Ready to Retrofit:

The Process of Project Team Selection, Building Benchmarking, and Financing Commercial Building Energy Retrofit Projects

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About this Guide

Purpose

This guide presents a process for three key activities for the building owner in preparing to retrofit existing commercial buildings: selecting project teams, benchmarking the existing building, and financing the retrofit work. Although there are other essential steps in the retrofit process, the three activities presented in this guide are the critical elements where the building owner has the greatest influence on the outcome of the project.

Audience

Primary

- Building owners
- Designers
- Contractors

Secondary

- Engineers
- Energy service companies (ESCOs)
- Energy/efficiency program managers
- LEED consultants
- Control companies

Content Overview

This guide providesan introduction and overview to the retrofit process and then dives deeper into thekey activities that an owner can influence most in the retrofit process: (1) Selecting Your Project Team, (2) Benchmarking Your Building, and (3)Financing Your Energy Efficiency Projects

- **Building Energy Retrofit Overview** will provide you a simple explanation of the retrofit process, the project stages and the players involved.

- **Selecting Your Project Team**will help you select both an internal team to plan and oversee yourretrofit project, and an external team to perform the retrofit. The process provided for selecting a design team would also apply to contractor selection.

- **Benchmarking Your Building**will help you understandthe role of energy benchmarking in determining the scope of a retrofit project, how to select the right energy information system (EIS) for your building, and how to use the EIS to save energy.

- **Financing Your Energy Efficiency Projects**provides you with multiple financing options and performance contracts to finance your retrofit.

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GLOSSARY

Btu	British thermal unit
CFD	Computational Fluid Dynamics
ECM	Energy Conservation Measure
EIS	Energy Information System
Envelope	Physical separator between the interior and the exterior environments of a building
ESCO	Energy Service Company
ESPC	Energy Savings Performance Contract
EUI	Energy Use Intensity
IGA	Investment-Grade Audit
LEED	Leadership in Energy and Environmental Design
Massing Study	A study of multiple buildings that share similar characteristics
M&V	Measurement & Verification
RLF	Revolving Loan Fund

1 Building Energy Retrofit Overview

For newcomers, undertaking a building energy retrofit can seem overwhelming. Even individuals familiar with the construction process may feel a little lost at first when considering new twists such as energy audits, conservations measures, financing, and measurement and verification.Relax: you can do this.Strip away the terminology and new twists and a building energy retrofit isrevealed to be a capital facilities project that follows a simple and logical process.

Figure 1 below lays out all of the process steps and associated activities necessary to conduct a building energy retrofit. This rest of the guide dives deep into three key activities on that list—Team Selection, Benchmarking, and Financing—but this first chapter provides an overview of these process steps, so that you can visualize how those three activities connect with the others to ensure a successful project.

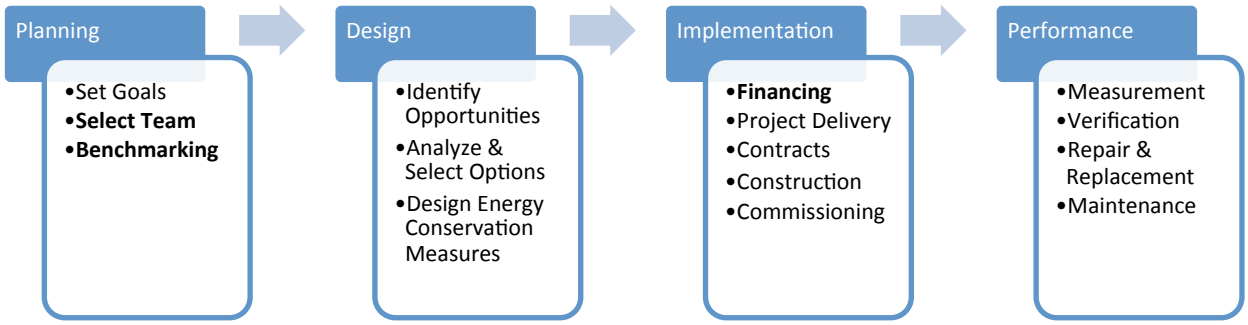


Figure 1: Steps and activities in the Retrofit process

1.1 Planning

1.1.1 Set Goals

Project planning and pre-project planning occur at the very earliest stage of a project and serve to better define the project goals and develop better alignment of the process and desired outputs.Take this opportunity to establish aggressive, deep energy retrofit goals.Establish the building energy performance goals prior to establishing your strategies, to ensure that creative and innovative pathways to achieving the project goals remain open. Further guidance on goal-setting will be presented in the building benchmarking Section 3 of this guide.

1.1.2 Select Team

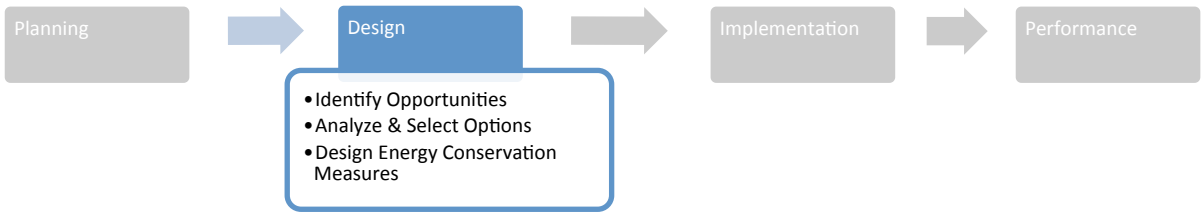
A successful retrofit project will require the contributions of many different people with very different but complementary knowledge and skills.It is important to include stakeholders at all levels of the organization, as well as external expertise, to establish buy-in and lines of

communications among all parties involved. See **Section 2** to learn more about selecting your team.

1.1.3 Benchmarking

Once a project team is in place, with established goals for the project, establish a starting point for the project.A point of reference, typically current operating conditions, is determined so that you can verify project goals in terms of percentage reduction or some other comparative measure.Benchmarking allows for the current building operating characteristics to be compared against other similar buildings in terms of size, purpose, and geography.Benchmarking provides a landscape of building data from which you can set a post-retrofit performance goal for your target building. This process also identifies a baseline or business-as-usual scenario that you can use to conduct economic analyses of individual or portfolio energy conservation measures, to develop a business case for each. See **Section 3** to learn more about benchmarking.

1.2 Design



1.2.1 Identify Opportunities

The design process begins with a **preliminary energy audit**, which can be accomplished in one to two days, depending upon the size of the facility.The preliminary audit can occur concurrently with the benchmarking, since much of the information obtained from the audit will be required to benchmark the building.This audit will identify potential energy conservation measures (ECMs) at a very high level and provide estimates of both energy and associated costs savings.The ECMs identified are typically those sources of greatest energy use within buildings (See Figure 2).This first audit provides sufficient information to assess the objectives and goals established during the planning phase, as well as to provide a realistic range of the required project investment, for financial planning.Projects can reach this phase of the project with little or no investment, and it typically serves as a go/no go decision point for the project.

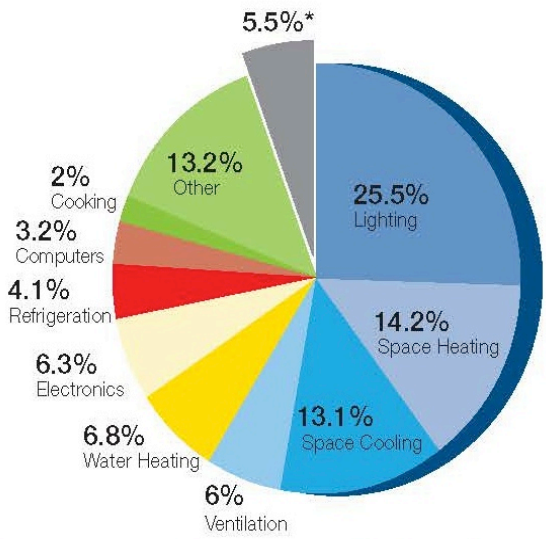


Figure 2: Breakdown of Primary Energy End-Use in Commercial Buildings
Source: Commercial Buildings Energy Consumption Survey (2003)

Once the team decides to move forward following the preliminary audit, and makes any necessary adjustments to the project goals, the project proceeds into an **investment-grade audit** (IGA).This audit is much more data intensive and typically requires two to three months of development beyond the preliminary audit.The output of this IGA will typically be a report outlining both the previously identified ECMs and new ones, in much greater detail.Both the savings calculations and financial analyses will be much more accurate and provide the confidence required by investors—thus the name *investment-grade audit*.

1.2.2 Analyze and Select Options

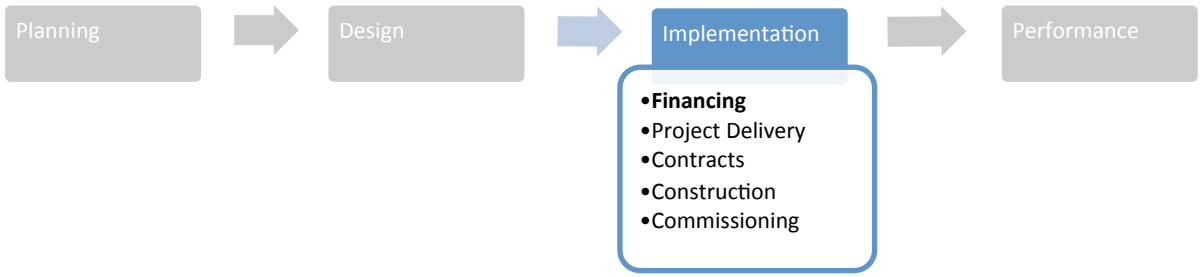
The retrofit team will balance many influencing factors in selecting the ECMs for the project.Energy reduction and associated cost savings are obvious priorities, and to a large extent drive ECM selection, depending upon the type of financing to be employed.Hopefully, the goal-oriented approach has challenged the project participants to identify innovative solutions.These solutions will need to be compared along with renewable energy goals, sustainability initiatives, building certification requirements, and other factors to determine the appropriate mix of ECMs to best meet the chosen project goals. The evaluation process will need to evaluate ECMs in bundled scenarios due to interactive effects and financing restrictions.Many ECMs with very low payback periods will be used to offset desired ECMs with much longer paybacksin a bundled format, in order to include more ECMs in the project and provide for a deeper retrofit.

1.2.3 Design Energy Conservation Measures

Once the specific ECMs for the project have been selected, the final design of each ECM must be completed to create the construction documents.These design documents must be sufficient in detail for a contractor to furnish and install the ECMs without any additional design information.Contractors may, however, provide shop drawings for specific ECMs to further detail the manner in which a specific piece of equipment is to be installed.In a design-build contract arrangement, the contractor will also be providing the design documents and essentially designing the project for their own installation.In either case, the owner should take

an active role in reviewing the design documents for compliance with the intent of the ECM and the overall project goals.

1.3 Implementation



1.3.1 Financing

The decision on how to finance your project is another key decision for the owner that will drive much of the ECM selection and implementation.Each organization will evaluate retrofit project financing differently, depending upon their internal financing requirements, internal rate of return, cash available, current debt, and capital facilities planning.The financing options for owners include self-financing, third-party financing, and loans.There are numerous specific finance vehicles from which to select the one that makes the most sense for your project. See **Section 4**to learn more about financing your project.

1.3.2 Project Delivery

The three most common project delivery methods in use today are: design-bid-build, design-build, and construction management.There are also hybrid methods, such as the bridging-design-build method, that are particularly well-suited to retrofit work as well.Deciding which delivery method to use largely depends upon the available resources and project team expertise.The traditional **design-bid-build** is the most resource-intensive method in terms of internal resources; however, it also allows for the greatest amount of owner control.Conversely, the **design-build** approach requires fewer internal resources but the owner also sacrifices much of the control over design.The **construction manager** and **bridging-design-build** methods offer a middle-ground approach wherein the owner retains more of the design control in exchange for allocating moderate resources to the project.The project delivery selection process is also an ideal time for the owner to show strong support and incentive for and integrated project delivery that supports integrated design through early involvement of key participants, alignment of incentives, and collaborative control.

In all three basic forms of project delivery, the owner is still responsible for overall project management. The three main delivery methods are shown in Figure 3 with associated contract and communications relationships.

Design-bid-build (DBB)

Under the design-bid-build project delivery system, the owner contracts separately for the design and construction of the project. The owner contracts directly with a design professional for the preparation of plans and specifications and assistance in the bidding stage. The design professional may also provide oversight of the project during the construction phase. The owner enters a separate contract with the general contractor for the construction of the project. Under the design-bid-build project delivery system, the owner retains responsibility for overall project management. All contracts are executed directly with the owner. The design of the project is complete before the contractor is selected, which generally transpires through a competitive bidding process with the assistance of the design professionals.

