

# **Striking While the Climate is Hot: New Program Design for Accelerated Delivery of Energy Retrofit Projects**

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## **ABSTRACT**

This paper presents a new program design that streamlines and accelerates energy project identification and delivery. Never has there been more capital and political support for energy efficiency; but taking advantage of this opportunity, on a scale and pace that tangibly impacts Climate Change, requires new program deployment strategies. Meeting this challenge is especially difficult in the public sector due to limited staff and traditional contracting methods that are administratively burdensome and slow.

City of San Francisco's program brings together in-house staff with local energy engineering teams for audit, design and construction management services and Job Order Contracts (JOC) for construction - in a partnership approach. A JOC is a competitively bid, indefinite quantity contract with a catalog of detailed construction tasks at established unit prices. JOCs are part of a trend that is transforming the public sector construction industry. The program offers many advantages associated with more bundled contracting - such as speedy project delivery, reduced administrative burden, cost certainty, improved teamwork and reduced finger pointing - without sacrificing competitive pricing and quality. The project schedule for design-through-construction award has been reduced to as little as six weeks compared to 10-15 months using conventional procurement strategies. The program has helped staff approximately double its projected project "through-put" completing about \$4 million in energy retrofits initiated during the first year. The program design can serve as an innovative model for agencies seeking to capture the remaining efficiency potential in their facilities at a pace that satisfies federal stimulus funding requirements.

## **Introduction**

Like in many public agencies, San Francisco's municipal energy efficiency program was recently presented with the enviable problem of investing a vastly increased amount of energy efficiency funding, as quickly and productively as possible. While enviable, this was still a problem - especially since traditional public sector contracting methods are administratively burdensome and slow. San Francisco's solution was to leverage an important market transforming trend in public sector construction: Job Order Contracts (JOCs). A JOC is a competitively bid, indefinite quantity contract with a catalog of detailed construction tasks at established unit prices. San Francisco developed one of the nation's first customized Job Order Contracts specifically for energy retrofits. These energy retrofit JOCs were the centerpiece of a new program designed to deliver quality energy efficiency projects at high speed and competitive costs.

The Energy Efficiency Services group (EES) is part of the City and County of San Francisco Public Utilities Commission (PUC) Power Enterprise, which supplies power to City facilities. EES operates a mix of municipal energy-efficiency programs that serve approximately

40 City and County agencies, typically supported by a \$3 to 5 million annual capital budget. In Fiscal Year 2009-10, the City doubled this capital budget, while also obtaining \$3 million in USDOE energy efficiency grants. With political support and financing no longer the biggest barriers to energy efficiency, the important question became how to implement energy retrofit projects. This implementation challenge is shared by many public agencies as a result of more than \$6 billion in USDOE Block Grants and State Energy Programs awarded in 2009.

When considering how best to accelerate municipal facility retrofits, we drew upon previous work in which staff compared a range of “project delivery options” available for implementing large-scale, multiple facility, energy efficiency projects. By project delivery options we mean the ways an agency procures the services required to implement energy retrofit projects: energy audits, design, construction, and measurement and verification. An “unbundled” project delivery approach would be where an agency bid out and contracted for each of these services separately. The most “bundled” approach would be “Performance Contracting” which provides turnkey services including guaranteed savings. Between these extremes are degrees of partially “bundled” contracted services. EES concluded that, while the advantages offered by more bundled options were desirable, it was difficult for San Francisco to give up bidding out the construction. We did, however, begin to achieve some bundling by combining audit, design and construction management services within one professional services contract, which created efficiencies and provided greater continuity throughout the lifecycle of each project.

EES’s experience with JOCs began in 2007 when we initiated small lighting projects using a General Contractor JOC. EES and SFPUC Contracts staff then worked with a JOC consulting firm, The Gordian Group, to develop a customized lighting JOC task catalog in 2008, and established a heating, ventilating, and air conditioning (HVAC) JOC by late 2009.

