	11106	MONTOYA1	24.9	35.7
11021	ASCARATE	13.8	28.8	11107	MONTOYA2	24.9	25.9
11022	ASCARATE	4.2	5.7	11109	MONTOYA3	24.9	28.8
11024	AUSTIN	4.2	6.0	11119	MONTWOOD	23.9	11.5
11026	AUSTIN_1	13.8	25.0	11124	PHELPS_D	14.4	11.8
11027	AUSTIN_2	13.8	22.8	11125	PICACHO	24.9	29.9
11029	BERGENST	13.9	0.7	11126	PROLER	2.4	3.4
11032	BORDER	13.2	9.8	11128	RGC_DC	115.0	5.6
11033	BORDER1	13.8	8.8	11129	RGC_LOBO	69.0	2.7
11034	BORDER2	13.8	8.8	11185	RIO_BOS1	13.8	19.3
11179	BUTERFL2	13.8	8.3	11212	RIO_BOS2	13.8	17.0
11036	BUTERFLD	13.8	21.5	11132	RIO_GRAN	14.4	17.3
11068	CALIENTE	13.8	19.9	11137	SALOPEK1	24.9	6.1
11040	CHAPARAL	13.8	17.6	11211	SALOPEK2	24.9	18.5
11042	CHEVRON	13.8	8.5	11198	SALOPEK3	24.9	12.1
11108	CHEVRON2	13.8	6.3	11139	SANTA_F#	13.8	15.3
11044	CHEVSO1	13.8	12.9	11141	SANTA_T1	24.9	18.9
11045	CHEVSO2	13.8	12.2	11210	SANTA_T2	24.9	9.7
11120	CLINT	13.8	8.0	11144	SCOTSDAL	14.4	41.8
11048	CLINT	4.2	0.6	11146	SHEARMAN	13.8	20.0
11120	CLINT	13.8	8.0	11148	SIERRA_B	24.9	1.7
11050	COPPER	13.8	22.3	11150	SOCORRO	13.8	2.4
11053	COYOTE	13.8	7.7	11152	SOL_1	13.8	18.4
11055	CROMO1	13.8	20.7	11153	SOL_2	13.8	16.4
11056	CROMO2	13.8	16.3	11067	SPARKS	13.8	15.5
11058	DALLAS1	14.4	13.8	11156	SUNSET	4.2	5.7
11059	DALLAS2	13.8	11.3	11155	SUNSET	14.4	19.5
11000	DIABLO	13.8	9.7	11158	SUNSET_N	13.8	21.5
11064	DYER	14.4	32.4	11159	SUNSETN2	13.8	13.3
11070	FABENS	4.2	2.6	11161	THORN_1	13.8	26.6
11072	FARAH	13.8	8.1	11162	THORN_2	13.8	26.7
11074	FARMER	24.9	4.3	11164	VALLEY	14.4	7.0
11180	FELIPE	23.9	6.2	11166	VISCOUNT	14.4	19.0
11077	FT._BLIS	13.2	24.6	11168	VISTA_1	13.8	20.3
11079	HATCH	24.9	12.1	11169	VISTA_2	13.8	25.5
11081	HOLLOMAN	115.0	20.6	11171	WHITE_SA	13.8	11.9
11083	HORIZON	14.0	16.2	11173	WRANGLR1	13.8	42.8
11086	LANE	13.8	20.6				
11089	LASCRUC1	23.9	55.5				
11090	LASCRUC2	23.9	43.7				