Cover Memo

File #: LB 15-009, **Version:** 1

DATE: September 10, 2015

TO: Council Sustainability Committee

FROM: Director of Utilities and Environmental Services

SUBJECT
Zero Net Energy Policy for City Buildings

RECOMMENDATION
That the Committee reviews and comments on this report and recommends that the Council adopts the attached draft resolution (Attachment I).

SUMMARY

This report presents a policy that, if adopted by Council, would require new municipal buildings and significant retrofits of existing municipal buildings to be designed and constructed as zero net energy (ZNE) buildings. This policy would be consistent with current General Plan policies and would help prepare Hayward for anticipated changes to the State building code.

BACKGROUND

A ZNE building is one that produces as much energy as it consumes over the course of a year. More specifically, the California Energy Commission (CEC) defines ZNE as follows:

> "A Zero-Net-Energy Code Building is one where the net amount of energy produced by on-site renewable energy resources is equal to the value of the energy consumed annually by the building, at the level of a single "project" seeking development entitlements and building code permits, measured using the California Energy Commission's Time Dependent Valuation metric."

The Time Dependent Valuation (TDV) method encourages building designers to design buildings that perform better during periods of high energy cost. TDV is based on a series of annual hourly values for electricity cost and monthly costs for natural gas. The CEC is California's primary energy policy and planning agency and is responsible for forecasting future energy needs, promoting energy efficiency and conservation, and developing renewable energy resources. The California Public Utilities Commission (CPUC) regulates privately owned electric, natural gas, telecommunications, water and transportation companies. The CPUC's Codes and Standards program works with the California Building Standards Commission to continuously improve the Title 24 Building Energy Efficiency Standards.
In 2008, the CPUC adopted a Long Term Energy Efficiency Strategic Plan, which includes the following goals:

- all new residential buildings will be ZNE by 2020
- all new and 50% of existing state-owned public buildings will be ZNE by 2025
- all new and 50% of existing commercial buildings will be ZNE by 2030

California's ZNE goals are a part of the state's overall strategy to achieve the greenhouse gas reductions required by AB 32. Since 2008, the State has been actively working to support the ZNE goals by developing plans and requirements and is gradually incorporating the requirements into the state's building energy efficiency standards (Title 24). ZNE requirements will phased into future versions of the California Building Standards Code, so there is no need to adopt a resolution to implement the ZNE requirements for residential and commercial buildings. Benefits of ZNE buildings are listed in the State's *California ZNE Communications Toolkit* (Attachment II).

In April 2012, Governor Brown issued Executive Order B-18-12 requiring all new State buildings and major renovations beginning design after 2025 to be constructed as Zero Net Energy facilities with an interim target for 50% of new facilities beginning design after 2020 to be Zero Net Energy. The Order also requires State agencies to take measures toward achieving Zero Net Energy for 50% of the square footage of existing state-owned building area by 2025.

To achieve ZNE, a building must first be designed to be very energy efficient, and then include sufficient on-site renewable power generation, typically solar photovoltaic and solar hot water. An example ZNE home is shown in the diagram in Attachment III and includes LED lighting, extra insulation, high performance windows, a smart thermostat, high efficiency appliances, and a solar photovoltaic system.

In July 2008, the City Council adopted an ordinance requiring all new building or renovation projects that equal or exceed 20,000 square feet in area or $5 million in construction costs to be LEED Silver certified. LEED certification requires a high level of energy efficiency and green building materials, but it does not require renewable energy.

General Plan Policies - Hayward's General Plan, adopted on July 1, 2014, includes the following policies and implementation programs related to zero net energy in municipal buildings:

NR 2.5 Municipal Greenhouse Gas Reduction - The City shall reduce municipal greenhouse gas emissions by 20% below 2005 baseline levels by 2020, and strive to reduce community emissions by 61.7% and 82.5% by 2040 and 2050 respectively.

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 facilities where feasible.

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.

PFS-2.3 Sustainable Practices -The City shall serve as a role model to businesses and institutions regarding purchasing decisions that minimize the generation of waste, recycling programs that reduce waste, energy efficiency and conservation practices that reduce water, electricity and natural gas use, and fleet operations that reduce gasoline consumption.

PFS-2.7 Energy Efficient Buildings and Infrastructure - The City shall continue to improve the energy efficiency of City buildings and infrastructure through implementation of the Municipal Green Building Ordinance, efficiency improvements, equipment upgrades, and installation of clean, renewable energy systems.

DISCUSSION

Several cities in Alameda County have policies or ordinances similar to Hayward's, requiring new buildings to be LEED certified, but none have ZNE policies. Some cities have included ZNE requirements on a per-project basis. The City of Berkeley completed a new ZNE library in early 2014, the City of Fremont is contemplating ZNE for their new civic center, and the City of Albany is considering ZNE for a new maintenance center/corporation yard.