San Francisco’s program design builds on these two elements - local energy engineering teams with bundled audit, design and construction management services; and customized energy efficiency JOCs for construction – joined in a partnership approach. Utilizing JOCs helped San Francisco significantly increase the scale and pace of public building energy retrofits while controlling costs. A list of completed projects is listed in Table 1 – List of EES Projects Using JOCs.

**Table 1 – List of EES Projects Using JOCs**

<b>Project Name</b>	<b>Total Project Cost</b>	<b>Electricity Savings (kWh)</b>	<b>Peak Savings (kW)</b>
Veterans Bldg. & Opera House Lighting	\$596,030	543,117	179.4
Davies Symphony Hall Lighting	\$377,435	585,819	124.4
Broadway Tunnel Lighting-East Bore	\$84,178	22,285	30.3
Broadway Tunnel Lighting-West Bore	\$254,119	265,428	2.6
McLaren Lodge and Annex Lighting	\$34,292	37,968	9.1
Fire Department Lighting	\$213,105	243,013	52.1
Police Department Lighting	\$400,532	463,476	87.7
Real Estate: 1660 Mission Street-Lighting	\$254,735	303,526	49.7
Real Estate: 1650 Mission Street-Lighting	\$386,684	298,614	79.4
Hall of Justice Lighting Ph 1	\$225,532	256,288	47.6
Moccasin Kirkwood Powerhouse Lighting	\$249,333	285,000	30
Southeast Waste Treatment Lighting Ph 1	\$267,063	281,943	31
All Waste Treatment Sites Lighting Ph 2	\$428,332	452,198	50
All Waste Treatment Sites Lighting Ph 3	\$415,344	438,486	49
<b>TOTAL</b>	<b>\$4,186,714</b>	<b>4,477,162</b>	<b>822.4</b>

Source: San Francisco PUC Power Enterprise/ Energy Efficiency Services, 2009

The program has helped staff approximately double its projected project “through-put”, with projects ranging in size from a \$20,000 lighting project to a \$1.6 million major HVAC system upgrade at the Davies Symphony Hall. In addition to speed, the program team found that the program design offered many other important advantages, including:

- Improved teamwork and collaboration among designers and contractors; these players often are set up to be at odds with each other under conventional contracting.
- Increased flexibility to meet project needs. Project teams can more easily perform small “mock ups”, perform retro-commissioning tasks, and easily adapt strategies during construction without the cost penalties associated with change orders.
- Greater cost certainty and control since the contractor provides an early cost proposal during the energy audit, and costs associated with any scope changes are fairly priced.
- Greater quality control through standardized procedures, through hiring high quality contractors, and by using consultants that stay engaged throughout the project.

This paper describes the program design, explains how JOCs work, and presents some pros and cons relative to both the conventional “design-bid-construct” delivery option and to Energy Performance Contracts (EPCs). Finally, we present lessons learned and discuss future market transformation and program application possibilities.

## **Program Description**

The program’s main objectives are to: 1) cost effectively reduce energy usage, peak demand and CO<sub>2</sub> emissions in City of San Francisco facilities; and 2) accelerate the completion of energy efficiency projects. Projects are considered to be cost-effective and eligible for funding if they achieve an overall 10 year payback for a site or group of sites within a department. This cost-effectiveness threshold has the benefit of avoiding “cream-skimming” which would undermine a comprehensive retrofit approach.<sup>1</sup>

The program provides the full range of services needed to help departments carry out successful lighting and HVAC energy retrofit projects. Project management is provided by EES staff; energy audits, retrofit design, construction management, and measurement and verification services are provided by an energy consulting team; and construction services are provided through separate lighting efficiency and HVAC efficiency JOCs. The package of measures for a given project can be very comprehensive, limited only by the cost-effectiveness threshold. Lighting projects include fixture replacements, high efficiency lamps, ballasts and controls. HVAC projects include controls, equipment replacement (motors, package units), major system upgrades (boilers/chillers/distribution systems), water heating, kitchen equipment, and insulation/envelope measures. Renewable/distributed generation projects, office equipment, and water conservation are not targeted by EES projects since these measure types are addressed by other SFPUC programs.

