

C40 Municipal Building Efficiency
C40 Sustainable Infrastructure Finance
Renew Boston Trust
Municipal Buildings

"... people who work in infrastructure development often bemoan a 'funding gap.' But as Bertrand Badre, CFO of the World Bank, points out, there is plenty of capital in the world. There is not a funding gap; there is a project gap. Infrastructure projects are not up to investment standards." **Harvard Business School, 2014**

Abstract

How can the tools of finance be applied to spark an expansion of capital flows to municipal building stocks in need of improvement? The goal of the Renew Boston Trust municipal programme is to harness mechanisms that effectively expand the city's access to capital without limiting its financial options in other areas, moving it away from over-reliance on government-sponsored incentives to a more sustainable model of public finance. Renew Boston Trust represents an evolution of successful models implemented in the past decade by other C40 cities. [Use this link](https://vimeo.com/193456992) (https://vimeo.com/193456992) to view a short tutorial on municipal finance and how the programme works in the larger context of city operations.

1. Programme context

Climate policy in Boston

The City of Boston's 2014 Climate Action Plan, the heart of its Greenovate Boston programme, which received a C40 Cities Award in 2015, aims to reduce GHG emissions 25% by 2020 and 80% by 2050, as compared to 2005 levels. As part of this ambition, the city is targeting a 12.5% reduction in CO₂e emissions attributed to large commercial buildings and institutions. Municipal buildings are expected to make a sizable contribution to these goals.

Background

Boston is known as the home of a number of world-class research institutions and innovative responses to climate change. In 2006, the Clinton Climate Initiative ("CCI"), headquartered in Boston, became the operating arm of the C40 Cities Climate Leadership Group under an MOU signed by former president Bill Clinton and City of London Mayor Ken Livingstone, the founder of C40. In subsequent years, CCI pioneered development of sustainable models supporting both climate change mitigation and adaptation. Working in 22 of the C40 cities, with leading energy services providers, and in cooperation with global financial partners, CCI's Energy Efficiency Building Retrofit programme helped to make energy efficiency and resiliency bankable by using a performance-based project underwriting model. CCI methods and mechanisms were the template behind hundreds of retrofit projects and programmes, notably the following:

- [New York City's Empire State Building](#)
- [City of London's RE:FIT and RE:FIT Schools](#)
- [Retrofit Chicago](#)
- [State of Victoria's Greener Government Buildings](#)

The Renew Boston Trust municipal programme borrows from and replicates methods piloted in C40 cities from 2007 to 2013, as well as integrating elements of research sponsored by the Center for Sustainable Enterprise and Regional Competitiveness at the University of Massachusetts, Boston, research presented at refereed ACEEE and ECEEE conferences in the US (2012) and EU (2013).

Experience from hundreds of previous deep energy retrofit projects suggests that the self-liquidating investment potential (where a financially attractive investment can be made and the costs or obligations are fulfilled from energy consumption savings) of Boston's 15.8 million square foot building portfolio might be \$7.75 per gross square foot, or about \$120 million. To put this in context, in the year prior to organising Renew Boston Trust, the city invested under \$0.20 per gross square foot

in efficiency upgrades. The difference between these two figures represents the capital that must be unlocked to transform the city's building stock and to make a meaningful contribution to the Paris Agreement's aspirations.

Boston has an annual borrowing cap of about \$150 million, an informal limit normally set in discussions with credit-rating agencies (S&P, Moody's, Fitch); and \$120 million in building retrofits represents significant competition for the city's many other uses of borrowed capital, which must serve a range of important social needs such as education and public safety. While the city has the highest credit rating available, it nevertheless cannot borrow unlimited amounts without the means to repay the additional debt; and raising taxes is extremely unpopular with voters.

