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Achieving Energy Savings in Small- and Medium-Sized Public Facilities:

A Strategic Approach to Prioritizing and Financing

This resource is for state, local government, and K-12 school staff managing small- and medium-sized facilities. Readers will learn to address the unique challenges of smaller energy-saving projects and make informed decisions about financing. Section 1 provides tools for obtaining the information required to prioritize potential energy upgrades. Section 2 presents financing options for energy upgrades, as well as insights that will help decision makers select the right financing model for their project and jurisdiction. Section 3 summarizes key takeaways and highlights additional resources for small- and medium-sized public facilities.

Facilities of less than 50,000 square feet account for 84% of all state and local government buildings, and 80% of all state and local buildings are more than 20 years old.[1] These small- and medium-sized facilities are ripe for energy upgrades that can help states, local governments, and K-12 school districts save an estimated 20-30% in energy costs. These savings can be leveraged to save taxpayer dollars, supplement limited budgets, and pay for other public priorities. Table 1 features examples of public-sector building types and relevant statistics.

Despite the value energy savings can provide for states, local governments, and K-12 schools, it can be particularly challenging to complete energy upgrades in small- and medium-sized public facilities. These smaller facilities often lack the necessary staff, procurement, contracting, or legal support, and, in many cases, have less attractive financing options than larger projects. For example, public-sector facilities managers overseeing smaller buildings do not always have staff or funding available to conduct regular repairs and replacements on existing building systems, which can result in significant deferred-maintenance backlogs.[2]

Table 1. Public buildings by size, age, operating hours, energy use intensity, and estimated energy cost[3]

	Government Office	Police Station	Library	K-12 School	Courthouse
Median Size (ft² per building)	6,000	6,000	11,600	14,400	32,000
Median Age (years)	33	23	34	28	47
Median Operating Hours (hours per week)	45	168	53	45	45
Source Energy Use Intensity (kBTU/ft²) - National Median Reference Value	116.4	124.9	143.6	104.4	211.4
Estimated Energy Cost ($/year)[4]	6,684	7,172	15,941	14,387	64,739

[1] U.S. Department of Energy, Commercial Building Energy Consumption Survey (CBECS), 2012. See: https://www.eia.gov/consumption/commercial/reports/2012/preliminary/

[2] For instance, deferred maintenance in K-12 schools totaled $271 billion in 2016. See the 2016 State of our Schools: America's K-12 Facilities report. Available online at: https://www.centerforgreenschools.org/infographic-2016-state-our-schools-americas-k-12-facilities.

[3] U.S. Department of Energy, CBECS, 2012. See: https://www.eia.gov/consumption/commercial/reports/2012/preliminary/ (see reference to energy use patterns). Note: Exterior lighting and wastewater facilities are excluded, which account for significant energy use within the public sector

[4] Blended rate of .00957 $/kBTU factors in energy consumption from four primary fuels (i.e., electricity, natural gas, residual fuel, district steam) and average national cost per fuel from 2018 Energy Information Administration. See: https://www.eia.gov/.

Motivations to Upgrade Facilities

Limited budgets in the public sector result in facility upgrades that are often motivated by an urgent need to replace equipment that has failed–a reactive facility upgrade that can no longer be delayed. However, proactively replacing equipment before it fails and investing in energy-efficiency upgrades offers significant opportunities and benefits, including energy, water, and cost savings; a shorter deferred-maintenance backlog; improved occupant comfort; and progress toward overarching energy-reduction goals. Whether projects are reactive or proactive, it is a good management practice to evaluate the lifetime cost-saving potential of a project before investing. Consider:

Reactive Upgrades – An improperly installed heating and cooling system can result in a 30% loss in system efficiency, which means thousands of dollars in additional costs over the life of a system.[5] Even emergency projects warrant careful planning to maximize energy and cost savings.

Proactive Upgrades – Decision makers can take time to design and complete more comprehensive projects that maximize energy savings.

Informing Your Decision Makers

A carefully designed, targeted energy upgrade can pay for itself over its useful life through energy savings and, depending on how the project is financed, can incur no debt and result in minimal disruption to an organization's operating and capital budgets. Before exploring energy assessments, audits, and financing options for upgrades in the following sections, consider the key questions your decision makers (e.g., finance officer, treasurer) will likely ask prior to approving a building-energy upgrade:

Payback – How long will it take to pay off the upfront cost through lifetime operating cost savings?

An energy audit provides an estimate of annual energy-cost savings associated with an energy-efficiency upgrade, allowing for a simple calculation of payback. Energy savings performance contracts (ESPCs) guarantee a specified level of project energy savings. *Learn more in Section 1*.

Finance vs. Internal Budgets – I only receive budget support for emergency repairs. How can I plan building upgrades? Should we pay for the project through our capital or operating budget? Should we borrow funds to complete the project? Or should we use a combination of sources?

Borrowing money may be a compelling option if financing can be attained with minimal effort and debt impact. Borrowing can also enable more comprehensive retrofits than might otherwise be possible. For urgent, reactive upgrades, internal funding may be a better option. In either case, take advantage of all available financial and technical assistance, as well as utility incentives. *Learn more in Sections 1 and 2*.

On- vs. Off-Balance Sheet – If financing is a compelling option, is there a way to structure the deal so it incurs no debt, otherwise referred to as "off-balance sheet"?