**Program Set Up:** The program is staffed by a program manager and three project managers. Program staff use as-needed professional services contracts with four consulting

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<sup>1</sup> Cream-skimming refers to the pursuit of the easiest, quickest payback energy efficiency measures. While cream-skimming improves short-term project cost-effectiveness, it results in saving less energy overall; it also creates lost opportunities for large facility upgrades that, alone, may have an unattractive payback.

teams to provide energy engineering. The City has awarded contracts to three lighting contractors, each with \$1.5 million contract capacity. The program team has focused on lighting projects during the first year while developing a customized HVAC efficiency JOC. The City has recently awarded contracts to three HVAC contractors (Fall 2009), each with a \$3 million contract capacity. Individual task orders are issued as projects are identified and approved.

**Project Development and Implementation:** The project manager initiates a meeting with the client department to determine the list of sites to be audited, the schedule, site contacts, and site access procedures. The consultant then identifies a preliminary list of retrofit opportunities and facilitates a “joint scope meeting” with the JOC contractor and the department to discuss the opportunities. The consultant then finalizes the retrofit solutions and the JOC contractor provides a preliminary cost proposal, which the consultant incorporates into the audit report.

Once the department selects the audit recommendations, an interdepartmental Letter of Agreement (LOA) is signed for EES project funding and implementation services. The consultant then develops a detailed JOC scope of work and the contractor submits their final costs for a review. Once the cost proposal is approved, a task order and a Notice to Proceed are issued to the JOC contractor for installation of the energy efficiency measures. The consultant provides construction management and measurement and verification services.

## **Job Order Contracting<sup>2</sup>**

### **What’s a JOC?**

A Job Order Contract is a competitively bid, firm fixed priced, indefinite quantity contract between a facility owner and a construction contractor. A task order under the contract is issued to a contractor for a wide variety of renovation, repair or construction projects. Each task order consists of a scope of work, which the contractor translates into a detailed list of repair and construction tasks, all of which have specifications and established unit prices.

By comparison, the conventional procurement process for public sector construction projects is to solicit competitive bids for each project, based on a completed design. This “design-bid-construct” process, driven in part by competitive bidding laws, is appropriate for larger, more complex projects, where extensive design is needed, and delivery timelines are longer. But for energy efficiency projects that are relatively small “repair or replace” projects, preparing bid packages, designing, advertising and receiving bids is a very time (and money) consuming process. Meanwhile energy savings and environmental benefits are delayed.

With Job Order Contracting, instead of procuring construction work one project at a time, prospective contractors are asked to bid on a “Construction Task Catalog” (CTC) which lists a series of tasks with preset Unit Prices. The contractor bids a single markup that applies to all the task prices. The contractor with the lowest bid markup is awarded a contract that can accommodate multiple small to mid-sized projects.

### **How Does a JOC Work?**

The CTC is developed by engineers and cost-estimators assuming the use of experienced labor and high quality materials. All Unit Prices are based on local labor (including current

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<sup>2</sup> This section adapted from unpublished material by Rob Garner of The Gordian Group, February 2010.

prevailing wages), material and equipment prices. The scope of work for each project is explained to the contractor at a Joint Scope Meeting. Based on the scope of work, the Contractor develops a Price Proposal using appropriate tasks, quantities and the applicable contractor mark-up (Adjustment Factor). The project manager and the consultant review the Proposal and if acceptable, a Task Order is issued.

### **Where Have JOCs Been Used for Energy Efficiency Retrofit Projects?**

The first JOC contracting system was developed at NATO in the 1980's as an alternative contracting method for repair, renovation and maintenance type projects. Since then, billions of dollars of JOC projects have been completed within the United States Army, Air Force and the Navy and the United States Postal Service. While standard JOCs have been used for energy efficiency retrofit projects in the past, it is a much newer market trend to develop a CTC based on energy efficiency projects. The authors are aware of two other public agencies that have embarked on energy-efficiency focused JOCs. In 2009, New York City Department of Environment customized their CTC for energy efficiency contracts and have awarded 5 HVAC Energy Efficiency JOCs, and 5 Electrical Efficiency JOCs. In 2010, the US Postal Services moved to a JOC-specific Energy Conservation Program, and intends to award \$40M in projects. (Gordian. 2010)

