California ISO

Moorpark Sub-Area

Local Capacity Alternative Study

August 16, 2017

1. Executive Summary

Pursuant to the California Energy Commission's (CEC) request in the June 9, 2017[1] and June 20, 2017[2] Committee orders, the California Independent System Operator Corporation (ISO) has prepared a study regarding local capacity alternatives to the Puente Power Project (Puente). In the study, the ISO analyzed three portfolios of capacity alternatives that were designed to meet the local capacity requirements (LCR) in the absence of Puente. The study does not, however, address the timing or feasibility for procurement of the alternative resources portfolios, but instead quantifies the amount of preferred resources, energy storage, and/or reactive power devices that would be necessary to meet LCR in the Moorpark sub-area.

The ISO, in consultation with Southern California Edison (SCE), developed three alternative resource scenarios to meet the Moorpark LCR in the absence of Puente. Each of these scenarios begins with a common set of incremental distributed resources that consists of an incremental 80 MW of energy storage enabled demand response resources, 25 MW of incremental photovoltaic (PV) solar/energy storage hybrid resources, and approximately 30 MW of existing slow responding demand response resources coupled with incremental energy storage to enable these resources to meet local area contingencies. This represents an incremental 135 MW of distributed resources that are assumed to be procured or properly enabled in the Moorpark sub-area under all three scenarios.

This 135 MW of incremental distributed resources is not sufficient to meet the local capacity requirements for the Moorpark sub-area. As a result, the ISO studied three scenarios to quantify the amount of additional "grid-connected" resources necessary to meet the applicable reliability criteria.[3] The ISO conducts its planning studies to adhere to NERC, WECC, and ISO transmission planning standards as well as the local capacity technical study criteria set out in the ISO tariff[4] to ensure adequate local area

[1] Committee Order Granting Applicant's Motion to Exclude the Supplemental Testimony of James H. Caldwell and Accepting the California Independent System Operator's Offer to Conduct a Special Study (TN#218016) (June 9 Order).

[2] Committee Orders Extending the Time for the California ISO Special Study, Denying the City of Oxnard's Request for Additional Time, Revising the Committee Schedule, and Cancelling the June 28, 2017 Committee Conference (TN#219815) (June 20 Order).

[3] The ISO uses North American Electric Reliability Corporation (NERC) reliability standards, Western Electricity Coordinating Council (WECC) regional criteria, ISO planning standards and local capacity technical study criteria set out in the ISO's tariff (Section 40.3.1.1, Local Capacity Technical Study Criteria). The latter was most relevant in this study.

[4] ISO Tariff Section 40.3.1.1 provides that "[t]he Local Capacity Technical Study will determine the minimum amount of Local Capacity Area Resources needed to address the Contingencies identified in Section 40.3.1.2."

reliability. In this case, the local capacity technical study criteria set out in the ISO tariff to avoid voltage collapse for the contingency events set out in the requirements are the most limiting and are the basis for establishing the volume of required local capacity.

In the Scenarios 1 and 2, the ISO determined the amount of (1) in-front-of-meter (IFOM) battery storage; or (2) dynamic reactive power, respectively, necessary to meet local capacity requirements described above. For Scenario 3, the ISO assumed the Ellwood Generating Facility, a 54 MW gas-fired plant located in the Moorpark sub-area, will retire instead of being refurbished. The ISO then determined the amount of IFOM battery storage that would be necessary under this scenario. The additional "grid-connected" resources needed to meet the local capacity technical study criteria for each of the three scenarios are detailed below:

- **Scenario 1 –** 125 MW of energy storage resources with a nine hour continuous discharge duration would be necessary to satisfy local capacity requirements consistent with the local capacity technical study criteria.
- **Scenario 2 –** A 240 Mvar reactive power device would be necessary to satisfy local capacity requirements consistent with local capacity technical study criteria. Unlike Scenario 1 and 2, however, the reactive support does not also provide protection from loss of load through load shedding to avoid thermal overloads; load shedding is not desirable but is permitted under the local capacity technical study criteria in the circumstances being studied.
- **Scenario 3 –** If the 54 MW Ellwood Generating Facility is retired rather than refurbished, 240 MW of energy storage resources would be necessary to satisfy local capacity requirements consistent with the local capacity technical study criteria. 115 MW of this energy storage capacity would need a five hour continuous discharge duration, 65 MW would need a nine hour continuous discharge duration, and 60 MW would need a ten hour continuous discharge duration.

The ISO also conducted a summary cost comparison of the alternative scenarios based on publicly available information. The ISO's cost comparison indicates that the estimated capital costs for scenarios 1 and 3 are significantly higher than the estimated capital costs for the Puente project, as shown in Table 1-1 below. The estimated capital costs for scenario 2 is only slightly higher than the Puente project but this scenario does not provide the same level of protection against post-contingency load shedding to mitigate thermal overloads. These costs represent initial installation costs and do not include ongoing operating or maintenance costs, or replacement costs to adjust for shorter expected lifespans of some equipment versus others.

Table 1-1

Capital Cost Estimates of Resource Portfolios

Resource	Description	Estimated cost (millions)
Scenario 1	Incremental distributed resources plus grid connected battery storage	$805
Scenario 2	Incremental distributed resources plus reactive device	$309-$359
Scenario 3	Incremental distributed resources plus grid connected battery storage (if the Ellwood Generating Station is retired)	$1,116
Puente Power Project	262 MW combustion turbine generator	$299

2. Introduction

2.1. Background

The California Public Utilities Commission (CPUC) authorized SCE to enter into a long term resource adequacy power purchase agreement with NRG Oxnard Energy Center, LLC (NRG) for the 262 MW gas-fired Puente facility.[5] The project was approved to offset the local capacity requirements in the Moorpark Sub-Area that result from the expected retirement of close to 2000 MW of once-through-cooled (OTC) generation at the end of 2020 due to state policy limiting the use of coastal and estuarine water. NRG subsequently applied to the CEC for certification to construct and operate the Puente facility.

In connection with its consideration of NRG's application, the CEC accepted the ISO's offer to study various portfolios of preferred resources[6] that could meet the identified need, and indicated that an ISO special study of one or more alternative resource portfolios that considers the parameters and assumptions below would be most useful.

- The necessary resources are in place to meet the reliability need in the Moorpark Sub-Area in 2021 with timely Once-Through Cooling (OTC) compliance;

[5] CPUC Decision 16-05-050.

[6] To be precise, "preferred resources" as defined in CPUC proceedings applies more specifically to demand response and energy efficiency, with renewable generation and combined heat and power being next in the loading order. The term is used more generally here consistent with the more general use of the resources sought ahead of conventional generation.