

User Guide: Municipal Zero Net Energy (ZNE) Resources and Templates

The San Mateo County Bay Area Regional Energy Network (BayREN) team identified a need for municipal ZNE policy analysis and template language to help jurisdictions take early action toward the State’s ZNE goals. Following an initial analysis of existing ZNE resources, the San Mateo County BayREN team worked with consultant DNV-GL to develop request for proposal (RFP) and owner project requirements (OPR) template language. The following resources encourage developers to construct new municipal buildings to ZNE, and enable jurisdictions to value and monitor ZNE goals from project design to end construction:

Resources 1-5 are available for municipal use. To request editable versions, please contact codes@bayren.org

Resource #	Pages	Title	Purpose
Resource 1	2-4	BayREN ZNE Policy Analysis Matrix	A matrix of ZNE policies from across the country. Can be used to identify best practices and policy options for Bay Area jurisdictions.
Resource 2	5-14	BayREN ZNE Policy Analysis Presentation	A summary of findings from the policy analysis presented to Bay Area jurisdictions. Can be used to understand existing ZNE policy tools.
Resource 3	15-16	Request for Proposals (RFP) Language	The language is intended to be inserted into any new building RFP, or in some cases, the request for qualifications (RFQ) or request for information (RFI), depending on the contracting arrangement.
Resource 4	17-23	Owner’s Project Requirements (OPR) Template	Template language to assist project teams in ensuring project ZNE and sustainability goals remain consistent from the earliest planning stage. Can be adapted into agency’s existing OPR language.
Resource 5	24	EUI Targets	A calculator that can be used to identify appropriate EUI targets for achieving ZNE in various building types. This document informs Resources 3, 4, and 5.

National ZNE Policy Analysis

Example	Source	Type	Sector	Building Type	Scope	Location	CA specific	Date issued	Link	Comments
					Provides a scale for measuring commercial building energy performance. Sets energy targets for actual energy consumption rather than using a predictive energy model of building energy performance to calculate a "percent better than code" metric. zEPI sets an energy use intensity (EUI) target for building type and is adjusted for climate. It is also the measure by which a building's energy efficiency is calculated once operational and occupied based on measured energy use data.					The scale establishes zero net energy as the absolute goal making the need for a baseline obsolete. The only measurement that matters is how far a building has progressed towards zero net energy performance. The scale goes from zero to 100, with 100 representing the average energy consumption based on 2003 Commercial Buildings Energy Consumption Survey (CBECS) data.
New Buildings Institute zEPI	Industry organization	Other	Commercial	Both		International	No - national		http://newbuildings.org/code-policy/zepi/	
New Buildings Institute Codes and Policies	Industry organization						No - national			
New Buildings Institute Incentives	Industry organization						No - national			
New Buildings Institute Stretch Codes	Industry organization	Building Code	All	Both	A stretch code is a locally mandated code or alternative compliance path that is more aggressive than base code, resulting in buildings that achieve higher energy savings.	MA, OR, CA	No - other	NA	http://newbuildings.org/code-policy/utility-programs-stretch-codes/stretch-codes/	Can work in tandem with utility incentive programs.
Pima NetZero	Local jurisdiction	Building Ordinances	All	Both	The Net-Zero Energy Standard has a prescriptive residential section and a prescriptive commercial section covering apartments, office and retail. These building types represent approximately 30% of total energy use in the metro area. The Net-Zero Energy Standard also has a performance section for both residential and commercial that will allow buildings that can not use the prescriptive path to achieve a net-zero certification by using energy modeling software.	Tucson & Pima Counties, AZ	No - other	6/6/2012	http://www.pima.gov/netero/ http://www.pima.gov/netero/Documents/Net-Zero-Code-Final.pdf	The goal of the project was to develop a building standard that will provide a prescriptive set of rules for designing a building that generates as much energy as it uses. There is also a performance path in the code using Energy Modeling. The performance path is recommended for maximum benefit.
Boulder Sustainable Energy Plan	Local jurisdiction	Energy or Community Plan	All	Both	The SEP identifies a host of strategies to reduce greenhouse gas emissions and make our communities "ClimateSmart." These strategies are designed to reduce the major sources of greenhouse gas emissions. Accordingly, the strategies are organized by the main ways we use energy: in our homes, businesses, industries, government operations, and transportation.	Boulder, CO	No - other	4/1/2008	http://www.bouldercolorado.gov/ohc/publichealth/sustainableenergyplan.pdf	20 key recommend first-tier actions out of 35. 30 actions have associated cost, cost savings, and GHG reduction impacts quantified while the remaining 5 focus on planning, educational, and revenue generating efforts that could not be quantified.
Lancaster Zero Energy Road Map	Local jurisdiction	Energy or Community Plan	All	Both	The goal has two phases: first to reach 215 megawatts (MW) of renewable power capacity, then 530 MW.	Lancaster, CA	Yes		https://energycenter.org/case-study-lancaster-zne-goal	As of January 2014, the city required new single family homes to provide solar-generated power at a minimum average of 1 kilowatt per home.
City of Lancaster Mandatory Solar Requirement for New Homes	Local jurisdiction	Policy	Residential	Both	All residential buildings with a building permit issuance date of January 1, 2014 or later must have a certain amount of photovoltaics (PV) installed. The specific system size requirements vary according to zone and lot type (see link).	Lancaster, CA	Yes	1/1/2014	http://programs.dsireusa.org/system/program/detail/5624	
Massachusetts Stretch Code	Local jurisdiction	Building Code	Municipal	Both	Local mandated jurisdictional option: this code shall be the building code for all towns, cities, state agencies or authorities in accordance with M.G.L. c. 143, § 94. The provisions of this code and other referenced specialized codes shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appendances connected or attached to such buildings or structures. http://www.mass.gov/eops/docs/dps/8th-edition/13-energy-efficiency.pdf	175 Municipalities in MA http://www.mass.gov/eops/docs/dps/8th-edition/13-energy-efficiency.pdf	No - other	7/24/2009	http://www.mass.gov/eops/docs/dps/8th-edition/13-energy-efficiency.pdf	Although the standard "non-stretch" energy provisions of the code will be based on the IECC 2012 as of July 1, 2014, the stretch code will continue to be based on amendments to the IECC2009 (and ASHRAE 90.1-2007 for large commercial buildings) until such time as the stretch code is updated.
Oregon Stretch Code	Local jurisdiction	Building Code	All	Both	Alternative compliance path more stringent than state-based energy code: the Oregon Reach Code is adopted to provide optional standards for the effective use of energy and the utilization of renewable energy technologies in the construction and design of buildings to provide approaches and techniques for achieving effective energy use and reducing negative impacts of the built environment.	OR	No - other	7/1/2016	http://www.bcd.oregon.gov/notices/Adopted_Rules/2011/070111_ReachCode_pr.pdf	The code is an optional set of construction standards and methods that are economically and technically feasible, to regulate the design and construction of buildings for the effective use of energy and the employment of renewable energy technologies. The code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve the effective use of energy, and to reduce the negative potential impacts of the built environment.
California Stretch Code	Local jurisdiction	Building Code	All	Both	Local mandated jurisdictional option		Yes		http://www.bcd.oregon.gov/notices/Adopted_Rules/2011/070111_ReachCode_pr.pdf	
Austin Energy Green Building	Local jurisdiction	Policy	All	Both		Austin, TX	No - other			
Minnesota Sustainable Building 2030 - Chapter 278	Local jurisdiction	Policy	Municipal	Both	In 2008, the governor signed into law Chapter 278, which provides for the Minnesota Sustainable Building 2030 (SB 2030) standards. It requires that every five years, total carbon emissions from building energy use be reduced by 10% to a final reduction of 100% by 2030 compared with the MN 2003 baseline of building average energy use. It requires that all buildings be scientifically benchmarked and real reduction in energy consumption measured and that utilities develop and implement programs to help building owners achieve the energy savings goals through design assistance, incentives and verification. And it requires analysis and evaluation of the effectiveness and cost-effectiveness of Sustainable Building 2030 performance standards, conservation improvement programs, and building energy codes.	Minnesota	No - other	6/30/2008	https://www.leg.state.mn.us/docs/2010/mandated/100310.pdf	
Executive Order B-18-12	Local jurisdiction	Policy	Municipal	Both	New State building and major renovations after 2025 must be ZNE. 50% of new facilities after 2020 must be ZNE. Take measures toward achieving ZNE for 50% of existing state-owned building area by 2015.	California	Yes			
City of Hayward ZNE Policy for Municipal Buildings - Executive Order B-18-12	Local jurisdiction	Policy	Municipal	Both	All new city building that begin design after 2025 be ZNE. All existing city building for which renovations exceeding 50% of the building's value and that begin design after 2025 be ZNE. Lesser improvements to existing city buildings should include efficiencies and technologies that facilitate achieving ZNE by 2030.	Hayward, CA	Yes	9/10/2015		
Santa Barbara County ZNE	Local jurisdiction	Policy	Municipal	Both	All new Santa Barbara County owned facilities and major renovations beginning design after 2025 [will] be constructed as Zero Net Energy Facilities with an interim target for 50% of facilities beginning design after 2020 to be Zero Net Energy. Santa Barbara County departments shall also take measures toward achieving Zero Net Energy for 50% of existing Santa Barbara County owned facilities by 2025 and the remaining 50% by 2035.	Santa Barbara, CA	Yes	November, 2014	https://santabarbaracounty.com/Legislationbeta/legislationbeta.aspx?ID=1639014&GUID=30909C28A-27B0-4604-96F4-E445A7F60637	Passed 3/4/2014
The Downtown Palo Alto Net Zero Energy (DPANZE) Initiative	Local jurisdiction	Policy	Commercial	Existing	Achieve Net Zero Energy (NZE) for at least 100 existing commercial buildings in downtown Palo Alto by year-end 2017.	Palo Alto, CA	Yes		http://www.clean-coalition.org/site/wp-content/uploads/2015/03/DPANZE-Initiative-Overview-24-18-16-Dec-2014.pptx	