### **Comparing the Program to Other Project Delivery Options**

In comparing San Francisco's JOC-based program to other project delivery options, the authors recognize that there is no "perfect" energy project delivery option for all agencies and project types. Rather, each of the available options creates certain advantages and disadvantages that may or may not be important in light of local conditions. Below we compare San Francisco's program to conventional "design-bid-construct" and to energy performance contracting using eight key criteria. This is not an exhaustive comparison of these options, but it does speak to the issues we considered important for our agency. We also describe how the program is designed to maximize performance within each area.

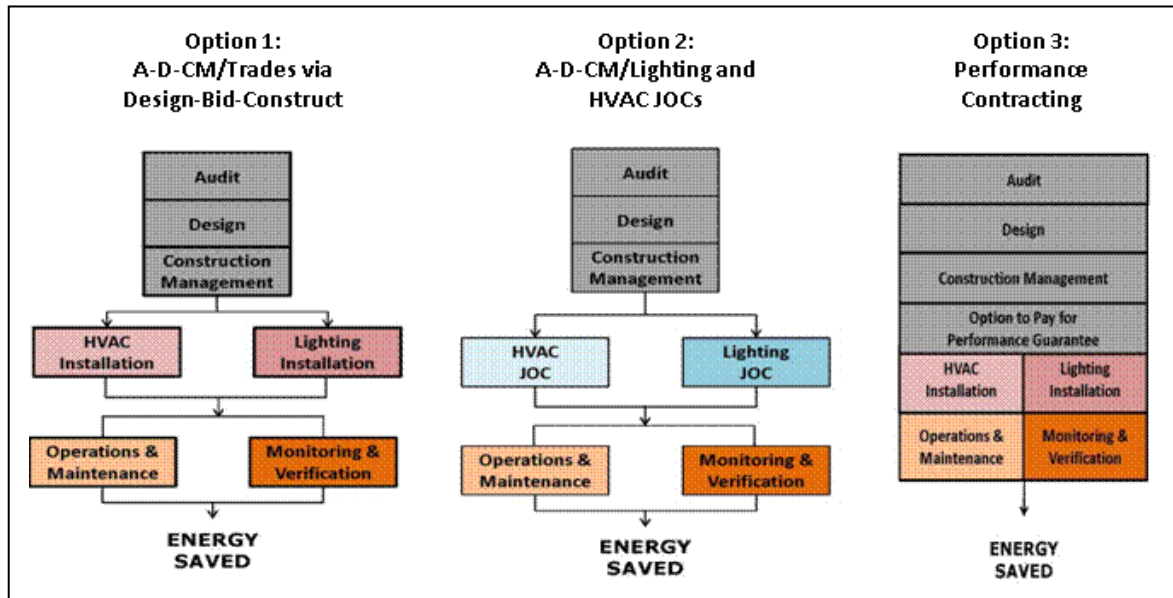
#### **Project Delivery Options Definition**

**Option 1: A-D-CM/trades via design-bid-construct.** One professional services contract for audit, design and construction management ("A-D-CM"); construction by separate trades, conventionally bid via design-bid-construct.

**Option 2: A-D-CM/lighting and HVAC JOCs.** One as-needed professional services contract for audit, design & construction management; on-call construction by lighting and HVAC JOCs.

**Option 3: Energy Performance Contracts (EPCs).** Performance contractor for turnkey energy retrofit services including audit, design, construction management, installation, operations and maintenance, and monitoring & verification, with an option to pay a premium for the performance warranty ("guaranteed savings") with annual reconciliation.

Figure 1. Project Delivery Options



Source: Vance & Deakin. 1996

## How JOCs Compare and How We Maximize Program Performance

**1) Project delivery speed.** One of the main objectives of the program is to accelerate the rate of municipal energy retrofitting; therefore, project delivery speed is an important criterion. There are also significant financial benefits to providing energy savings sooner.