Debt and non-debt financing options are available for energy upgrades. *Learn more in Section 2*.

Interest Rate, Fees, Performance Risk, and Staff Effort – What are the costs (i.e., interest rate and fees), who bears the risks, and how much staff time is required?

Financing options vary in their ability to manage different risks (e.g., performance risk, maintenance risk, and credit risk). Depending on how risks are managed with each financing option, the cost of financing may be more or less expensive, and the level of staff effort can vary. *Learn more in Section 2*.

[5] ENERGY STAR, 2009. A Guide to Efficient Heating and Cooling. See: https://www.energystar.gov/ia/partners/publications/pubdocs/HeatingCoolingGuide%20FINAL_9-4-09.pdf.

Unique Challenges Facing Small Projects

Adapted from the U.S. Department of Energy's (DOE) Energy Savings Performance Contracting for Small Projects*

- **Designing Projects that are Economically Viable** – Project development costs are about the same for small projects as they are for large projects. With reduced potential for energy savings in smaller projects relative to larger projects, it can be difficult to cover project development costs. Additionally, smaller public facilities are more likely to be widespread or in rural locations, which adds travel costs.
- **Identifying Experienced Staff to Lead Projects** – Managing an energy upgrade, especially when using a complex financing option, requires specialized knowledge and staff availability. Staff at smaller state agencies, local governments, and K-12 schools are stretched thin with their primary obligations.
- **Adequately Managing Risk** – Financial institutions may perceive unique risks with small government entities making it more difficult to find competitive financing. For example, a shrinking tax base, particularly in a rural community, can limit a community's ability to make future payments. Also, if a property is non-essential (e.g., municipal golf course or community center), it may be perceived as higher risk compared to essential properties (e.g., jails and wastewater treatment facilities)

*U.S. Department of Energy, 2021. ESPC for Small Projects. Available online at: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/ESPC%20for%20Small%20Projects%20FINAL_May%202021_web%20version.pdf.

Section 1: Overcome the Information Hurdle and Prioritize Projects

Certain critical information will be required for internal planning purposes and to help decision makers assess the viability of a project. Technical information, such as the current energy-use patterns, energy costs, potential energy savings, and financial analyses (e.g., payback period, cash flow analysis) provide decision makers with the insights they need to prioritize and execute energy upgrades. For resource-constrained state agencies, local governments, and K-12 school districts managing small- and medium-sized facilities, obtaining this information is an important first-step toward making high-confidence decisions about energy upgrades. Consider using DOE's Energy Data Management Guide[6] to help obtain this information and establish an energy-data-management program that can inform your organization's energy-investment decisions.

This detailed, technical information is critical because it reduces the risks associated with financial transactions and helps decision makers weigh the benefits and costs of a proposed project. However, obtaining this information can be time-consuming and costly, and often means committing internal funds and staff time, finding financial or technical support, or delaying a much-needed building energy upgrade. To help overcome the "information hurdle" that frequently impedes energy upgrades in small- and medium-sized public facilities, this section outlines a strategic approach and financing options for obtaining actionable information.

Energy Assessments and Audits Support High-Confidence Decision Making

The technical information (e.g., upfront costs, ongoing costs, projected energy savings, etc.) decision makers need to approve energy upgrades starts with an energy assessment. An energy assessment is a no-cost,[7] first-step measure to approximate potential energy savings in a building. Completing an energy assessment includes establishing a baseline of historic energy usage and costs; tabulating building information such as size and age; and capturing other relevant context including weather, building-use patterns (e.g., hours of operation), and known age of key building equipment (e.g., HVAC system). Tools such as ENERGY STAR Portfolio Manager and DOE's Building Energy Asset Score[8] provide an online platform for collecting and organizing these data points. Portfolio Manager can convert inputted data into actionable metrics, such as energy use intensity (EUI). Within a portfolio of buildings, a high building EUI signals an opportunity for energy savings relative to other buildings. For a single building, ENERGY STAR provides U.S. national median reference values for EUI across common building types, which decision makers can reference to find opportunities for energy savings in their building. Also known as benchmarking, this practice involves comparing the measured performance of a device, process, facility, or organization to itself, its peers, or established norms, with the goal of providing analysis that can inform and motivate facilities managers to seek performance improvement.[9]

An energy assessment that shows a building is underperforming compared to similar buildings is an indication of the potential benefits of an energy audit, which is more time-intensive and costly than an energy assessment. Energy audits provide a whole-building evaluation of current energy usage relative to prospective energy usage that could be achieved through upgrades to building systems, such as lighting, heating, cooling, ventilation, and building envelope. Energy audits come in many different forms, and generally range from low-cost or limited-detail analyses to high-cost or highly detailed analyses known as investment grade audits (IGAs).

The most sophisticated energy audits provide advanced technical analyses (e.g., energy-use variability analysis for specific equipment under different weather or occupancy scenarios), which addresses financial risk concerns (i.e., the risk that cost savings will not materialize). Most energy audits, regardless of cost or sophistication, result in recommended low- or no-cost energy-conservation measures. Even limited-detail audits are, therefore, a worthwhile investment because they will often suggest low-cost energy-conservation measures that can quickly pay back the cost of the audit.