Example	Source	Type	Sector	Building Type	Scope	Location	CA specific	Date issued	Link	Comments
Cambridge Getting to Net Zero	Local jurisdiction	Energy or Community Plan	Municipal	New Construction	(a) A bold policy target of Net Zero Emissions for new construction: New buildings should achieve net zero beginning in 2020, starting with municipal buildings and phasing in the requirement for other building types between 2022-2030. (b) Targeted improvements to existing buildings: The Building Energy Use and Disclosure Ordinance (BEUDO) will provide the information necessary to target energy retrofit activity, including, over the long term, the regulation of energy efficiency retrofits at time of renovation and/or sale of property. (c) Proliferation of renewable energy: Increase renewable energy generation, beginning with requiring solar-ready new construction and support for community solar projects, evolving to a minimum requirement for onsite renewable energy generation. (d) Coordinated communications and engagement: Support from residents and key stakeholders is imperative to the success of the initiative.	Cambridge	No - other	3/16/2015	file:///C:/Users/karkok/Downloads/netzero_20150316_detailedactionplan.pdf	Extend beyond municipal
Research Roadmap for Getting to ZNE Buildings - State of California Energy Commission	Industry organization	RFP language	All	Both	Develop a research roadmap that identifies, describes and prioritizes research, development, demonstration and deployment (RDD&D) gaps that needs to be addressed to achieve the state's goals for Zero-Net Energy (ZNE) buildings – in California's Investor-Owned Utility service territories – in a safe, equitable and cost-beneficial manner.	California	Yes	11/12/2015	http://www.energy.ca.gov/contracts/RFP-15-315/	The goal is to develop a technical assessment and Research Roadmap that identifies, describes, and prioritizes key RDD&D needs for achieving the state's goals for Zero-Net Energy (ZNE) buildings in a safe, equitable, and cost-beneficial manner. Specifically, the research roadmap must synthesize the input of stakeholders and experts in order to:
Reducing Costs for Communities and Businesses Through Integrated Demand-Side Management and ZNE Demos	Industry organization	RFP language	All	Both	Fund integrated technologies, strategies, and demonstrations that emphasize energy efficiency packages that include, but are not limited to: advanced building envelope materials or construction methods; advanced heating, ventilation, and air conditioning (HVAC) technologies and strategies; including right sizing systems and components based on increased energy efficiency; building and occupancy controls or energy management systems for HVAC, lighting, plug loads and other energy-using systems; advanced lighting technologies and daylighting controls; and demand response technologies.	California	Yes	11/2/2015	http://www.energy.ca.gov/contracts/GFO-15-308/	Each application must fall within one of the following project groups applicable to applied research and development research stage or technology demonstration and deployment research stage: Group 1: Applied Research and Development: Emerging Building Technology and Approaches for Existing Buildings; Group 2: Applied Research and Development: Emerging Technology Pilots for Zero Net Energy New Buildings; Group 3: Applied Research and Development: Develop Cost-Effective Approaches to Achieve California's Zero Net Energy Buildings Goals; Group 4: Applied Research and Development: Zero Net Energy Cost-Effectiveness Models by Climate Zone for Multifamily and Commercial Buildings; Group 5: Technology Demonstration and Deployment: Integrated Demand-Side Management Demonstrations to Achieve Maximum Efficiency; and Group 6: Technology Demonstration and Deployment: Large-Scale, Community-Wide Demonstrations to Achieve Zero Net Energy.
Prop 39 ZNE Pilot Program (PG&E)	Industry organization	RFP language	Municipal	Existing	To provide commercial project design and technical assistance services in support of PG&E's Proposition 39 (Prop 39) Zero Net Energy (ZNE) Pilot Program. PG&E seeks high-quality technical support to provide the detailed design, technical, and performance assistance that will be offered to project teams through the Prop 39 ZNE Pilot Program. PG&E will use the services of consultants to assist PG&E staff. PG&E will award contract work based on each consultant team's areas of expertise and the needs of the Prop 39 ZNE Pilot Program	California	Yes	5/15/2015	http://www.pge.com/includes/docs/pdfs/b2b/purchasing/bidopportunity/CA_Proposition39eZeroNetEnergyPilotProgram.pdf	K-12 and Community Colleges
Prop 39 ZNE Pilot Program (SCE)	Industry organization	RFP language	Municipal	Existing	Same as above	California	Yes	6/7/2016		
NREL RFP Language for ZNE	Industry organization	RFP language	Municipal	New Construction	The Department of Defense in its Annual Energy Management Report, May 2010, set a goal for Fort Carson to be a Net Zero installation by the year 2020. In accordance with this stated goal, it has been determined that the Butt's Plateau and 13th Combat Aviation Brigade (CAB) complex will be a Net Zero campus. In support for Fort Carson's Net Zero objective all new vertical construction is to be Net Zero Ready. Consequently, each individual building should be designed and constructed to minimize energy and water use and limit the amount of waste produced.	Fort Carson, CO	No - other	June, 2012	http://apps1.eere.energy.gov/buildings/publications/pdfs/ef/annotated_rfp_ftcarson.pdf	Increased preference will be given to proposals that exhibit significant energy reduction (well beyond 40%) through the use of passive design strategies, prior to the inclusion of renewable energy that incorporates efficient design strategies for the mechanical/electrical systems, building envelope, and fenestration. Higher proposed building energy efficiency and higher renewable energy percentages will be rated more favorably. Higher proposed building energy efficiency is more preferred and will be rated more favorably than higher renewable energy percentages. More favorable ratings will be given for proposed energy systems that exhibit favorable qualities in terms of performance, quality, maintenance, and operability. Less favorable ratings will be given for LCCA's (if applicable) which are inadequate, which is based on unrealistic assumptions
Santa Clara County ZNE Plan	Local jurisdiction	Energy or Community Plan	Municipal	Existing	ZNE Study for 400,000 sf county government center, 6 MW fuel cell RFP and eval, tariff analyses and emissions study, on-site and off-site renewable energy technology eval, 11 mw solar PV res-bct analysis	San Jose, CA	Yes		http://www.sagerenew.com/santa-clara-county/	Zero net energy plan for the County's existing multi city block Government Center, including their County Offices, Courthouse and Jail.
NYU Green Lease Guide	Industry organization	Lease Language	Commercial	Existing	This Green Lease Guide aims to provide general guidelines, key points and sample provisions that will be useful to New York University (NYU) in reducing the carbon footprint and overall sustainability of the facilities that it occupies as a tenant.	New York, NY	No - other	8/1/2011	http://www.scps.nyu.edu/export/sites/scps/pdfs/real-estate/sbe-green-lease.pdf	
The Pathways to Zero Grant Program	Industry organization	Incentive Program	All	Both	The Pathways to Zero Grant Program is a \$3.5 million Department of Energy Resources (DOER) initiative launched in 2014 to spur the development of Zero Net Energy Buildings (ZNEB) in Massachusetts. \$3.0M is being used to support residential and commercial ZNEB projects through feasibility studies, integrated design, and construction funding, and \$500,000 is being used for public awareness, workforce development, efforts to develop and standardize best practices, and DOER resources. - See more at: http://database.aecce.org/state/financial-incentives#sthash.9t45pcw0.dpuf	MA	No - other		http://www.mass.gov/ea/energy-utilities-clean-tech/energy-efficiency/zero-net-energy-bldgs/	

