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Petition for Post-certification License Amendment Supplement

Increase in Electrical Production Associated with the Advanced Gas Path/Dry-Low NOx Combustor Project

for the

Cosumnes Power Plant

Sacramento, California
(01-AFC-19C)

Submitted to the:

California Energy Commission

Submitted by:

Sacramento Municipal Utility District Financing Authority

September 2018

With Technical Assistance by:

JACOBS

Introduction

The Sacramento Municipal Utility District Financing Authority (SFA) respectfully submits this supplement information to the California Energy Commission (CEC) for our August 2018 post-certification license modification (Transaction Number 224625) for the Cosumnes Power Plant (CPP) (01-AFC-19C). During the CEC staff's review of the petition, the staff informally requested information on Sacramento Municipal Utility District's (SMUD) electrical generator interconnection process. This supplemental filing is a response to this inquiry.

Data Request: SMUD submitted a petition requesting to increase CPP's electrical output, originally licensed for up to 1,000 megawatts (MW) of generation with only 534 MW of generation installed, by 69 MW (for a total of 603 MW). Did SMUD perform an interconnection assessment for this increase in generation capacity and if so, please provide a copy of the assessment.

Response: SMUD did not complete a generator interconnection assessment for increase in CPP generation because CPP is already interconnected to SMUD's electrical system. However, as required by the North American Electric Reliability Corporation's Reliability Standard FAC-002-2 and in accordance with good utility practices, SMUD perform a study to ensure that no adverse reliability impacts to the Bulk Electric System occur as a result of the increased CPP output. The study results, presented in Attachment 1, did not identify any such reliability impacts and, as such, the project does not require any system upgrades or mitigation plans due to the proposed increase in CPP electrical generation.

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Attachment 1
CPP North American Electric Reliability Corporation FAC-002-2 Compliance Documentation

Cosumnes Power Plant Upgrade Project

NERC FAC-002-2 Compliance Documentation

Sacramento Municipal Utility District
Grid Planning

April 27, 2018

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1 BACKGROUND

The Sacramento Municipal Utility District (SMUD), established in 1946, is the nation's sixth largest community-owned electric utility in terms of customers served (approximately 625,000), and covers a 900 square mile area that includes Sacramento County and a small portion of Placer County. SMUD's all-time peak demand of 3,299 MW occurred on July 24, 2006.

Cosummes Power Plant (CPP) is a gas combined-cycle facility with two combustion turbines (CTs) and one condensing steam turbine (ST) located near SMUD's Rancho Seco 230 kV Substation. It has been in commercial operation since year 2005 with 500 MW generation output. After more than 10 years in operation, CPP was due for major overhaul. SMUD Power Generation department recommended to replace CT1 with 184 MW generation output in May 2018, which is 28 MW increasing and resulting 14 MW increasing for ST. In April 2019, CT2 will be upgraded with 184 MW generation output. As a result, ST will be increased by another 14 MW, a total of 28 MW increasing for the ST generation output. Therefore, CPP will have total of 76 MW increasing in generation output.

The power flow study was performed with CPP Upgrade Project, and the study result concluded there wouldn't be any system criteria violations for the SMUD transmission system under both normal and contingency conditions. The CPP upgrade projects with 76 MW increased generation output would reduce system reliability risks of load shedding and potential voltage collapse during peak summer operation condition. This report documents SMUD compliance with the NERC FAC-002-2 Reliability Standard.

2 STUDY ASSUMPTIONS

The Study used the General Electric (GE) PSLF computer program, and utilized the SMUD 2017 Ten-Year Transmission Assessment Plan study base case for the year 2019 summer peak case. The SMUD 2019 summer peak case was originally developed from the WECC approved "2018 HS3S" full loop case. Therefore, the 2019 summer peak case reflects the WECC transmission system topology including transmission system of the Western United States, Western Canada and the system of Comisión Federal de Electricidad (CFE) of Baja California, Mexico. For dynamic stability studies, the latest WECC Master Dynamics File (December 18, 2015) was used as a starting point and dynamic load models were added to this file.

The base case assumptions and modifications are further described in the following sections.

2.1 Load Related Assumptions

The 1-in-10 load forecast at the SMUD area was used in the study base case. The 1-in-10 load forecase represents an anticipated coincident/simultaneous peak load, based upon a

one-in-ten-year heat wave. The 2019 heavy summer study case was also updated with a 1-in-10 load forecast at the SUMD surrounding area of PG&E's North and Central Valley areas. Table 1 lists load levels used in the 2019 summer peak study base case.