Energy audits are a logical next step for public-sector facilities managers that have completed energy assessments and identified underperforming buildings ripe for energy savings. Energy audits have costs, but are a useful tool for decision makers not yet prepared to approve the greater cost of energy upgrades. The sub-sections below outline three approaches to pay for the cost of energy audits.

[6] DOE, 2020. Energy Data Management Guide. Available online at: https://www.eere.energy.gov/energydataguide.
[7] Staff time will often be necessary to complete an energy assessment. A professional or consultant may be hired to provide a higher-quality or more detailed energy assessment, but a "back of the envelope" energy assessment is a prudent first step that can usually be performed without specialized skills or knowledge.
[8] ENERGY STAR Portfolio Manager is a free, online tool to measure and track energy and water data and benchmark performance. See online: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager. Building Energy Asset Score (Asset Score) is a national standardized tool for evaluating the physical and structural energy efficiency of commercial buildings. Asset Score generates a simple energy efficiency rating that enables comparison among buildings and identifies opportunities to invest in energy efficiency upgrades. See online: https://www.energy.gov/eere/buildings/building-energy-asset-score.
[9] Learn more about benchmarking here: https://www.energy.gov/eere/slsc/building-energy-use-benchmarking.

Optimize Your Energy Audit*

- **Find Economies of Scale** – Consider bundling many measures and/or buildings into an audit to spread out fixed costs (e.g., vendor travel, report preparation, etc.). Cast a large net and integrate all energy end-uses such as buildings, outdoor lighting, streetlights, and unoccupied facilities such as water pumping stations.
- **Prioritize Facilities** – Quickly identify the least efficient buildings by using the metric known as energy use intensity (EUI), a measure of energy usage per square foot of building space (e.g., kBtu/ft^2). In general, facilities with the highest EUI are the least efficient and should be targeted first. Find U.S. National Median Reference values for EUI from ENERGY STAR online here: https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf.
- **Understand Potential Costs** – Prior to factoring in utility incentives or financing options, energy audits range in cost between $0.12 and $0.50 per square foot. The cost depends on building complexity, and the sophistication of the audit, among other factors.
- **Use Qualified Vendors** – Talk with peers about their experience to find a qualified energy auditor. Look for certifications from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Building Professionals Institute (BPI), or Association of Energy Engineers (AEE).

*Pacific Northwest National Laboratory (PNNL), 2011. A Guide to Energy Audits. Available online at: https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20956.pdf.

Energy Savings Performance Contracts and Energy Audits

For many public-sector facilities, Energy Savings Performance Contracts (ESPCs) are a preferred option for obtaining this information and ultimately supporting energy upgrades.[10] ESPCs are often structured to start with an investment grade audit (IGA), which provides detailed information about current energy expenses, the cost of replacement equipment, the energy-savings potential, and many other details.

Public entities find ESPCs very appealing because they do not require upfront payment of the costs associated with the audit, comprehensive energy upgrades, or other activities occurring after the completion of upgrades. However, many energy service companies (ESCOs) are unlikely to enter into a contract unless they are reasonably sure there will be enough energy cost savings to structure a deal and cover their expenses including the upfront cost of the IGA. Additionally, under some arrangements, ESCOs will require public entities to pay for the cost of the energy audit if the audit finds significant savings opportunities and the public entity declines to enter into a contract.

Small- and medium-sized public facilities can benefit from ESPCs. Key considerations specific to using ESPCs in smaller facilities include:

State ESPC Programs – As of 2018, 34 states have ESPC programs.[11] Many of these programs are designed to simplify the process of entering into ESPCs by offering technical, financial, or contractual assistance. Some of these programs are available to local governments and K-12 school districts, while all programs serve state facilities. State programs provide technical assistance to public-sector ESPC customers on the full scope of an ESPC project, including measurement and verification (M&V) planning to ensure the project is achieving the savings that have been guaranteed.[12]

Aggregation or Pooling – Larger projects involving more buildings and more energy-savings potential are better suited to ESPCs because the lifetime energy savings are more likely to exceed upfront transaction and retrofit costs. Consider expanding your project scope to include more facilities and more potential energy savings so that ESPCs become a cost-competitive option. One potential strategy is to partner with neighboring communities or sister agencies to grow the portfolio of buildings.[13]

Market Context – Market competition, financial partnerships, and the availability of utility or state incentives can greatly influence the feasibility (e.g., total cost, expected return on investment) of an ESPC project. Public-sector facilities managers should contact peers, their state energy office, or depending on procurement rules, ESCOs to find out if your facilities are suitable for ESPC.