Example	Source	Type	Sector	Building Type	Scope	Location	CA specific	Date issued	Link	Comments
Colorado ENERGY STAR / Energy Saving Mortgage Program	Local jurisdiction	Incentive Program	Residential	Both	The Energy Saving Mortgage Program incentivizes both the purchase of efficient homes and efficiency renovations in refinanced homes. Home buyers can earn a credit of up to \$8,000 on their mortgage for net-zero homes, or a percentage of that credit for homes scoring between a 50 and a zero on the Home Energy Rating System (HERS) Index Scale. Renovations function similarly as home owners can earn up to \$8,000 in incentives for efficiency retrofits to existing homes. - See more at: http://database.aeccee.org/state/financial-incentives#sthash.9t4Spco0.dpuf	CO	No - other		http://www.fourcore.org/portals/0/documents/Sustainable%20Building/ESM_Description.pdf	
NYSERDA Low-rise Residential New Construction Program	Local jurisdiction	Incentive Program	Residential	New Construction	On June 6, 2014, the New York State Energy Research and Development Authority (NYSERDA) announced the availability of significantly higher incentives under its Low-rise Residential New Construction Program including first incentives for homes designed for net zero energy performance. Builders can avail \$2,000-\$8,000 per unit under three performance tiers, with the highest amount for net zero homes.	NY	No - other	6/6/2014	http://www.nyscrda.ny.gov/funding/Opportunities/Current-Funding-Opportunities/PQN-2309-Low-Rise-Residential-New-Construction-Program	Incentives are available to support the achievement of increased levels of energy performance, up to and inclusive of homes or dwelling units which are designed and constructed to achieve net zero energy performance.
City of Irvine No-Fee Solar Permits (per Measure S)	Local jurisdiction	Policy	All	Both	The city of Irvine has waived all permit and plancheck fees for Solar Panels and Solar Hot Water Heating Systems	Irvine, CA	Yes	3/8/2011	https://legacy.cityofirvine.org/cityhall/cd/buildingsafety/solar_installations/default.asp	Includes rooftop solar panels, solar carports, and solar hot water systems.
Culver City Building Safety Division Mandatory Green Building Program	Local jurisdiction	Policy	Commercial	Both	All new construction, new additions, and major renovations in Culver City up to 49,999 square feet of affected area are required to comply with Category 1 requirements, excluding single family and two family structures. All new construction, additions, and major renovations of 50,000 square feet and greater of affected area are required to comply with Category 2 requirements, excluding single family and two family structures.	Culver City, CA	Yes	6/1/2009	http://www.culvercity.org/Home/ShowDocument?Id=902	Subject to approval by the Culver City Community Development Department Director, Culver City plan check and permit fees in an amount not to exceed Five Thousand Dollars (\$5,000) per project may be waived for energy efficiency improvements which are located in the AIP (Area Improvement Plan) Phase I and Phase II areas.
Culver City Building Safety Division Mandatory Solar Photovoltaic Requirement	Local jurisdiction	Policy	Commercial	Both	All new construction in Culver City of 10K sf or greater, additions of 10K sf or greater, and major renovations of 10K sf or greater are required to install 1 KW of solar photovoltaic power per 10K sf or applicable building areas.	Culver City, CA	Yes	Spring 2008	http://www.culvercity.org/Home/ShowDocument?Id=440	
City of Sebastopol - Mandatory Solar Requirement for Residential and Commercial Buildings	Local jurisdiction	Building Code	All	Both	Minimum system size may be calculated by either of two methods, prescriptive or performance. Buildings using the prescriptive method must install 2 watts per square foot of conditioned building area including existing, remodeled and new conditioned space. Buildings using the performance method must use modeling software or other methods approved by the official to demonstrate that the system installed will meet 75% of the building's annual electricity load.	Sebastopol, CA	Yes	7/5/1905	http://energy.gov/savings/city-sebastopol-mandatory-solar-requirement-residential-and-commercial-buildings	
Berkeley Solar PV Permitting and Submittal Requirements	Local jurisdiction	Policy	Residential	Both	The City of Berkeley also offers a streamlined permitting procedure for small solar PV rooftop systems (10kW AC or less) for single family and duplex homes. This streamlined procedure includes the use of standard plans and offers electronic submission of applications.	Berkeley, CA	Yes	9/30/2015	http://www.ci.berkeley.ca.us/solarpermitguidew/	
Berkeley Energy Savings Ordinance (BESO)	Local jurisdiction	Policy	All	Existing	Requires completion of Home Energy Score energy assessment at time-of-sale, although it allows for the buyer to take on the Home Energy Score requirement	Berkeley, CA	Yes	2015/2016	http://www.ci.berkeley.ca.us/EnergyOrdinanceupdate/	
San Francisco Mandatory PV	Local jurisdiction	Policy	All	New Construction	New construction shorter than 10 floors to install solar panels or solar water heaters on top of new buildings, both residential and commercial.	San Francisco, CA	Yes	Effective 1/11	http://www.pv-tech.org/news/paving-the-way-san-francisco-first-big-us-city-require-rooftop-solar	
Santa Ana Streamlined Residential Solar Plan Check and Permitting	Local jurisdiction	Policy	Residential	Both	Streamlined residential roof top solar plan check and permitting process for qualifying projects	Santa Ana, CA	Yes	9/30/2015	http://www.ci.santa-ana.ca.us/pba/buildingsafety/ResidentialSolar.asp	