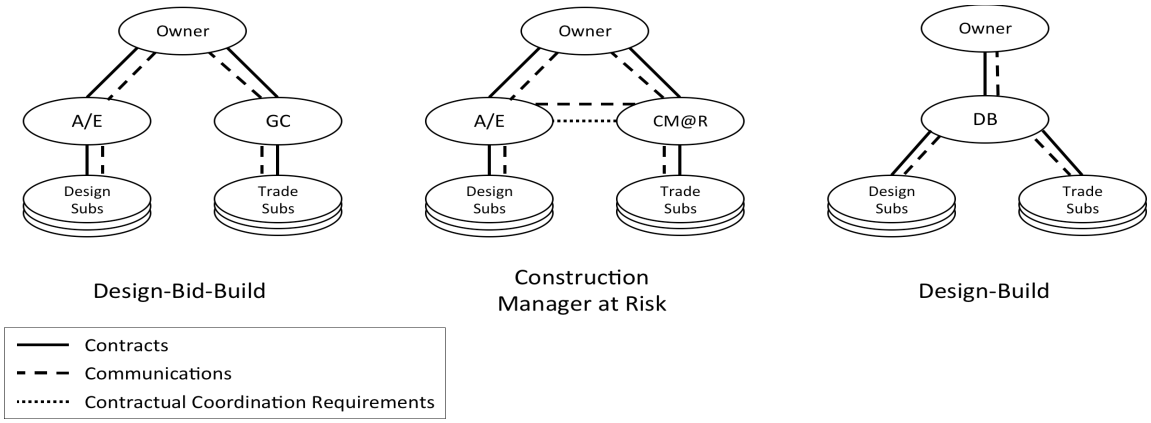


Figure 3: Project Delivery Systems – Contracts and Communications
Source: Molenar, K. D. (2009)

Construction Manager at Risk (CM@R)

Construction Manager at-Risk provides a commitment to the owner to deliver the project within a Guaranteed Maximum Price (GMP). The timing of the CM@R's engagement, which occurs ideally relatively early in the design process has a large impact on his influence in the project. Under this arrangement, the CM@R, not the owner, holds the contracts for the construction subcontractors (or performs the construction itself) so the CM@R is not only responsible for management of the construction, but also at risk for the construction cost.

Design-build (DB)

In the design-build project delivery system the owner enters into a contract with a single entity that will assume the obligation of furnishing design, supervision and construction services during the project. The design-build project delivery system is an attractive alternative to the design-bid-build system because it provides a single point of responsibility for design and construction. It has the advantage of taking the owner out of the middle of disputes between the

contractor and design professionals. It has the disadvantage, however, of eliminating the checks and balances that occur when the design and construction phase are contracted separately.

Performance Contract Design-Build

This single-source engineering-construction method is combined with a financial plan. The DB firm takes responsibility for the building program, and the client pays for the project via energy and/or labor cost savings. This is the method used in federal ESPCs.

Bridging Design-Build

Bridging is a hybrid of the traditional DBB method and the DB method. It retains aspects of each system that are beneficial to the owner and eliminates the aspects that cause problems for the owner. Prior to selecting the DB firm, the owner invests in an owner's design consultant (ODC) who will create the menu of needs through schematic design and design development. In terms of an energy efficiency project, this would occur through the preliminary assessment (PA) and investment grade audit (IGA). The owner will then select a DB firm to complete the final design and build the project. The ODC also then serves as a third party commissioning and measurement and verification (M&V) agent.

Energy Savings Performance Contract

An ESPC is actually another name for performance contract design-build. The ESCO conducts a comprehensive energy audit and identifies improvements to save energy. In consultation with the owner, the ESCO designs and constructs a project and in some cases (including all federal ESPCs) arranges the necessary financing. The ESCO guarantees that the improvements will generate energy cost savings sufficient to pay for the project over the term of the contract. The markups paid to ESCOs (approximately 20-30%) are substantially higher than markups typically paid in the construction industry (5-8%). These higher margins potentially pose too great a burden on small-medium energy efficiency projects. In addition, the design of projects by ESCOs also engaged in building equipment and controls manufacturing, as many are, may also present a conflict of interest that could result in suboptimal design of, and savings from, the projects.

A summary comparison of the project delivery systems discussed is presented in Table 1. The traditional ESPC system is relatively weak because it fails to deliver either construction cost savings or control over design to the owner. The two design-build systems provide better solutions with preference being given to the bridging method. The bridging design-build system incorporates all of the advantages provided by the design-build system plus owner control of design. Both of these design-build systems potentially provide significant cost savings in terms of reduced contractor markups and construction cost savings. Therefore, bridging design-build GMP and performance contract design-build GMP are the recommended project delivery systems for small-medium alternatively financed energy efficiency projects. The performance contract design build system would be appropriate if no funds were available for energy audits and needed to be financed as part of the construction contract. Proposal stipends may be used

with this method to provide enhanced competition and allow the federal government to benefit from creative solutions put forth by any of the bidders.

Table 1: Comparison of Project Delivery Systems

Project Delivery System	Single Entity (Design & Construction)	Guaranteed Maximum Price	Construction Cost Savings to Owner	Owner Control of Design
Design-Bid-Build				√
Energy Savings Performance Contract	√	√		
Design-Build				
Performance Contract D-B GMP	√	√	√	
Bridging D-B GMP	√	√	√	√
Construction Manager @ Risk GMP		√	√	√

Project Delivery Recommendations

The two project delivery methods recommended for small-medium energy performance contract projects are shown in Figure 4. The bridging design-build &power purchase agreement (PPA) system should be employed when funding is available for an investment grade audit (IGA). This method provides the best value by providing greater competition and best value determination. This system also allows for a single entity to perform the final design and construction in order to guarantee savings. In an optimized structure, the owner's design consultant (ODC) prepares the IGA which allows for greater design control by the owner and removes any conflicts of interest.

Additionally, the PPA is coordinated within the project structure to ensure holistic treatment of energy within the facility while freeing up the energy conservation activities for deeper retrofit measures and deployment of emerging technologies. The design-build & PPA system is recommended when no funding is available for an IGA. The procurement of the design-build contractor must then rely more heavily on qualifications. Procurement competition and quality can be enhanced through the use of proposal stipends. The owner will forfeit more control of

the design, however the level of effort imposed on the owner also decreases. Otherwise, this system enjoys the same benefits as the bridging method.

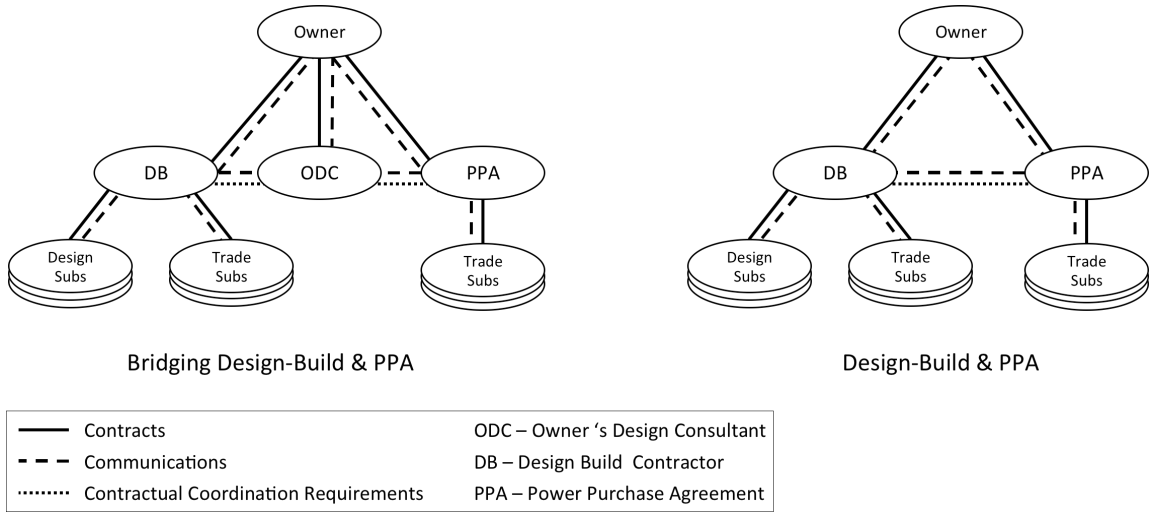


Figure 4: Recommended Project Delivery Systems

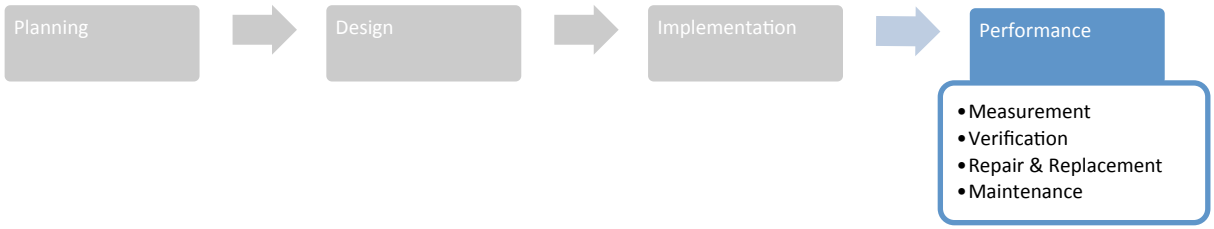
1.3.3 Construction

Retrofit and remodel projects are often more difficult to implement because actual site conditions can be very different from the plans provided.Buildings are often renovated, and systems such as plumbing, electrical, and HVAC are altered without any acknowledgement on existing as-built drawings.Therefore, a retrofit project should remain flexible and expect to encounter issues that may alter the manner in which an ECM is installed, while ensuring that there is no significant impact on the desired energy savings.Therefore, it is key that a clear and concise communication plan and process be set in place prior to construction to resolve issues promptly, and with the least amount of disruption and delay.

1.3.4 Commissioning

Commissioning is extremely important in the building energy retrofit process.This activity is intended as a quality check on all of the installed ECMs, to ensure that they are operating as designed.If ECMs were installed improperly, or set to operate inconsistent with the intended design, then the desired energy savings are at risk.Ideally, to remove any conflict of interest, a third-party commissioning agent performs the commissioning.

1.4 Performance



1.4.1 Measurement and Verification

Measurement and verification (M&V) is the activity that answers the most common question of an energy retrofit project, "How do I know that I'm actually getting the savings?"The M&V process compares measured energy use after an energy retrofit to the existing baseline established during the IGA and benchmarking.Individual ECMs are often measured to ensure that each is realizing its expected energy savings, and that the total energy savings are not a case of overachieving ECMs lifting up underperforming ECMs.The goal is to maximize the energy savings, which is best achieved by maximizing each individual ECM to the greatest extent possible.

The M&V process occurs after construction completion, commissioning, and start-up.In third-party finance projects, M&V is typically conducted each year to ensure that the energy savings are providing the necessary cost savings to exceed the finance payment.

1.4.2 Repair and Replacement

Retrofit projects should take into account equipment that will need to be repaired or replaced during the performance period.For example, in a 20-year third-party financed project, a boiler with a life expectancy of 10 years will need to be replaced twice during the contract's performance period; once in the middle and once at the end.The replacement costs, as well as any required maintenance, must be included in the project plan, and certainly in the project financial model.

1.4.3 Maintenance

Operations and maintenance (O&M) is another activity during the performance period that canbe performed either by a contractor or using the owner's internal resources.If the owner performs required O&M during the performance period, he or she also takes on responsibility for some of the ECM performance and, potentially, any shortfalls in the cost savings.The contractor can maintain the ECMs throughout the performance period as part of the agreement, thus relieving the owner of any responsibility for performance shortfall related to O&M.Thiscost

can be accounted for in the financial model to be paid from each year's savings; however, the service cost is typically higher than that of the owner's internal resources.

2 Selecting Your Project Team

Selecting the right team members for an energy retrofit project can go a long way toward helping to ensure the project's success. Knowledgeable, motivated participants will keep the project on track and be likely to identify the best energy-saving technologies and processes.

For internal team members, this guide offers a list of issues to consider, spanning from availability of staff to expertise in energy-related projects. For external team selection, this guide presents considerations for selecting a design team. Though this guide does not explicitly address contractor selection, similar considerations may apply.

2.1 Qualifications for Your Internal Team

Owners should select their internal team to ensure that their interests are followed throughout design and delivery of the retrofit project.

If you are an owner, use the subheadings as a quick checklist to determine who may be a good fit for the internal team.

If you are a designer or an owner's representative, you may want to review this list in more detail. The topics included here provideonly a minimum set of considerations.

2.1.1 Time Available

It is critical that your staff has time available to devote to your retrofit project. Although retrofit projects cost less than a new construction project and rarely involve as much square footage, do not assume that they will involve less staff time. Because they generally involve more uncertainty than new construction, staff must be available to address issues as they arise.

Retrofit projects may involve less money and less square footage than new construction, but may require a similar amount of staff time.