Learn more: The DOE has an ESPC for Small Projects[14] and an ESPC for K-12 Schools Primer.[15] Additionally, use the ESPC Preliminary Diagnosis Tool[16] to quickly determine if your facilities might be appropriate for ESPC, or learn more about ESPCs by exploring the DOE Energy Savings Performance Contracting Toolkit.[17]

[10] Industry analysis finds that public facilities regularly account for more than 80% of the annual revenue generated by ESPCs. Lawrence Berkeley National Lab, 2016. U.S. Energy Service Company (ESCO) Industry: Recent Market Trends. Available online at: https://emp.lbl.gov/sites/default/files/esco_market_report_oct2016.pdf.
[11] Energy Services Coalition, 2018. Analysis: The Relationship between Key Attributes for Programmatic Design and State GESPC Success. Available online at: https://energyservicescoalition.org/Data/Sites/1/documents/resources/needs-assessment-analysis-of-relationship-between-key-attributes-and-state-success-2018.pdf.
[12] Based on evidence from federal facilities, ESPC projects with robust M&V achieve an average of 107% of guaranteed savings; there is no comparison point for projects without M&V because actual savings are unknown. For more information, see: https://www.energy.gov/sites/prod/files/2019/02/f59/business-case-mv-espc_0.pdf.
[13] Learn about a successful multi-local government aggregation effort in Hamilton County, Ohio. Available online at: https://www.energy.gov/eere/slsc/downloads-case-study-hamilton-county-oh-energy- performance-contracting-aggregation-project.
[14] DOE, 2021. ESPC for Small Projects. Available online at: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/ESPC%20for%20Small%20Projects%20FINAL_May%202021_web%20version.pdf.
[15] DOE, 2016. ESPC: A Primer for K-12 Schools. Available online at: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/K-12-ESPC-Primer.pdf.
[16] This Tool is a single page checklist of facility attributes that frequently indicate good fit for ESPC. Available online at: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/ESPC%20Mini-Audit.pdf.
[17] DOE, 2016. Energy Savings Performance Contracting Toolkit. Available online at: https://betterbuildingssolutioncenter.energy.gov energy-savings-performance-contracting-espc-toolkit.

Utility- or State-Supported Assistance for Energy Audits

Energy utilities and states may offer technical and/or financial assistance designed to reduce the barriers to completing an energy audit or similar evaluation. For example, utilities may offer a low- or no-cost "walk-through" energy audit to commercial customers, which public facilities may qualify for based on their electric load or building size.

If available, these are excellent offerings for small- and medium-sized public facilities. Most assistance programs can be used with or without ESPCs. Potential assistance includes:

Utility Incentives – Utilities may offer incentives to conduct a simple or sophisticated energy audit. Contact your utility account representative to ask about available incentives. For example, FirstEnergy utilities in Pennsylvania offer a Facility Incentive Program available for qualifying state and local public facilities.[18]

State Grants – Some states offer programs for local governments, non-profits, or other targeted sectors that are designed to provide grant funding to support energy audits and energy upgrades. Grant programs often come with commitments including performance tracking. For example, New Jersey and Maryland offer grant programs specifically for local governments.[19]

State Loan Programs – While many states offer revolving loan funds designed to support public-sector efficiency upgrades (discussed further below), some states, such as Minnesota,[20] explicitly allow for revolving loan funds to be used for energy audits.

Learn more: For more information, contact your energy utility account representative, your state energy office, or explore the Database of State Incentives for Renewables and Efficiency (DSIRE).[21]

Using Internal Budgets for Energy Audits

Public-sector facilities managers and energy professionals may wish to use internal operating or capital budgets to pay for an energy audit. By using available cash instead of financing, your public agency can avoid transaction costs and interest payments, as well as retain full control over the project scope. However, there are many competing demands on internal operating and capital budgets, and the state, local government, and K-12 school budget appropriations process often moves slowly. If funds can be made available, they are usually limited amount by the expectation that the investment will achieve a short, simple payback (i.e., under 10 years). Nonetheless, given the opportunity costs of delaying an energy upgrade (see text box to right), a strong business case can often be made for putting internal funds toward an energy audit.

Energy Audits as a Savvy Investment: The Cost of Delay

- **Opportunity Cost –** Decision makers cannot overcome the information hurdle and start making informed choices about their energy usage without an investment in an energy audit. Every month of delay brings additional energy costs relative to the potential savings that could be accruing. Example: Consider a low-cost energy retrofit, such as installing weather stripping on a leaky door. If implemented, this retrofit will cost $100 and generate $10 in monthly energy savings. This project can yield a simple payback in under one year. Energy audits identify these types of low-cost energy conservation measures. Relative to other investments a public-sector finance officer might authorize, energy audits can offer a competitive yield.
- **Cash Flow Opportunity Calculator –** Many facility managers may be confident that all or most energy upgrades have been identified or completed. For facility managers debating the merit of a detailed audit or unsure of the savings potential of their facilities, the ENERGY STAR Cash Flow Opportunity Calculator is a starting point to gauge savings potential and quantify the cost of delay. https://www.energystar.gov/CFOcalculator.

[18] Learn more about the Pennsylvania Facility Incentive Program online at: https://energysavepa-business.com/incentives/facility-audits/.
[19] Learn more about the New Jersey Local Government Energy Audit Program online at: http://www.njcleanenergy.com/commercial-industrial/programs/local-government-energy-audit/local-government-energy-audit; learn more about the Maryland Smart Energy Communities Program online at: https://energy.maryland.gov/govt/Pages/smartenergycommunities.aspx.
[20] Learn more about the Minnesota Loan Program online at: https://mn.gov/commerce/industries/energy/financial-assistance/feasibility-study-loan-program.jsp.
[21] Database of State Incentives for Renewables and Efficiency (DSIRE). Available online at: https://www.dsireusa.org/.

Section 2: Financing Energy Upgrades

Provided with the energy conservation measures and savings projections recommended by energy audits, public-sector facilities managers and decision-makers can assess financing options for implementation. This section presents best practices for evaluating financing to complete building-energy upgrades and offers six financing options that may be suitable to upgrades in small- and medium-sized public facilities.