ZNE Policy Analysis

**Summary of ZNE Policy Research conducted for
Bay Area jurisdictions**

**BAY
AREA** Regional
Energy
Network

San Mateo County BayREN

Scope of Work

Task 1. Leverage RICAPS meetings to explore city needs



Task 2. Compile relevant ZNE policy and ordinance examples



Task 3. Prioritize and develop targeted ZNE resources for San Mateo



Task 4. Form working group to guide ZNE template development



Task 5. Refine and compile ZNE policy resources

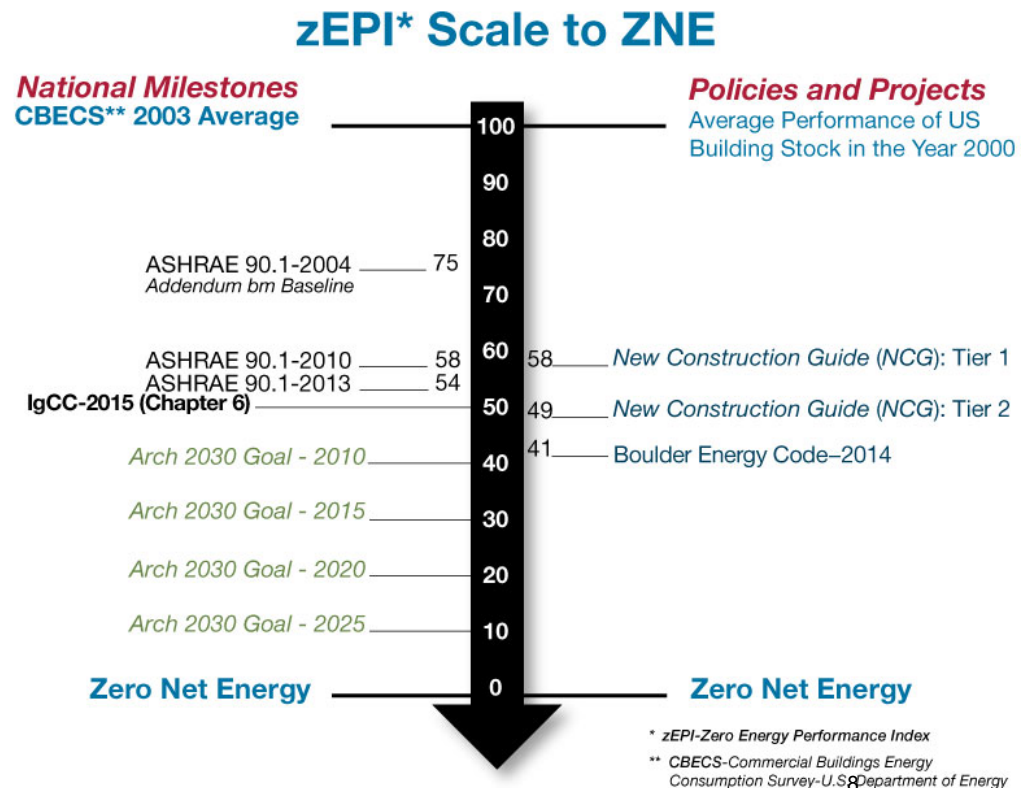
Overview of research findings

- Building codes (including stretch codes) and ordinances (6)
- Energy or Community Plans (4)
- Policies (13)
- RFP language (2)
- Lease language (3)
- Incentive programs (financial and alternative) (3)
- Other industry-developed tools or recommendations