2.1.2 Retrofit Design and Construction Project Experience

Retrofit projects typically involve different issues than new construction projects. For instance, they are often more uncertain because documentation about the existing structure is often lacking. Therefore, staff experienced in new construction projects may find retrofit work challenging. If possible, include someone with retrofit experience on the team so they can anticipate and plan for company-specific construction issues as they arise. For example, a team member with retrofit experience may know the age of the mechanical systems in most of the company's buildings, and be able to share that knowledge with the design team. This

information would enable the design team to select a new mechanical system that integrates with the existing mechanical system, if necessary.

Retrofit experience comes in handy when building plans are lacking.

2.1.3 Low-Energy Projects Experience

Low-energy projects are similar to "typical" design and construction projects in most ways: they involve the same phases and for the most part, the same tasks. However, they feature a couple important differences.

1. **Low-Energy Certification.** If you are seeking certification (like LEED, ENERGY STAR, and others) for your low-energy building project, a team member should be aware of timelines and document requirements for low-energy certification.
2. **Modeling.**Low-energy projects often require more modeling than their "typical" project counterparts. A team member should become familiar with the outputs of these models, to be able to assess predicted building performance. For instance, most energy model output includes a predicted British thermal unit (Btu) per square foot value. Havinga member of the design team convert this number into kilowatts per square foot (kWh/sf) (or another useful metric) will allow you better assess changes in energy use.

2.1.4 Familiarity with Company Objectives

Although you are well aware of your company's goals, vision, and mission, it may be less clear how these tenets translate to design and construction projects. You may consider asking your more experienced colleagues about how the company approaches design and construction projects, especially those with energy goals. For instance:

- Is it critical that building projects achieve LEED certification?
- Is it critical that projects qualify for low-energy tax incentives?
- Does your company approach construction projects with safety as a primary objective?

Design and construction projects almost always involve tradeoffs between competing objectives, so be aware of how to evaluate different options to align with your company's objectives.

2.2 Qualification for your External Design Team

The external design team is typically responsible for designing the retrofit project. Thus, team selection affects the project outcome. Choosing the right team for the project maximizes the likelihood of meeting the project goals. The list presented here is not exhaustive; you should feel free to add other considerations based on your own experience. This information is presented in bulleted form here, and as a table in Appendix A. We also provide a sample Request for Qualifications (RFQ) as Appendix B. Information presented here, as well as in the Appendices, was developed to select technical expert teams to participate in the U.S. Department of Energy's Commercial Building Partnerships (CBP) Program (2010; 2011).

2.2.1 Architectural Experience

You should ensure that your external team has demonstratedarchitectural experience in, at minimum, the following areas:

- ☐ Comparing and contrasting potential building massing and optimizing forlow-energy performance
- ☐ Low-energy envelope systems and components
- ☐ Integrated low-energy systems incorporating envelope components in the areas of both new and existing construction
- ☐ Daylighting, solar shading optimization, and thermal performance of building envelope components and systems for both new and existing construction
- ☐ Infiltration detailing and building tightness for both new and existing construction
- ☐ Thermal bridging detailing
- ☐ Architectural design experience across a variety of market sectors and building types
- ☐ Commercial building design teams, design engineers, and management teams through charrette leadership
- ☐ Presentations to design teams
- ☐ Construction document preparation
- ☐ Specification preparation
- ☐ Communicating with design team members

Low-energy innovation in the area of building and site relationships is preferred.This experience may include relationships with utilities, government, public works, natural resources, funders, and others.

2.2.2 HVAC and Related Controls Experience

Ensure that your external team has demonstrated HVAC and controls experience in, at minimum, the following areas:

- ☐ Low-energy HVAC systems and integrated low-energy systems incorporating envelope, lighting, and daylighting components.The team should have successful low-energy systems experience in areas such as radiant heating and cooling, Dedicated Outside Air Systems (DOAS), heat recovery, and low-energy dehumidification.
- ☐ Low-energy HVAC controls design, including integrated controls with other systems (such as plug load monitoring, dynamic shading, and demand response)
- ☐ Instrumentation of thermofluid systems, and data acquisition and storage for building systems, including low-energy HVAC systems
- ☐ HVAC design, controls, and monitoring experience across a variety of market sectors and building types
- ☐ Low water-use systems, including innovative water harvesting technologies, and water-use optimization
- ☐ Low-energy HVAC controls for systems, including those using radiant heating and cooling, chilled beams, thermal mass, night purge, thermal storage,geothermal systems, and other systems.
- ☐ Communications and control technologies for demand response
- ☐ Plug load- and device-level monitoring and controls
- ☐ Energy use monitoring and feedback visualization tools(for example, dashboards)
- ☐ Controls experience for buildings across a variety of building types

2.2.3 Lighting, Daylighting, and Related Controls Experience

Your external team should have demonstrated experience with lighting and daylighting retrofits (including lighting and daylighting controls)in, at minimum, the following areas:

- ☐ Using Radiance, AGi32, or other advanced design software tools and other relevant software and models
- ☐ Optimized glazing selection for daylighting and heat gain
- ☐ Solar shading optimization for daylighting and heat gain, light shelves, and other integrated daylighting devices
- ☐ Low-energy lighting design, including expertise with emerging low-energy fixtures and technologies, such as light-emitting diodes (LEDs)
- ☐ Low-energy lighting and daylighting controls design (experience with lighting controls integration with facade systems is preferred)
- ☐ Lighting, daylighting, and controls design experience across a variety of market sectors

2.2.4 Energy Modeling and Simulation Experience

You should ensure that your external team has demonstrated energy modeling and simulation experience in, at minimum, the following areas:

- ☐ Using whole-building energy analysis programs,with an emphasis onEnergyPlus
- ☐ Documenting all phases of model development, including key inputs and providing references for assumptions and data
- ☐ ASHRAE 90.1 2007, Appendix G, Modeling Guidance, through application of Appendix G to buildings, participation in ASHRAE committee work, or relevant papers delivered or published
- ☐ A variety of building simulation tools that may be useful for specific equipment or systems
- ☐ Presenting model results to design teams, management teams, and/or professional organizations
- ☐ Modeling advanced low-energy HVAC systems and controls, such as radiant heating and cooling systems, natural ventilation, and displacement ventilation
- ☐ Modeling advanced low-energy lighting and daylighting systems, including controls.
- ☐ Performing energy conservation measure comparisons through simulation
- ☐ Performing simulation comparisons with ASHRAE 90.1 and other baselines (such as existing building benchmark data)
- ☐ Modeling new construction and existing buildings, including existing HVAC plants
- ☐ Life cycle cost analysis, net present value, andinternal rate of returnanalysis
- ☐ Modeling for building types across a variety of market sectors

2.2.5 Building Auditing and Data Collection Experience

You should ensure that your external team has demonstrated building auditing and data collection experience in, at minimum, the following areas:

- ☐ Building HVAC design and operation, building control systems, electrical systems, domestic hot water systems, lighting and daylighting systems, and plug and process load devices
- ☐ Conducting audits and collecting building and load-related data in and for a variety of commercial building types and processes
- ☐ Tools and equipment used to measure and characterize energy loads and building performance, and access to those tools and that equipment
- ☐ Making energy efficiency recommendations based on energy consumption data, and based on building auditing experience, estimating the costs of the recommendations, estimating potential energy and cost savings, and calculating economic performance in terms of simple payback, lifecycle costs, internal rates of return, or other metrics.
- ☐ Processes using all energy types, including natural gas, electricity, fuel oil, and renewables.

2.2.6 Cost Estimation Experience

You should ensure that your external team has demonstrated cost estimation experience, in at minimum, the following areas:

- ☐ Cost estimation for low-energy buildings, including innovative low-energy systems such as radiant heating and cooling, displacement ventilation, renewable energy systems, integrated controls, and chilled beams
- ☐ Innovative financial mechanisms in low-energy building design
- ☐ Conducting cost estimation and life cycle cost analysis for low-energy building retrofits or new construction
- ☐ Cost estimation experience across a variety of market sectors

2.2.7 Commissioning Experience

You should ensure your external team has demonstrated commissioning experience, in at minimum, the following area:

- ☐ Commissioning to provide consultingexpertise on commissioning procedures may be the only skill set required; you can hire a separate commissioning agent to perform a commissioning test.

3 Building Benchmarking

3.1 Why Benchmark Your Building?

The maxim "you can't manage what you can't measure" has become a cliché in the business world. Yet, when it comes to energy management, most building owners and operators lack even basic information as to how their property performs compared to their peers or best practices.

Energy benchmarking is an important tool for developing indices of energy performance and setting goals. Benchmarking metrics typically focus on whole-building energy use, represented with a unit-less point system for rating or absolute energy consumption and intensity indicators.

Uses of energy benchmarking as applied to buildings include:

- Determining how a building's energy use compares with that of others
- Setting targets for improved performance and tracking progress/persistence
- Facilitating assessment of property value and marketing rental properties
- Gaining recognition for exemplary achievement
- Identifying energy saving strategies
- Providing reference points for commissioning and retro-commissioning
- Improving energy demand forecasts (at a range of geographic scales)
- Providing feedback for design of better buildings (via design guidelines, standards, etc.)

Over the past few years, there has been a significant increased interest and activity in commercial building energy efficiency benchmarking. Most notable has been a flurry of new regulations passed by national, state, and local governments. These include the European Performance of Buildings Directive which requires all buildings with significant public access to display their energy performance; Assembly Bill 1103 in California which requires all commercial buildings to disclose their energy performance at the time of sale or lease; EISA 2007 which requires all U.S. government buildings to be benchmarked on an ongoing basis; and local regulations in cities such as New York which require commercial buildings to be benchmarked. In addition, voluntary benchmarking programs continue to grow in both government and utility programs.

3.2 How to Benchmarking Your Building

3.2.1 Whole-Building Benchmarking

Whole-building benchmarking is the process of comparing a building's overall energy efficiency relative to a peer group of buildings using a building energy use intensity (EUI) metric such as a thousand Btu per square foot (kBtu/sf) or kBtu/student (for a school). The EUI metric is normalized for key building characteristics that are not related to efficiency, such as floor area, occupancy hours, climate, and number of occupants. Whole-building benchmarking can help prioritize buildings to target within a portfolio.

There are several commercially available tools for benchmarking. The EPA ENERGY STAR Portfolio Manager isone of the most widely used benchmarking tools. Many EI systems offer the capability of doing benchmarking across a portfolio of buildings recorded within the system.Different tools offer different degrees of normalization—ranging from simple filtering of the portfolio to select a comparable peer group, to regression-based analysis. The key analytical consideration in selecting a benchmarking method pertains to the approach used to normalize the value of the metric, in order to obtain meaningful "apples-to-apples" comparisons.

A simple crude approach to normalization is to filter the comparison peer group of buildings, to obtain a subset of buildings that has similar characteristics to the building being benchmarked (Figure 5). A more rigorous approach is to conduct a multiple regression analysis on the peer comparison dataset, which yields an equation that relates the performance metric (such askBtu/sf-yr) to normalizing parameters (such as operation hours). This equation is then used to compute normalized energy use, against which actual energy use can be compared.

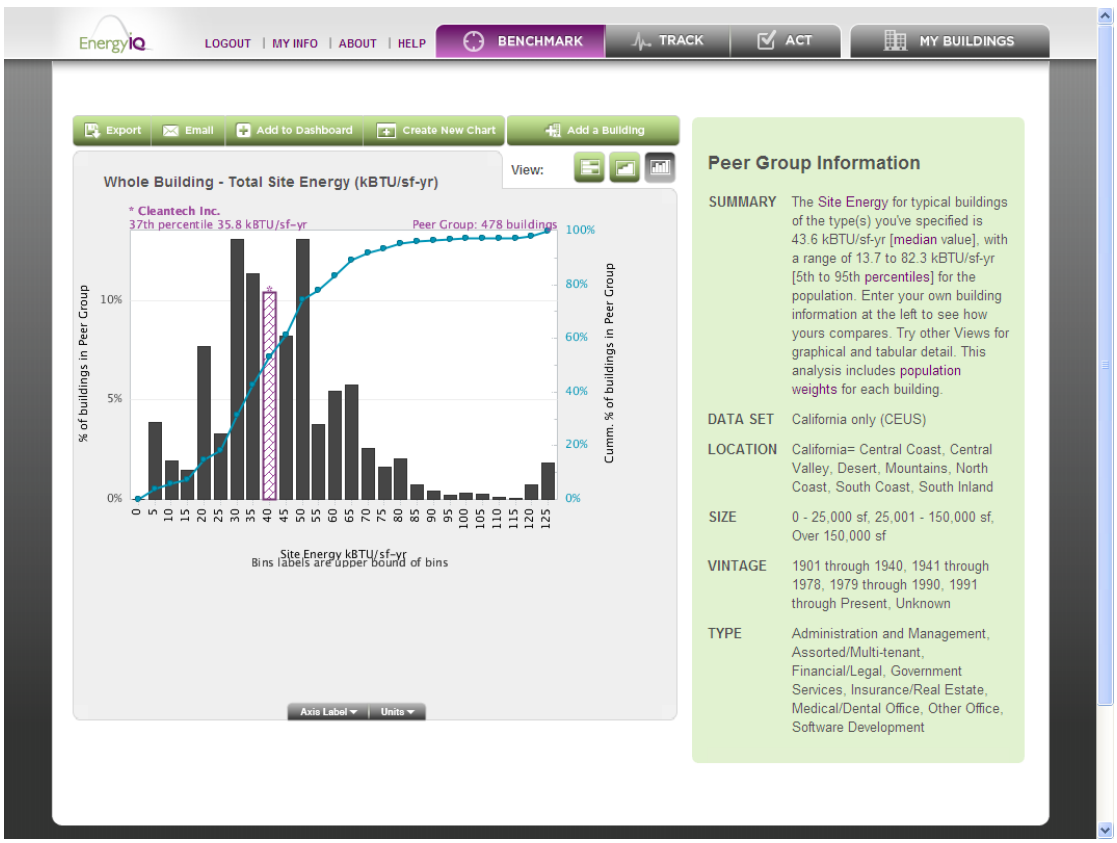


Figure 5. This output plot from EnergyIQ(an online tool for building benchmarking) shows a frequency distribution and cumulative frequency plot of the total site energy (kBtu/sf-yr) for a peer group of buildings used to benchmark an office building "Cleantech Inc." which is at the 37th percentile of the peer group.