- How JOCs compare:** JOCs save time relative to the design-bid-construct model by completing the bidding process up front and allowing the project manager to focus on completing projects, instead of repeatedly bidding work. Once an energy audit is completed, projects can begin in a matter of weeks instead of months. The HVAC JOC also includes design services allowing overlapping of design tasks and construction. Bundled options like EPCs are also faster than traditional options in the design and construction phases. Some states have legislation that allows sole sourcing with EPCs, but a Request for Qualifications (RFQ) selection process is still recommended. (CEC. 2000) Some public agencies (including San Francisco) are reluctant to issue sole-source contracts, or even design-build contracts, since construction is not competitively bid. Thus, contracting with an EPC can require more upfront time to educate and obtain approval from legal, purchasing and financial stakeholders. (Hansen. 1998) Hiring an owner's agent knowledgeable in EPCs can speed up the procurement process and help insure the right EPC contract is negotiated for the job.
- How the program design maximizes project speed:** The process developed by EES adds one to two months to the audit phase to engage the contractor and obtain a cost proposal; but designers and contractor reach a mutual understanding up front which creates significant time savings during the design and review of the final proposal and submittals.

**2) Cost certainty.** A reasonable level of certainty in estimated project costs is important, especially when projects are approved based on an agreed-upon level of cost effectiveness.

- ***How JOCs compare:*** The JOC provides more cost certainty and transparency than the other two options because contractors are held to prices in the CTC. With the design-bid-construct method, costs are not known until the end of a lengthy bidding process; final prices can be hard to predict, and change orders pose a serious risk to project costs. EPCs offer a high level of cost certainty after the Investment Grade Audit is delivered and the Energy Services Agreement is finalized. (Also, as in design-build, the risk of project cost overruns is borne by the performance contractor). Depending on the contract, however, scope changes may require negotiations with the performance contractor, who is then in a position to charge non-competitive prices on change orders.
- ***How the program design maximizes cost certainty:*** San Francisco's program maximizes cost certainty by bringing in the contractor during the audit stage to provide a cost proposal which is then incorporated into the audit.

**3) Reduced administrative burden.** Reducing the level of administrative burden on the staff – in terms of program setup, selecting contractors, and invoicing – means that more projects can be handled by the existing staff and administrative costs are reduced.

- ***How JOCs compare:*** JOCs reduces the administrative burden compared to design-bid-construct, especially where multiple projects would require repeated bidding. EPCs, being even more bundled, can reduce the administrative burden even further, after the initial set up period.
- ***How the program design reduces administrative burden:*** The program reduces staff's administrative burden by bundling the audit, design and construction management services, and by establishing general task orders for flexible delivery of engineering services. The program team also established standard policies, procedures and documents that create efficiencies, streamline project delivery, and reduce time in generating and reviewing documents. The streamlined process minimizes errors by using the same basic spreadsheets and documents through sequential phases. For example, the lighting audit spreadsheet turns into an attachment to the scope of work; it then evolves into the as-built documents, which are subsequently used to verify JOC contractors' requests for payments. The templates and forms are maintained on a shared FTP site and can be updated as needed.

**4) Fostering teamwork and collaboration/minimizing finger pointing.**

- ***How JOCs compare:*** The JOC process eliminates some of the usual sources of contention, such as change orders. The process also encourages contractors to focus on their long-term partnership with the City, since only a minimum amount of JOC contracting work is guaranteed. By comparison, the design-bid-construct method tends to create an adversarial environment where designers and contractors are at odds with each other, making it difficult to collaborate. An EPC provides a single point of responsibility and is also effective at fostering teamwork and a long-term partnership with the owner, so

long as the guaranteed savings and measurement and verification aspects of the agreement do not become contentious.

- ***How the program design maximizes teamwork and collaboration:*** The program design fosters teamwork by engaging the contractor during the audit stage to provide input on the recommended energy efficiency measures. The consulting team is involved through the entire project cycle, which maximizes communication and opportunities to collaborate with the contractor. Each of the parties is given enough responsibility and authority that they have a high degree of ownership of the project. The consultant serves as a technical resource throughout the entire project; the contractor is both a contractor and a trusted advisor; the City department is both a recipient of services and a participant in measure selection and construction management.