Case Study – Small ESPC Project in Bloomfield, New Mexico

Bloomfield, New Mexico has 7,000 residents and approximately 122,000 square feet of public facilities including a city hall (31,000 square feet), cultural center (20,900 square feet), and police and courts building (18,600 square feet), among other facilities. An ESCO completed a comprehensive investment grade audit and identified measures that, bundled together, could be funded through savings within the desired 15-year financing term. The $453,000 project cost was financed under an ESPC with the state's financing authority and benefited from state-provided technical assistance. The project resulted in guaranteed savings of $30,000 per year over a 14.8-year financing term.

Source – DOE, 2021. *Energy Savings Performance Contracting for Small Projects.* See online here: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/ESPC%20for%20Small%20Projects%20FINAL_May%202021_web%20version.pdf.

Project Financing Best Practices

Financing energy upgrades is more involved than financing audits because it requires management of greater financial and operating risks. Consider the following while evaluating options for financing energy upgrades:

Target Comprehensive Retrofits – A typical building has the potential for multiple energy upgrades. Some upgrades have longer payback periods (e.g., a new HVAC system), while others might yield a shorter payback (e.g., new interior lighting). Avoid "cream-skimming," or completing only the projects with the shortest payback. By bundling long and short payback projects together, more comprehensive energy upgrades can be executed while still retaining a strong business case (i.e., an acceptable payback period). Larger projects can also attract more competition from contractors and lenders and may lead to bulk-purchase discounts for supplies.

Use Multiple Funding Sources – It is common to combine multiple funding sources to pay for a project–even small projects. For example, loans may be coupled with internal funding to complete a project. Explore utility incentives and grant programs alongside the financing options discussed below to create a complete "menu" of your financing options. Using a single financing option is likely to be more expedient and less complicated, but may be less cost-effective, so consider the urgency of your project.

Prioritize Risk Management – Energy upgrades entail numerous risks that must be managed. For example, performance risk (e.g., will the equipment work as promised? Will energy savings materialize?), maintenance risk (e.g., if equipment breaks, who will fix it?), and credit risk (e.g., will this inhibit our ability to get financing in future?) must all be managed. The key distinguishing feature among financing options is how risk is managed and shared across project partners (i.e., public sector, utilities, contractors, and capital providers). One benefit to performance-based projects (e.g., ESPCs) is that they typically require the contractor and/or a knowledgeable third party to perform measurement and verification, which is a strong safeguard against the risk of underperforming equipment and unrealized energy savings.[22]

Differentiate ESPCs from Funding Sources – ESPCs are not a financing source on their own and must be paired with a funding or financing source (e.g., loans, leases, bonds, or internal funding). With a built-in performance guarantee, ESPCs mitigate the risk of not achieving energy savings, which can open up access to low-cost financing. To understand how ESPCs can be paired with various financing options and meet individual project needs, explore DOE's ESPC Financing Decision Tree.[23]

Form Partnerships – Partnerships with utilities, contractors, capital providers, and other groups are essential to managing and sharing risk in a manner that is acceptable to decision makers. For example, public-sector financial officers responsible for monitoring credit risk can partner with financial institutions to find financing with favorable accounting treatment. Partnerships ensure specialists are involved with the project so public-sector staff can focus on their core responsibilities.

[22] Further information on measuring and verifying energy savings, with examples from the public sector, is available in the "Evaluating ESPC Results" section of the DOE ESPC Toolkit: https://betterbuildingssolutioncenter.energy.gov/energy-savings-performance-contracting-espc-toolkit.
[23] DOE, 2017. ESPC Financing Decision Tree. Available online at: https://betterbuildingssolutioncenter.energy.gov/espc/financing-decision-tree.

Energy Upgrade Financing Options

Energy efficiency financing options can be segmented into two types: traditional and specialized. Traditional financing options are commonly used to pay for a range of goods and services (e.g., energy efficiency projects, new vehicles, etc.), and include loans, leases, and bonds. By contrast, specialized financing options are secured by the revenue stream (i.e., cost savings) associated with energy efficiency upgrades, and include ESPCs and energy services agreements. Below are potential financing options—both traditional and specialized—to consider for small- and medium-sized public facilities.

Case Study – State Revolving Loan Fund, Texas LoanSTAR Program

For more than 30 years, the Texas LoanSTAR program has provided financing for energy efficiency upgrades at public facilities (e.g., state, local government, K-12, and higher education). The Texas LoanSTAR revolving loan fund has financed over 306 loans, including many under $500,000, totaling more than $532 million with cumulative energy savings exceeding $647 million.

Source – Texas State Energy Conservation Office, 2020. See online here: https://comptroller.texas.gov/programs/seco/funding/loanstar/.

Energy Savings Performance Contract – ESPCs are performance-based contracts that cover the cost of energy upgrades, as well as energy audits and other activities, with energy savings achieved over the life of the project. As referenced above, ESPCs are not a financing option on their own, but rather a vehicle that must be paired with one or more of the funding sources described below (e.g., loans, leases, bonds, or internal funding). ESPCs are very popular energy-efficiency financing tools within the public sector. Successful approaches to using ESPC for smaller projects include taking advantage of available technical assistance, partnering with ESCOs that have small project experience, and expanding the project scope to make it more economically viable, among other strategies.[24] For more information on ESPCs, see DOE's ESPC Toolkit: https://betterbuildingssolutioncenter.energy.gov/energy-savings-performance-contracting-espc-toolkit.

