REPLACING A POLLUTING POWER PLANT WITH BEHIND-THE-METER RESOURCES

Country/region	**United States (Oakland, California)**
Type of E1st approach	B – In front / Investment 2 – Enabling E1st (Substituting a retiring gas unit calling on the participation of distributed resources, including energy efficiency and demand response)
Energy carrier(s) targeted	Electricity
Sector(s) / energy system(s) or end-uses targeted	All
Implementing bodies	Pacific Gas and Electric Company (PG&E) East Bay Community Energy (EBCE) Bidding organisations
Decision makers involved	Public Utilities Commission of the State of California (CPUC) (regulator) California Independent System Operator (CAISO)
Main objective(s)	Ensure adequacy between electricity demand and supply
Implementation period	From mid-2022
Authors of the example	Marion Santini (RAP)

The Oakland Clean Energy Initiative (OCEI) aims to address the retirement of a 165 MW fossil-fuel peaking plant[1] while avoiding the need for building new transmission lines and keeping costs down. The mix of resources selected for contributing to the project include demand-side resources (energy efficiency and demand response) as well as distributed generation (photovoltaic) and storage. The selected resources are expected to be operational in mid-2022, when the fossil-fuel plant retires.

[1] The plant runs on jet fuel. For more information see EBCE, 2018.

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1. Background

California Independent System Operator (CAISO) is a nonprofit public benefit corporation in charge of operating the wholesale energy market and maintaining reliability on the high-voltage, long-distance power lines for the grid serving 80% of California and a small part of Nevada.[2] Each year, CAISO goes through a transmission planning process to identify system limitations and opportunities for improving reliability and efficiency. The outcome of the process is called the ISO Transmission Plan.[3]

During the 2015-2016 planning process, CAISO identified a long-term reliability concern for the East Bay Area[4] (CAISO, 2016). The retirement of the 40-year-old Oakland Dynegy power plant, planned for 2022, is a risk to local transmission reliability. Once the plant is retired, peak electricity supply will need to come from other areas, causing a stress on the transmission infrastructure. This is a concern for CAISO, which controls the development and maintenance of the transmission system. CAISO is currently engaged in a Reliability Must Run contract with Dynegy, which means that the plant commits to supply electricity during periods where it is most needed.

As noted by Chhabra (2018), the "standard procedure" would be to repower the retiring power plant with new gas turbines or to install high-power transmission lines through Oakland. The first solution would mean further pollution and greenhouse gas emissions, while the second solution would require digging through a heavily populated area.

2. How has the E1st principle (or similar concept) been implemented?

When dealing with reliability issues, demand-side resources are potentially cheaper options from a total system perspective than building new peaker plants or transmission lines. They also bring other benefits to the economy (local job creation, etc.) and the environment. Well-designed energy efficiency and demand response programmes can contribute to lowering peak demand for energy, which is a major determinant of the size of the power system and has a large influence on its cost. Mainstreaming demand-side solutions to address reliability issues is therefore a key strategy to enable the E1st principle (Enefirst, 2020).

To deal with the planned retirement of the Oakland peaker plant, CAISO said it would consider alternatives including a portfolio of local clean resources, in line with its policy on the consideration of alternatives to address local needs in transmission planning (CAISO, 2013). The Pacific Gas and Electric Company (PG&E), which is a regulated investor-owned utility providing services in this area, has worked with CAISO to analyse how distributed clean energy resources could become part of an alternative to the plant. This resulted in the Oakland Clean Energy Initiative (OCEI), which was approved by CAISO in March 2018 (PG&E, 2018).

The project's scope is outlined in the 2017-18 Transmission Plan (CAISO, 2018). It combines substation upgrades, in-front-of-the-meter energy storage, and the competitive procurement of an additional 10 MW-24

[2] More information here: http://www.caiso.com/about/Pages/default.aspx
[3] More information here: http://www.caiso.com/planning/Pages/ReliabilityRequirements/Default.aspx
[4] Covering cities in Alameda and Contra Costa counties, including Concord, Berkeley, Oakland, Hayward, Fremont and Pittsburg.

