City of Culver City

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Staff Report

File #: 19-953, **Version:** 1 **Item #:** A-1.

CC - (1) Receive a Feasibility Report Presentation by Willdan to Install a Microgrid Containing Solar Photovoltaic and Battery Energy Storage Systems at the Veterans Memorial Complex and Senior Center; and (2) Provide Direction to the City Manager as Deemed Appropriate

Meeting Date: March 18, 2019

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Fiscal Impact: Yes [] No [X] **General Fund:** Yes [] No [X]

Public Hearing: [] **Action Item:** [X] **Attachments:** [X]

Commission Action Required: Yes [] No [X] **Date:**

Public Notification: (E-Mail) Meetings and Agendas - City Council (03/13/19); Willdan (02/28/19)

Department Approval: Charles D. Herbertson (03/08/19)

RECOMMENDATION

Staff recommends that City Council (1) receive a Feasibility Study presentation from Willdan Energy Solutions ("Willdan") regarding the construction of a Microgrid containing solar photovoltaic and battery energy storage systems, for the Veterans Memorial Complex and Senior Center; and (2) provide direction to the City Manager as deemed appropriate, including direction to pursue grant and other funding sources to implement the Microgrid.

BACKGROUND/DISCUSSION

Over the last few years, Public Works has completed several studies to determine the technical and financial viability of rooftop and parking facility photovoltaic solar (PV) energy generation systems, battery storage systems to reduce energy consumption during peak demand periods, and a Zero Net Energy Master Plan that outlines the facilities where installation of on-site generation systems are feasible.

Based on the findings of these studies and in conjunction with the City's Hazard Mitigation Plan, it was determined that a combined solar and battery storage project, or an advanced energy-independent campus (aka "Microgrid"), at the Veterans Memorial Building (VMB) and the Senior Center would make a good pilot project (the "Microgrid Project"). If implemented, the Microgrid Project would support the emergency shelter elements of the Hazard Mitigation Plan and demonstrate that energy resiliency using clean, renewable power. The objective is to build a Microgrid containing an on-site energy generation system that is powered by 100% clean electricity and has the capacity to run all day and night independent of the grid every day (except some cloudy days) and in particular, during an emergency event (aka "islanding"). The Public Works Department work plan included hiring a consultant to study the feasibility of implementing the Microgrid Project.

Staff released a scope of work and interviewed five companies that offered a range of energy engineering, distributed energy resources, technical, and mechanical expertise. Willdan Energy Solutions (Willdan) emerged as the company that had the most relevant Microgrid feasibility and implementation experience. Willdan presented a team of microgrid advisors and smart city strategists, a clear plan for funding the project, and has worked with Culver City since 1985 on civil engineering projects. Willdan also provides engineering and data analytics support to the Clean Power Alliance (CPA) and are currently working on an electrification study for City's Transportation Department. In October 2018, the City Manager administratively approved an agreement with Willdan in amount not-to-exceed $48,864 to complete the Microgrid Project study.

Willdan's Solar PV, Energy Storage, and Microgrid Feasibility Report

Willdan started a Preliminary Assessment of the Microgrid Project in November 2018. The consultant team completed thorough site visits to map out potential solar PV array placements, meter installation locations, and battery sizing to provide the City with several microgrid scenarios. Staff worked with the consultants to obtain Southern California Edison (SCE) and Southern California Gas (SCG) usage data for the Senior Center, VMB, and the Plunge. Representatives from SCE actively participated in all the meetings to ensure that any plans that Willdan designed will take SCE's input and limitations into consideration. As part of the Microgrid analysis, Willdan took into account the City's decision to power all City facilities with 100% Green Power through the CPA.

Three Microgrid scenarios were studied by Willdan that are summarized below:

Option	EE Cost	Infr. Cost	Solar Cost	Battery Cost	Total Cost
A: Economic	$371,500	$199,405	$1,524,250	$469,800	$2,564,955
B: Resilience 1	$371,500	$543,730	$1,748,500	$1,549,800	$4,213,530
C: Resilience 2 (true Microgrid)	$371,500	$775,615	$2,440,750	$1,485,900	$5,073,765

Option	Total Cost	Annual Energy Savings	Payback in Years with Savings
A: Economic	$2,261,150	$150,000	17.1
B: Resilience 1	$3,539,300	$200,000	21.1

C: Resilience 2 (true Microgrid)	$4,350,900	$213,900	23.7

Energy Efficiency (EE) Measures Cost: Willdan estimated that 19% of the combined site loads at both locations can be offset by additional energy efficiency projects focused on mechanical equipment and electrification of natural gas heating equipment. The Microgrid options presented below assume implementation of these additional energy efficiency measures.