Case Study – Small Bond Issuance in Asheville, North Carolina

Asheville, North Carolina issued a $1.75 million general obligation bond in 2011 to finance the conversion of 7,500 streetlights from high-pressure sodium to light-emitting diode (LEDs). The streetlights were converted over an 18-month period, resulting in annual savings of 2.2 million kWh and more than $400,000. The savings from the project were used to repay the bond as well as support other energy projects in the community.

Source – Urban Sustainability Directors Network, 2014. See online here: https://www.usdn.org/uploads/cms/documents/asheville-led-streetlights-and-green-capital-improvement-program-best-practices-case-study.pdf.

Advantages: Energy savings are guaranteed, little to no upfront cost is required, and performance risk is shifted to the ESCO (assuming a robust M&V plan is included[25] and the customer has clear responsibilities for building operation[26]), and may be structured as non-debt.[27]

Disadvantages: Seldom suitable for projects under $500,000 in cost, long closing times, significant transaction costs (e.g., procurement, legal, and contract support), and typically structured as debt.

Learn More: A variant on traditional ESPCs are self-managed ESPCs, which can bring project management in-house and may lower costs.[28] In self-managed ESPCs a public agency acts like an ESCO in the services provided.

Loans – Loans involve financing or access to upfront capital to be repaid over a schedule with interest payments. Commercial, market-rate loans may meet the needs of public-sector decision makers, but most lenders' lack of familiarity with energy efficiency upgrades can result in either difficultly accessing funding or higher interest rates. However, programs such as state revolving loan funds offer loans at below-market rates (e.g., 3% to 5% interest for below-market vs. 6% to 8% interest for market rate) for energy efficiency and renewable energy investments. For more information on loans, see: https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/loan-or-debt-financing.

[24] DOE, 2021. ESPC for Small Projects. Available online at: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/ESPC%20for%20Small%20Projects%20FINAL_May%202021_web%20version.pdf.
[25] For more information on ensuring strong M&V in savings, see: https://www.energy.gov/sites/prod/files/2019/02/f59/ESPC-strategies-mv_0.pdf.
[26] For more information on the structure and elements of an ESPC savings guarantee, see: https://www.energy.gov/sites/prod/files/2019/02/f59/understanding-espc-savings-guarantee.pdf
[27] May be considered non-debt financing in certain states depending on state law and accounting treatment including when ESPC is used in concert with internal funding (always non-debt), tax-exempt lease purchases (sometimes non-debt), certain types of bonds (sometimes non-debt), and energy services agreements (always non-debt). For more information on tax-exempt leases (commonly used in tandem with ESPCs) see the Government Accounting Standards Board (GASB) - Statement No. 87 (Leases). Available online at: https://www.gasb.org/jsp/GASB/Pronouncement_C/GASBSummaryPage&cid=1176169177502.
[28] For example, see the Denver Housing Authority self-managed ESPC. Available online at: https://betterbuildingssolutioncenter.energy.gov/implementation-models/dhas-self-managed-energy-performance-contracting.

Advantages: A well-understood financing product that provides most of the upfront capital, is available in small dollar amounts, and has a simple structure that can close quickly.

Disadvantages: Market rate loan interest rates are often higher than alternative options (e.g., bonds), often require down payments, and will usually count against debt limits.

Learn More: Multiple states offer programs that facilitate below-market loans specifically designed to serve hard-to-reach markets such as small- and medium-sized public facilities.[29] For example, the Nebraska Dollar and Energy Savings Program coordinates with a network of over 280 lenders to co-invest 0% interest rate funding with market-rate loans, resulting in a blended interest rate ranging from 2.5% to 5%.[30]

Table 2. Side-by-Side Comparison of Financing Options

	ESPCs	Loans	Tax-Exempt Leases	Bonds	ESAs	Internal Funding
Primary Advantages	Guaranteed savings, low performance risk for the project owner	Expedient financing, well understood, often available for small projects	Expedient financing, zero down payment, flexible terms	Often yields the lowest-cost financing	Payment based on performance, always non-debt	Always non-debt
Primary Disadvantages	Not well-suited for projects <$0.5M, long closing times, often structured as debt	Often requires down payment, higher cost of borrowing, counts as debt	Small projects may not always be attractive for vendors	Very complex, best suited for projects >$1M	May not serve smaller projects, limited equipment control	Competes with other funding priorities, limited funds can reduce project size and potential benefits
Potential Risks to Manage	Minimized risks to public entity, risks further managed with M&V in contract	Performance, maintenance, and credit risks	Performance risk	Performance, maintenance, and credit risks	Minimized risks to public entity	Performance and maintenance risks
Notes	Not a funding or financing source, used to manage risks and gain access to lower cost financing	Revolving loan funds may offer lower borrowing costs, but introduce more complexity	No energy savings guarantee, but operations and maintenance services are available	May be structured as a non-debt revenue bond	Considered non-debt as payment only required if performance criteria met	Funding may come from operating or capital budgets

[28] Search for loan programs in individual states using the National Association of State Energy Officials' State Energy Loan Fund Map available online at: https://www.naseo.org/issues/energy-financing/revolving-loan-funds.
[30] Lawrence Berkeley National Laboratory, 2016. Current Practices in Efficiency Financing: An Overview for State and Local Governments. Available online: http://eta-publications.lbl.gov/sites/default/files/lbnl-1006406.pdf.