2. Programme overview

Timeline and goals

The Renew Boston Trust municipal programme has been in development since early 2014, when City Energy Project, a 10-city climate policy and capacity building effort funded by Bloomberg Philanthropies, Kresge Foundation, and Doris Duke Charitable Foundation, donated 3 years of technical assistance to update city operations in several important areas. Now in the final stages of implementation, Renew Boston Trust is fully institutionalized in the Mayor's cabinet and represents the cornerstone of a 5-year plan to complete a \$120 million transformation of the municipal building portfolio. Programme governance is shared by several cabinets, including Finance, Law, Public Facilities, and Environment & Energy. City asset owners implementing the retrofits include Public Works, Schools, Police, Fire, Health, Parks & Recreation, Transportation, and Information Technology. However, not every public-sector building is included because in eastern Massachusetts, as transit and ports are managed by state, not city, agencies; and in the US, public housing is managed by the federal government.

The programme is designed to foster so-called deep-energy retrofit projects with blended paybacks on the order of 20 years. The Rocky Mountain Institute (2012) defines deep retrofits as measures targeting multiple systems across an entire building. Deep-energy projects achieve much greater energy, emissions, and cost savings compared to projects that focus only on upgrading isolated building systems such as lights or pumping.

In addition to the primary goal outlined in its Climate Action Plan, the city established several interim goals for Renew Boston Trust.

- Update and institutionalize durable mechanisms of retrofit project finance in the areas of contracts, procurement, budgeting, and public finance.
- Attract new investment capital to Boston's public sector by making retrofit projects more bankable in the minds of bond investors, without limiting the city's financial options or affecting other uses of capital.
- Expand Boston's green-collar workforce and create an ongoing source of skilled jobs, both in the building trades and related professions.

As an interconnected goal, the programme expects to finance certain climate resiliency projects as well, especially those related to building systems operation. Resiliency measures prepare the city for potential extreme weather events or electric grid failures.

Organization and governance structure

Renew Boston Trust requires an interdisciplinary team of decision makers that can simultaneously assess statutory, contractual, technical, and financial issues. Typical government organizations would normally require many changes to build the capacity for the successful operation of a programme like Renew Boston Trust. There must be clear lines of decision-making, with both solid-line (direct decision making) and dotted-line (input, but not decision making) relationships. Given the programme's a) unique budget underwriting requirement, which is needed to achieve successful financing, and b) the tightly linked nature of projects and their

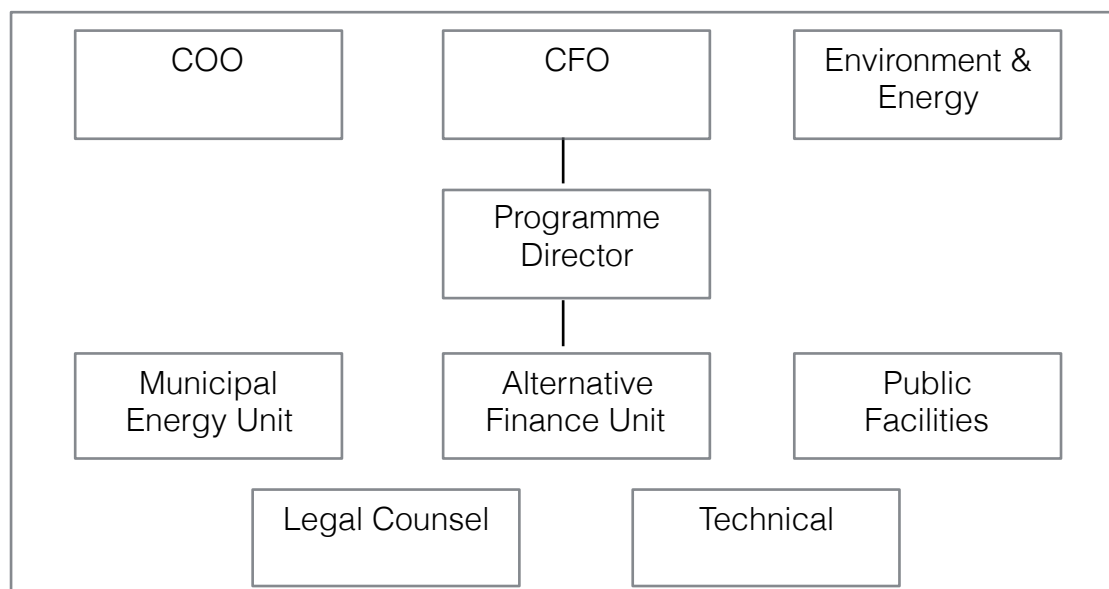


Figure 1: Governance structure of Renew Boston Trust municipal programme

acceptance for funding by financial markets, the budget office is one logical place to locate authority for programme policies and practices. Also, an experienced

