PROJECT OVERVIEW

With the support of the Clinton Climate Initiative (CCI), the Houston mayor's office developed and implemented a large-scale energy efficiency retrofit program to address all city buildings using CCI's best practices energy performance contracting methodology. The city government has set a goal of reducing its energy demand from buildings by at least 25 percent through the program.

INITIAL CCI ENGAGEMENT

As the implementation partner of the C40 network, an association of large cities committed to taking action on climate change, CCI has worked with the Houston mayor's office since May 2007, when the mayor became a founding member of CCI's flagship Energy Efficiency Building Retrofit Program (EEBRP).

Before deciding to participate in CCI's retrofit program, the city government had an infrastructure upgrade program that planned and scheduled facilities improvements over a multi-year period. However, difficulties in financing upgrades from the capital improvement budget and in securing contract bids for comparatively small-scale improvements ($350,000-$750,000) meant that the city was falling behind on its planned upgrade schedule. As a result of participating in the EEBRP, the mayor's office asked CCI to support the development of a holistic, multi-building financeable building retrofit program. In working with CCI, the city government decided to pursue an energy services performance contracting (EPC) model, which allowed the city government to undertake a multi-building retrofit project that fully exploited energy and cost savings opportunities without large capital budget outlays. This program became a keystone of former Mayor Bill White's commitment to transform Houston from "energy capital" of the world to the "energy conservation capital" of the world.

ESCO SELECTION

The city government moved swiftly after initial engagement with CCI. In June 2007 the city issued a request for qualifications (RFQ) for the retrofit of 271 buildings totaling 11 million square feet. As a public entity, the city of Houston was subject to the Texas Government Code, which establishes procedures for procuring professional services. Under this code, a government entity must choose a service provider on the basis of qualifications only, with no consideration of price or scope of work in the selection process. Price is negotiated after the city selects the intended contractor(s), and the contract performance must be verified by an independent third party. CCI worked with the city government to identify energy service companies (ESCOs) that could implement the retrofit project under CCI's energy performance contracting best practices. Five interested firms responded to the RFQ, four of which were invited to the request for proposal (RFP) stage of the process. Here respondents were given the opportunity to demonstrate their creativity and innovation by proposing uncosted energy conservation measures for three representative buildings. An evaluation team verified references and vetted the energy conservation measures proposed by the respondents.

The city ultimately chose to award its contract to two ESCOs, Siemens and Schneider Electric/T.A.C., based on the firms' experiences working with particular building typologies similar to Houston's building stock. Both Siemens and Schneider Electric/T.A.C. showed a proven track record in successful large-scale energy performance contracts and demonstrated great flexibility in adapting timelines to fit the requirements of occupied administrative buildings. In accordance with CCI's best practices, Siemens and Schneider Electric/T.A.C. agreed to guarantee the energy savings resulting from the project over a period of up to 20 years; they also agreed to monitor savings in accordance with the International Performance Measurement and Verification

Protocol (IPMVP). In mid-2008, the parties initiated the auditing and project definition process for the first tranche, or sub-project, of nine buildings.

FINANCING SOLUTION

CCI helped the city government understand and consider the available financing alternatives. The city ruled out many options, including a bond election, which would have incurred delays and extra costs. Ultimately the city decided to finance the project on an interim basis by issuing tax-exempt commercial paper; it will later refinance the paper with a general obligation bond.

KEYS TO SUCCESS

The city's innovative approach to the project makes the city a prime example of building retrofit best practices.

- The city government committed all of its non-enterprise revenue buildings to the initiative – 271 buildings, comprising 11 million square feet. By making this large-scale commitment up front, the city attracted many best-in-class firms who brought innovative and competitive solutions to the table early in the service procurement phase of the project. Moreover, by going through the procurement process just once, the city streamlined the selection of firms and accelerated project implementation – thereby expediting the delivery of energy and cost savings in the buildings as well.
- By grouping similar building types into discrete tranches, the city increased the program's odds of success. This tactic not only streamlined project management and finance but also took advantage of economies of scale and blended payback available only with multiple-building projects.
- The city defined its program goals (such as a minimum percentage of energy savings) as well as specific aspects of the buildings (such as envelope) that the ESCOs had to address, which gave the respondents guidance and pushed them to maximize innovation.
- The city was willing to take a long-term, lifecycle cost perspective on the program benefits (to the maximum allowed under Texas law), allowing a blended payback of up to 20 years.
- The city took a creative and open-minded approach to finding a set of financing solutions that would allow the projects to move forward.
- The city maintains quality control and minimizes project management demands by authorizing the work in each tranche on a schedule that is aggressive but that also allows for adaptation by building occupants and the ESCOs.