3.2.2 System-Level "Action-Oriented" Benchmarking

Action-oriented benchmarking is intrinsically more in-depth than conventional whole-building benchmarking, essentially forming a bridge between full-fledged simulation (for design) or

energy audits (for retrofit), as shown in Figure 6 (Mills et al. 2008).An action-oriented benchmarking process ideally interoperates with other aspects of building energy management, particularly commissioning and retro-commissioning, where results can help identify deficiencies and suggest where interventions are merited.

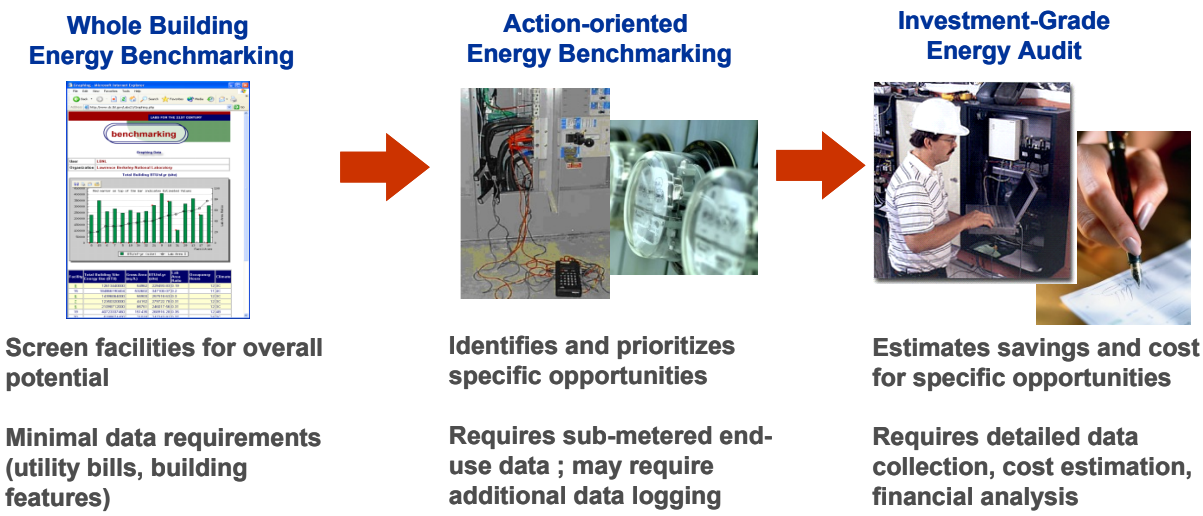


Figure 6: Action-oriented benchmarking in the context of whole-building benchmarking and investment-grade audits

In isolation, conventional energy benchmarking can inspire action but provides no practical guidance. Action-oriented benchmarking enables users to identify potential energy-efficiency options and prioritize areas for more detailed analysis and full-scale audits.This represents a means of opportunity assessment not afforded by conventional benchmarking.However, the choice of metric itself often dictates the general message conveyed, and thus care should be taken to use appropriate metrics.For example, simply calculating miles per gallon as a transportation metric would always suggest that a motorcycle is the superior form of transportation.Relevant metrics are a central element of action-oriented benchmarking.Some users are motivated by traditional engineering metrics (such as energy per unit of floor area), while others find more meaning in metrics of cost or energy-related pollution released or avoided.

An action-oriented process must offer cross-sectional analyses (such as those for static comparisons to other buildings) as well as longitudinal (for tracking performance over time).Overlays of targets are a natural method for helping to define targets and gauging progress.

Granularity of analysis is also integral to the action-inducing value.High-level metrics,such as those at the whole-building level, may suffice for some users.However, in other cases more detailed metrics are essential.This is especially the case if benchmark outcomes are to be used to infer specific measures that could be taken.For example, Figure 7 shows a benchmark plot for laboratory ventilation system efficiency that allows a user's facilities to be compared to a peer group (Mathew et al. 2010).

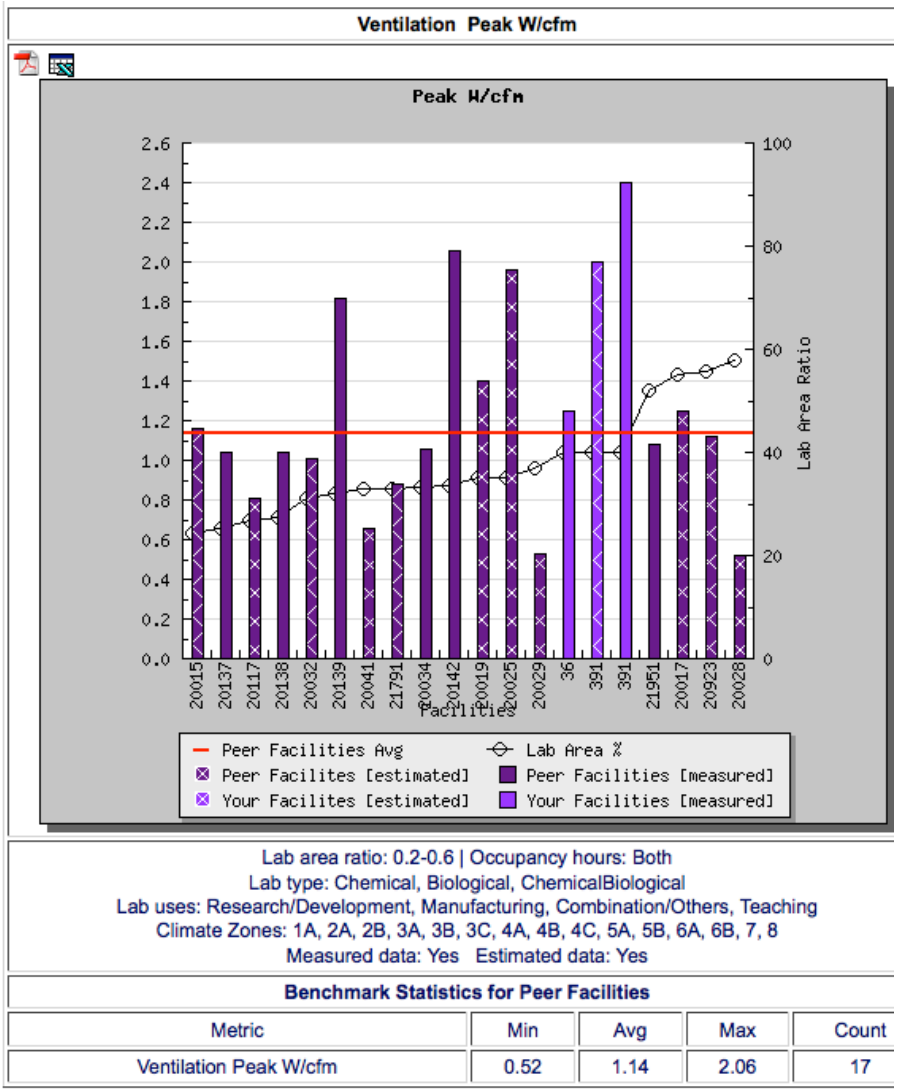


Figure 7. System-level benchmark plot of ventilationWatts per cubic feet per minute(W/cfm) from the Labs21 benchmarking tool.

As noted above, action-oriented benchmarking occurs in a broader context of understanding and managing building energy performance. While more dynamic and detailed than conventional energy benchmarking, action-oriented approaches are not a substitute for full-fledged energy audits of existing buildings or true simulation for new construction or retrofit.Action-oriented benchmarking does, however, provide a quick and low-cost screening process that can flag potential improvements or realistic targets.

4 Financing Energy Efficiency Projects

One of the biggest hurdles to energy efficiency projects is financing.This section will direct you to the right financing vehicle, help you understand performance contracts, and point you towards a resource of rebates and incentives.Performance contracts are specific types of third-party finance contract mechanisms that allow for projects to be implemented with little or no up-front capital investment.Rebates and incentives are essentially cash available from utilities or government organizations that you can be apply to the implementation costs of an energy efficiency project; they can also be leveraged to build a larger project for you to realize even greater energy efficiency.

4.1 Financing Options

There are three main ways to finance energy efficiency projects:

- Self-financing
- Loans
- Third-party financing

As is shown in Figure 8below, these financing alternatives can be used together as well as individually.For example, a building owner could leverage funds available for replacement of a boiler to buy down a much larger project using third-party financing.The result would be a project with far greater energy savings then replacement of the boiler alone.

Figure 8: Energy-efficiency project financing options

To determine which type of financing is best, you must match the resources available for your project to the most appropriate finance mechanism. Self-financing has the least cost of financing because the money is already inhand, and there is no interest or fee associated with borrowing the money. Self-financing also provides the owner with the greatest amount of control because they have more options available in terms of contracting mechanisms.Conversely, third-party financing has the highest cost of financing due to the higher interest expense associated with the financial risk of the contractor rather than the building owner.Under third-party financing, the owner also has the least amount of control because they are limited to projects requiring an Energy Services Contractor (ESCO).

4.1.1 Self-Financing

To avoid interest costs, you should use internal funds to finance energy-efficiency projects whenever possible.When money that would otherwise be servicing debt can be invested in the energy-efficiency retrofit, even greater efficiency gains can be achieved.

4.1.2 Loan

A second option for financing energy-efficiency projects is a loan. The borrower initially borrows the amount needed (the *principal*) to finance the project, and is obligated to pay backthe loan (along with the cost for borrowing the money—the *interest*) in regular installments.Depending upon the term of the loan, you will pay back approximately one-and-a-half to two times the amount you borrowed for the project.Even so, a loan with affordable payments is the best alternative if you cannot buy what you need outright. Any cash funds that you have available for the project can be used as a down payment, so that you need to borrow less and incur fewer finance charges.

Figure 9shows the process of using a loan to finance your energy efficiency project.First, an audit is performed to determine if your project is feasible and that it will provide a realistic income stream to make the loan payments.Once a viable project is identified, you can proceed through the solicitation and procurement phases of the project.Once the bids are received and a successful contractor is awarded the project, the loan can be approved; the construction and

implementation phase can commence once the funds from the loan have been secured.

4.1.3 Third-Party Financing

Third-party financing is provided by an entity other than the two main parties in a contract; in this case,anyone other than the building owner or construction contractor.Withthird-party financing, an intermediarycan raise money in privatecapital markets to fund the energy-efficiency project.

Third-party financing for energy-efficiency projects typically exists in two forms: project financing and contractor financing:

- In *project financing,*the building owner will apply for and obtain the financing required to implement the project. The money is typically obtained from traditional lending institutions or investors.It isbased on the creditworthinessof a project's cash flows and assets, rather than onthe backing of a company or the full faith and creditof the building owner
- In *contractor financing,* a contractor arrangesfinancing from the lending institution, financieror investors. The loan is backed by firm contracts from thebuilding ownerfor funding the energy-conservationimprovements in his or her buildings.

Below are several examples of third-partyfinancing.

4.1.3.1 Leasing

You can obtain energy-efficiency equipment through a leasing arrangement between you, the lessee, and the company providing the leased equipment and/or financing, the lessor. Typically, the lessee agrees to make regular lease payments over a specified period of time at an established interest rate. In a lease-purchase agreement, you have the option to purchase the equipment at the end of the term for an amount agreed upon in the contract.

4.1.3.2 Small Business Financing

The federal government's U.S. Small Business Administration (SBA) has perhaps the greatest potential for influencing widespread deployment of energy performance contracting.The SBA's financing channels include banks and other lending institutions that offer a number of SBA-guaranteed loan programs to assist small businesses.

While SBA itself does not make loans, it does guarantee loans made to small businesses by private and other institutions. These loan guarantees reduce a lender's risk, making it more attractive to provide project capital for an energy-efficiency project.