programme director is needed to head operations — that is, procurement, contracting, vendor performance management. However, given the technical nature of project development and the sometimes-onerous legal landscape of public-sector design-build procurement and contracting, the programme director requires multi-disciplinary staff support.

Figure 1 schematically illustrates the Renew Boston Trust governance structure. The City of Boston addressed the budgeting issue by creating a first-of-its kind budget office, the Alternative Finance Unit (“AFU”), to work in parallel with the existing (operating and capital) budget departments. The new budget office represents a third source of budget funding for city divisions, *funding which comes from neither the operating nor the capital budget*. AFU budgets include self-funded (a/k/a self liquidating) budgets and are granted based on clear underwriting rules established by the budget office. Any division desiring funding for a retrofit project submits an application with a conforming analysis of project economics, which the AFU aggregates with applications from other divisions. These so-called aggregations are underwritten by the AFU with input from the multi-disciplinary team and approved for funding.

Other departments participating in programme governance include Law, Public Facilities, and Environment & Energy, all of which have assigned staff to the multi-disciplinary governance team in addition to Finance. Governance is supplemented by outside legal counsel and a technical owner’s representative with deep knowledge of energy performance contracting to fill gaps in the city’s internal capacity, as needed. A cabinet-level “board of directors,” consisting of 3 cabinet chiefs, supervises the Programme Director’s team.

Performance measurement

Under the City of Boston’s Building Energy Reporting and Disclosure Ordinance (“BERDO”), all city energy use must be publicly reported each year. With several years of energy data, the city has a baseline of its energy use. Once approved, each aggregation of efficiency projects will include a savings guarantee (measured in energy units, not currency) that sets the target reduction in city energy use, which the performance contractor must meet or pay the city a fee. The fee is calculated to cover any shortfall in the repayment amounts associated with financing the aggregation. In this way, the cost of implementing and financing the aggregation will always be covered, either by the energy savings it produces or by a guarantor’s fee. Energy price fluctuations are not managed by the energy performance

contract, as it is less costly for the city to manage energy price risk using conventional financial hedging strategies if needed.

Unique budgeting and financing innovations

Renew Boston Trust's principal innovation lies in its rules-based budget underwriting and bond earmark. As previously mentioned, funding efficiency retrofits is often constrained by reliance on capital budgets because of limits on total borrowing and intense competition for funding with other high-priority municipal projects — that is, cities can only afford so much debt and have a lot of demands on the capital they raise. Finding a way to decouple efficiency retrofit project spending from the normal capital budgeting process is a useful way around those limitations, as retrofit projects then no longer have to compete with other capital budget categories. A way to accomplish that is to fund efficiency retrofits with a protected set-aside from bond proceeds, a so-called bond earmark that is reserved for qualified self-liquidating projects such as efficiency and renewable energy.

Efficiency retrofit projects under Renew Boston Trust are subject to a unique rules-based approval process, administered by the Alternative Finance Unit in the Office of Budget Management. The AFU establishes underwriting rules to ensure that capital costs are reliably offset by operational savings, generally by requiring performance based contracts with enforceable liquidated damages language for any energy savings shortfalls.

Though authorized by the city charter to finance its operations with either municipal leasing or bonding, the City of Boston currently considers a municipal bond earmark a better option for the initial tranche of retrofit financing. An earmark requires few changes in the city's current treasury operations and has been treated favorably in the past by credit rating agencies and investors.

Every city must manage its debt within limits determined by the rating agencies. However, with proper procurement and budget underwriting processes, *rating agencies normally approve borrowing above the normal limits*. By financing projects in this way, improvements can be funded based solely on project economics, rather than caps imposed by the city's normal borrowing limits.