Industry tools: zEPI Scale

Absolute scale used to benchmark buildings as opposed to the percent-better-than-code baselines with ZNE as the end goal

- The scale runs from 0-100, with 100 representing the average energy consumption based on CBECS data.
- Who's using it?
 - Earth Advantage
 - New Buildings Institute
 - International Green Construction Code 2012 (51)
- Barriers to inclusion



Policy Focus - Mandatory Solar Ordinances

- **Culver City**
 - 1KW of solar per 10K sf for applicable projects
 - New construction, additions, or major renovations over 10K sf
 - Does not apply to 1-2 family structures, garages, or parking structures
- **Lancaster**
 - 0.5 kW to 1.5 kW depending on type
- **San Francisco**
 - New construction <10 floors must install solar panels or solar water heaters on top of new buildings, both residential and commercial.
- **City of San Mateo**
 - Minimum size system for all new (1 kW to 5 kW depending on type) or alternative solar hot water system
 - Mandatory cool roofs for low-sloped commercial and multifamily of ≥ 0.70

Policy Focus - Mandatory Solar Ordinances

Sebastopol

1) Either install 2 watts per square foot of conditioned building area including existing, remodeled and new conditioned space **OR**

2) Use modeling software to demonstrate that the system installed will meet 75% of the building's annual electricity load.



Financial Incentives

- PACE financing
- Solar rebates and incentives
 - City-funded (SF, Marin)
 - Utility-funded (LA, Pasadena, Plumas-Sierra)
- ZNE-specific
 - NYC: \$2-8K per unit under three performance tiers, the highest being for ZNE homes
 - City of Watsonville: New Climate Impact Fee enacted, fully refunded for ZNE
- PV Buydown Programs
 - Anaheim, Truckee, Ukiah, etc.
 - Bay Area SunShares

Non-financial Incentives

- **City of Irvine:** No-fee solar permits
- **Culver City:** Plan check and permit fees (not to exceed \$5K) waived for energy efficiency improvements in specific areas
- **San Diego:** Expedited permits



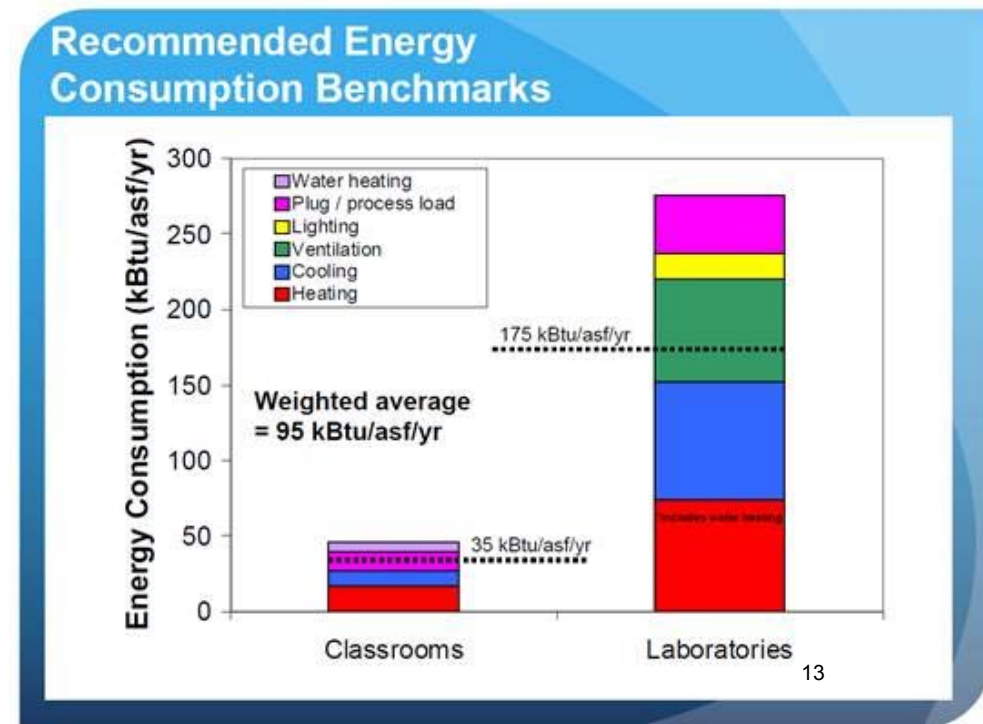
RFP and Lease Language

Community College in LA

“This project shall be built in a manner that maximizes all possible sustainable attributes including, but not limited to, state-of-the-art building design, mechanical design, and material selection, and building integrated renewable energy generation systems to achieve zero-energy consumption and a carbon-neutral profile upon completion.”

Utility RFP

- Prepare a list of proposed design measures for the building to achieve a very low energy footprint in the range of at least 16-22 kBtu/sf, or less, along with supporting documentation and analysis.



Recommendations for Targeted ZNE Policy Resources

RFP Template Language

- Energy Use Intensity (EUI) targets
- Lifetime cost (not just upfront capital)
- San Mateo County climate zone

ZNE Incentive Programs

- Expedited permitting
- Expedited inspections
- Based on the EUI targets

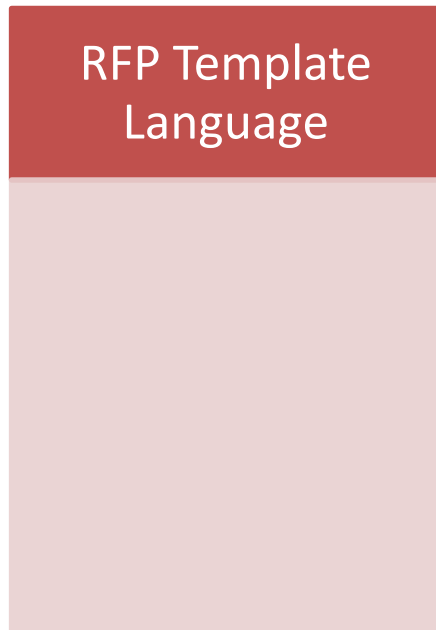
ZNE Incentive Programs

- New city climate fee
- Refunds for ZNE or ZNE-ready buildings
- Based on the EUI targets