4.1.3.3 Revolving Loan Fund (RLF)

A revolving loan fund (RLF) is typically established from a source of capital that does not need to be repaid.Loans from the fund are made for projects and, as loan repayments are made, funds become available for new loans to other projects. Hence, the money from the fund revolves from one project to another. Figure 10 illustrates how this works.

<u>Projects</u>

Revolving loan funds have traditionally been established to completely finance an energy efficiency project.One such example is the Harvard Green Campus Loan Fund (GCLF).The GCLF is a $12 million revolving loan fund that provides up-front capital for projects that reduce Harvard's environmental impact.The model is relatively simple: the GCLF provides the capital, and the applicant department agrees to repay the fund via savings achieved.

This paid-from-savings approach enablesapplicants to upgrade the efficiency, comfort, and functionality of their facilities without incurring up-front capital costs.Loans are availableto cover full or partial project costs.The maximum loan is $500,000 per conservation measure with a required minimum internal rate of return (IRR) of 9%.To date, the program has achieved an average 27.9% return on investment (ROI) through a mix of short- and long-term projects.

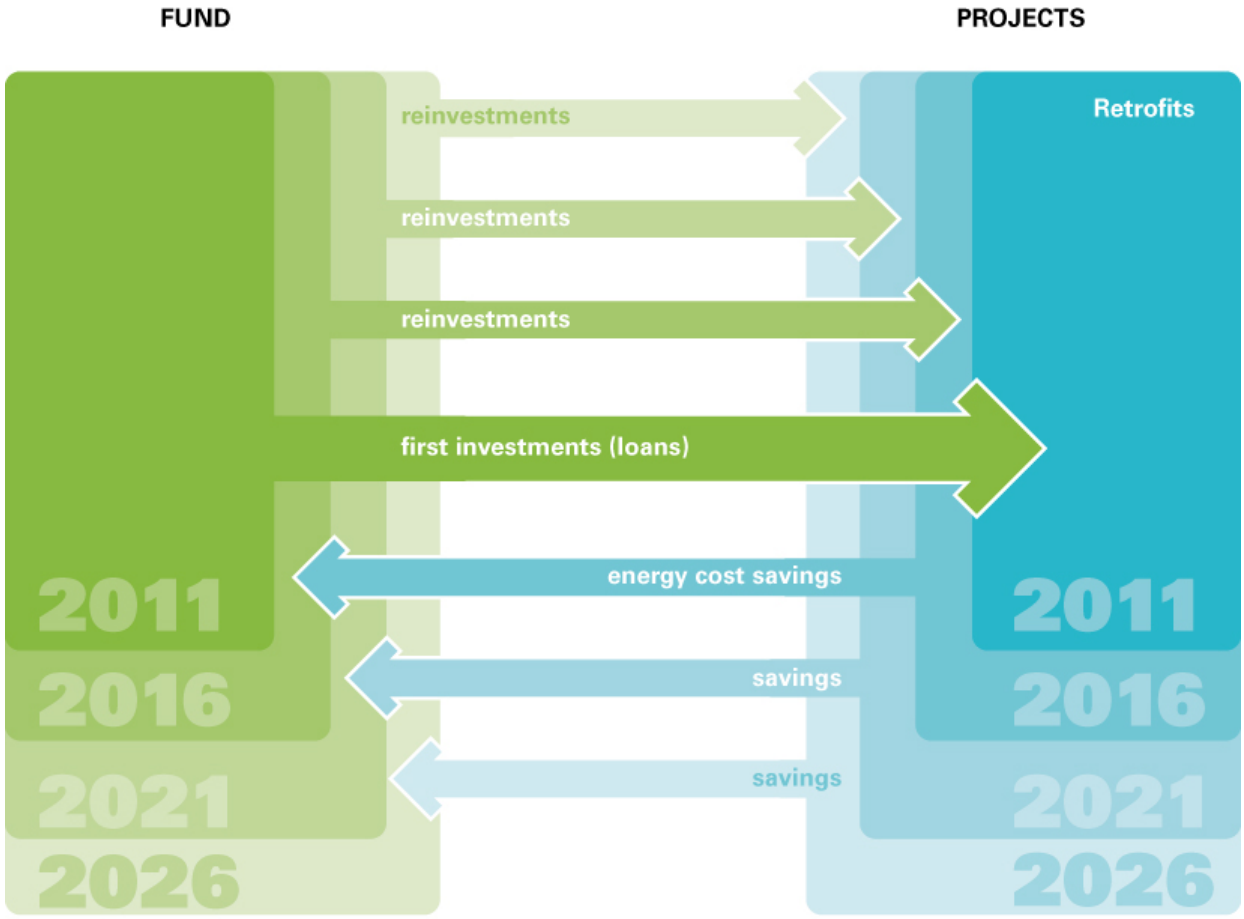


Figure 10: How a revolving loan fund (RLF) works

Audits

The power of the RLF could be leveraged further by using the funds strictly for energy audits. Figure 11 illustrates how this concept can be used to develop an ongoing energy retrofit program. The RLF is initially funded by the building owner or through some combination of grants and

internal funds. The funds from the RLF are then used solely to finance energy audits to identify viable energy-efficiency projects. Once identified, the projects can be bundled or individually presented to financiers for third-party financing. The end result should be a much greater energy savings per dollar on loan from the RLF.

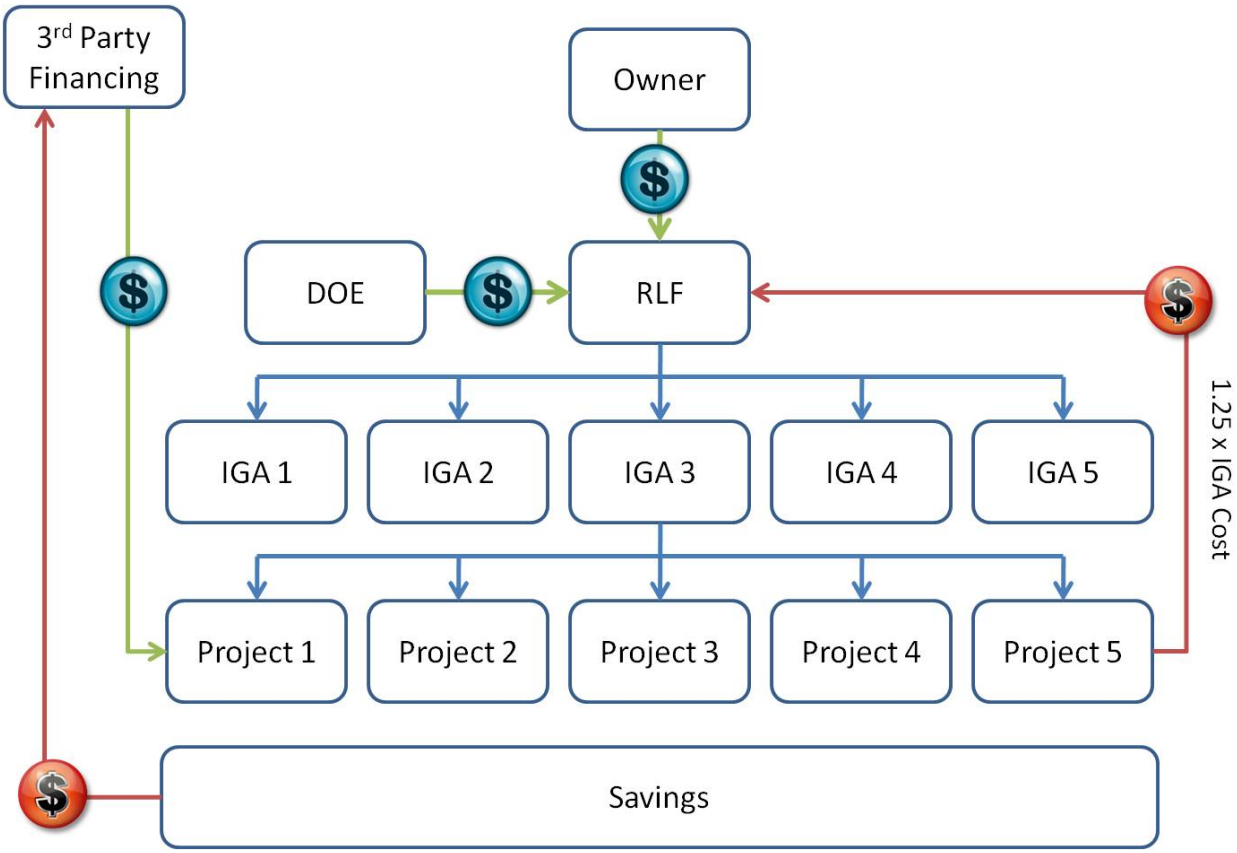


Figure 11: Example of a leveraged revolving loan fund

4.2 Performance Contracting

Performance contracting is a specific type of third-party financing mechanism. The most common contract mechanism used to implement energy-efficiency projects is a design-build contract referred to as an *Energy Savings Performance Contract* (ESPC), which is provided by an energy service company (ESCO). The ESPC was introduced in Section 1 of this guide as one of the project delivery methods used for building energy retrofits. However, what is unique about the ESPC is its integration of third-party financing, which is discussed in greater detail here.

The advantages of performance contracts include:

- No upfront capital costs

- Turnkey solution / Design-build
- Integrated approach
- Fewer internal resources needed
- Guaranteed savings
- Ongoing O&M

4.2.1 What is an Energy Service Company (ESCO)?

An ESCO delivers energy-efficiency services through an ESPC (which is explained in further detail below). An ESCO typically provides the following services:

- An energy audit
- Construction management
- Project design and commissioning
- Project financing
- Project monitoring
- Equipment maintenance and operations

Energy service companies historically have been equipment manufacturers; however, energy companies and utilities, general contractors, construction managers, and specialty contractors have also recently begun to enter the ESCO market. An advantage to using a construction contractor or manager is that they have no conflict of interest with regard to equipment and energy conservation measure (ECM) selection.In addition, the project overhead and profit markups of the construction industry are significantly less than those typically found in projects performed by equipment manufacturers.

Do you need an ESCO? The answer depends upon the capabilities of the team you assemble using the guidance in Section 1.Your internal team can use Figure 12 to help you decide.

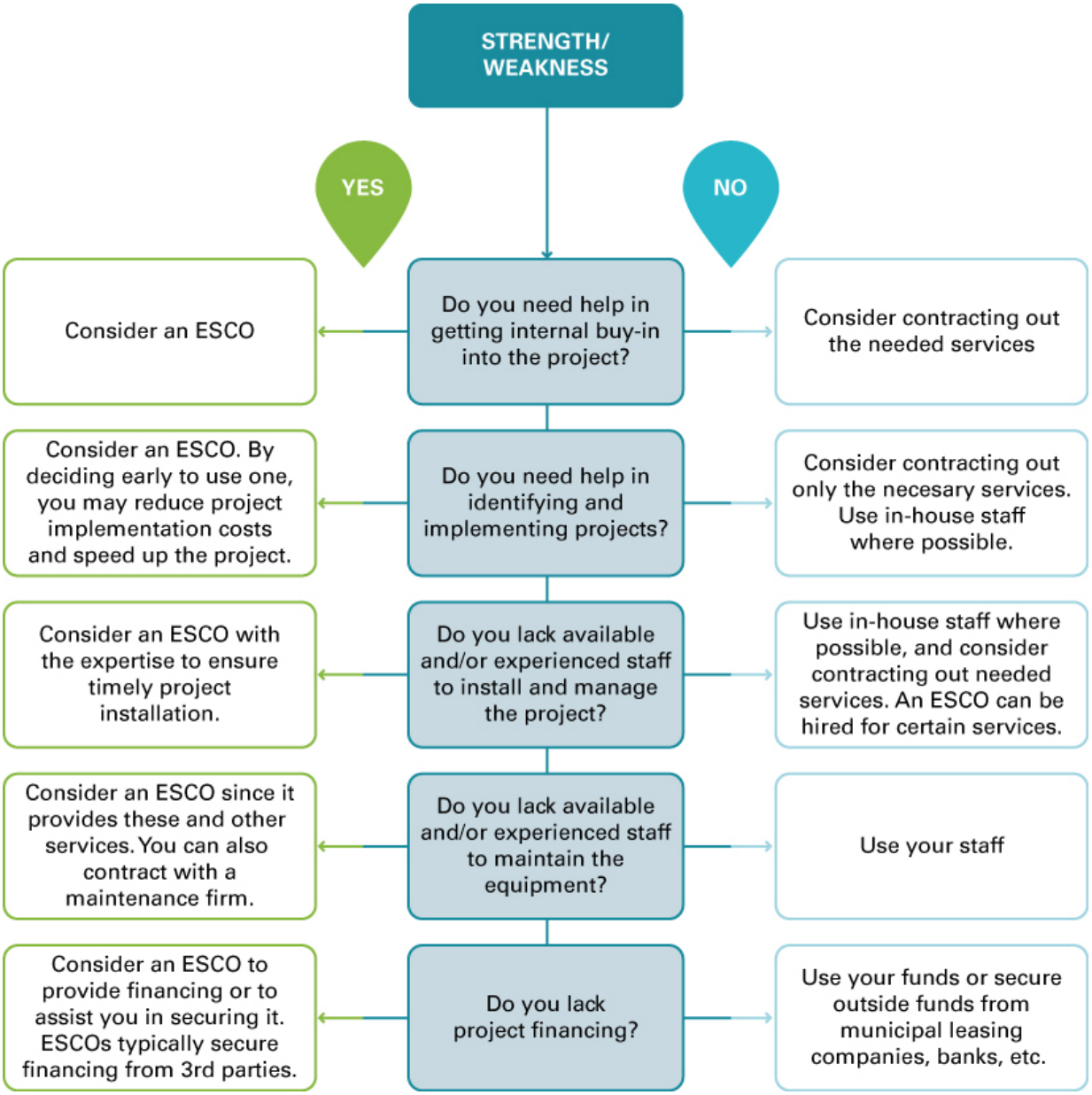


Figure 12: Does my project need an ESCO?