MW of alternative resources. CAISO's Transmission Plan presents the OCEI elements, as well as the alternatives which have been considered, but rejected, during the planning process (Table 1).

Table 1 – Scenarios considered to meet the reliability concern and associated costs

Scenario	Description	Estimated Capital Cost 2022 $M	Total Cost 2022 $M
OCEI ***(selected scenario)***	• Upgrades to Moraga 230/115 kV Transformer Bank and at Moraga 115 kV and Oakland X 115 kV substation buses • Transmission line rerates on Moraga-Claremont 115 kV Lines #1 and #2 • A minimum of 10MW / 4 hour of in-front-of-the-meter utility-owned energy storage within Oakland C and Oakland L 115 kV substation pocket • Competitive procurement of additional 10 MW-24 MW of preferred resources sited within the Oakland C and Oakland L 115 kV substation pocket (at least 19.2 MW must be load-modifying in nature) • Continued reliance on transferring Alameda Municipal Power load from Cartwright (North) to Jenny (South) during peak loading conditions and after an N-1, in preparation for an N-1-1	56 - 73	102
115 kV (scenario not selected)	• Three alternatives (Moraga-Maritime 115 kV Line Installation, Moraga-Oakland 'C' 115 kV Line Installation or Moraga-Oakland 'L' 115 KV Line Installation)	193 - 217	367
230 kV (scenario not selected)	• Submission from Next Era Energy Transmission (NEET) West: new 230 kV line from Moraga or Sobrante to Oakland C substation with a 230/115 kV transformer connecting to Oakland C 115 kV substation • Additional upgrades would need to be added to alternative to address the reliability need identified	316	574
Generation (scenario not selected)	• 200 MW of generation	232	368

(Source: based on CAISO, 2018, pp.128-129)

OCEI stands out in terms of the associated costs. It also contributes to reaching environmental objectives, notably by allowing an increased penetration of renewable energy.

Following the approval of the plan by CAISO, PG&E in collaboration with the public power supplier East Bay Community Energy (EBCE) opened a request-for-offers process in 2018. EBCE solicited resource adequacy from clean resources and PG&E sought local transmission-related reliability needs. The Solicitation Protocol (PG&E and EBCE, 2018) lists the resources which can participate in the bid. It identifies needs for peak day hourly resources (Figure 1). To mitigate against potential contingency overloads, PG&E seeks resources that reduce electrical consumption or increase generation between 8:00 am and 6:00 pm.

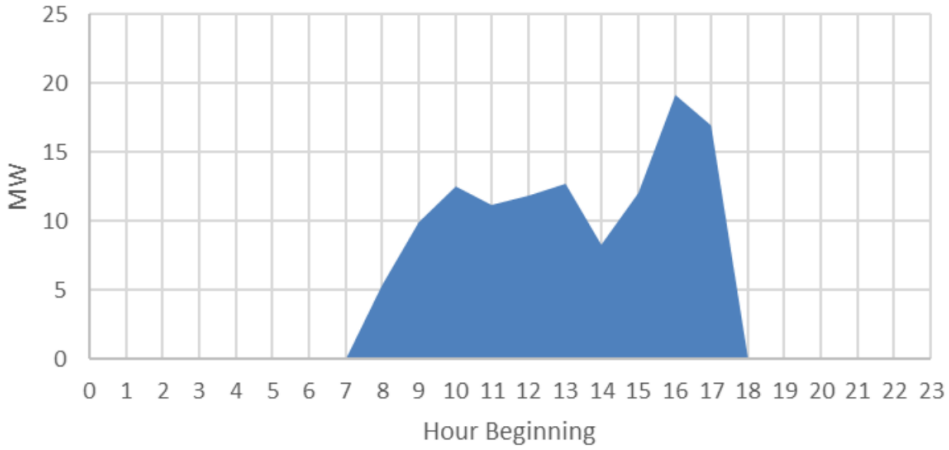

Figure 1 – OCEI Peak day hourly resource need
(Source: PG&G and EBCE, 2018)

3. Effects / impacts

The Oakland Clean Energy Initiative has a forecasted in-service date of mid-2022. PG&E said that it has received "multiple, competitive bids" (Morris, 2019).

