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Agenda Report

October 6, 2014

TO: Honorable Mayor and City Council

THROUGH: Municipal Services Committee (September 23, 2014)

FROM: Water and Power Department

SUBJECT: **AB2514 ENERGY STORAGE SYSTEM PROCUREMENT TARGETS AND POLICIES**

RECOMMENDATION:

It is recommended that the City Council:

1. Find that the proposed action is not a project subject to the California Environmental Quality Act (CEQA) as defined in Section 21065 of CEQA and Section 15378 of the State CEQA Guidelines and, as such, no environmental document pursuant to CEQA is required for the project;
2. Find that it is not appropriate at this time to establish procurement targets for energy storage systems to be procured by Pasadena Water and Power ("PWP") due to lack of cost-effective viable options.
3. Direct PWP staff to continue to look for appropriate opportunities to encourage the cost-effective deployment of viable energy storage systems, and to make new recommendations to the City Council regarding cost-effective and viable energy storage system procurement targets and policies, if any, at least once every three years.

EXECUTIVE SUMMARY:

Assembly Bill 2514 (2010, Skinner) ("AB 2514") requires that publicly-owned utilities commence a process to determine appropriate targets, if any, for the utility to procure viable and cost-effective energy storage systems by March 1, 2012, and that their governing boards such as the City Council set appropriate procurement targets, if any, by October 1, 2014 for energy storage systems to be procured by December 31, 2016, and December 31, 2021. The City Council may also consider a variety of possible policies to encourage the cost-effective deployment of energy storage systems, including refinement of existing PWP procurement methods to properly value energy storage systems. The City Council must reevaluate the policies and procurement targets, if any, at least once every three years.

The City Council directed PWP to initiate the evaluation process as part of the Integrated Resource Plan Update adopted by the City Council on March 5, 2012. PWP subsequently initiated a review of energy storage system research conducted by leading institutions, including the Electric Power Research Institute ("EPRI"), Department of Energy ("DOE"), Sandia National Laboratories, Southern California Edison, Black & Veatch, DNV KEMA, Navigant Consulting, and others. PWP actively participated in the Southern California Public Power Authority ("SCPPA") Energy Storage Working Group. The working group issued an energy storage Request for Proposals ("RFP") and licensed energy storage evaluation software from Navigant Consulting. PWP conducted its own analysis of energy storage viability and cost-effectiveness for the Pasadena system utilizing the Navigant software (see attached report).

Based on work completed to date, PWP has not identified a specific need or any viable energy storage technologies that are cost-effective at a scale that is practical for PWP. Therefore, it is recommended that the City Council not establish specific targets at this time.

However, the energy storage industry is still in its early stages. As technologies evolve their cost-effectiveness is expected to improve over the coming years. PWP will continue to monitor developments in energy storage system technology and cost, and will present updated recommendations regarding energy storage system procurement targets and policies to the City Council at least once every three years.

BACKGROUND:

According to AB 2514, the term "energy storage system" means commercially available technology that is capable of absorbing energy, storing it for a period of time, and thereafter dispatching the energy.

An "energy storage system" must be *cost effective* and:

- reduce emissions of greenhouse gases,
- reduce demand for peak electrical generation,
- defer or substitute for an investment in generation, transmission, or distribution assets, or
- Improve the reliable operation of the electrical transmission or distribution grid.

The legislative policy embodied in AB 2514 was enacted to expand the use of energy storage systems to:

1. Assist in integrating increased amounts of renewable energy resources into the electrical transmission and distribution grid in a manner that minimizes emissions of greenhouse gases;
2. Optimize the use of the significant additional amounts of variable, intermittent, and off-peak electrical generation from wind and solar energy that will be entering the California power mix on an accelerated basis;

3. Reduce costs to ratepayers by avoiding or deferring the need for new fossil fuel-powered peaking power plants and avoiding or deferring distribution and transmission system upgrades and expansion of the grid;
4. Reduce the use of electricity generated from fossil fuels to meet peak load requirements on days with high electricity demand and potentially avoid or reduce the use of electricity generated by high carbon-emitting electrical generating facilities during those high electricity demand periods, which could have substantial co-benefits from reduced emissions of criteria pollutants[1]; and,
5. Provide the ancillary services[2] otherwise provided by fossil-fueled generating facilities to reduce emissions of carbon dioxide and criteria pollutants.