**5) Cost minimization and control.** Key factors that influence costs include the level of competitiveness in the selection processes, the degree of risk assumed by the contractor, and risk of change orders during construction.

- ***How JOCs compare:*** Gordian Group document-review efforts indicate that JOCs can save up to 15% in actual costs by using client-specific technical specifications instead of detailed design drawings. (Gordian. 2010) Procurement costs decrease because the contractor selection process is done once, up front, and because the construction is competitively bid (as compared to an EPC). Negotiated change orders are all but eliminated because any changes are merely added to the overall scope of work directly from the price book. Finally, direct construction costs decrease overall because of volume discounts and because contractor bids can spread overhead costs out over the entire course of the JOC contract.
- ***How the program design minimizes costs:*** Bundling the audit, design and construction management services leads to greater continuity and reduces rework. By contracting directly with the trades as prime contractors, the contracts have no mark up on the core work performed; this would not be the case if using a general contractor JOC. The program's many standard documents and procedures also achieve efficiencies.

**6) Quality control.** Equipment, installation work, and other services must meet the City's standards for quality, including equipment quality and accuracy of services.

- ***How JOCs compare:*** The JOC process improves quality by customizing and specifying the equipment quality in the task catalog. Since only a minimum of work is guaranteed, the contractors have the incentive to perform high quality work in order to continue receiving projects. By comparison, the traditional design-bid method can result in the contractor being motivated to make as much money as possible from that one opportunity. The contractor can do this by cutting corners to be awarded the low bid, and then submitting requests for claims and change orders. Some industry professionals also believe that design-build (an aspect of an EPC) may put the project quality at risk if both the project performance and equipment specifications are not well defined. (AIA. 1996) This can be mitigated through use of an owner's agent to serve as a watchdog of the EPC contractor.



- ***How the program design maximizes quality control:*** The program design enhances quality control by customizing the construction task catalog before bidding, and by requiring bidders to have specialized expertise in retrofit projects. Program staff have found the quality of work performed by the lighting and HVAC JOCs to be superior to the work being performed by mechanical/electrical (M/E) subcontractors under General Contractor JOCs.

**7) Flexibility.** This criterion refers to the ability of the delivery option to a) adapt to scope changes during construction due to client input, design errors or unforeseen conditions; and b) meet the diverse needs of the client departments.

- ***How JOCs compare:*** JOCs provide much flexibility to modify the scope without the cost penalties of change orders or having to negotiate the price of new tasks with an EPC. The success of San Francisco’s JOC-based retrofit program rests in part on:
  - offering basic measures along with customized solutions (i.e., tasks not in the CTC are “non pre-priced” measures, which are priced “at cost” plus a pre-agreed mark-up);
  - having the ability to perform small “mock ups” and innovative prototypes;
  - easily accommodating adjustments in the field;
  - applying various levels of design to various measures;
  - teamwork and collaboration among designers and contractors.
- ***How the program maximizes flexibility:*** The JOC process gives flexibility through Supplemental Task Orders that use pre-priced tasks for changes in quantities or types of retrofits implemented during construction.

**8) Measurable benefits and persistence of savings.** An objective of the program is to ensure that installed measures produce the expected benefits.

- ***How JOCs compare:*** The unit pricing aspect of JOCs puts an emphasis on having an accurate count of units installed; this contributes to more accurate as-built records and certainty of the quantities of installed measures. San Francisco’s program complements the JOC as-built records with robust measurement and verification. An EPC, when priced to include operation and maintenance and guaranteed savings, performs the best in this category. To match EPC persistence, a city could invest in periodic monitoring and/or continuous commissioning of buildings as part of a larger energy management program.
- ***How the program design insures tangible benefits:*** The program has established measurement and verification procedures that follow the International Performance Measurement and Verification Protocol (IPMVP). Currently, full measurement and verification is performed on every project.