Option A: Economic Option
The Option A Microgrid scenario is the lowest cost option. The generation systems are sized to maintain critical loads at the Senior Center and the VMB during an outage. However, this scenario is not a true microgrid, meaning it cannot island or act independently from the grid. Because the Plunge meter is not electrically connected to the solar and battery systems, it can only benefit from the bill credit from the excess of solar generation at the adjacent VMB and Senior Center site through SCE's (or CPA's) Net Energy Metering-A (NEM-A) program. Because this scenario does not include physical consolidation of the existing meters, the number of meters remain at four. This scenario generates an annual energy bill savings of $150,000.

Option B: Resilience 1
This scenario gives the City more flexibility to size up the solar and battery systems through consolidation of the meters at VMB. Consolidation of meters can lower costs through reduction in meter charges and reduction in energy/demand charges. Additional solar, larger batteries and consolidation increases the resiliency of this option, but also increases the costs to build. The capital costs include conduit, cables, labor, and meter infrastructure. This system combines all meters at VMB into one meter for a total of two meters across the two sites. This scenario gives an annual energy bill savings of $200,000.

Option C: Resilience 2
This final option would provide the truest form of a microgrid. All the meters would be consolidated into one master meter and the design would include an even more robust solar and storage system for the energy distribution between all sites and across Culver Blvd. Power can be shared on either side of the street. This option nearly eliminates the costs associated with unplanned sustained outages that can cost the City up to $60,000 per year at the Senior Center and VMB, primarily from lost revenue from rentals. This scenario gives an annual bill savings of $213,900.

<u>Option C: Resilience 2 -- True Microgrid (Staff Recommendation)</u>

After discussion and review with Willdan and SCE, staff recommends proceeding with Option C. While it is the most costly solution, Option C allows the City to build a true Microgrid that provides 100% resiliency and use of clean renewable power through on-site generation and battery storage.

- The Senior Center and VMB are identified in the Hazard Mitigation Plan as two critical facilities that will serve as emergency shelters in the event of a natural disaster.

- In addition to participation in the CPA, this Project is the next step toward innovative energy projects that align with the City's commitment to long-term planning solutions that reduce greenhouse gas emissions and addresses climate change while using clean renewable power.

- Willdan has researched and identified several options for funding the project. Their team has previously submitted successful grant applications for California Energy Commission (CEC) grants and loans and can assist staff with language and cost-benefit analysis for grant applications.

Funding Pathways

Depending on the direction the City Council provides to staff, staff will work with Willdan to pursue the avenue of funding that aligns with the desired Microgrid option.

The City may pursue grant funding through the FEMA Hazard Mitigation Grant Program. This includes a 25% local cost share requirement. Other pathways include utility rebates and incentives for energy efficiency measures and Self-Generation Incentive Program (SGIP) and Demand Response Programs through SCE.

Other financing vehicles include California Energy Commission loans at 1% interest for energy efficiency and renewable self-generation projects. Loans through the California I-Bank's California Lending for Energy Efficiency and Environmental Needs (CLEEN) Center or municipal debt through bonds, leases, or loans.

Finally, the City may pursue third-party ownership of the energy equipment through a Power Purchase Agreement where the City pays for the energy it uses that is produced at an agreed upon rate from the self-generation system.

Next Steps for Implementation

If the City Council approves moving forward with the Microgrid Project, staff with work with Willdan on the option that the City Council wishes to pursue. Willdan's scope of work includes their preparation of technical specifications and procurement support necessary to bid construction of the Microgrid Project or to enter into a Power Purchase Agreement.

FISCAL ANALYSIS

There is no fiscal impact associated with receiving this presentation.

ATTACHMENTS

1. Microgrid Feasibility Report

MOTIONS

That the City Council:

1. Receive a presentation of the Microgrid feasibility report prepared by Willdan; and

2. Provide direction to the City Manager for staff to work with Willdan to evaluate the mechanical energy efficiency measures recommended and to pursue grant and other funding opportunities to implement Option C (the True Microgrid); or

3. Provide other direction as deemed appropriate.