Leases – Leases provide 100% upfront financing to be repaid over time through a fixed lease payment. Public entities often use tax-exempt leases, which allow the lessor to claim a tax exemption, effectively reducing the cost to the public-sector borrower. ESPCs in the public sector often leverage tax-exempt leases as the underlying financing vehicle. For more information on leasing, see here: https://www.energy.gov/eere/slsc/leasing-arrangements.

Advantages: Tax-exempt lease purchase agreements are widely available, do not require upfront costs, are often structured as non-debt, and have flexible terms.

Disadvantages: Some lessors are unwilling to provide leases for small projects.

Learn More: The Centralia School District in Washington used multiple funding sources to complete $1.3 million in energy efficiency improvements across seven buildings. The project used tax-exempt leases and a state-offered lease buyback program to secure low-rate financing.[31]

Bonds – Bond financing involves issuing bonds to raise capital sufficient to cover project costs; bond proceeds are repaid with interest to bondholders. Bonds present the lowest cost of borrowing available to public entities and often set the standard for the cost of borrowing against which other financing options are compared. Bonds may be used in conjunction with ESPCs, and energy projects with guaranteed savings may be eligible for off-balance sheet financing via issuance of revenue bonds in certain states. For more information on bonds, see here: https://www.energy.gov/eere/slsc/bonding-tools.

Advantages: Tax-exempt bond financing enables low borrowing costs (i.e., low interest costs and reduced debt payments) and may be feasible for smaller energy upgrades if bundled with a larger bond issuance.

Disadvantages: High transaction costs (e.g., one-time bound counsel, bond placement fees) and concerns about debt capacity lead many public entities to use bond financing sparingly and only for large projects (i.e., $1M+).

Learn More: Nearly every state and territory in the U.S. has used bonds to support energy efficiency, renewable energy, or environmental infrastructure. Between 2005 and 2017, almost $30 billion of bonds were issued for these purposes with an average issuance of $150 million. Smaller bonds of $1-3 million were also successful.[32]

Energy Services Agreements (ESAs) – Third-party providers cover the upfront cost of upgrades in exchange for a long-term commitment from the customer to pay for their services. The customer pays only if performance criteria are met on a monthly basis, and the service provider owns and maintains the equipment over the term of the agreement. The annual energy savings from the upgrades are often structured to exceed the annual costs of the service agreement. For more information on ESAs, see here: https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/efficiency-a-service.

Advantages: Compared to leases, ESAs are almost always designed to be off-balance sheet, and costs are incurred only if performance metrics are met.

Disadvantages: This relatively new financing tool has limited examples in the public sector and limited equipment control for the borrower (e.g., customer doesn't own the equipment and cannot alter or sell it).

Learn More: ESAs may take on modified forms such as managed ESAs where providers are responsible for paying the customer's utility bill.[33]

Internal Funding – This option involves using internal funds or cash to pay for energy upgrades. For most public entities, this means tapping their operating or capital budgets. Capital budgets are more appropriate for larger, expensive upgrades that require planning, while operating budgets are often used for smaller projects or in an emergency situation. Public entities can also use internal funding to create a dedicated (i.e., not to be used for other purposes) internal revolving loan fund. The fund allows savings from energy upgrades to be recovered and re-circulated to fund additional energy upgrades. For more information on internal funding, see: https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/internal-funding.[34]

Advantages: Uses a proven financing tool with minimal upfront transaction costs or long-term commitments and does not require interest payments.

Disadvantages: May compete with other capital or operating costs, relies on limited public funding frequently resulting in smaller projects with reduced energy savings potential, and is constrained by the speed of the budget appropriations process.

Learn More: Hillsboro, Oregon created a specialized, dedicated internal fund (capitalized with $51,000) designed to finance efficiency improvements. Energy cost savings are used to replenish the fund, which then fund new energy efficiency projects. As of 2014, five projects received funding; together they are estimated to save approximately $24,000 annually.[35]

[31] More information on the Centralia School District in Washington and its use of tax-exempt leasing is available online at: https://www.energy.gov/sites/prod/files/2014/06/f16/lbnl-6133e-wa.pdf.
[32] DOE, 2020. Leveraging Bond Financing to Support Energy Efficiency and Renewable Energy Goals: A Resource Summary for State and Local Governments. Available online at: https://www.energy.gov/sites/prod/files/2020/10/f79/Leveraging-Bond-Financing_resource-summary.pdf. Municipal Securities Rulemaking Board (MSRB), 2019. Municipal Securities: Financing the Nation's Infrastructure. Available online at: http://www.msrb.org/~/media/files/resources/msrb-infrastructure-primer.ashx?la=en.
[33] The non-profit Kuakini Medical Center executed a series of energy upgrades using the ESA financing model. More information is online at: https://betterbuildingssolutioncenter.energy.gov/implementation-models/kuakini-medical-center.
[34] See the DOE Green Revolving Fund Toolkit for examples and resources. Available online at: https://betterbuildingssolutioncenter.energy.gov/toolkits/green-revolving-funds.
[35] For more information on Hillsboro, Oregon, see: https://betterbuildingsinitiative.energy.gov/implementation-models/sustainability-revolving-fund.