INTERACTIVE ACTIVITY

1. Pro's and con's of each approach (write on post-it notes)
2. Vote on preferred Incentive Program Approach (sticky dots)

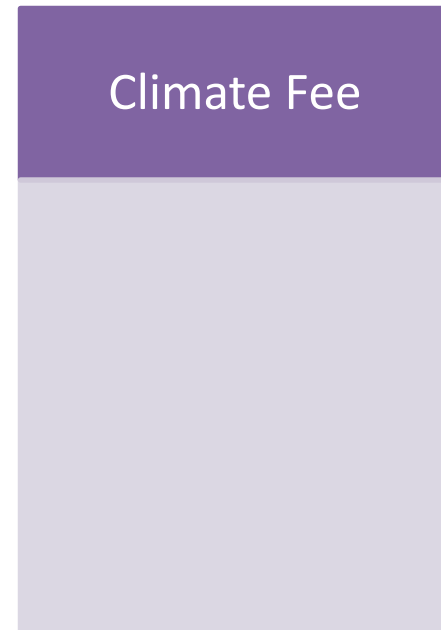
RFP Template
Language



Expedited
permit/
inspections



Climate Fee



Request for Proposal Language- SUSTAINABILITY and ENERGY EFFICIENCY

Guidance: The following language is intended to be inserted into any new building RFP/RFQ/RFI to provide clear direction for ZNE construction for each municipal project. Copy language as instructed below in the *bolded, italicized font*. Reference complementary EUI Target spreadsheet to determine appropriate EUI maximum for building type and adjust value in **bolded red, if necessary. Please delete guidance before finalizing RFP document.**

Insert in Project Description:

Project shall be designed and constructed to maximize sustainable attributes including, but not limited to, state-of-the-art building design, mechanical design, and material selection, and building integrated renewable energy generation systems to perform, once occupied, at an EUI of no more than **18* kBtu/sf** with the end goal of zero-energy consumption and a carbon-neutral profile.

*depends on building type and size

Instruction: Insert in Experience:

The information requested in this section is intended to permit the selection team to review experience and actual results of the teams and team member's ability to successfully design and construct projects similar in nature and complexity to the Project. Project teams meeting the design experience guidelines will be scored accordingly, with points be awarded positively for each requirement listed below. [Include scoring matrix here, TBD]

The Contractor, Architect of Record and Design Architect (if not the AOR), and MEP shall provide design or construction project profiles for a maximum of five (5) independent projects each having been completed within the last 10 years or are currently under construction and at least 50% completed. Project Profiles shall be limited to two (2) pages in length for each project and must respond to each line item contained on the project profile template attached.

Projects are to demonstrate the team's design and construction experience on similar projects in terms of significant new construction, critical schedules, complexity, scope, function, size, cost control, dollar value, and design-build experience.

Instruction: Insert in Design Experience:

Submit a maximum of five (5) project profiles representative of the AOR's ability to design projects of similar size, scope, character and complexity to this Project.

- At least two (2) of the projects must be in California.
- All projects must have been completed within the last ten (10) years or are currently under construction and at least 50% complete.
- At least two (2) projects must have a construction cost in excess of \$10 million dollars.
- At least two (2) projects must have utilized the Design-Build delivery method.
- At least one (1) project must be designed to perform at Zero Net Energy, extra consideration given to projects that document via EUI performance post-construction.

Instruction: Insert in Project Profiles Summary/References:

For each project, complete the Project Profile Template attached. Each profile is limited to two (2) pages and must include a response to all line items of the template for each project presented. Additional information, photos and other graphic materials may be included. Include a narrative addressing the salient features for each project and a brief statement indicating the relevance of the referenced project to this Project, specifically stating the overall goal of achieving “carbon neutrality” or Zero Net Energy. Indicate the degree of involvement by key construction personnel being proposed for this Project.

Owner's Project Requirements- SUSTAINABILITY and ENERGY EFFICIENCY

Guidance: This document is intended to provide a framework for creating the Owner's Project Requirements (OPR). Owner to complete all sections indicated by *red, italicized font*. Revert to standard font upon completion and also edit/delete other sections as appropriate to clearly communicate the OPR to the design and construction team. Please delete guidance before finalizing OPR document.

Owner Representative Contact:

Name

Position

Date

This document is intended to provide a framework for creating the Owner's Project Requirements (OPR). Owner to complete all sections indicated by *red italics*, revert to standard font upon completion and also edit/delete other sections as appropriate to clearly communicate the OPR to the design and construction team.

Owner's Project Requirements

- 1.1. Sustainability Goals and Requirements: *Insert general sustainability narrative here. Include discussion of cost-payback analysis as applicable, building materials discussion as applicable etc.*
The project goal is to achieve the following benchmarks: *Delete criteria that do not apply, add others as necessary*
 - 1.1.1. LEED or LEED equivalent: *version and anticipated rating*
 - 1.1.2. Living Building Challenge: *certified, or number of petals*
 - 1.1.3. Passivehouse: *certified*
 - 1.1.4. Green Globes: *version and anticipated rating*
 - 1.1.5. ASHRAE Standard 90.1-2010: *% better than baseline building*
 - 1.1.6. Energy Use Intensity (EUI): *XX* kBtu/yr site energy use
 - 1.1.7. Zero Net Energy (ZNE) building

1.3.2. CxA responsibilities by phase:

Phase	Commissioning Responsibility
Pre-design Phase	<ul style="list-style-type: none"> • Review OPR (and provide template) • Review BOD
Design Phase	<ul style="list-style-type: none"> • Create Design Commissioning Plan • Create and Manage Design Issue Log • Review Design Documents • Supply Cx Specifications • Attend Pre Bid Meeting
Construction Phase	<ul style="list-style-type: none"> • Create Construction Commissioning Plan • Review Submittals • Create and Manage Construction Issue Log • Hold Commissioning Kick Off Meeting • Create PFT & FPT Check Sheets and Forms • Perform Site Inspections • Observe / Verify / Perform site PFT tests
Acceptance Phase	<ul style="list-style-type: none"> • Observe / Verify FPT • Review O&M Manuals and As Built Drawings • Verify Operator Training • Create Commissioning Report • Create Systems Manual
Warranty Phase	<ul style="list-style-type: none"> • Observe/Verify deferred testing • Perform a warranty site visit and review report • Verify documentation of utility baselines
Ongoing Cx Phase	<ul style="list-style-type: none"> • Assist operators with maintaining baselines