Table 1: Load Levels used in the 2019 summer peak study base case

Load Serving Entity	Load (MW)
SMUD	3,310
WAPA Sierra Nevada Region	281
TID	694
MID	704
NCPA	487
City of Redding	272
PG&E (including other Muni loads in PG&E service territory)	29,452

2.2 Generation Related Assumptions

2.2.1 SMUD Hydro Generation

The SMUD Upper American River Project (UARP) consists of seven hydro power houses: Loon Lake, Robbs Peak, Jones Fork, Union Valley, Jaybird, Camino, and White Rock. Although the total nameplate capacity of the UARP is 698 MW when all units are on-line based on the Pmax level documented in the 2019 summer peak base case, in order to meet the SMUD operation reserve requirement, the study base case used 520 MW generation level based on the "typical" expected operating performance for the time period being studied during normal average hydro conditions. Table 2 summarizes the UARP generation capacity and dispatched MW level for the UARP hydro generation units at the SMUD area used in the 2019 summer peak base case.

Table 2: SMUD Hydro Generation Levels used in the 2019 summer peak base case

Name	Nameplate Capacity (MW)	Dispatched Level in the Case (MW)
Loon Lake	77	70
Robbs Peak	24.5	20
Jones Fork	10.5	9.5
Union Valley	47	40
Jaybird U1	77	60
Jaybird U2	77	60
Camino U1	75	50
Camino U2	75	50
White Rock U1	110	80
White Rock U2	125	80
Total Hydro	**698**	**520**

The Northern California hydro systems will be dispatched at approximately 83% level with COI at 4755 MW.

2.2.2 SMUD Thermal and Solar Generation

There are four thermal generation power plants and three peakers in the SMUD area including Cosumnes combined cycle power plant, Campbell Soup Cogeneration, Procter & Gamble Cogeneration, Carson Cogeneration plants and Procter, Carson and McClellan peakers. The 2019 WECC summer peak case documented the Pmax level for the SMUD thermal generation based on the WECC generation testing data. Table 3 provides the SMUD thermal generation capacities and dispatched generation MW level used in the 2019 summer peak base case. Six utility scale of solar generation have been modeled at the SMUD area. Table 4 lists the SMUD solar generation related information for the 2019 summer peak case case.

Table 3: SMUD Thermal Generation Levels used in the 2019 summer peak base case

Name	Capacity (MW)		Dispatched Level in the Base Case (MW)
Cosumnes Power Plant	Gas	184	160 before /184 after
	Gas	184	160 before /184 after
	Steam	192	165 before /192 after
	Total	**560**	**485 before / 560 after**
Campbell Soup Cogeneration	Gas	125	100
	Steam	52	50
	Total	**177**	**150**
Procter & Gamble Cogeneration	Gas	49	40
	Gas	49	40
	Steam	42.4	40
	Total	**140.4**	**120**
Carson Cogeneration	Gas	49	40
	Steam	13.7	10
	Total	**62.7**	**50**
McClellan Peaker	74		60
Procter Peaker	49		40
Carson Peaker	42		40
Total Thermal Generation	**1105**		**1020**

Table 4 - Solar generation dispatch used in the Study

System	Plant	Maximum Operating Capacity	Dispatch (MW)
SMUD	Elk Grove 1 Solar	50.9	41
	Elk Grove 2 Solar	37.9	30
	Solar Share	11	7.3
	Cordova	9.5	8
	Hedge	1.5	1
	Sutter's Landing North City	1.5	1
	Total	**112**	**88**

2.3 Transmission System Network Assumptions

New transmission upgrade projects that will be operational by the spring of the 2019 study year have been modeled in the study cases. Table 5 below lists three new transmission upgrade projects with the operation date by the spring of 2019.

Table 5 - New Transmission Upgrade Projects Modeled in the 2019 Study Case

Project Name	Project Description	In Service Date
Cosumnes Power Plant Upgrade Project	Increase 24 MW each generation output for CT1 and CT2 through turbine upgrade. Results in increase of 28 MW for ST.	CT1: May 2018 CT2: April 2019
Hurley Jumper Replacement Project	Replace Hurley 230 kV strain bus and jumpers on the Hurley-Tracy #1 and #2 230 kV lines.	Fall 2018
Hurley - Procter 230 kV Line Re-conductor	Reconductor approximately 6.5 miles of the Hurley - Procter 230 kV Line.	Spring 2019

2.4 SMUD Import Level

The maximum import level of the SMUD area will be 1900 MW for the 2019 summer peak study case without Sutter Power Plant. The 2019 heavy summer study base case has 1643 MW import level.