PROJECT CHALLENGES

Because the buildings under retrofit were occupied by city employees and in active use by the public, the project required a high degree of schedule coordination between the building occupants, the city, and the ESCOs. Schneider Electric/T.A.C. and Siemens made a concerted effort to avoid construction during peak hours of public demand. For instance, lighting retrofits were done at night, and major plant upgrades were made over weekends or holidays to avoid interruption of service to taxpayers.

The need to adhere to the public procurement requirements of the Texas Government Code posed another challenge to the city by restricting its ESCO selection criteria to qualifications only. The city was therefore unable to assess the relative cost of the proposals put forward by the ESCOs at the RFP stage. Moreover, the cost savings projected by the ESCOs after the audit must be reviewed by an independent third-party licensed professional engineer, adding another bureaucratic step to the process. The process of choosing a partner based on qualifications, not cost, was new to many stakeholders in the city and required significant education and demonstration before the procurement could proceed.

CCI ROLE

CCI supported the city government throughout the project development process, including:

- Introducing the concept of energy services performance contracting (EPC) as a mechanism for implementing large-scale energy efficiency retrofits without large capital expenses
- Helping design a procurement process that utilized CCI's best practices in performance contracting and encouraged innovation
- Drafting the RFQ and RFP for the city's review, approval, and processing
- Identifying ESCOs that could support the best practices terms
- Providing access to CCI's purchasing alliance supplier partners, which offer discounted pricing on energy efficient technologies
- Providing and securing external financing advice for the project

Siemens Project (Tranche 1)

PROJECT AT A GLANCE

ESCO ..... Siemens
Project Size ..... 37,499 sq ft
2 buildings
Project Cost $763,330
(17 ECMs identified; 4 approved)

Annual Energy Savings

- Electricity ..... 43.6% (557,885 kWh)
- Natural Gas ..... 19.2% (407 MMBtu)
- Water 0%

Annual Energy & Maintenance

- Cost Savings 37.6% ($58,350)
- Annual Emission Reductions ..... 291 tons of CO_2
- Simple Payback ..... 13 years
- Construction Duration ..... 14 months

ENERGY CONSERVATION MEASURES and CONTRIBUTION TO OVERALL SAVINGS

HVAC EFFICIENCY IMPROVEMENTS 57.0%
Replaced packaged rooftop units and split systems.

LIGHTING IMPROVEMENTS 24.0%
Retrofitted all T12 lamps and magnetic ballasts with T8 and T5 lamps with electronic ballasts. Installed occupancy sensors and controls as appropriate.

ENERGY MANAGEMENT SYSTEM INSTALLATION 14.0%
Installed new building automation system in both facilities.

SOLAR THERMAL HEAT COLLECTOR FOR POOL HEATING 5.0%
Provided and installed solar thermal collector to provide supplementary heat to therapeutic swimming pool inlcuding collectors and controls, pumps, and equipment.

SIEMENS PROJECT TIMELINE

Schneider Electric Project (Tranche 1)

PROJECT AT A GLANCE

ESCO.....Schneider Electric/T.A.C.
Project Size.....1,102,905 sq ft
7 buildings
Project Cost.....$9.66 million
(8 ECMs identified; 7 approved)

Annual Energy Savings

- Electricity.....28% (7,342,113 kWh)
- Natural Gas.....38% (9,809 MTO)
- Water.....36% (5.69 million gallons)

Annual Energy & Maintenance

- Cost Savings 29% ($836,507)
- Annual Emission Reductions.....3,323 tons of CO_2
- Simple Payback.....11.6 years
- Construction Duration.....14 months

ENERGY CONSERVATION MEASURES and CONTRIBUTION TO OVERALL SAVINGS:

BUILDING CONTROLS 35.0%
The existing building controls system was expanded. Sites with no systems in place had new systems added. All systems were commissioned and web-enabled to allow remote access.

COMPUTER ROOM AIR HANDLING UNITS 17.9%
Replaced 14 units and added three units. Replaced chilled water pumps and installed a backup generator.

LIGHTING IMPROVEMENTS 17.8%
Color rendition and efficiency were addressed through the addition of new fixtures and motion sensors in one large high-rise and five police substations.

CHILLER PLANT MEASURES 14.6%
Six high efficiency chillers were installed; three existing cooling towers were replaced, and two chilled water pumping stations were replaced.

DUAL DUCT UPGRADE 8.8%
Four existing large double-duct air-handling units were modified to operate with independent hot and cold deck control.

WATER CONSERVATION IMPROVEMENTS 5.5%
Wholesale replacement of water closets, supplemented by the installation of low-flow flush valves, new low-flow shower heads and aerator installations.

ROOF TOP HVAC 0.4%
Replaced six existing natural gas heating/DX cooling packaged rooftop units.

SCHNEIDER ELECTRIC PROJECT TIMELINE

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