



DATE: December 6, 2016

TO: Mayor and City Council

FROM: Director of Utilities and Environmental Services

SUBJECT

Zero Net Energy Goal for Municipal Facilities

RECOMMENDATION

That Council reviews this report and adopts the attached resolution establishing a goal of achieving cumulative Zero Net Energy (ZNE) for municipal facilities by 2025.

SUMMARY

To meet the Council adopted goals for reducing greenhouse gas (GHG) emissions related to municipal facilities, all energy used by buildings and facilities will need to come from renewable sources by 2050. The City is already producing about half of its energy needs from renewable energy and the Council Sustainability Committee recommends establishing a goal of achieving cumulative Zero Net Energy (ZNE) for the City's portfolio of facilities by 2025.

BACKGROUND

ZNE Policy for New and Retrofitted City Buildings – On September 10, 2015, the Council Sustainability Committee considered a [report](#) and recommended a ZNE policy. On May 17, 2016, the City Council adopted a [resolution](#) requiring that any new or significant retrofits of City buildings that begin design after January 1, 2017 be constructed as ZNE buildings.

Council Sustainability Committee – On July 11, 2016, staff presented a [report](#) to the Council Sustainability Committee about City-wide renewable energy use and a timeline for achieving cumulative ZNE for City facilities. Staff showed that the City has the potential to install sufficient renewable energy on City facilities to meet or offset all of its electricity and natural gas use. The Committee recommended that Council adopt a goal of achieving cumulative municipal ZNE by 2025 and also made the following comments:

- The Committee asked if staff intends to switch existing gas appliances to electric appliances, noting that it would be costly. Staff indicated that appliances may be

changed to electric when they reach their life expectancy. However, in the near term, the City may offset the emissions from natural gas use with additional PV.

- The Committee asked staff to consider prioritizing the various projects and phase in groups of projects that were most cost effective.
- While more expensive than roof-mounted solar photovoltaic (PV) panels, carport-mounted PVs serve dual purposes because carports would also protect cars from the elements.
- The Committee asked staff to include information about the City's current spending on electricity and natural gas and potential cost savings in the report to Council.

General Plan – Hayward's General Plan includes the following policies related to renewable energy.

Policy NR-4.4 Energy Resource Conservation in Public Buildings – The City shall continue to require all public facilities and services to incorporate energy and resource conservation standards and practices.

Policy NR-4.10 Public Renewable Energy Generation – The City shall ensure that all new City-owned facilities are built with renewable energy, as appropriate to their functions, and shall install renewable energy systems at existing City facilities where feasible.

Policy NR-4.11 Green Building Standards – The City shall require newly constructed or renovated public and private buildings and structures to meet energy efficiency design and operations standards with the intent of meeting or exceeding the State's zero net energy goals by 2020.

California Building Code – The state building code, CalGreen, is updated every three years and requires higher levels of energy efficiency with each cycle. Starting in 2020, CalGreen will require single-family homes to be ZNE and starting in 2030, all new commercial buildings will be required to be ZNE.

DISCUSSION

Hayward has been producing renewable electricity for decades. Current renewable energy facilities include the combined heat and power at the Water Pollution Control Facility (WPCF) (operating since 1982 and replaced in 2015), solar PV on the roof of the animal shelter/landscape building on Barnes Court (2005), solar PV at the WPCF (2010), solar PV at the Utilities Center (2012), and solar PV at the corporation yard (2012). These facilities in total produce more than 12 million kWh annually, or approximately half of the electricity consumed at all City facilities. Ultimately, all of the energy needs of all City facilities will need to be met by renewable energy in order to meet the City's long term GHG reduction goals.

In 2015, the City purchased approximately 9.4 million kWh of electricity at a cost of \$2,237,943, for facilities including buildings, traffic signals, streetlights, and water/wastewater pumping. This 9.4 million kWh is the amount that would need to be reduced by energy efficiency and/or generated from new renewable sources in order to "zero out" the City's electricity use. In addition, in 2015, the City spent approximately \$154,837 on

approximately 157,000 therms of natural gas per year, mostly for space and water heating, which is equivalent to roughly 4.6 million kWh. To generate enough electricity to achieve ZNE, approximately 14 million kWh would need to be generated or offset.

With funding from the Bay Area Regional Energy Network (BayREN), staff at StopWaste facilitated a study by DNV-GL to consider Hayward's potential to install renewable energy to meet its total energy needs. The study focused on answering the following questions:

- Is it feasible to achieve cumulative municipal ZNE by 2025? Can we do it sooner?
- Are City staff's solar potential estimates reasonable?
- Will achieving ZNE be cost effective?
- Which PG&E rate tariff will be most beneficial to the City?
- How can we address natural gas use?