4.2.2 Energy Savings Performance Contracts (ESPCs)

Energy savings performance contracting refers to a contracting method in which the contractor provides and finances energy improvements and is repaid from the energy and energy-related cost savings it generates.These contractsallow building ownersto implementenergy savings projects without up-front capital costs and without special budget allocations orappropriations. In an ESPC, the ESCO conducts a comprehensive energy audit for the facility and identifies energy-saving improvements. The ESCO consults the building owner, then designs and constructs a project that meets the agency's needs and arranges the necessary financing. The ESCO guarantees that the improvements will generate energy cost savings sufficient to pay for the project over the contract term (see Figure 13. After the finance term ends, additional cost savings accrue to the building owner.

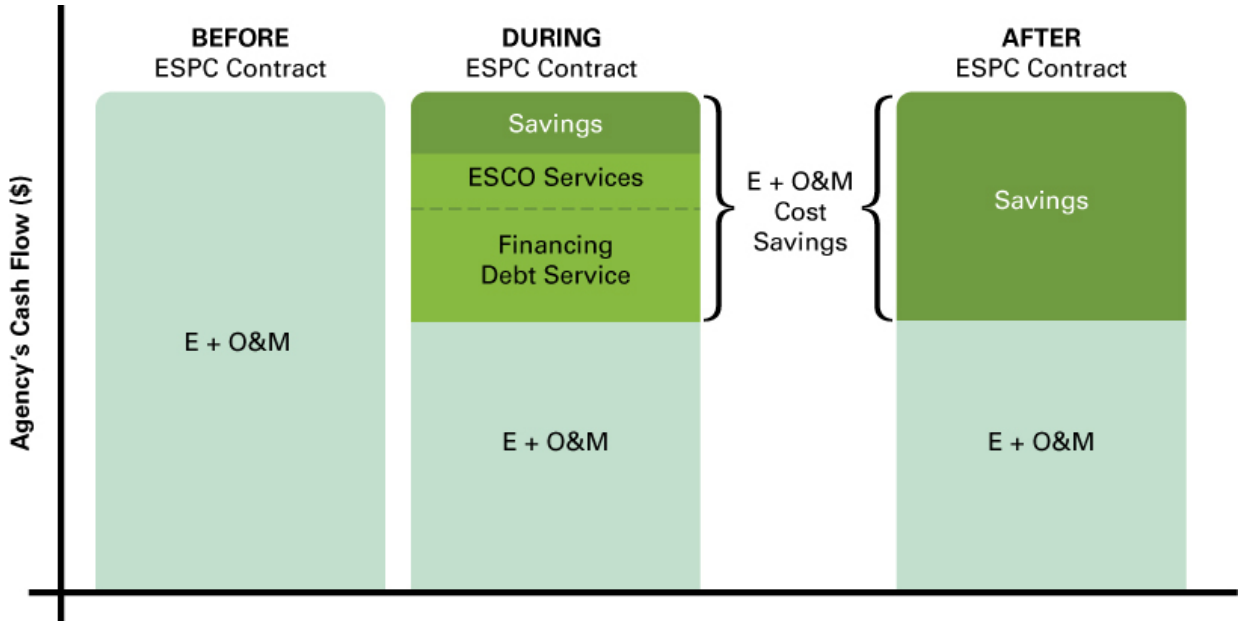


Figure 13: ESPC cash flow

4.3 Rebates and Incentives

Various energy-efficiency rebates and incentives are available from federal, state, and local government agencies, as well as from energy utilities.These incentives can be used to effectively lower the installed costs for energy-efficiency projects.A comprehensive list of energy-related incentives is available from the Database of State Incentives for Renewable Energy (DSIRE)website, www.dsireusa.org. DSIRE is funded by the U.S. Department of Energy and is an ongoing project of the North Carolina Solar Center and the Interstate Renewable Energy Council.

5 Resources

Buying Energy-Efficient Products: This site provides purchasing specifications to help buyers comply with energy-efficient procurement requirements.
www1.eere.energy.gov/femp/procurement/index.html

Federal Energy Management Program: Project Funding: This site provides further details about different project funding mechanisms and when each may be appropriate for your project.www1.eere.energy.gov/femp/financing/mechanisms.html

Database for State Incentives for Renewable Energy (DSIRE): A comprehensive list of energy-related incentives is available from the Database of State Incentives for Renewable Energy (DSIRE)website. www.dsireusa.org

California Energy Commission: Handbooks for Energy Efficiency: This site provides links to download guides created by the California Energy Commission, including how to hire ESCOs, energy auditors, and how to finance projects.
www.energy.ca.gov/reports/efficiency_handbooks/

Energy Star Portfolio Manager: Portfolio Manager helps you track and assess energy and water consumption within individual buildings as well as across your entire building portfolio. For many facilities, you can rate their energy performance on a scale of 1–100 relative to similar buildings nationwide.
http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

EnergyIQ: EnergyIQ is an action-oriented benchmarking tool for non-residential buildings. Energy managers, building owners, architects and engineers can use it to identify energy efficiency opportunities using whole-building and system level benchmarking.
http://energyiq.lbl.gov/

National Renewable Energy Laboratory's Research Support Facility:How Selecting and Managing the Project Team Supports Energy Savings: The National Renewable Energy Laboratory, NREL, is home to a net-zero energy laboratory, the Research Support Facility (RSF). The DOE and NREL attribute much of the RSF's success to how the project team was selected and managed.
http://www.nrel.gov/docs/fy09osti/46382.pdf; http://www.nrel.gov/sustainable_nrel/rsf.html

6 References

Energy Information Administration. (2008). 2003 Commercial Buildings Energy Consumption Survey, U.S. Department of Energy.

EPA Energy Star Portfolio Manager. http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

Mathew, P., R. Clear, K. Kircher, T. Webster, K.H.Lee, T. Hoyt. "Advanced Benchmarking for Complex Building Types: Laboratories as an Exemplar," Proceedings of the 2010 ACEEE Summer Study of Energy Efficiency in Buildings. ACEEE, Washington, D.C. LBNL-3911E.

Mills, E., P. Mathew, N. Bourassa, M. Brook, and M.A. Piette. "Action-Oriented Benchmarking: Concepts and Tools." *Energy Engineering. Volume 105, Number 4 / June - July 2008.* LBNL-358E

Molenar, K. D. (2009). Sustainable, High Performance Projects and Project Delivery Methods.The Charles Pankow Foundation.

U.S. Department of Energy. (2010). "ARRA Commercial Building Partnerships Technical Expert Support Request for Proposals." United States Department of Energy, Washington, DC.

U.S. Department of Energy (2011)."Commercial Building Partnerships". U.S. Department of Energy Available at http://www1.eere.energy.gov/buildings/commercial_initiative/building_partnerships.html. Accessed 31 Jan, 2011.

Appendix A

TECHNICAL EXPERT TEAM LEVEL 1 EVALUATION WORKSHEET

Offeror Name: _____
Offeror Location: _____
Evaluator Name: _____

Application:
Technical Expert Team

Background for Reviewers ----> Criteria to demonstrate competence as an M&V Technical Contractor includes a minimum amount of demonstrated project experience at the energy savings levels identified in the RFQ. Note that it is at the reviewers discretion to accept energy savings results for baselines older than ASHARE 90.1-2007, per the RFQ. The reviewer may also accept energy savings over other baselines, including previous building energy use for building retrofit projects. The criteria can be met for any combination of new or existing retrofit projects.

A. Identify the top 3 energy saving projects in the proposal for new and retrofit construction and indicate baselines used:

New Construction	Retrofits
Project: _____	**Project:** _____
☐ % below _____ (baseline)	☐ % below _____ (baseline)
Project: _____	**Project:** _____
☐ % below _____ (baseline)	☐ % below _____ (baseline)
Project: _____	**Project:** _____
☐ % below _____ (baseline)	☐ % below _____ (baseline)

-- Does the proposal demonstrate the overall CBP energy saving goals?
(demonstrates significant number of projects that meet the energy goal

☐ **Yes**

☐ **No**

B. Indicate the expertise areas included in the proposal:

☐ Architectural
☐ HVAC
☐ Energy Modeling/Simulation
☐ Lighting and Daylighting
☐ HVAC and Integrated Controls
☐ Building Auditing and Data Collection
☐ Cost Estimation
☐ Commissioning

-- Does the proposal include all expertise areas?

☐ **Yes**

☐ **No**

C. Does the proposal qualify to move on to Level 2?
(if answered yes to A and B, move on to Level 2)

☐ **Yes**

☐ **No**

M&V TECHNICAL CONTRACTOR LEVEL 1 EVALUATION WORKSHEET

Offeror Name: _____
Offeror Location: _____
Evaluator Name: _____

Applicaton:
M&V Technical Contractor

Background for Reviewers ----> Criteria to demonstrate competence as an M&V Technical Contractor includes a minimum amount of demonstrated project experience at the energy savings levels identified in the RFQ. Note that it is at the reviewers discretion to accept energy savings results for baselines older than ASHARE 90.1-2007, per the RFQ. The reviewer may also accept energy savings over other baselines, including previous building energy use for building retrofit projects. The criteria can be met for any combination of new or existing retrofit projects.

A. Identify the top 3 energy saving projects in proposal for new and retrofit construction and indicate baselines used:

New Construction	Retrofits
Project: _____	**Project:** _____
☐ % below _____ (baseline)	☐ % below _____ (baseline)
Project: _____	**Project:** _____
☐ % below _____ (baseline)	☐ % below _____ (baseline)
Project: _____	**Project:** _____
☐ % below _____ (baseline)	☐ % below _____ (baseline)

-- Does the proposal demonstrate the overall CBP energy saving goals?
(demonstrates significant number of projects that meet the energy goal criteria)

☐ **Yes**

☐ **No**

B. Does the proposal qualify to move on to level 2?

☐ **Yes**

☐ **No**

Appendix B

Sample Request for Qualifications (RFQ)

SAMPLE REQUEST FOR QUALIFICATIONS (RFQ)

1.0 INTRODUCTION

1.1 Definitions

Terms used throughout this RFQ are defined here.

Technical Expert Team (External Team): A team of individuals, companies, or other entities that can provide a broad range of technical expertise to Participants in order to meet program goals.

Team Lead: The lead individual, company or entity for a Technical Expert Team. The Team Lead will be responsible for most interactions with the Owner. The Team Lead will be responsible for completing deliverables, financial management, and coordinating other team members and will likely be required to have subcontracts or other agreements with other members of the Technical Expert Team.

M&V Technical Contractor: An individual, company or entity that is acting apart from a Technical Expert Team that provides focused expertise in the area of Measurement and Verification (M&V) related to buildings operations.

Subcontractor: The entity, be it the Team Lead of the Technical Expert Team or the M&V Technical Contractor, that will enter into an agreement with the Owner.

1.2 Background

1.3 Overview

This RFQ incorporates the lessons learned from previous low-energy retrofit projects. Using the successful Technical Expert Teams selected from this RFQ, the Owner will invite a number of Technical Expert Teams to submit proposals for a low-energy retrofit project. Each team will have a designated company as a Team Lead (the prime subcontractor) that will be responsible for most interactions with the Owner. The Team Lead will be responsible for all reporting, budgeting, and other contractual obligations established under this RFQ.

Team selection will be based on the capabilities of team members presented in statements of qualifications submitted under this RFQ.

Statements of Qualifications may be submitted either on behalf of a Technical Expert Team or as a stand-alone M&V Technical Contractor. The Technical Expert Team qualifications are requested in a wide variety of technical areas related to building energy design, including metering, equipment selection, construction, modeling, etc. Offerors can also submit Statements of Qualifications as M&V Technical Contractors under this RFQ. The Owner has explicitly chosen to retain the functions of monitoring and verification (M&V) separate from the Technical Expert Teams. Thus, submissions from Technical Expert Teams do not need to include M&V capability. The Owner is interested in receiving

proposals from Offerors interested in performing M&V work. Offerors may apply for both M&V and Technical Expert Team work but will not be the M&V Technical Contractor for any work in which they are also a member of the Technical Expert Team. Offerors interested in submitting for M&V work need to clearly indicate in their statements of qualifications that they are interested in being considered for this work.