A distributed storage project has been selected. Sunrun is planning to install batteries in more than 500 low-income households in and around Oakland, providing several MW of solar and more than 2 MWh of batteries by 2022. This will deliver 500 kilowatts of grid reliability capacity to EBCE during a 10-year contracted period (Sunrun, 2019). Sunrun will use a state subsidy programme which requires that savings from the solar panels are passed on to low-income tenants (Tepperman, 2019).

Utility storage projects are also being developed,[5] and it is interesting to note that Vistra Energy[6] has acquired the Oakland Power plant (which is meant to retire in 2022) and will build a battery energy storage project of 20 MW/80 MWh on the site. The system will draw electricity from the grid during off-peak hours and discharge it during peak hours (EBCE, 2019a).

The OCEI is still evolving, as shown in the next paragraph.

4. Changes over time, if any

CAISO (2019) requested some changes in the project as part of the 2018-2019 transmission planning process. The granularity of the project was improved.[7] CAISO also recommended that the utility-owned energy storage project should no longer be required to serve as a transmission asset. On this point, the staff

[5] See also: esVolta (contracting entity Tierra Robles Energy Storage, LLC), a storage project under development, which will provide 7MW/28MWh of local resource adequacy for a period of 10 years, and will help to address the transmission-related reliability needs (EBCE, 2019b).
[6] Vistra is also developing a large energy storage system in Moss Landing, California.
[7] Out of the total resource mix (20 MW/120 MWh) to be sited within the Oakland C and Oakland L 115 kV substation pocket, no less than 7 MW/28 MWh should be either located at the Oakland L substation or interconnected via the PG&E distribution system to the CAISO-controlled grid at Oakland L. This adjustment was mentioned by PG&G during the planning process (PG&E, 2019a).

of the California Public Utilities Commission (CPUC) provided comments during the planning process (CPUC, 2019a), requesting additional information regarding the permitted revenue streams for the energy storage component of the OCEI. They asked whether the energy storage component must function as a dedicated transmission asset, recovering capital investments only through the transmission rate case, or if the storage could also access other market revenue streams.

During the 2019-2020 planning process, which is ongoing at the time of writing, PG&E (2019b) requested confirmation that OCEI is still necessary to provide near-term reliability and requested that CAISO identify the location and amounts of any additional resource requirements associated with the incremental load growth in the new forecast. PG&E expects CAISO to "*facilitate a coordinated, phased transition and termination of the Reliability Must Run (RMR) agreement with the Vistra Oakland Power Plant, in tandem with the new OCEI resource additions*." In their comments, the staff of the CPUC (2019b) supported an evaluation of the potential for increased distributed energy resources procurement to meet the evolving needs in the OCEI project area.

The modifications in the project shows that reliability planning is a meticulous exercise, which requires adequate planning, technical capacities and frequent revisions.

5. Barriers and success factors

Effective communication with all stakeholders is important to build confidence and ensure the success of such an initiative. This is confirmed by recent developments reported in local media (Tavares, 2019). In November 2019, the Alameda City Council directed its city attorney to file a complaint against PG&E with the Federal Energy Regulatory Commission (FERC). The Council asserts that OCEI places an undue burden on Alameda Municipal Power (AMP) and its customers. Alameda is located on an island in the San Francisco Bay, adjacent to Oakland. AMP fears that if OCEI does not work properly, the island's two connections to the power grid will be reduced to one — putting their customers at risk of losing power for an extended period of time. AMP management said that "*nearly every attempt by AMP to engage in a meaningful dialogue with PG&E has been met with resistance, delay and, on occasion, a complete refusal to even communicate or otherwise return emails*".

6. Replicability and scalability potential

Replicating the approach requires an enabling regulatory framework. Indeed, PG&E has to seek approval through the Public Utilities Commission of the State of California (CPUC) for its procurement contracts.