It's important to understand how that works and why. Any creditworthy municipality has a limit on its annual borrowing that is normally determined in discussion with the 3 major credit-rating agencies. In one recent case, a small New England city owned a double-A-minus (AA-) credit rating and an annual borrowing limit of \$25 million. In the city's initial tranche of efficiency retrofit and renewable energy projects, it was able to document improvements valued at about \$40 million,

all of which carried an energy performance guarantee from a guarantor with the highest corporate credit rating available.

When presented with these facts, all 3 rating agencies took the position that repayment of the additional borrowing is covered by a reliable stream of savings and is further backed by triple-A (AAA) corporate guarantee. As a result, rating agencies allowed the city to borrow the additional \$40 million *without a negative impact on its credit rating*. In subsequent tranches, the additional borrowing capacity was raised to \$80 million, which represents a \$7.75 per gross square foot investment in the city's building portfolio. In the case of Boston, a similar scenario would expand the city's ability to finance capital improvement by a little over \$120 million.

There were some strings attached to rating agency consent. Notably, project underwriting rules must meet the agencies' bankability standards, including suitable risk factors and debt service coverage ratios. The municipality must also submit an independent performance report each year, verifying that all contract terms and savings targets are currently being met.

Financing climate resiliency

There's an interplay between building efficiency and resiliency, as improving efficiency can reduce the cost of resiliency investments. As an example, consider the investment required by a hospital to meet new resiliency requirements for onsite power generation. To endure long outages that might result from a major storm, US hospitals have recently been required by regulators to expand their ability to generate power from several days to several weeks. The size of that investment, and associated impacts like the health hazard associated with storing large amounts of fuel on site, is directly affected by the efficiency of the hospital. An inefficient hospital will pay more for resiliency than an efficient one.

Unfortunately, as important as they are, resiliency investments are not normally self liquidating; but by piggybacking them, resiliency can be funded by blending its costs with the savings generated by efficiency retrofits to make the blended project self-liquidating overall. The blending works for three reasons.

- Certain resiliency investments such as back-up generators and renewable energy sources employ the same building systems technology used to improve efficiency. And there is considerable overlap in the technical skill sets required to implement either.
- Also, implementing blended projects collapses the more-or-less fixed mobilization costs for two projects into a single project. One estimate is that mobilization

requires as much as 30% of total project cost, so this can represent a substantial savings. Managing two projects as one also makes it easier to manage the disruption of such projects on normal building operations.

- Finally, blended efficiency and resiliency projects do not strain the project finance model used for retrofits. Experience with energy performance contracting has shown that substantial portions of a project with no payback themselves can be financed with the savings generated by the remaining project.

Blended efficiency and resiliency projects address both sides of climate policy, mitigation and adaptation. It is a more robust public message to have a single program delivery vehicle that incorporates both aspects of climate change. It also provides a mechanism to finance important resiliency projects without creating new competition for limited borrowing capacity and capital budgets.

Links to other programmes

There are two “flavors” of Renew Boston Trust, one for municipal buildings described here, and another for private building owners, described in an earlier case study developed for the C4o Private Building Efficiency network. Private and public sector programmes are strongly related in that they employ the same core business processes to improve project bankability and assure investors of reliable returns. They differ largely in their organization and the types of financial instruments used. However, public and private borrowers both are subject to more-or-less identical credit underwriting mechanisms employed by the rating agencies and banks. The tools of finance are ubiquitous and generally do not change greatly from sector to sector or even from region to region of the world.

3. Design and implementation

Programme organisation

Three years of funding by City Energy Project was required to organise Renew Boston Trust. When sealing the memorandum of understanding with the City Energy Project, the City of Boston opted to focus on financial solutions for spurring efficiency retrofits in the built environment. The city chose an advisor with experience developing similar programmes in C4o cities. The implementing partners of City Energy Project, Natural Resources Defense Council (NRDC) and the Institute for Market Transformation (IMT), provided administrative support.