### **Summary: Potential Uses of Project Delivery Options**

**Option 1: A-D-CM/trades via design-bid-construct.** Design-Bid-Construct is most suited for public sector retrofits that are larger, more complex projects, where extensive design is needed, where time is not critical, where budgets are large, and where energy performance may not be

key. For agencies that are less comfortable with non-traditional contracting methods such as using JOCs and EPCs, this is the default project delivery option.

**Option 2: A-D-CM/lighting and HVAC JOCs.** JOCs paired with A-D-CM consulting firms are well suited for public sector retrofits comprised of numerous medium-to-small lighting and HVAC projects, where short project cycles are needed, where strong project control (including competitively bid construction) is desired, and where retrofits may be phased over several years as projects are developed and funded. A JOC is well suited to accomplish work with federal stimulus funds because it expedites the procurement process, saves money, is competitively bid and is completely transparent. The program essentially delivers on-call, “turn-key” energy retrofit services that could be set up for one agency with many facilities or for a regional/state program that serves multiple local agencies. A JOC offers much flexibility in that it can include a wide range of retrofit strategies and easily accommodates scope changes, and individual projects (task orders) can be easily paid from different funding sources.

**Option 3: Energy Performance Contracts (EPCs).** An EPC provides the most services and a single point of responsibility for overall project performance; after initial set up it can provide speedy delivery and reduced administrative burden for project staff; and it offers the option of transferring the project savings risk to the contractor. An EPC is most advantageous when project management requirements exceed in-house capabilities, and when an agency needs guaranteed savings to get the project approved (and is willing to pay the premium to transfer that risk). Sophisticated owners, or those employing an experienced “owners representative”, would be in the best position to negotiate the EPC’s various contract specifications and provide oversight of their work. The EPC contractor may require a certain level of control over the project in order to assume the associated risks and to provide guaranteed savings. (CEC. 2000) Therefore, an agency using this option may have to give up some control of equipment selection, subcontractor selection, and full building operations and maintenance. The savings guarantee is most beneficial for projects with many variables that can affect the energy savings (such as HVAC control projects) for which ongoing monitoring or maintenance provided by EPC can assure savings persistence. EPCs are well suited for larger comprehensive and complex projects (e.g., cogeneration).

## **Lessons Learned Utilizing JOCs**

San Francisco’s energy retrofit program continues to be a work in progress, with ongoing project experiences and staff insights creating opportunities for continuing improvements. Some of the key “lessons learned” to date include the following.

### **1) Customized Lighting and HVAC CTCs Have Advantages over a GC CTC**

Whereas a construction task catalog (CTC) for general contractors (GCs) covers a wide range of potential construction tasks, EES’s customized CTCs for lighting and for HVAC were narrowed to only those tasks related to retrofit work. Energy efficiency-focused CTCs have many advantages compared to the broad CTC used for GCs, including the following:

**Ability to target lighting and HVAC trades as prime contractors.** The City contracted directly with trade contractors instead of with general contractors who carried mechanical or electrical subs. Advantages of contracting directly with the trade contractors include:

- The bids attracted higher quality lighting and mechanical contractors compared to those available as subcontractors under general contractor JOC contracts.
- The bid advertisement outreach could target contractors experienced in energy retrofits, and the bid's minimum qualifications insured a high level of experience.
- Prime contracting with the trades eliminated contractor mark-ups for core work.

**Lower bids possible by reducing bidder's risks.** By narrowing the task catalog to those tasks and materials that were very familiar to lighting and mechanical retrofit firms, bidders perceived less risk than if their proposed mark-up also would apply to many less familiar tasks included in a full "general contractor" CTC. If bidders perceive more risk, e.g., from future prices of less familiar equipment, then bids would be expected to be higher.

**Can include energy-efficiency packages.** In addition to narrowing a task catalog to a single trade, customized CTCs included "assemblies" of typical retrofit tasks, with a market price for the work. This strategy improves the pricing and makes review of the proposals more efficient. For example, an assembly of tasks might be "fluorescent lamp and ballast replacement" or standard retro-commissioning tasks.