Offsetting Electricity Use – Staff recommends setting a goal of 2025 for the year by which electricity production on City facilities would be equal to or greater than the demand by City facilities. The provision of solar PV should be seriously considered and implemented at each and every new building and substantial retrofit or rehab project. In addition, to achieve the goal, consideration should be given to implementing stand-alone PV projects such as installing canopies with PV panels at municipal parking lots throughout the City and on rooftops of existing City-owned buildings.

Attachment III lists the facilities identified where renewables could be installed. If all potential sites were installed, approximately 15 million kWh could be generated annually. Actual generation will depend on technologies available at the time of installation – such as panel efficiency, panels per square foot, and tracking versus fixed systems. The estimate of 15 million kWh per year includes the installation of a second cogeneration engine at the WPCF. This would require a significant increase in biogas production compared to current production, which would require an increase in FOG (fats oils and grease) import or other feedstock. Also, additional gas conditioning equipment would need to be installed. These challenges are significant and expensive, and may take several years to address.)

The consultant's report noted that energy efficiency is much more cost-effective than installation of renewable energy facilities. Of the approximately 9.4 million kWh that needs to be offset, approximately 0.8 million kWh could be addressed by retrofitting existing facilities with LED lighting and installing other energy efficiency improvements. It is possible that the 8.6 million kWh of electricity production can be achieved without the second cogeneration engine. DNV-GL estimates that installing solar to address the remaining 8.6 million kWh will cost approximately \$15 million.

Following is a list of the renewable energy facilities that DNV-GL recommends as the highest priority based on financial return, size of system, and visibility.

High Payback	Project Cost
Police Station - LED + Solar (ZNE Potential)	\$1,117,046
Fire Station 5 - LED + Solar (ZNE Potential)	\$42,441
Fire Station 1 - LED + Solar (ZNE Potential)	\$240,573

Base Load Opportunity	Project Cost
City Hall	\$176,483

Large Renewable Opportunity	Project Cost
WTCP Phase II	\$3,564,000
May Road (Adjacent to Treeview Reservoir)	\$926,640

Options for Offsetting Natural Gas Use – While 8.6 million kWh of electricity can be offset with new renewable energy facilities, the City also uses natural gas equivalent to approximately 4.4 million kWh of electrical energy. DNV-GL has identified some options for addressing natural gas use, which are listed below in order of staff’s preferred approach.

Option	Work Entailed	Pros	Cons
1. Offset with Renewable Electricity	Install additional renewable electricity generation to offset gas energy use.	Similar to ZNE electricity approach	Does not provide full payback
2. Electrify Municipal Buildings	Replace gas space heating, water heating, cooking, etc. with electric equivalent.	Fixes long-term emissions issues	Invasive retrofit process
3. Create Biogas Vehicle Fueling Station	Install a biogas fueling station for municipal vehicles next to the WPCF.	Highly marketable and assists with transport emissions work	Requires fuel switching for municipal fleet. Does not eliminate use of natural gas.
4. Install Storage Tanks and Truck Biogas	Install storage tanks at each facility that uses gas and truck biogas to sites for use in gas appliances.	Minimally invasive and directly renewable	Requires fuel truck and tank purchases

The above options will continue to be evaluated by DNV-GL and City staff to determine the most cost-effective solutions. It should be noted that there are other factors that may need to be considered such as end-users preferences. For example, the current retrofit of Fire Stations No. 2 through 6 includes installation of gas ranges and ovens, since like many homeowners, staff prefer cooking with natural gas.

Renewable Energy Self-Generation Bill Credit Transfer (RES-BCT) Tariff – Following completion of the WPCF cogeneration facility in December of 2014, the City switched the facility’s electric service from Pacific Gas and Electric’s (PG&E) net metering tariff to the Renewable Energy Self-Generation Bill Credit Transfer (RES-BCT) tariff. Due to the size of the cogeneration and solar facilities (more than two mega-watts), net energy metering (NEM), which is limited to

one megawatt, was no longer applicable. The RES-BCT tariff allows local governments with one or more eligible renewable generating facilities to export energy to the grid and receive generation credits (in dollars) to other “benefitting accounts” at other City facilities. The program allows up to five megawatts of renewable generation per generating account. The solar array and cogeneration facility at the WPCF qualify as renewable generating facilities. Benefitting accounts include three reservoirs with associated booster pump stations, two sewer lift stations, City Hall, and several other smaller accounts.