The Renew Boston Trust municipal programme supplements existing public procurement processes and is based on a 10-year-old design-build Massachusetts statute that requires performance-based contracts, known as energy performance

contracts (EPCs) or energy services performance contracts (ESPCs). Because it is believed that performance contracting makes the city's capital improvements and infrastructure projects more bankable and expands capital funding options, it was felt that establishing an EPC procurement process could lead to a broad expansion of investment in municipal energy efficiency and also create a practical means to fund some of the city's critical resiliency investments.

While city departments can theoretically continue to use capital budget allocations to fund efficiency retrofit projects, under the EPC model, projects often qualify for a much larger budget allocation, provided they are developed to a set of underwriting rules. The energy savings "cash flow" generated by an efficiency project effectively raises the level of fiscally responsible investment. A special unit, the aforementioned AFU, underwrites and approves qualified projects for funding using mechanisms developed by the Office of Budget Management.

The initial development of a range of new business practices was carried out by a six-member task force and supported by selected internal and external consultants with related expertise in public EPC procurement, contracts, project management, and finance. The task force also tapped the experience and lessons learned by other local jurisdictions, which have implemented similar programs. The immediate objectives of the task force were to establish a replicable EPC procurement and vendor management process and to select a prime contractor, a single construction manager at risk to guarantee project performance, by the end of 2015.

Further objectives of the task force were to address a number of questions in four distinction areas.

Law	What are elements of an enforceable energy performance contract? How does procuring an EPC fit within existing state law?
Budget	What are elements of an effective EPC procurement process? What language should be included in an RFQ and EPC?
Public Facilities	What are elements of an effective vendor pre-qualification process? What evaluation criteria should be used to screen vendor proposals? What are vendor performance measurement best practices?
Finance	Which funding mechanisms are best suited for EPC projects? What enhancements to existing funding mechanisms are appropriate? What new funding mechanisms ought to be considered?

City divisions, the asset owners, were offered training in the new business processes needed to develop and submit projects for approval by the AFU. City departments completed training and began identifying candidate projects in mid 2016.

Six temporary staff assignments were required to achieve the task force objectives. The principal participants were the task force leadership chosen by the mayor’s office and technical assistance by the City Energy Project, as well as one member from each of four functional areas — law, budget, finance, and public facilities. The demands on each participant’s time varied over the 18-month life of the task force, as little as 10% while at no time exceeding 50%. Individuals were nominated for the task force by their cabinet chiefs.

In addition, several state and federal government agencies were tapped to provide training and technical support; and a number of outside consultants were engaged, with additional grant funding from the Barr Foundation, either for their experience in developing similar programs or for their expertise in specific technical aspects of energy performance contracting and finance. The task force completed organising Renew Boston Trust in 2016, handing off day-to-day responsibility to the governance structure headed by a permanent Programme Director. The City Energy Project technical assistance MOU expired at the end of February 2017.