On this point, the CPUC decision (2019c) requiring electric system reliability procurement for 2021-2023 states that all sources shall be considered toward the 3,300 MW requirement. This covers new and existing sources, preferred and conventional sources, CHP, and demand-side resources. It is interesting to note that CPUC chose to not set a specific target for certain types of resources.[8] The CPUC (2019c) states that

[8] One exception is made to the principle of parity in view of reaching climate and energy targets: new development of fossil-fuel-only resources, at sites without previous electricity generation facilities, will not be considered towards the procurement obligation. The debate about the closure of fossil-fuel plants is vivid in California. The CPUC has extended the deadline for some plant's retirements due to reliability concerns, despite environmental concerns (CPUC, 2019c).

"*resources with different costs and benefits may be evaluated differently, so long as similar attributes are valued similarly*." The CPUC will not prescribe the exact metrics to be used to compare different types of resources, but it will require the investor-owned utilities to conduct their solicitations in a non-discriminatory manner – treating all resources on a level playing field as long as they deliver equivalent value.

In the European Union, only network services (and companies) remain in the regulated segment; generation and supply are market-based activities. For this reason, dealing with a retiring generation asset would involve a different process. Regarding network planning, the new market design (EU, 2019/943 and EU 2019/944) now requires both TSOs and DSOs to consider demand-side resources in their network planning (for more information, see Enefirst, 2020), which should improve the planning processes.

Regarding reliability planning, decision-makers in many countries have fallen back on capacity mechanisms as a temporary measure to secure investments in capacity assets (Pató et al., 2019), despite concerns about their effectiveness.[9] Article 18 of the recast EU Regulation on the internal market for electricity (EU, 2019/943) now states that demand-side resources need to be treated equally with supply-side in capacity mechanisms.[10]

The enforcement of these provisions will be crucial to allow the contribution of demand-side resources towards reliability objectives, within or preferably outside of a capacity mechanism. Attention is required, as the acceptance of demand response and energy efficiency bids in the capacity auctions does not necessarily mean that demand resources are on an equal footing with supply (Pató et al., 2019).[11]

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It is also interesting to note that a debate also took place in the Federal Energy Regulatory Commission (FERC) over the extension of CAISO's authority to contract for power generation outside of its electricity markets when the operator feels reliability may be threatened. Source: (Politico, 2019).

[9] On the issue of reliability concerns, see (Hogan, 2016).

[10] Member States with adequacy concerns must set up a plan for market reform that will eventually lead to the elimination of capacity mechanisms. This plan "should enable self-generation, energy storage, demand-side measures and energy efficiency by adopting measures to eliminate any identified regulatory distortions." The European Commission will review the implementation plans and decide whether the measures planned for market reform are sufficient. National Regulatory Authorities will report on implementation annually.

[11] In November 2018, the EU's General Court annulled the European Commission's decision to approve Great Britain's Capacity Market Mechanism, following concerns over discriminatory provisions hindering demand-response participation. For more information, see Pató et al., 2019.

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ABOUT ENEFIRST

ENEFIRST is a 3-year project funded under the Horizon2020 programme, which gathers a consortium of partners from across sectors and regions: IEECP, BPIE, Fraunhofer ISI, CEU, RAP, IREES, TU Wien.

From definition to implementation, ENEFIRST aims at making the "Efficiency First" (E1st) principle more concrete and operational, better understand its relevance for decision processes related to energy demand and supply, its broader impacts across sectors and markets, focusing on the building sector and related energy systems in EU Member States.

> ***E1st gives priority to demand-side resources whenever they are more cost-effective from a societal perspective than investments in energy infrastructure in meeting policy objectives. It is a decision principle that is applied systematically at any level to energy-related investment planning and enabled by an "equal opportunity" policy design.***

ENEFIRST combines policy analysis and quantitative assessments of E1st impacts to develop policy guidelines and recommendations, following a process with continuous exchanges with stakeholders.

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