The California Public Utilities Commission (CPUC) created the RES-BCT tariff system to allow local governments to generate electricity at one account and transfer any available credits to other accounts owned by the same local government in order to provide incentives for creating and using renewable energy. The CPUC mandated that 250 MW be set aside for RES-BCT tariffs, of which PG&E’s share is 105.25 MW. As of mid-2016, PG&E had 47 MW either interconnected or in process. Based on the last two years of growth in participation in the RES-BCT tariff, it is possible that PG&E will reach its cap sometime in 2019. For this reason, DNV-GL recommends that the City install all renewable energy that will be RES-BCT generating accounts over the next three years to ensure the credit can be utilized by Hayward.

Following are some important considerations regarding the RES-BCT tariff:

- Benefitting accounts must be those facilities that always consume more energy than they generate (even if a solar array is part of the facility).
- RES-BCT only offsets the generation charge – not transmission and other charges.
- PG&E will likely reach its limit for RES-BCT tariffs in 2019.
- NEM sites cannot receive RES-BCT credits.
- RES-BCT cannot be used to offset natural gas usage.
- East Bay Community Energy will likely honor RES-BCT and may offer a better tariff.

Net Energy Metering (NEM) Tariff - NEM allows consumers with solar systems to “sell” electricity back to the grid when they are overproducing (during the middle of the day) and use this as a credit to offset the electricity that they purchase from the grid when they are under-producing or inactive (at night). Any surplus credit is rolled over to the following billing period. If a NEM customer has produced surplus power at the end of a twelve month billing period, PG&E gives the customer a Net Surplus Compensation check, which is based on a rate set by the CPUC (currently between \$0.03 and \$0.04 per kilowatt-hour).

Following are some important considerations regarding the NEM tariff:

- Solar systems installed under the NEM tariff can be sized no larger than the electricity load of the host site. In other words, the NEM tariff cannot be used to offset energy used at other sites.
- The existing NEM rate structure offsets both generation and transmission charges.
- While there was a cap on the total NEM authorized under the previous tariff, there is no longer a cap under the successor NEM tariff, which is currently in effect. However, the CPUC will revisit this tariff in 2019, at which point the rate structure may change.

- East Bay Community Energy will likely honor NEM and may even offer a better tariff.

DNV-GL made the following recommendations regarding the use of PG&E tariffs:

1. The City should prioritize the locations where RES-BCT will be used due to the fact that the program may reach its cap in two to three years:
 - Sites where energy production has the potential to greatly exceed demand (such as the WPCF) should be flagged as the RES-BCT generating facilities.
 - Sites where solar systems cannot not meet the energy demand (due to lack of space or shade) should be placed on the RES-BCT tariff as benefiting accounts rather than on the NEM tariff. Benefiting accounts can have solar systems as long as those systems do not exceed the demand of the site.
2. NEM can be used in cases where the solar production will closely match site demand.

ECONOMIC IMPACT

The City's investments in renewable energy will have little impact on the local economy, but may be constructed by local businesses and may create some new local jobs.

FISCAL IMPACT

The City's investments in renewable energy would require upfront investment, but would yield long term cost savings. Hayward currently spends approximately \$2.3 million per year on electricity and natural gas. The new renewable energy facilities necessary to achieve ZNE by 2025 are estimated to cost approximately \$17 million and would likely have payback periods of 10 to 21 years. These investments are estimated to have a return on investment of 5 to 10%.

Approximately 500 MW new renewable energy facilities are identified in the approved Capital Improvement Program and funding for these projects has been identified. Funding for the remaining power is yet to be identified, but may come from a combination of enterprise funds and the General Fund.

SUSTAINABILITY FEATURES

The municipal ZNE goal is consistent with General Plan policies NR-4.4 (Energy Resource Conservation in Public Buildings), NR-4.10 (Public Renewable Energy Generation), and NR-4.11 (Green Building Standards). In addition, if the goal is achieved, the City and the community will benefit from the following sustainability features:

Energy: Electricity/natural gas/other fossil fuels.

Achieving a municipal ZNE goal would reduce the City's reliance on fossil fuels and would provide energy from clean and renewable sources.

Air: Air emissions of pollutants.

Achieving a municipal ZNE goal would reduce pollutants and make significant progress toward meeting the City's municipal greenhouse gas emissions reduction goals.

NEXT STEPS

If approved, this Council policy will be adhered to and followed for any municipal projects designed henceforth. Meanwhile, upon Council's approval of the attached resolution, staff will prioritize installation of renewable energy facilities with those that are the most cost-effective and for which funding has been identified in the Capital Improvement Program. Staff will identify potential funding sources for additional projects to be included in upcoming CIPs for Council approval.

Prepared by: Erik Pearson, Environmental Services Manager

Recommended by: Alex Ameri, Director of Utilities and Environmental Services

Approved by:



Kelly McAdoo, City Manager