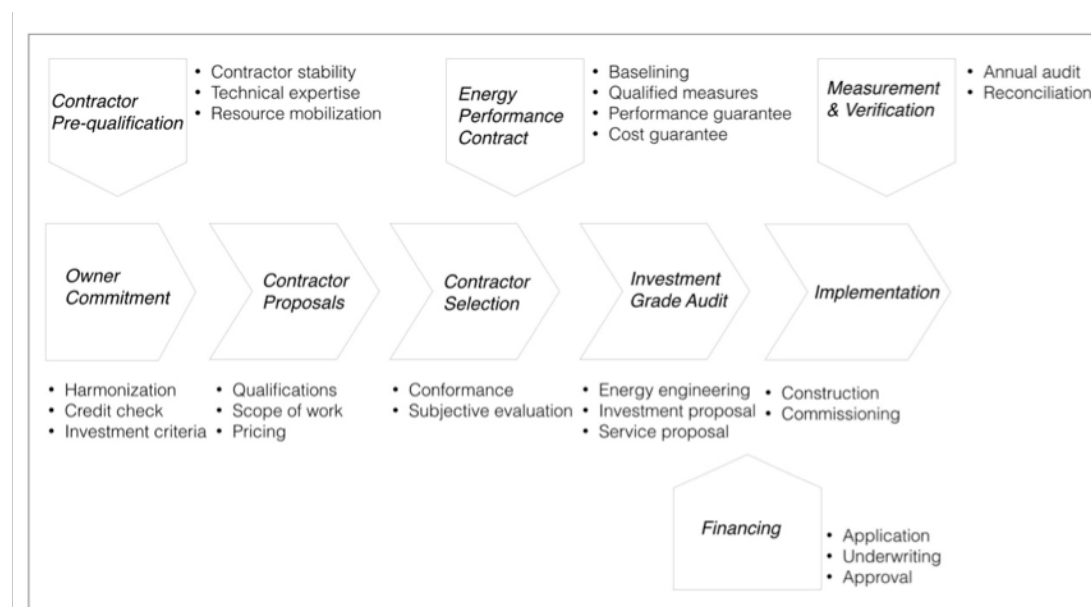


Figure 2. Energy performance contracting uses a design-build procurement model

Energy performance contracting

A proven performance-based contracting method is at the heart of Renew Boston Trust. In so-called energy performance contracting (EPC), a prime contractor (sometimes called an ESCO) establishes costs and energy savings during an

investment-grade audit (IGA) and then guarantees both maximum price and minimum energy savings in a binding contract. Under terms of a performance contract, if the contractor/guarantor does not deliver the savings promised, the project sponsor (in this case, the city) can call the guarantee and receive monetary compensation. Either way, a project sponsor is always made whole, from savings or compensation, for the amount needed to repay its debt to investors. Figure 2 schematically represents the process of procuring an energy performance contract.

Critical to the success of an energy performance contract are annual measurement and verification (M&V) audits, which are required on every project during its performance period and which allow project sponsors to reliably call their guarantee and claim compensation when the ESCO is unable to deliver savings at levels promised. As energy use measured at the meter is typically adjusted under performance contract terms for annual variations in weather, occupancy, building use, or one-time modifications, project sponsors often turn to third-party specialists for the analysis required.

Additional financing considerations

Though bonding is a common way to finance improvements to municipal infrastructure, virtually any essential-use efficiency retrofit project can also be financed in the US using a municipal lease, often at a total cost comparable to bonding. Whether bonding or leasing is a better alternative depends on the current state of city finances, the extent of restrictions on its access to capital markets, and its borrowing costs. Depending on the project, the total cost of lease financing can be no greater than bonding because of offsetting savings. US legal opinion generally holds that municipal leases are current obligations and not normally subject to the same legally mandated or rating agency borrowing caps as bonding.

In the US public sector, two common myths underlie the financing of municipal programmes – a) that efficiency retrofit projects can only be funded by bonding and b) that leasing from private sources is more costly than other forms of financing.

The first myth may have arisen because cities have traditionally financed new building construction and major renovations with bonds. Indeed, that is the only means by which jurisdictions in the US can legally assume multi-year debt obligations. However, US cities normally adopt special language (known as non-appropriation) in multi-year municipal leases that allows them to safely exit a lease if budgets are not appropriated in the out years. Such language effectively converts municipal leases of any term to current-year obligations. As a result, cities may treat them as current expenses and not include them in their long-term debt with

attendant borrowing caps and credit rating issues, while banks participating in the municipal lease market normally agree to the non-appropriation language.

The second myth arises perhaps because budget directors understand that the bonding rate is their city's lowest cost of funds and intuition suggested that other financing vehicles must therefore be more costly. At the scale of a major infrastructure project or wholesale renovation that may be true, but retrofit projects by their nature are considerably smaller. Issuing bonds entails considerable transaction costs, not required by municipal leasing, because of such requirements as an opinion of legal counsel and underwriting fees. Considerably lower transaction costs on municipal leases can be offset by somewhat higher cost of funds, but budget directors are usually surprised at how small the premium can be. One practical impact of a strong city bond rating is to minimize the premium paid for lease finance, to as little as 50 basis points (0.5%) in one real-world example. Depending on market conditions, the "leasing premium" sometimes disappears completely and the cost of funds for a lease is the same as the bonding rate.