At a minimum, Technical Expert Teams shall incorporate the following areas of expertise:

- o Architectural
- o HVAC and controls
- o Lighting, Daylighting and controls
- o Energy modeling
- o Building auditing and data collection
- o Cost Estimation
- o Commissioning

Technical Expert Teams and M&V Technical Contractors will be selected to submit proposals based on their ability to provide the information requested in Section 3.0, Evaluation Criteria and in Section 4.0, Statement of Qualifications Process Instructions. The Owner will select the successful Technical Expert Teams and M&V Technical Contractors and invite them to submit proposals.

Offerors may suggest M&V Technical Consultants or Technical Expert Teams that they wish to work with as part of their application, however the Owner reserves the right in all cases to assign Technical Expert Teams and M&V Technical Contractors to projects, and there are no guarantees that Offerors will be matched up with their preference.

The Owner may provide technical capabilities to supplement the Technical Expert Teams in the completion of technical tasks. These capabilities may be in the form of staff, equipment, web-based resources, or other subcontractors. Technical Expert Teams may be requested to provide expertise to other teams or to engage in joint projects with other Technical Expert Teams.

2.0 STATEMENT OF WORK

2.1 Scope

The Owner is seeking contractors, and/or teams of contractors headed by a Team Lead, to provide technical expertise for the retrofit of existing buildings, and/or the selection and implementation of energy efficiency measures for deployment throughout the Owner's portfolio of buildings. Those submitting statements of qualifications may do so as a Technical Expert Team with broad capabilities in a number of areas, or as M&V Technical Contractors. The Team Leads for selected Technical Expert Teams will have the primary role of interacting with the Owner.

2.2 Required Services

The Owner is seeking contractors with both broad and very specialized areas of expertise to provide the following three services. These services will be applicable to all projects.

2.2.1 Project Management Plan/Project Management

Each Subcontractor must prepare and submit a project management plan as a stand-alone document within 45 days of the award of each contract issued under this agreement. This plan should be formatted to include the following sections with information as described below.

A. Executive Summary: Provide a description of the project that includes the project type, the project goals, and expected results.

B. Risk Management: Provide a summary description of the proposed approach to identify, analyze, and respond to perceived risks associated with the proposed project. Project risk events are uncertain future events that, if realized, impact the success of the project. As a minimum, include the initial identification of significant technical, resource, and management issues that have the potential to impede project progress and strategies to minimize impacts from those issues.

C. Milestone Log: Provide milestones for each budget period (or stage) of the project. Each milestone should include a title and planned completion date. Milestones should be quantitative and show progress toward budget period and/or project goals. [Note: During project performance, the Team Lead shall report the Milestone Status as part of the required Monthly Progress Report. The Milestone Status must represent actual performance in comparison with the Milestone Log, and include:

   (1) the actual status and progress of the project,
   (2) specific progress made toward achieving the project's milestones, and,
   (3) any proposed changes in the project's schedule required to complete milestones.

D. Costing Profile: Provide a table that projects, by month, the expenditure of government funds for the first budget period for each team member (Stage of Work).

E. Project Timeline: Provide a timeline of the project (similar to a Gantt chart) broken down by each task and subtask, as described in the task order Statement of Work. The timeline for each task must include a start date and an end date. The timeline must also show

interdependencies between tasks and include the milestones that are identified in the Milestone Log (see above Section C). The milestones must relate to the required technical reporting requirements (refer to Section 2.4 'Description of Deliverables').

F. Communication Plan: Provide a plan for how Participants will be engaged in each task order and how the Owner will be informed of progress.

2.2.2 Interactions with Participants

The Technical Expert Team Leads or M&V Technical Contractors will have the primary responsibility of interacting with the Owner. Technical Expert Team members may also interact with the Owner on a more limited basis, focusing on one or a few of the following bullets, or being responsible for the communication over a brief period of time. These interactions may include the following:

- Determining the Owner's business criteria for the project. Business criteria include the economic, operational and branding constraints associated with each project.
- Agreeing to perform within non-disclosure agreements negotiated with the Owner. If the Owner requires a non-disclosure agreement, the Technical Expert Team and/or M&V Technical Contractor will be required to perform their duties in accordance with this non-disclosure agreement. Non-disclosure agreements, if applicable, will be provided to the successful Technical Expert Teams and M&V Technical Contractors with their contracts.
- Acquiring building data including utility data, plans, energy studies, equipment inventories, schedules and other information related to building energy performance and model inputs. Gathering this information may involve interacting with utilities, facility managers and operators, corporate managers or consultants to the Owner.
- Scheduling building inspections, kick off meetings, charrettes, periodic calls, webinars and other visits and meetings with the Owner and the design teams to gather information and to keep them informed.
- Reporting modeling and analysis results and conclusions to the Owner.

2.2.3 Technical Expertise

The Team Leads, Technical Expert Team members and M&V Technical Contractors may be required to provide technical expertise in one or more of the following areas, or in other areas related to energy efficiency, as determined by the Owner's project, to achieve energy efficiency in all types and sizes of commercial buildings and related facilities.

- inventorying existing building equipment and loads including the use of sensors, cameras and other equipment designed to test and quantify equipment or building performance
- characterizing baseline energy loads in buildings
- conducting energy audits
- consulting on energy efficiency measures
- optimizing and recommending energy efficiency improvements and energy use reduction strategies

- quantifying and analyzing ventilation levels and interactions with overall building heating, air conditioning, and ventilation systems
- quantifying and analyzing energy efficiency improvements, energy use reduction strategies and designs for heating, air conditioning and ventilation systems
- quantifying and analyzing energy efficiency improvements, energy use reduction strategies and designs for plug load equipment and control systems
- quantifying and analyzing energy efficiency improvements, energy use reduction strategies and designs for domestic hot water usage, equipment and controls systems, and interactions with other building hot water loads and sources
- quantifying and analyzing energy efficiency improvements, energy use reduction strategies and designs related to building envelope and orientation
- quantifying and analyzing energy efficiency improvements, energy use reduction strategies and designs for lighting equipment and controls systems
- quanitifying and analyzing daylighting strategies including controls, shading, glare, and light penetration
- tracking emerging technologies related to energy efficiency
- providing computational fluid dynamics analysis for natural ventilation performance and design
- calculating energy savings
- modeling whole-building energy performance using EnergyPlus and other commercial building simulation models
- estimating costs of recommended equipment and labor required for installation
- estimating operating costs for existing and recommended equipment including energy consumption, maintenance and other costs
- conducting lifecycle cost analysis for whole-building and individual efficiency measures and packages
- designing energy management system and related controls
- preparing specifications for recommended improvements
- preparing drawings that will assist design teams in incorporating recommendations into construction documents
- providing potential oversight of retrofit and construction projects
- familiarity with ASHRAE energy efficiency and ventilation requirements
- familiarity with renewable energy technologies, system designs and their application
- providing expertise regarding building commissioning and retrocommissioning processes and procedures for building systems including low energy HVAC, lighting, daylighting systems
- construction project management

- managing projects and coordinating with other contractors and design team members
- interacting with commercial building design teams
- organizing and conducting charrettes
- organizing media events related to energy efficiency
- organizing and conducting training related to energy efficiency and commercial building operations

The M&V Technical Contractors may be required to provide technical expertise in one or more of the following areas, as determined by the project, to achieve energy efficiency in all types and sizes of commercial buildings and related facilities.

- inventorying existing building equipment and loads including the use of sensors, cameras and other equipment designed to test and quantify equipment or building performance
- installing monitoring equipment
- characterizing baseline energy loads in buildings
- preparing field monitoring plans for both new and retrofit construction including recommendations for appropriate monitoring equipment
- calibrating and troubleshooting building instrumentation
- collecting and analyzing monitoring and utility data related to energy consumption
- conducting energy audits
- consulting on energy efficiency measures
- quantifying and analyzing ventilation levels and interactions with overall building heating, air conditioning, and ventilation systems
- tracking emerging technologies related to energy efficiency
- calculating energy savings
- assessing compiled energy use data compared with a calibrated whole-building energy performance model using EnergyPlus and other commercial building simulation models
- conducting lifecycle cost analysis for whole-building and individual efficiency measures and packages
- designing energy management system and related controls
- providing potential oversight of retrofit and construction projects
- familiarity with ASHRAE energy efficiency and ventilation requirements
- construction project management
- managing projects and coordinating with other contractors and design team members
- interacting with commercial building design teams

2.3 Description of Deliverables

2.4 Roles and Responsibilities of the Owner

This section outlines the roles and responsibilities of the Owner.

- Interactions with the Subcontractors: The Subcontractors need to understand and follow the contractual requirements issued by the Owner; the Owner's contracting officers or subcontract administrators representing the Owner are the only people who can provide contractual direction to the Subcontractors.
- Monitoring/Verification: The Owner may explicitly chose to retain the role of monitoring and verifying the level of energy savings and may choose to do this themselves or through a separate subcontract. This ensures an independent party measures and confirms the level of achieved energy savings and retains certain data that may be of use to BTS for other assessments.
- Training/Technical Expertise: The Owner may also offer certain technical expertise to the Subcontractors when they feel such support may serve the best interests of the Owner. The Owner may also provide assistance in the form of staff, equipment (which will be on loan during the project, but owned by the Owner), web-based resources, or specialized contractors.

2.5 Project Completion

All work shall be completed and submitted to the Owner by August 1, 2013. This shall include the completion of all deliverables and Measurement and Verification activities. All Subcontractor final invoices must be completed and submitted to the Owner by August 15, 2013.

3.0 EVALUATION CRITERIA

The Owner will evaluate each Offeror's statement of qualifications based on the information provided by the Offeror and the Owner's own experience. The evaluation will focus on the strengths and weaknesses of the statement of qualifications within the framework of the following criteria.

The Owner intends to select responsive and responsible Offerors whose statement of qualifications contains the combination of capabilities and experience, and labor rates offering the best overall value.

A responsive Offeror is one whose statement of qualifications satisfies the requirements of this RFQ, including the technical requirements of the proposed agreement. A responsible Offeror is one that is considered capable of performing and is otherwise eligible and qualified to perform the work as described in the Statement of Work.

The Owner will determine the best overall value by comparing differences in capabilities and experience offered with differences in labor rates and related factors, striking the most advantageous balance between expected performance and the overall labor rate profile. Offerors, therefore, must be

persuasive in describing their capabilities and experience and their value in enhancing the likelihood of successful performance and achievement of the goals and objectives.

Selection may be made on the basis of the initial statements of qualifications or the Owner may elect to negotiate with Offerors selected as finalists. The Owner reserves the right (and intends) to make multiple awards as a result of this RFQ.

3.1 Evaluation Criteria (Evaluations of Technical Expert Teams shall include the Team Lead and all proposed subcontractors)

Technical Expert Teams shall consist of the following expertise areas at a minimum:

- o Architectural
- o HVAC
- o Energy Modeling
- o Lighting, Daylighting and Controls
- o HVAC and Integrate Controls
- o Building Auditing and Data Collection
- o Cost Estimation
- o Commissioning

Offerors for both Technical Expert Teams, and M&V Technical Contractors shall demonstrate successful experience with integrated very low energy buildings for preferably both new construction AND existing retrofits, across a variety of market sectors and building types. Experience shall be demonstrated with summaries of actual building projects that show energy savings in comparison to ASHRAE 90.1 or California Title 24. If projects were developed based on other codes, explain the relevant codes and show how savings would compare with ASHRAE 90.1. The summaries shall state what benchmarks were used and how energy savings were modeled and verified. All stated energy savings percentages shall be prior to any offset by renewable energy. The most successful of these projects will meet the criteria shown in the following bullets, although the Owner recognizes that potential savings vary tremendously across building types:

- Energy savings criteria for sample projects based on ASHRAE 90.1 a:
  - o 50% energy savings or greater compared to ASHRAE 90.1-2007 for new construction and 30% energy savings compared to ASHRAE 90.1-2007 for existing construction. Energy savings comparisons to ASHRAE 90.1-2007 are preferred, however comparisons to ASHRAE 90.1-2004 may be acceptable.
- Energy savings criteria for sample projects based on California Title 24:
  - o 50% energy savings or greater compared to California Title 24-2005 for new construction and 30% energy savings compared to California Title 24-2005 for existing construction. Energy savings comparisons to California Title 24-2005 are preferred, however comparisons to California Title 24-2001 may be acceptable.

Successful experiences shall be demonstrated in the following technical capabilities and experience. Offerors for Technical Expert Teams are not required to show evidence of capabilities in M&V, Section 3.1.9.