The only jurisdiction in California that has a ZNE policy is Santa Barbara County. In February 2014, the Santa Barbara County Board of Supervisors adopted a resolution requiring all new County-owned facilities and major renovations beginning design after 2025 be constructed as ZNE facilities.

To achieve the City's greenhouse gas emission reduction goals and to carry out the General Plan policies listed above, all new municipal buildings will need to be ZNE and existing buildings will need to be renovated to be ZNE. As stated in General Plan policy PFS 2.3 above, "the City shall serve as a role model to business and institutions." If the City can demonstrate successful construction and operation of ZNE buildings, then private developers may follow suit before mandated to do so. The 21st Century Library and Community Learning Center is slated to lead the way by being the City's first ZNE building when it is completed.

The technology and the knowledge necessary to create ZNE buildings are available now. While there are additional costs associated with construction of a ZNE building, it is more cost-effective to design a new ZNE building than it will be to retrofit an existing building. However, as the Committee considers a possible ZNE policy, a note of caution would be appropriate. In order to get input from professions in the field, staff contacted an architectural firm with experience in designing ZNE municipal buildings. Their response was that a ZNE policy would be a very ambitious and admirable goal, but that the City should consider the following:

- Different building types (offices, libraries, maintenance facilities, etc.) have significantly different levels of energy use intensity (EUI); there is growing data available to illustrate what building types are realistic candidates to achieve ZNE.
- Renovations with tight budgets/small scope may prove particularly difficult to achieve this goal, as there is a significant financial effort required to improve overall existing building performance.
- There are other "flavors" of benchmarking that can establish projects as "ZNE Capable" or "High performing buildings" that prepare you for potential better future renewable energy technology.
- Although there are other alternatives (wind, geothermal, hydro), generally speaking PVs are the primary viable option for onsite power generation. Cities do have a unique position to negotiate alternate energy contracts with utilities, leveraging multiple buildings into an aggregated service contract.
- The more stories the building, the more challenging ZNE becomes due to limited roof area for PVs proportional to floor area.
- Some sites are shaded by geography or other buildings limiting solar power potential.

- Although the cost of PVs has been dropping over the last decade, the construction market is volatile and costs could rise unexpectedly to coincide with a project.
- There is a corresponding increase in design and engineering effort that needs to be taken into consideration.
- Plug loads have as much to do with achieving this goal as the building design - one donated "energy hog" refrigerator could blow the energy budget on a smaller project.
- Projects with intense "Process Loads" (such as large trash compactors and other high demand equipment), represent a challenging issue for ZNE.

Taking the above issues into consideration, the timeframes provided in staff's recommended policy provide some time to address these challenges. Staff recommends that:

- all new City buildings that begin design after 2025 be ZNE
- all new and existing City buildings with renovations exceeding 50% of the building's value and that begin design after 2020 be ZNE
- lesser improvements to existing City buildings should include efficiencies and technologies that facilitate achieving Zero Net Energy by 2025.

As noted above, there may be projects where the site, energy demand, and other aspects of a city building (or renovation) may make it challenging and costly to achieve ZNE. For these reasons, the Committee might consider the following alternative policies:

- Requires a minimum percentage (maybe 50%) of the projected energy demand be provided by on -site sources and that the remaining demand be offset by newly implemented renewable energy facilities at another City-owned property; or
- For buildings where it is not possible to install on-site renewable energy sufficient to qualify as ZNE, the building should be "ZNE Capable." ZNE Capable means that the building achieves energy performance similar to a ZNE building, but it does not have sufficient on-site power generation to qualify as ZNE.

FISCAL IMPACT

The costs associated with transforming the City's buildings to ZNE will be determined as each project is designed. Costs will decrease over time as the cost of solar photovoltaic panels continues to decline and as more builders gain experience constructing ZNE projects. According to the New Buildings Institute, several studies have found the incremental cost of ZNE buildings to be up to 15% more than conventional construction costs. This incremental cost is for design and construction only, and does not consider the life-cycle cost savings of lower energy costs to operate the building over time.

For residential construction, according to the CPUC, "Recent studies have indicated that the efficiency components of a new ZNE home have an incremental cost, after incentives, of just $2-$8 per square foot" and that "Custom home builders who are developing ZNE homes right now indicate that there are nominal additional costs and that the key issue to achieve ZNE is design and quality construction."

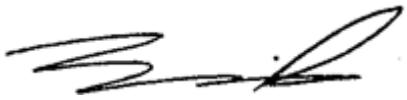
NEXT STEPS

Upon a recommendation from the Committee, staff will present the attached resolution to Council for adoption.

Prepared by: Erik Pearson, Environmental Services Manager

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

Approved by:



Fran David, City Manager

Attachments:

Attachment I	Draft Resolution
Attachment II	Fact Sheet: ZNE for Policymakers & Local Governments
Attachment III	Diagram of a ZNE Home