Evaluation Process

Since initiating the investigation into energy storage systems in March of 2012, PWP has reviewed energy storage system research and documentation prepared by others, and has been involved with SCPPA in several efforts. The most notable of these efforts included participation in the SCPPA Energy Storage Working Group, and the SCPPA RFP for Energy Storage.

Through the RFP, and the SCPPA RFI for Generation Replacement and Future Resources, PWP and other SCPPA participants have received and reviewed several innovative energy storage proposals providing real world data to validate the analysis. PWP has also had discussions, through SCPPA and directly, with several energy storage vendors and consultants, and with the California Energy Storage Alliance. PWP reviewed the reports and filings of other utilities, including Southern California Edison ("SCE"), Pacific Gas & Electric ("PG&E"), San Diego Gas & Electric ("SDG&E"), and other municipal utilities.

AB 2514 does not define "cost-effective." For purposes of this analysis, PWP used the following minimum criteria:

1. The product or service must fill an existing or anticipated unmet need, and
2. Must have a benefit-to-cost ratio ≥ 1, and
3. The benefits must accrue proportionately to the parties that pay the costs[3].

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[1] Criteria pollutants include carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. Criteria pollutants are the only air pollutants with national air quality standards that define allowable concentrations of these substances in ambient air.

[2] Ancillary services support the reliable operation of the transmission system as it moves high voltage electricity (generally >100 kV) from power plants to retail customers. Current ancillary services in the CAISO market include: regulation, spinning reserve, non-spinning reserve, voltage support, and black start.

[3] For example, if it is determined that an energy storage system installed in Pasadena could provide hundreds of millions of dollars of net benefits to the CAISO system (of which PWP load is only about 1%), but there is no way for PWP customers to recover the remaining cost of the energy storage system from the other 99% of CAISO customers if PWP were to install it, then by this definition, it would not be cost effective for PWP, even if the benefit-to-cost ratio were >1 for the CAISO.

Benefit-to-cost ratio is defined as the net present value ("NPV") of all direct, quantifiable benefits divided by the NPV of the direct, quantifiable costs of a defined energy storage system providing specific grid (or distribution/customer) services over its lifetime. To be cost effective, the energy storage product or service generally must be less expensive (or more effective) than alternative means of providing the same product or service.

Need for Energy Storage

Many of the applications and uses that energy storage systems can provide are also provided in other proven and more cost-effective ways. PWP has the ability to provide those products from existing generation (e.g., the Glenarm/Broadway power plants) as well as the option to purchase them from the California Independent System Operator ("CAISO") market at lower cost than energy storage. Some services provided by energy storage can also be achieved through conservation, demand-side management and rate design (e.g., time-of-use rate structures).

PWP has not identified specific distribution upgrades that could cost-effectively be deferred through the use of energy storage systems. If, at some point in the future, radial distribution feeders experience voltage fluctuations or other power quality issues as a result of a high penetration of local solar installations, electric vehicle charging, or other distribution network transformation, energy storage systems on the distribution network or for customer energy management services may provide a cost-effective alternative to other distribution system infrastructure improvements.

Cost Effectiveness

PWP, through the SCPPA Energy Storage Working Group, interviewed several consultants in search of a reasonably priced model to help evaluate the cost-effectiveness of energy storage technologies. The group considered at least three different models, and chose to license the Navigant SCPPA Energy Storage Tool ("ES Tool"). Based on user-configurable input data, the tool determines the net present costs and benefits of potential energy storage resources. According to Navigant, the tool has gone through extensive review and usage. Sandia National Labs and the DOE conducted formal peer reviews of the framework.

