Selecting a Net Zero Energy Design Team:
Recommendations for Success

NZE Selection Overview:

Clients for new buildings, or renovations, are increasingly asking for Net Zero Ready, Net Zero Energy, Net Positive Energy, or very high performing buildings with low Energy Use Intensity. These buildings have subtle differences but all work toward the ultimate goal of reducing building energy use and offsetting with renewable energy. Throughout this document these building variations will be referenced collectively as Net Zero Energy (NZE) buildings (please see the Explanation of Terms at the end of the document for detail on the differences). With the increased awareness of climate change and buildings' energy contributions to climate change; building owners, users, the public, and regulatory agencies, are concerned about the energy and carbon impacts of buildings. Many are advocating for NZE buildings. Or, at a minimum, clients are increasingly concerned about the energy impacts of buildings and are asking for accurate numbers for energy and carbon impacts in order to make prudent choices. At the same time, the cost of achieving NZE buildings is dropping rapidly, so that new NZE buildings are often less expensive than code, fossil fuel powered, buildings if energy improvements are financed with building construction. Today, NZE buildings are technologically achievable, affordable, and beautiful when compared to conventional buildings.

Unfortunately, some projects still do not achieve NZE goals or achieve NZE at significant additional expense. This can categorize NZE buildings as technologically challenging, expensive, and potentially risky; thereby limiting the construction of NZE buildings and this leaves the client for a proposed NZE building in a confusing and challenging place. How do clients with NZE motivation make effective assessments for comparing and evaluating NZE teams and proposals? What questions and information should be requested in RFP's for proposed NZE buildings?

This document is intended to assist building owners and managers with the selection of design teams for NZE building projects. In order to be cost effective and successful, NZE projects require a collaborative process with an integrated design and construction team with specific and in-depth expertise and experience. Therefore, selecting qualified and experienced design and construction teams is critical for project success.

Recommendations, questions and evaluation criteria are provided on the following pages that can be incorporated into the team selection and interviewing processes for NZE buildings. These suggestions, and easily comparable metrics, can assist building owners and clients in evaluating whether potential NZE design teams are both qualified and experienced with net zero strategies, practices, and metrics. This is critical to ensuring the success of NZE buildings that are above and beyond standard construction industry practices. This document is also focused on giving clients the construction cost, financial, and energy information needed to make prudent energy and financial decisions.

Below are 13 suggested submission requirements to include as part of a NZE RFP. These suggestions are in addition to typical submission requirements, questions, and

evaluation criteria included in an RFP, such as team approach, project timeline, communication and collaboration model, team qualifications, project experience, fee, etc. After the suggested submission information and questions below, there is an explanation of terms that are important to understand in evaluating NZE proposals.

The purpose of including this supplemental information in an RFP is to allow building owners, managers, and clients to make informed evaluations based on objective data about energy performance, technical expertise, cost and overall project delivery on completed NZE projects. Design teams may have varying amounts of the information that is requested, so some areas may not be answered or may be partially answered. We suggest discussing the design teams' responses further during interviews.

Suggested information to request from potential design firms in a NZE RFP and in project team interviews

(Note: The questions can be copied directly from the text below as they are directed toward a design team responding to an RFP, also feel free to include the attached spreadsheet which can be used to convey this information.)

Experience

1. NZE Project Experience: Provide information on past experience of design team leader and key consultants in designing and constructing NZE Buildings, both as individual firms and as a team. List client name, contact info, building type and use, building size, and construction cost. Specifically include information on the design team's track record in setting EUI metrics during schematic design and actual monitored EUI at project completion.
2. NZE Speaking/Writing Experience: If applicable, provide information on NZE building design speaking, workshops/teaching, technical papers, etc.
3. Past Project Energy Performance Metrics: Provide information on building energy performance in each of the following categories:
    - Energy Use Intensity (EUI) both modeled and actual
    - EUI with and without renewables
    - Measured air infiltration (blower door result)
4. Cost Effective NZE Experience: Provide the following cost information for all NZE projects completed to date:
    - Total additional construction cost for the NZE building over a code compliant building, with and without renewable energy costs.
    - Increased cost per square foot for the NZE building over a code compliant building, with and without renewable energy costs.
    - Increased percentage of the building cost for the NZE building over a code compliant building, with and without renewable energy costs.
5. NZE Financial Modeling Experience: Indicate what financial modeling and reports the design team has completed projecting the financial impacts of the NZE

enhancements above a code compliant building. Provide a copy of one report for a past project.

6. NZE and Passive House Certifications: Indicate the high-performance building certifications the design team has achieved with completed projects to date. Of particular note and interest are the International Living Futures Institute (ILFI) Living Building Challenge (LBC), Zero Energy Certification, and Zero Carbon Certification; Passive House Certification; and the New Buildings Institute (NBI) Getting to Zero Buildings Database listings.
7. Post Occupancy Evaluation (POE): Attach any POE's on completed NZE projects.

Energy Metrics and Tracking Requirements

In the proposal, address the following owner's project requirements for information:

8. EUI Requirements: Propose a process for setting an EUI during schematic design. Provide EUI targets or range that the design team recommends for this project and indicate the reasoning for suggesting this EUI.

9. Air Infiltration Requirements: Propose a process for setting the building air infiltration target during schematic design. Provide air infiltration targets or range that the design team recommends for this project and indicate the reasoning for suggesting this.