3.1.1 Architectural (including glazing and facades)

- Demonstrated experience with building massing studies and optimization for low energy performance.
- Demonstrated experience with low energy envelope systems and components, and integrated low energy systems incorporating envelope components in the areas of both new and existing construction.
- Demonstrated experience with daylighting, solar shading optimization and thermal performance of building envelope components and systems for both new and existing construction.
- Demonstrated experience with infiltration detailing, building tightness for both new and existing construction.
- Demonstrated experience with thermal bridging detailing.
- Demonstrated low energy innovation in the area of building and site relationships preferred. May include relationships with utilities, government, public works, natural resources, funding structures, etc.
- Demonstrated architectural design experience across a variety of market sectors and building types.
- Demonstrated experience interacting with commercial building design teams, design engineers and management teams through charette leadership, presentations to design teams, construction document preparation, specification preparation, and communicating with design team members.

3.1.2 HVAC

- Demonstrated experience with low energy HVAC systems, and integrated low energy systems incorporating envelope, lighting and daylighting components. Successful low energy systems experience shall be demonstrated, such as radiant heating and cooling, Dedicated Outside Air Systems (DOAS), heat recovery and low energy dehumidification.
- Demonstrated experience with low energy HVAC controls design, including integrated controls with other systems (e.g. plug load monitoring, dynamic shading, demand response, etc.).
- Demonstrated experience with instrumentation of thermofluid systems, data acquisition and storage for building systems, including low energy HVAC systems.
- Demonstrated HVAC design, controls and monitoring experience across a variety of market sectors and building types.
- Demonstrated experience with low-water use HVAC systems, including innovative water harvesting technologies, and water use optimization.

3.1.3 Energy Modeling/Simulation

- Demonstrated experience in using whole building energy analysis programs with an emphasis on EnergyPlus.

- Demonstrated experience with documenting all phases of model development including key inputs and providing references for assumptions and data.
- Demonstrated familiarity with ASHRAE 90.1 2007, Appendix G, Modeling Guidance, through application of Appendix G to buildings, participation in ASHRAE committee work or relevant papers delivered or published.
- Demonstrated experience and capabilities with a variety of building simulation tools that may be useful for specific equipment or systems.
- Demonstrated experience presenting model results to design teams, management teams and/or professional organizations.
- Demonstrated expertise in modeling advanced low energy HVAC systems and controls, such as radiant heating and cooling systems, natural ventilation, displacement ventilation, etc.
- Demonstrated experience in modeling advanced low energy lighting and daylighting systems, including controls.
- Demonstrated experience with performing energy conservation measure comparisons through simulation.
- Demonstrated expertise with performing simulation comparisons with ASHRAE 90.1 and other baselines (e.g. existing building benchmark data).
- Demonstrated expertise with modeling both new construction and existing buildings, including existing HVAC plants.
- Demonstrated experience with Life Cycle Cost Analysis, Net Present Value & Internal Rate of Return Analysis.
- Demonstrated modeling experience for building types across a variety of market sectors.

3.1.4 Lighting and Daylighting

- Demonstrated experience using Radiance, AGi32 or other advanced design software tools and other relevant software and models.
- Demonstrated expertise with optimized glazing selection for daylighting and heat gain.
- Demonstrated expertise with solar shading optimization for daylighting and heat gain, light shelves and other integrated daylighting devices.
- Demonstrated expertise with low energy lighting design, including expertise with emerging low energy fixtures and technologies, such as LED.
- Demonstrated expertise with low energy lighting and daylighting controls design. Experience with lighting controls integration with facade systems preferred.
- Demonstrated lighting, daylighting and controls design experience across a variety of market sectors.

3.1.5 HVAC and Integrated Controls

- Demonstrated experience with low energy HVAC controls, such as systems using radiant heating and cooling, chilled beams, thermal mass, night purge, thermal storage, geothermal systems, etc.
- Demonstrated experience with communications and control technologies for demand response.
- Demonstrated experience with plug load and device level monitoring and controls.
- Demonstrated experience with energy use monitoring and feedback visualization tools.
- Demonstrated controls experience for buildings across a variety of building types.

3.1.6 Building Auditing and Data Collection

- Demonstrated knowledge of building HVAC design and operation, building control systems, electrical systems, domestic hot water systems, lighting and daylighting systems, and plug and process load devices.
- Demonstrated experience with conducting audits and collecting building and load related data in and for a variety of commercial building types and processes.
- Demonstrated experience with – and access to – tools and equipment used to measure and characterize energy loads and building performance.
- Demonstrated experience with making energy efficiency recommendations, estimating the costs of the recommendations, estimating potential energy and cost savings, and calculating economic performance in terms of simple payback, lifecycle costs, internal rates of return, or other metrics.
- Demonstrated familiarity with processes using all energy types, including natural gas, electricity, fuel oil, and others.

3.1.7 Cost Estimation

- Demonstrated experience with cost estimation for low energy buildings, including innovative low energy systems such as radiant heating and cooling, displacement ventilation, renewable energy systems, integrated controls and chilled beams.
- Experience with innovative financial mechanisms in low energy building design.
- Demonstrated experience conducting cost estimation and life cycle cost analysis for low energy building retrofits or new construction.
- Demonstrated cost estimation experience across a variety of market sectors.

3.1.8 Commissioning

- Demonstrated knowledge of commissioning to provide consulting expertise on commissioning procedures only, not to perform commissioning (which will be required of the Participant to be performed by others).

3.1.9 Measurement and Verification (M&V) (for Offerors proposing M&V efforts)

- Demonstrated experience with instrumentation of thermofluid and electrical systems, data acquisition and storage for building systems, including HVAC systems.
- Licensed electrician preferred. Installation of electrical devices may be contracted out to a licensed electrician or may be performed by licensed electricians employed by the Participants. All installation of electrical devices must be done in accordance with local regulations.
- Demonstrated experience with benchmarking and collection of performance data from existing buildings.
- Experience with different data base systems and their incorporation and use in performance monitoring software.
- Demonstrated experience with a variety of building instrumentation technologies, their compatibility with energy management systems, and data collection options.
- Demonstrated experience in preparing monitoring plans for both new and existing buildings.

3.1.10 Renewable Energy and Onsite Energy Production

- Demonstrated expertise with design and implementation of leading edge high efficiency onsite renewable energy supply systems, including photovoltaic systems.
- Demonstrated expertise with integrated renewable energy technologies such as those with heat transfer/heat recovery capabilities, building integrated PV, etc.
- Demonstrated expertise with renewable energy rebates, incentives and other financial instruments, including innovative partnerships and financing mechanisms.
- Demonstrated experience in alternate onsite energy production systems, such as cogeneration, fuel cell technology, biogas, etc.

3.1.11 CFD (Computational Fluid Dynamics)

- Demonstrated knowledge of building HVAC design and operation, including using CFD to analyze low energy systems such as radiant in-slab cooling and heating, radiant chilled water panels, chilled beams and displacement ventilation.
- Demonstrated experience with conducting CFD analysis of building conditions, including but not limited to natural ventilation.
- Demonstrated experience with providing CFD analysis results in formats suitable for use to design HVAC and building envelope systems, including controls.

3.2 Demonstrated Experience with Commercial Building Energy Efficiency

Provide evidence for each scope area listed in Section 3.1 that Offeror is proposing (e.g. HVAC, lighting, etc.), as described below.

1. Documented success with low energy building performance for new construction. Provide verified and/or non-verified % savings of projects to be submitted in support of criteria in section 3.1. Verified data preferred.
2. Documented success with low energy building performance for existing construction. Success with existing building envelope retrofit of particular noteworthiness. Provide verified and/or non-verified % savings of projects to be submitted in support of criteria in section 3.1. Verified data preferred.
3. Evidence of progressive low energy design (e.g. white papers, present conference seminars, collaborate on code improvements, innovative installations documented, etc.)

3.3 Regional Expertise

Demonstration of applicable experience in multiple climate regions as classified according to the DOE climate zones is highly desirable (http://www.energycodes.gov/implement/pdfs/color_map_climate_zones_Mar03). Offerors shall indicate by table each of the regions they have applicable low energy experience in for each of the technical capability areas listed in Section 3.1.

3.4 Market Sector Expertise

Demonstration of applicable experience in multiple commercial building market sectors is desirable. Commercial building market sectors of interest include, but are not limited to: General Retail, Grocery Stores, Malls, Banks, Hospitality, Hospitals, Medical Office Buildings, Higher Education, Offices, Commercial Kitchens, Schools, Distribution Centers, Parking Garages, Conference Centers, Laboratories and Data Centers.

Offerors shall indicate by table each of the market sectors they have applicable low energy experience in for each of the technical capability areas listed in Section 3.1.

3.5 Personnel Technical Capability and Experience

Demonstrated technical capabilities for all proposed personnel and experience that compliments the requirements for each scope area listed in section 3.1 (e.g. HVAC, lighting, renewable energy, etc.). Technical Expert Team Offerors are not required to indicate any capability for Section 3.1.9, Measurement and Verification.

3.6 Project Management Capability

1. Experience of proposed Project Management staff.
2. Demonstrated ability to provide services on time and within budget.
3 Demonstrated project management policy, standards, and training/qualifications.

3.7 Labor Rates

Reasonableness with respect to market rates.

4.0 STATEMENT OF QUALIFICATIONS PROCESS INSTRUCTIONS

The sections below summarize the process for requesting additional information and the proposal deadlines.

4.1 Questions or Requests for Additional Information

The Owner will respond to questions regarding this RFQ submitted in writing to RFQinquiries@owner.com on or before May 3, 2012. Questions submitted after this date may not be answered prior to statement of qualifications due date.

4.2 Proposal Submissions

Statements of Qualifications are due by uploading proposals and all associated materials to the RFQ website (http://RFQInquries.owner.com) by 3 PM, Pacific Daylight Savings Time on May 10, 2012. Statements of Qualifications received after this time may not be considered. Section 4.3 below describes the statements of qualifications submission process, and the proposal format and page requirements. Statements of Qualifications shall be valid for a minimum of 120 days.

4.3 Format and Submittal Requirements

Statements of Qualifications shall be provided as a single file for Technical Expert Team applications, and a single file for M&V Technical Consultant applications. Each statement of qualifications shall be organized at a minimum with the following categories, included with a cover page, table of contents and numbered pages. Statements of Qualifications shall be 8 ½"x 11" format, with margins no less than 1" and font size no smaller than 12pt Arial. Statements of Qualifications submission shall be by Adobe PDF electronic format only. Any Statements of Qualifications submitted in hard copy will NOT be reviewed.

4.3.1 Company History (5 pages max)

For each Company listed in the Statements of Qualifications (including lower-tier subcontractors that are part of the team), describe the history of the firm, management organization, and key personnel. Describe each company's philosophy on design team integration, and how the team's combined commitment and organization will benefit the Owner.

4.3.2 Relevant Project Experience (20 Pages max)

This section should include a review of how the company or teams meets the requirements of section 3.1. The Statement of Qualifications should provide a project page of relevant technical projects each company has worked on in the past 10 years linked to one or more of the technical capability requirements in Section 3.1. Provide sample projects that demonstrate experience within the companies area of expertise as listed in section 3, including innovative design experience spanning different market sectors and climate regions. Each project page is limited to 1 page in length.

For each project, please include:

- Relevant Demonstration of Capability Areas (Section 3.1)
- Title
- Budget and Timeline
- Relevance to RFQ
- Scope Description

4.3.3 Profile of Key Personnel (25 page max)

Provide a one page staffing plan and include a 1-page resume for all key personnel proposed. This should include employees who will be responsible for providing technical expertise and project management services for the duration of the project. For each company, organize the presentation of resumes according to the capability criteria in Section 3.1.

4.3.4 Capacity to Perform Assignments (2 Page max)

Provide a statement indicating each company's ability to perform services as described in this RFQ, through a summary of its current workforce and staffing. This shall include a profile of current capacity, and ability to commit the appropriate staff to the partnership efforts. For team submissions, provide an overview of how the team will be managed, Team Leads and communication plans.

4.3.5 Labor Rates

Provide a table of current labor rates for all staff proposed for this effort. The price proposal must include fixed fully burdened labor rates and itemized estimated costs for direct expenses for the work if applicable.

4.3.6 Certification (1 Page max)
Provide the following:

- A letter certifying that during the past (x) years the firm or team has successfully completed (x) projects similar to the type described above.
- A statement from the firm's insurance carrier verifying that coverage will be provided in the amounts required. Amounts required are listed in Article X of the Agreement.
- A statement that Offeror will accept any Non-Disclosure Agreement as required by the project.
- Each Statement of Qualifications submitted should include a statement of acceptance of the enclosed terms and conditions of the Agreement and its incorporated documents. Failure to accept terms and conditions may result in significant, unacceptable delays in the award of a subcontract which could cause the Owner to reject Offerors proposal.
- Complete the attached Representations and Certifications Form attached hereto as Appendix XX.

4.4 Successful Applicants Negotiate Agreements

Successful applicants will have Agreements negotiated and put into place with the Owner.