Bonding has other drawbacks. For example, the entire amount must be taken down at the outset whereas retrofit projects on a city scale involve implementing thousands of measures in hundreds of occupied buildings without interrupting daily operations. That can take many years, and the amount of funding needed in any given period is not always easy to predict. Municipal leasing has more flexible takedown provisions, so cities can access funds only as they are needed. Avoiding interest until funds are needed lowers financing costs even further.

A variety of municipal-lease repayment structures effectively allow borrowers to match repayment schedules to energy efficiency project cash flows. That, in turn, ensures that project savings always cover debt service and that projects have a positive impact on operating budgets. Matching costs with benefits in this way is ideally suited to energy efficiency projects and makes ongoing investment sustainable because all but the most ambitious projects are budget neutral.

Municipal leases are available for virtually any size project, and the entire amount can be financed under a single master lease agreement to which individual project schedules can be added over time. Cities seldom have master lease agreements in place to access private finance on an ongoing basis for retrofit projects beyond 7 years, whereas lease terms of 15 or 20 years are normally available for jurisdictions with strong credit. Master lease agreements can be re-negotiated annually to ensure the best available terms.

4. Outcomes and impacts

Benefits

- Provides a streamlined mechanism to provision and fund energy efficiency and resiliency projects without creating new competition for scarce capital budget allocations or burdening the city's credit rating.
- Creates a durable funding mechanism for resiliency investments, which are not normally self liquidating.
- Captures additional value for money by collapsing essentially fixed mobilization costs for multiple small projects by aggregating them into larger projects.
- Insures that energy efficiency projects are of sufficiently high quality that operational savings are actually received immediately and do not degrade over time, or if they do that the city is compensated financially for shortfalls.
- Expands the city's technical capacity to operate buildings more efficiently because project measurement and verification results in city employees receiving ongoing training and support for best building operating practices.
- Leverages the city's overlapping building technology and technical skill sets needed to manage energy efficiency and resiliency projects in combination, rather than separately.

Environmental impact

Fostering deep building retrofit projects should lead to significant reductions in energy, water, and GHG emissions in Boston landmarks. The focus on deep-energy retrofits ensures that all building systems are brought into alignment, where in the past, environmental impacts were minimal because of a focus on small, single-system conservation measures. As climate resiliency is a second focus, the municipal portfolio should be better prepared for sea-level rise, power outages, and extreme weather events that result in flooding.

Social impact

Upgrading building systems requires upgrading the technical skills needed to operate those systems. Moreover, those skills need to be baked in to the municipal workforce to ensure the persistence of energy savings over the expected 20-year performance period. The auditing, installation, operation, and maintenance of energy and water conservation measures is an occasion to invest in training city staff. It also creates an opportunity for students at local educational institutions to participate in the upgrade process and learn valuable new skills that prepare them for the modern workforce, where new technology is prevalent. These are 21st-century, green jobs for Boston residents, a priority of the Mayor's Office of Workforce Development.

5. Lessons learned for replication

Drivers

Clear and attractive benefits for the CFO

- Opens the gate to sources of city funding not previously available
- Hands mayor a powerful new tool for improving schools and other city services

Exploiting the self-funding aspects of efficiency and renewable energy

- Funds extensive improvements with neutral impact on existing operating and capital budgets
- Eliminates competition for capital funding, giving efficiency a dedicated source of funding and freeing capital for strategic purposes

Potential scalability in a short timeframe

- Unlocks years of deferred investment in city infrastructure
- Enables wholesale transformation in a single administration

Challenges

Guidance from an outside change agent must be accepted by the city

- Local experience or pilots are not sufficient to make changes needed on this scale
- A programme architect without career risk is needed to create the vision
- The role of change agent is to define and patiently explain everyone's role

Executive leadership must be strong and evident throughout the process

- City's chief executive must make initial push and stay connected with progress
- Rivalries must be contained and compromises negotiated with stakeholders

Implementation requires a "learning organization" mentality

- Longstanding city employees must be willing to master new skills
- Multiple organizations, used to working in silos, must hold a shared vision
- Decisions must be made whose outcomes won't be felt for many years

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