10. EUI Tracking: Modeled EUI numbers are required at 50% SD and updated at 100% SD, and 100% DD as a part of the project process. Indicate that this work is included in the proposal.

11. NZE monitoring: Provide NZE monitoring services, including the calculation of the actual EUI based on one year of energy data. Indicate that this work is included in the proposal.

Project Approach

12. Building Design Strategies: Provide an overview of suggested building design strategies that the design team thinks are appropriate for this project to achieve NZE building goals.

Low EUI/NZE Services

13. Scope of Work and Fee: Proposals should include all work necessary to deliver a NZE building. See the attached document, *Net Zero Energy (NZE) Design Services*, for a summary of NZE scope of work to be provided. Break out the fee related to the NZE scope of work identified in this RFP.

Explanation of Terms:

Throughout this document terms have been used that may not be familiar to clients providing RFPs and/or to design teams responding to NZE RFPs:

- NZE (Net Zero Energy): A building that produces as much energy as it consumes on an annual basis using only renewable energy.
- NPE (Net Positive Energy): A building that produces more energy than it consumes on an annual basis using only renewable energy.
- NZR (Net Zero Ready): A building that is designed to be NZE, and is designed so that renewable energy could provide all of the building's energy needs, but does not yet have the renewable energy included in the project. The building is designed so that renewable energy can easily be added in the future.
- EUI (Energy Use Intensity or Energy Utilization Index): Historically, buildings have not had a simple and effective way of comparing energy performance. Cars have fuel mileage which is an easy way to compare car energy performance. For buildings, EUI provides a relatively simple way to compare buildings by totaling up all energy a building consumes on an annual basis and then dividing by the size of the building (kBtu/sf-yr). This can be done with energy modeling during the building design process and with actual utility data after the building is completed and occupied. Some firms track their actual EUIs on just their best projects, and some on all their projects. Energy tracking on all projects is an asset to NZE projects by increasing knowledge of building performance. Over time, like with the auto industry, this will improve the collective energy performance of buildings. Often firms indicate building performance based on how much better than code a building is. This tracking of relative performance, as opposed to absolute performance, based on EUI, is much less useful when designing NZE buildings. Evaluating the past experience of competing firms on the basis of EUI provides the simplest, most effective, and accurate comparison objectively.
- Low EUI: EUI's between 10-25 kBtu/sf-yr are recommended for typical NZE buildings, such as offices, retail, residential, classrooms, but not including buildings with significant process loads, such as commercial kitchens, laboratories, manufacturing, etc. NZE buildings should reduce their energy consumption 80-90% over typical existing buildings before they add renewables. For NZE buildings, this energy reduction is consistent with Passive House standards for energy conservation.
- Modeled vs. Actual EUI Performance: When evaluating NZE building performance the actual performance is of utmost importance, versus what was modeled. This is particularly important when comparing the energy performance of differing design teams. If a building is more than a year old, it is relatively easy to get actual EUI performance based on utility data. Also checking on building's performance after a year of occupancy may uncover areas where the building is not performing as designed, so it provides an inexpensive check.

- EUI With and Without Renewables: Generally, EUI is the energy intensity of the building based on annual energy consumption and therefore excludes energy production from renewable energy sources. The EUI without renewables shows how buildings are performing in terms of energy conservation. The EUI with renewables shows how the building and renewable system are performing together to achieve net zero or net positive performance.
- Financial Analysis of NZE Performance: Financial analysis provides valuable information during design to show projected cumulative savings relative to the incremental capital cost required for NZE. Through determining the difference between a net zero building and a code compliant building construction cost, modeled energy use, and applying financing terms and fuel escalation, the financial prudence of different levels of energy conservation can be assessed. Cost effective and potentially cash flow positive NZE buildings require financial analysis.
- Net Zero, Passive House, and/or High-Performance Energy Certifications: The International Living Futures Institute provides a cost effective NZE certification-Zero Energy Certification. An additional resource is the New Buildings Institute (NBI) who maintains a database of emerging and verified net zero buildings https://newbuildings.org/resource/getting-to-zero-database/. The Passive House Institute of the US (PHIUS) and Passive House International (PHI) has certification processes for very low EUI projects and NZE based on an energy model of the building and third-party verification that construction meets the detailed drawings.

Project Performance Metrics Comparison

Project Name	SF	Year Completed	New/ Reno/ Addition	Process Loads	Energy Use Intensity (EUI)			Cost			Air infiltration cmf50/sf (6-sided gross envelope area)	Certifications
					Modeled	Actual	Net EUI including renewable energy prouduction	Additional Captial Cost	Additional Captial Cost/sf	Additional Capital cost as % of Building Cost		
					(kBtu/sf-yr)							

US Energy Information Administration Median Site EUI Comparative

Source: Maclay Architects

Education College/University	**kBtu/sf-yr**	104
Food Service - Restaurant Cafeteria	**kBtu/sf-yr**	207
Lodging	**kBtu/sf-yr**	88
Public Assembly	**kBtu/sf-yr**	119
Office	**kBtu/sf-yr**	88
Residential - Single family	**kBtu/sf-yr**	52.9
Residential - Multi- family	**kBtu/sf-yr**	67.6

Source: EIA CBECS 2003 and Architecture 2030 Inc.