1.4. Accessibility Requirements: The building shall meet all current Americans with Disabilities Act (ADA) or other governing standards or requirements. Systems requiring routine operation and maintenance, such as HVAC components and electrical panels, shall be designed to provide adequate access and clearances for all operation and maintenance tasks. *List any additional requirements here.*

- 1.5. Building Envelope: The building envelope is the most important component of the mechanical system. All components must be evaluated to determine the energy impact of this component. For example, adding more glazing at a lower U-value may reduce total building heating (or not). It is anticipated that this project will use high-performance for all of the thermal components of the building envelope. Massing, shading and glazing will need to be studied in detail to assure that the envelope harvests solar energy in the appropriate quantities to avoid summer cooling loads and winter heating loads.
- 1.6. Mechanical System Requirements: The HVAC system shall be designed to contribute to the overall energy goals and space controllability and to meet the design data matrix of this OPR. The system shall be constructed to industry best practices using standard industry components such that the operation and controllability are well understood by typical operators. All systems must be accessible and the design should take into consideration ease of operation and maintenance. Specific systems requirements: *List any additional requirements such as specific DDC interfaces, equipment types to be used or avoided, etc.*
 - 1.6.1. No combustion will be allowed on site.
 - 1.6.2. Filtration will be to *(choose one, list any spaces with higher criteria) MERV 7, 8, 11, 13.*
 - 1.6.3. All pumps and fans will be variable speed.
 - 1.6.4. Users in the space *will/will not* have access to thermal setpoints.
 - 1.6.5. Provisions will be made to install additional heating/cooling if the Owner finds that building thermal comfort is not acceptable.
 - 1.6.6. Ventilation Requirements:
 - 1.6.6.1. Mechanical ventilation systems shall be designed to meet minimum ASHRAE standard 62.1 ventilation required for all spaces. Ventilation shall be determined based on occupancy type, area, and of height of space.
 - 1.6.6.1.1. Office occupant density: xxx sqft/person
 - 1.6.6.1.2. Conference room occupant density may be based on total peak head count RMI will expect in the space, which may be over typical ASHRAE occupant density assumptions.
 - 1.6.6.2. Mechanical ventilation system design *shall not* be increased to 30% above ASHRAE standards per LEED or any other
- 1.7. Building Dashboard System Requirements: This project will include a building dashboard to allow real-time monitoring, interaction and education of building visitors with the building systems. The primary objective of this system is to educate building visitors about the energy used, energy produced on site, how the building envelope and/or mechanical systems are operating to reduce energy use. This interface will also be used by building operators and during the M&V exercise to understand the building energy use/production.
- 1.8. Plumbing System Requirements: The plumbing system shall be designed to provide excellent service to the occupants and meet the sustainable water use goals of this OPR.
- 1.9. Fire Protection System Requirements: The building shall be fully sprinkled with a system that meets code requirements for the building type, use and occupancy.
- 1.10. Lighting Requirements: The lighting systems will be designed to meet applicable codes, meet project stated energy goals and provide excellent indoor lighting comfort. It is anticipated that daylighting controls will be used in all main spaces and occupancy controls used in all service spaces to limit lighting energy use. *List any additional requirements such as specific interfaces, fixture types to be used or avoided, etc.*

- 1.11. Electrical Power System Requirements: The electrical system shall be designed to provide all building power requirements for occupant transportation, HVAC, plug load, emergency load, lighting load and other special loads of the building as required by local or regional codes and the design of the other building components. *List any requirements for power quality or redundancy.*
- 1.12. Emergency Power will be provided to the following systems:
 - 1.12.1.
- 1.13. Fire Alarm Requirement: The building shall have a fire alarm and notification system throughout the building. The system shall provide primary notification of any smoke or fire event directly to the building occupants and to a UL station.
- 1.14. Security Requirements: The building shall have a security system throughout the building. The system will include: *(edit lists as appropriate)*
 - 1.14.1. Card access system
 - 1.14.2. Security station
 - 1.14.3. Intrusion alarm
 - 1.14.4. Closed circuit television system
- 1.15. Communication Requirements: *Describe anticipated communication systems for example: wifi throughout, Ethernet connections at all workstations, any special speed requirements etc.*
- 1.16. Acoustical Requirements: The design shall prevent ambient noise from intruding into the building and causing noise levels above those indicated in the OPR. The design shall also prevent internally generated noise from rotating and vibrating equipment from infringing on adjacent spaces not to exceed those levels indicated in the OPR.
- 1.17. Benchmarking Requirements: The design shall provide predicted utility usage benchmarks for each utility system in the building. These benchmarks shall be based upon the engineers *design calculations and/or design modeling. The designer shall also include predicted possible uncertainty predictions for the baselines provided.* These baselines will be used to evaluate future building performance and operator evaluation.
- 1.18. Measurement & Verification (M&V) Requirements: The Owner intends to use a M&V program to verify ongoing operations and commissioning of the building. The building will use the following M&V systems and procedures: *(Select one of the following M&V performance levels and delete the others as needed. Add/delete design components and features as needed to reflect expected systems.)*
 - 1.18.1. Level I M&V shall include using the building's master electric, gas and water meter readings to evaluate monthly performance from previous readings to present readings. The operators shall be provided with simple work tools to normalize the meter readings for weather and occupancy variations on an annual or monthly basis, and compare these uses against anticipated (i.e. modeled) energy performance.
 - 1.18.2. Level II M&V shall include using sub meters to separate loads to more accurately determine operator performance of electric, gas and water usage over time. At a minimum the building shall be provided with the following meters:
 - Main electric meter, lighting load sub-meter, and HVAC load sub-meter
 - Main water meter, landscape sub-meter, kitchen sub-meter, cooling tower sub-meter and water feature sub-meter
 - Main gas meter, domestic hot water sub-meter, kitchen sub-meter
 - Metering for on-site renewable energy systems (PV or SHW)The operators shall be provided with simple work tools to normalize the meter readings for weather and occupancy variations on a monthly basis.