Section 3: Conclusion and Recommended Resources

Public facilities can benefit from operational cost savings associated with energy-efficiency upgrades. Small- and medium-sized public entities with limited budgets are especially well-positioned to benefit from these upgrades, and can be strategic in how they design and pay for them. Facilities managers and energy professionals can leverage financing to make energy-saving investments immediately, avoid further deferred maintenance, and tackle larger, more comprehensive projects.

This resource serves small- and medium-sized public entities by showcasing a cost-effective, step-by-step approach to using financing to complete building energy upgrades (see Table 3). This approach emphasizes overcoming the information hurdle through no-cost energy assessments, targeted energy audits, bundling multiple measures, leveraging partnerships, matching project characteristics to suitable financing options, and taking advantage of all available financial and technical assistance offered by states and utilities.

Table 3. A strategic, step-by-step approach to financing building energy upgrades

Step 1: Energy Assessments	Step 2: Energy Audits	Step 3: Building Upgrades
Purpose: Obtain actionable information. Understand energy usage patterns across a portfolio of buildings and benchmark performance against similar buildings.	**Purpose:** Obtain information that can support a financial investment. Identify building components with most opportunity for energy savings.	**Purpose:** Execute building upgrades to capture energy savings, improve comfort, etc.
Scope: All buildings and facilities in your portfolio.	**Scope:** Only facilities with the highest potential for energy savings based on Step 1 results.	**Scope:** Targeted buildings and building components based on Step 2 results (i.e., audit).
Confidence in Energy Savings: Low confidence.	**Confidence in Energy Savings:** Medium confidence based on results of energy assessments (Step 1).	**Confidence in Energy Savings:** High confidence based on results of energy audits (Step 2).
Cost: No or low cost supported with staff and available energy usage data.	**Cost:** Low to high cost depending on the scope of the energy audit.	**Cost:** Higher costs that vary depending on project scope, technology, etc.
Financing Options: Not applicable.	**Financing Options:** ESPCs, Utility- and State-Supported Programs, Internal Funding.	**Financing Options:** Internal Funding, Leases, Loans, ESPCs, Bonds, ESAs.
Outcome: A reduced set of buildings meriting further exploration through an energy audit.	**Outcome:** A specific set of energy conservation measures and projected energy savings.	**Outcome:** Energy and cost savings, improved building performance and comfort.

Recommended Resources for Public-Sector Energy Managers

Energy Savings Performance Contracting for Small Projects – Best practices, technical reference documents, and case studies to support ESPCs for small projects. See: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/ESPC%20for%20Small%20Projects%20FINAL_May%202021_web%20version.pdf.

Energy Savings Performance Contracting Toolkit – Step-by-step resources for ESPC implementation. See: https://betterbuildingssolutioncenter.energy.gov/espc/home.

Leveraging Bond Financing to Support Energy Efficiency and Renewable Energy Goals: A Resource Summary for State and Local Governments – A resource for non-finance energy experts looking to navigate the bond issuance process to invest in energy efficiency or renewable energy. See: https://www.energy.gov/sites/prod/files/2020/10/f79/Leveraging-Bond-Financing_resource-summary.pdf.

Better Buildings Financing Navigator, Public Sector Energy Financing Primer – A succinct overview of financing barriers and opportunities in the public sector along with a comparison of commonly used financing mechanisms. See: https://betterbuildingssolutioncenter.energy.gov/financing-navigator/primer/state-and-local-government-energy-financing-primer.

Current Practices in Energy Efficiency Financing: An Overview for State and Local Governments – A detailed overview of traditional and specialized mechanisms for financing energy efficiency. See: https://emp.lbl.gov/publications/current-practices-efficiency.

Database of State Incentives for Renewables and Efficiency (DSIRE) – A state-by-state database of incentives and programs available to support energy efficiency investments. See: http://www.dsireusa.org.

Energy Data Management Guide – A web-based resource that presents a seven-step approach for establishing data-driven energy management in the public sector. See: https://www.eere.energy.gov/energydataguide.

ENERGY STAR Portfolio Manager – A free tool for organizing and tracking energy usage among a portfolio of buildings. See: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

Building Energy Asset Score - A national standardized tool for evaluating the physical and structural energy efficiency of commercial buildings. See: https://www.energy.gov/eere/buildings/building-energy-asset-score.

A Guide to Energy Audits – A primer to what to expect when initiating an energy audit. See: https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20956.pdf.

Clean Energy Finance Tool – A free decision-support tool for state and local governments interested in developing a financing program to support energy efficiency. See: https://www.epa.gov/statelocalenergy/clean-energy-finance-tool.

Green Revolving Funds Toolkit – A Green Revolving Fund (GRF) is an internal capital pool that is dedicated to funding energy efficiency, renewable energy, and/or sustainability projects that generate cost savings. This toolkit provides cross-sector resources on establishing a GRF. See: https://betterbuildingssolutioncenter.energy.gov/toolkits/green-revolving-funds.

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