## **2) There are No Perfect Energy Audits - Construction is Messy - And that's OK**

Even if a premium is paid for the perfect energy audit, projects can change by the time of construction. For example, facility staff often identifies new needs or constraints once construction is imminent. A JOC is able to easily accommodate adjustments in the field without conflict or price gouging – whether these adjustments are due to client input, audit gaps, or new technologies that have just come on to the market. JOCs are so adept in this area that they could help accelerate the use of emerging technologies into the market.

## **3) Energy Audits Are Best Left to the Engineers**

The initial program design experimented with saving on consultant costs by having the JOC contractors perform lighting surveys and collect lighting data as part of the JOC cost proposal. Experience showed that the contractors do a good job collecting data that would impact their costs, but did not collect the data needed to establish baseline conditions, evaluate various options or determine cost-effectiveness. The program team shifted this task back to the consultants. A better role for the contractor was to provide constructability feedback on the audit before the design was finalized, and to catch some errors and infeasible retrofits.

## **Possible Future Applications and Market Transformation**

### **Replicating the Program Design for a Single Agency**

As JOC contracting continues to transform the public sector construction industry, and with continued energy efficiency funding, many public agencies could replicate San Francisco's program to accelerate energy retrofits. To do so, an agency would need to contract with a pool of qualified energy professionals to perform the Audit/Design/CM services, as well as with a pool of competitively-bid JOCs to install retrofits. An agency could also make use of the many standard documents and streamlined tools developed by EES – all designed specifically for JOC-based retrofits. As discussed earlier, the program could improve a local agency's ability to implement energy retrofit projects at a pace that satisfies federal stimulus funding requirements while providing competitively bid and transparent construction costs that help facilitate federal project accounting requirements.

### **Combining JOC CTC with Performance Contracting**

Among the more intriguing potential applications of a JOC-based energy retrofit program is the prospect of combining JOC contracting with EPC. This option could offer some of the advantages of EPC – a single point of responsibility, and maintenance services strategically applied to increase persistence of savings, along with the option of using guaranteed savings to transfer risk where most beneficial – with the advantages of a JOC. This combination would allow construction to be competitively bid; and costs to be transparent and controlled through established unit prices, without the cost penalties associated with change orders. EPCs or Joint Venture teams might potentially be selected through a combination of qualifications and a bid on the Adjustment Factor (the markup on the construction).

These turnkey energy retrofit services could be made available on-call much like as-needed engineering services and JOCs. Measurement and verification, guaranteed savings and equipment maintenance could be optional services that are standardized by measure type (established mark ups/costs, procedures and terms) and selected on a measure-by-measure basis within each task order.

### **Program Design on a Regional or State Level**

The program potentially could be set up at a regional or state level and made available to public sector, utility demand-side management, and private sector projects. As in San Francisco, such a program design with standard procedures and streamlined documents, could increase the speed of projects, improve project quality standards, reduce costs, and provide greater certainty that tangible environmental and economic benefits would be achieved. By having a sponsoring agency procure the contracts, many smaller public agencies could access the pre-qualified pool of consultants and the competitively bid energy retrofit JOCs. The program model potentially also could be used by utilities offering energy efficiency services to the private sector.

Significant precedents exist for using group-purchasing methods to procure products and services for local and state agencies. The California Department of General Services has prequalified performance contractors for use by other state agencies; the California Energy Commission and Association of Bay Area Governments (ABAG) hire energy consultants who

provide technical support to local governments. Regional agencies like ABAG can take advantage of law in California that enables legislative or governing bodies to enter into a joint powers agreement and “jointly exercise any power common to the contracting parties, even though one or more of the contracting agencies may be located outside” California. (California Government Code).

Customizing task catalogs for energy retrofits is a new trend with the potential to transform not only the federal energy program, but also public sector energy retrofits nationwide. From an economic stimulus standpoint, the increased ease of public retrofit contracting through JOCs also could help grow the energy retrofit construction industry.

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