3 STUDY CRITERIA

This study measured system performance based on the criteria and guidelines which are encompassed within the North American Electric Reliability Council ("NERC") Planning Standards of TPL-001-4 Reliability Standard and the Western Electricity Coordinating Council ("WECC") TPL-001-WECC-CRT-3 Transmission System Performance Criterion.

3.1 Post-transient Governor Power Flow

Post-transient studies have been performed to ensure the NERC Planning Standards and the WECC Transmission System Performance Criteria are met following credible outages within the system. Certain contingencies may activate Remedial Action Schemes (RAS) / Special Protection Schemes (SPS) which were included in the switching sequences as appropriate. More specifically, the study methodology and criteria consistent with the following:

- In the pre-contingency state and with all transmission facilities in service, the normal transmission system facility ratings shall not be exceeded and uncontrolled separation shall not occur.
- Following the single and double contingencies identified in the Study Contingencies, the emergency transmission system facility ratings shall not be exceeded and uncontrolled separation shall not occur.
- The criteria used for the transmission system to assess reactive power margin performance of the system are the 5% and 2.5% reactive tests for N-1 outages and credible N-2 outages respectively.
- All voltages at distribution substations will be restored to normal values by the transformer tap changers and other voltage control devices.
- All automatic switching will be allowed if the switching action can be completed within 3 minutes after the disturbance.
- Other assumptions:
  - Area Interchange: Disabled
  - Governor Blocking: Base load flag will be used per WECC practice
  - DC Line Transformer Tap Automatic Adjustment: Enabled
  - Phase Shifter Control: Disabled
  - Switched Shunt Devices: Disabled

3.2 Study Contingencies

The system performance with the CPP Upgrade project has been evaluated under normal conditions and following the loss of single or multiple BES elements as defined by the TPL-001-4 NERC Reliability Standard. Table 6 below summarizes the contingencies that have been studied.

Table 6 - Study Contingencies

Contingencies	Description
P0 (No contingency)	All Elements in Service
P1 (Single Contingency)	• Loss of one generator (P1.1) • Loss of one transmission circuit (P1.2) • Loss of one transformer (P1.3) • Loss of one shunt or SVC/STATCOM device (P1.4) • Loss of a single pole of DC lines (P1.5)
P2 (Single Contingency)	• Loss of one transmission circuit without a fault (P2.1) • Loss of one bus section (P2.2) • Loss of one breaker (internal fault) (non-bus-tie-breaker) (P2.3) • Loss of one breaker (internal fault) (bus-tie-breaker) (P2.4)
P3 (Multiple Contingency)	Loss of a generator unit followed by system adjustments and the loss of the followings: • Loss of one transmission circuit (P1.2) • Loss of one transformer (P1.3) • Loss of one shunt or SVC/STATCOM device (P1.4) • Loss of a single pole of DC lines (P1.5)
P4 (Multiple Contingency)	Loss of multiple elements caused by a study breaker attempting to clear a fault on one of the following: • Loss of one generator (P4.1) • Loss of one transmission circuit (P4.2) • Loss of one transformer (P4.3) • Loss of one shunt device (P4.4) • Loss of one bus section (P4.5) • Loss of a bus-tie-breaker (P4.6)
P5 (Multiple Contingency)	Contingencies with delayed fault clearing due to the failure of a non-redundant relay protecting the faulted element to operate as designed for one of the following: • Loss of one generator (P5.1) • Loss of one transmission circuit (P5.2) • Loss of one transformer (P5.3) • Loss of one shunt device (P5.4) • Loss of one bus section (P5.5)
P6 (Multiple Contingency)	Loss of two or more (non-generator unit) elements with system adjustment between them, which produce the more severe system results
P7 (Multiple Contingency)	Loss of a common structure as follows: • Any two adjacent circuits on common structure (P7.1) • Loss of a bipolar DC lines (P7.2)

4 STUDY RESULTS

The power flow analysis with the CPP Upgrade Project concludes transmission system at the SMUD area meets NERC and WECC reliability criteria under both normal and contingency conditions. The Project has no impact to any neighboring electric systems both steady state and contingency. The load serving capability at the SMUD area increases by 56 MW.