- 1.18.3. Level III M&V shall include using sub meters to separate loads to more accurately determine operator performance of electric, gas and water usage over time and all data shall be normalized through the use of a calibrated simulation model. At a minimum the building shall be provided with the following meters:
- Main electric meter, lighting load sub-meter, and HVAC load sub-meter
 - Main water meter, landscape sub-meter, kitchen sub-meter, cooling tower sub-meter and water feature sub-meter
 - Main gas meter, domestic hot water sub-meter, kitchen sub-meter
 - Metering for on-site renewable energy systems (PV or SHW)
- 1.19. Operations Training: The construction documents will require operation and maintenance instruction on all systems/equipment used on this project. *Insert any additional specific training requirements.*
- 1.20. O&M Manuals: All Operating and Maintenance manuals shall provide the information needed to understand start-up, operation, maintenance, shut down and repair of the equipment and assemblies used on the project. *Insert any additional specific training requirements.*
- 1.21. As-Built Drawings: As-built drawings shall be provided that record all revisions and changes to construction documents. *Insert any additional specific training requirements.*
- 1.22. System Manual: The system manual shall be the repository of information and operating documents to provide systems-based organizational information for system managers and operators.

Owner's Project Requirements- SUSTAINABILITY and ENERGY EFFICIENCY

Guidance: The following language is intended to be inserted into any new building OPR to assist project teams in ensuring project ZNE/sustainability goals remain consistent from the earliest planning stage. Insert project specifics where there is red, bolded font. Reference complementary EUI Target spreadsheet to determine appropriate EUI maximum for building type and size. Please delete guidance before finalizing OPR document.

As part of an overall commitment to sustainability and a goal of achieving “carbon neutrality” [the county] builds its facilities to last and promotes environmental quality and resource conservation through sustainable design and construction.

Sustainability and energy efficiency goals for this project include:

- Operate the facility at a minimum of **18 kBtu/sf**
- Design to LEED Gold, or equivalent, standards
- Include segregated collection and recycling of construction waste
- Incorporate strategies, measures, and systems to conserve energy, such as heat/enthalpy wheels, energy recovery units, “setback” modes, etc.
- Utilize Building Automation System and other controls to efficiently maintain and track performance of key building systems, particularly HVAC and lighting.
- Optimize air conditioning systems for maximum building efficiency
- Use low-VOC, regionally-available, and high recycled content materials.
- Adopt “daylight harvesting” to minimize electric lighting usage where functionally practical.
- Incorporate renewable energy strategies, systems, and products.
- Incorporate LED lighting in interior and exterior lighting design
- Develop a comprehensive Measurement & Verification Plan that allows for capturing, calculating and reporting relevant energy use data and performance verification of energy conservation measures.
- Display an interactive public “dashboard” capable of showing predicted and actual energy usage, costs and other performance metrics.
- Establish project team (owner, architect, engineers, energy manager, contractor, operations team, etc.) involvement throughout entirety of the project: initiation, design, construction, and conclusion.
- Report project EUI at each iterative energy model submission including an evaluation of ECM’s and associated energy savings

The Basis of Design (BOD) will establish specific plans and strategies for achieving these goals, and the construction documents will include sustainable construction practices and techniques.

Proposed Energy Use Intensities (EUI) for Zero Energy Buildings in PG&E territory

	Type	US National Median kBtu/sqft (Site)	2006 CEUS Energy Usage in PG&E Electric Service Area kBtu/sqft	2009 ASHRAE Standard Benchmark - Climate Zone 3C (San Fran, New construction) kBtu/sqft	2014 Energy Benchmarking Report - San Francisco Municipal Buildings	Alameda County Municipal Buildings	Proposed EUI Target Range		Target % below benchmark EUI	EUI Target by %	Average EUI from actual buildings (see below case studies)
							25% below	50% below			
Municipal	Small Office (<30,000 sf)*		64	35	61.43	46.7	26.3	17.5	50%	17.5	
	Large office (>30,000 sf)*		81	37	54.78	50.8	27.4	18.3	50%	18.3	
	Average office building		67	73	60.32	48.7	27.0	18.0	50%	18.0	17.62
	Hospital	197	155	142	282.35		106.5	71.0	50%	71.0	
	Post office	50	0	0			0.0	0.0	50%	0.0	
	Fire station	88	0	0	62.29	52.4	0.0	0.0	50%	0.0	
	Police station	88	0	0	73.82	84.4	0.0	0.0	50%	0.0	
	Prison	93	0	0	90.19	166.2	0.0	0.0	50%	0.0	
	Library	0	0	0	64.15	60.55	0.0	0.0	50%	0.0	
	Schools (K-12)	58	45	51	31.715		38.3	25.5	50%	25.5	
Commercial	Hotel	73	72	89			66.4	44.3	50%	44.3	
	Restaurant	224	297	415			311.3	207.5	50%	207.5	
	Retail	47	49	50			37.5	25.0	50%	25.0	
	Warehouse (non-refrig)	29	21	15	17.02	33.9	11.3	7.5	50%	7.5	
	Average office building	67	73	36	60.32	48.7	27.0	18.0	50%	18.0	
	Supermarket	186	173	166			124.5	83.0	50%	83.0	

*Per 2006 CEUS Energy Usage in PG&E Electric Service Area

**CEUS and ASHRAE data not available

Case studies of actual ZNE buildings in the Bay Area

ZNE Zero Net Energy Case Study Buildings--Volumes 1 & 2, Eleven non-res buildings thoroughly documented at ZNE!

Name	Type	City	Modeled EUI	Measured EUI	Additional Measured EUI
Packard Foundation Headquarters Building	Office	Los Altos	19.4	20.7	14.1
Stevens Library at Sacred Heart Schools	School	Atherton	27	16.9	
IDEAs Office Building	Office	San Jose	24.8	18.7	
Watsonville Water Resources Center	Office/Lab	Watsonville	56.9	51.4	
UC Merced Science & Engineering Building 1	Lab	Merced	119	207	188
UC Merced Classroom & Office Building	Classroom	Merced	37	44	41, 36
DPR Construction Office Building	Office	San Francisco	25.8	22.4	
IBEW-NECA JATC Training Facility	Classroom/Office	San Leandro	18	16.3	
Speculative Office Building at 435 Indio Way	Office	Sunnyvale	21.2	13.5	
West Berkeley Branch Library	Library	Berkeley	17.5	23.1	
The Exploratorium	Museum	San Francisco	45.6	42	

Volume 1: <http://bit.ly/2a6j6v4>

Volume 2: <http://bit.ly/29V0Vwx>

Energy Use Intensity (EUI) benchmarking data sources

<https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf>

http://www.architecture2030.org/files/2030_Challenge_Targets_National.pdf

<http://newbuildings.org/resource/getting-to-zero-database/>

<http://cms.ashrae.biz/EUI/>

https://www.energycodes.gov/sites/default/files/documents/2015_IECC_Commercial_Analysis.pdf

<http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF>

<http://sfwater.org/Modules/ShowDocument.aspx?documentID=8587>

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