PWP considered the various technologies and functions that energy storage can provide, and narrowed the list to those that PWP believed would have the highest potential viability and best fit for PWP by 2016 and by 2021. The technologies that were modeled by PWP using the ES Tool included:

1. Compressed Air Energy Storage (above ground),
2. Compressed Air Energy Storage (below ground),
3. Pumped Hydro Storage,
4. Flywheel Energy Storage,
5. Advanced Lead Acid Batteries,

6. Lithium Ion Batteries, and
7. Thermal Energy Storage.

Results

Compressed Air Energy Storage ("CAES") and Pumped Hydro were the only potentially cost-effective technologies identified by the ES Tool. However, in order to provide the highest value services necessary to be cost effective, the storage facility would need to be located within the City's limits. It is unlikely that opportunities exist within the City to develop such technologies at a viable and cost-effective scale. There may be future cost-effective opportunities to secure such resources outside of Pasadena to help integrate PWP's portfolio of renewable resources.

Based on work completed to date, PWP has not identified any viable energy storage technologies that are cost-effective at a scale that is practical for PWP at this time. The energy storage industry is still in its early stages, with many technologies still evolving, and cost-effectiveness is expected to improve rapidly over the coming years. PWP has not identified a need at this time that would justify the expense of energy storage to its customers. Unless a clear need and cost-effective application are identified, setting energy storage procurement targets could lead to unnecessary costs that would increase rates.

PWP staff will continue to look for appropriate opportunities for energy storage systems as it executes its Integrated Resource Plan, and procures future renewable and conventional energy. PWP staff will continue to work with SCPPA to evaluate various energy storage technologies through solicitation of proposals for energy storage systems as standalone offers as well as in conjunction with renewable and conventional energy projects.

PWP will report to the California Energy Commission ("CEC") as required by AB 2514 with respect to energy storage system procurement targets and policies that may be adopted (or not) by the City Council, and if such targets and/or policies are ever adopted, PWP's compliance with such. Any reports made by PWP to the CEC pursuant to AB 2514 will be made available to the public by the CEC and/or PWP on their respective websites.

Other Municipal Utility Results

PWP has reviewed work performed by other municipal utilities, including an extensive report prepared by the Sacramento Municipal Utility District that concluded energy storage is not yet cost-effective and that no procurement targets should be set. To date, four other public utilities (Anaheim, Palo Alto, Lodi, and Truckee Donner) have also filed resolutions and/or reports with similar recommendations.

Some municipal utilities, including the Los Angeles Department of Water and Power and the Imperial Irrigation District, are expected to recommend establishing energy storage procurement targets. Unlike PWP, each of these utilities has a large service territory

and operates its own electrical balancing area. The targets these two utilities choose to set may not be entirely based on pre-established determinations of cost effectiveness or need.

The City of Redding has recommended extending its Ice Bear thermal energy storage program and has set procurement targets of 3.6 MW for 2016 and 4.4 MW for 2020. PWP expects there may be three or four other municipal utilities that will set modest procurement targets, but informal polling of the California Municipal Utilities Association's 39 members indicates that the majority are likely to find energy storage is not cost-effective at this time, and will decline to set procurement targets.

COUNCIL POLICY CONSIDERATION

The proposed action will help PWP achieve regulatory compliance and is consistent with the City Council's goal to maintain fiscal responsibility and stability by seeking cost-effective means to meet the City's conservation and sustainability goals and to provide a high level of public service.

ENVIRONMENTAL ANALYSIS:

The proposed non-adoption of energy story system procurement targets is an administrative action that would not cause either a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment. The proposed action is for the City to comply with AB 2514 by not adopting energy storage system procurement targets at this time because energy storage has not been found to be cost-effective for PWP. No physical construction is contemplated or would be authorized, by the actions proposed in this staff report. Therefore, the proposed action is not a "project" subject to CEQA, as defined in Section 21065 of CEQA and Section 15378 of the State CEQA Guidelines. Since the action is not a project subject to CEQA, no environmental document is required.

FISCAL IMPACT:

There is no fiscal impact as a result of this action, and it will not have any indirect or support cost requirements. The anticipated impact to other operational programs or capital projects as a result of this action will be none.

Respectfully submitted,

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ATTACHMENT: PWP AB 2514 Energy Storage Systems Evaluation Report