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SUSTAINABILITY

# How Economics Can Help Corporate Capital Budgeting: The Case of Sustainable Energy Upgrades

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*Budgeting can motivate investment in sustainable energy.*

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Corporate decision-making needs an update when it comes to reviewing and valuing investments in sustainable energy projects in buildings.[1] The capital budgeting playbook used by many organizations (corporations, not-for-profit companies, and public entities) to make these investment decisions does not accurately attribute, quantify, or calculate the benefits and costs of implementing (or not implementing) sustainable energy upgrade projects. Understanding where and how this flawed organizational decision-making takes place is the first step to a better capital budgeting process that can accurately value energy upgrade projects and tap into available financing solutions. Organizations need to quickly figure out how to assess the real costs of inaction versus the benefits of implementing sustainable energy upgrades since there are trillions of dollars of energy assets (ranging from efficient lighting to sustainable cooling, heating and ventilation systems) to be replaced or upgraded within buildings in many market sectors. Understanding the true cost and benefit of these capital-intensive upgrades means taking into consideration a broader range of economic, environmental, and operational factors, which could transform deferred or delayed investments into approved projects.

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## The Missed Opportunity

Sustainable energy upgrades involve the modification or replacement of existing equipment (everything from lighting to boilers, chillers, and indoor air sensors) to reduce energy use and upgrade the resiliency, sustainability, and operational efficiency of a building. Additionally, upgrades increasingly include adding new energy systems like critical cooling and heating equipment to meet growing demand to improve indoor air quality and maintain the indoor temperature needed for health and safety. The economic benefits of energy upgrades for organizations are substantial and multifaceted, including lower operating expenses and significant energy savings.[2] These upgrades also offer environmental benefits including sizeable reductions in greenhouse gas (GHG) emissions which can help organizations hit decarbonization goals and net zero targets and comply with regulations that limit or restrict the use of fossil fuels.[3] Unfortunately, the real cost of inaction is not baked into the decision-making process of most organizations thereby systematically reducing the relative attractiveness of sustainable energy upgrades, resulting in missed opportunities.

To illustrate, consider a college with deferred maintenance across its campus that consists of a mix of energy and infrastructure upgrades. Three years ago, a $15 million project was identified to replace this college's aging heating, ventilation, and air conditioning (HVAC) system as well as to upgrade interior and exterior lighting and make water efficiency improvements within the college's dorms and athletic facilities. This project had a simple payback period (total investment divided by annual savings) of approximately 10 years. This college, like many higher education institutions, had capital budget constraints. The college was presented with a project scope that included an option to have an Energy as a Service provider finance and implement the project. However, this option was rejected because: (1) the cost of capital for external financing was viewed as higher than the internal cost of funding, and (2) there was a lack of alignment between stakeholders at the college: some wanted to proceed while others favored self-funding the upgrade later. The later date to implement this project still has not come and, as a result, the college has lost roughly $1 million in energy savings per year and has emitted an added 5,200 tons of GHG per year compared to if they had proceeded with the project. Moreover, and importantly, these losses are compounded by the cost of ad hoc repairs (which can be double the expense of a planned energy upgrade) as well as the impact that deferred maintenance has on productivity, health, and safety in the indoor environment.

This scenario is not unique. In fact, countless colleges, factories, hospitals, and commercial buildings across the globe make the same decision to defer or delay an energy upgrade due to three pervasive issues: (1) flawed capital budgeting practices that don't accurately account for costs and benefits, (2) undervaluing the economic benefits of acting now, and (3) decision-making biases. Each of these stymies critical and timely investments in sustainable energy upgrades.

## Flawed Capital Budgeting Practices

Organizations run energy upgrades through a capital budgeting process that determines whether the economic merits of an investment justify internal funding or approval. The return, or profitability, of a project is compared to an internal hurdle rate that represents a minimum economic viability threshold. Common hurdle rate metrics include internal rate of return (IRR), net present value (NPV), or a simple payback period. If a project meets or exceeds an organization's hurdle rate, it is often approved, otherwise it is rejected.

When an energy upgrade is rejected because it fails to meet the internal hurdle rate, the real economic benefits and costs of that project are rarely factored into the decision-making process. The lost revenue from the downtime of equipment that fails, the added maintenance expenses needed to keep aging equipment running, or the cost of ad hoc emergency repairs are often omitted. Also excluded are tangible, but admittedly harder to quantify, benefits that improve the investment profile of an energy upgrade like increased productivity and improved health and safety from better lighting, improved indoor air quality and temperature for workers, students, patients, and so on. These types of non-energy savings and related benefits are material, can be measured, and should be included to provide a thorough project review.

Traditional capital budgeting reviews can also lead organizations to be shortsighted and break apart projects. Splitting energy upgrades apart, funding only short payback items (like lighting) without bundling, and blending the longer payback items (like old boilers and chillers), results in critical equipment upgrades not getting done. When the decision is made to only fund short payback items, organizations forego meaningful economic and environmental benefits and add operational risk for the very equipment needed to run their core business.

## Undervaluing the Economics of Acting Now

Sustainable energy upgrades are typically capital-intensive, long-term investments that compete with other projects for internal funding. If there are capital budget constraints, organizations will consider (and often reject as too expensive) having an outside company finance and implement an energy upgrade project. Organizations are frequently undervaluing external financing solutions like Energy as a Service (EaaS) which combines the upfront cost of financing a project with the construction and ongoing ownership, operation, and maintenance of the energy upgrade.[4] The project evaluation process often compares the cost of capital of an external financing option to the internal cost of funding, typically an organization's weighted average cost of capital (WACC). Depending on the type of external financing being considered, organizations can make the mistake of comparing their WACC to an external solution that combines financing with technical services. The result is that the technical services included with EaaS financing are not given a weighted value, so the "cost" of external financing is not being compared to the real cost of self-funding.

The financial bias goes even deeper because organizations do not assign a cost to delay or a value to the added benefits of accessing "today's dollars" through external financing. Implementing an energy upgrade now can be more efficient from a time-value cost of money, since an organization can begin to accrue associated benefits immediately and not incur the added costs and lost benefits linked to delaying an upgrade. Penciling out the real benefits and costs of implementing an upgrade project requires including items like forgone energy savings, and ongoing expenses related to maintaining and repairing old equipment, so that an organization understands the now-versus-later cost of money. This can help ensure that a proposed upgrade project implemented with external funding now (if internal funding isn't available) is compared to the cost of waiting for internal funding to become available.

For example, on the previously mentioned college upgrade project, when the project was initially proposed (in May 2021), the cost (effective rate) of the external financing options was roughly 8 percent (and included technical services) compared to the college's last financing at approximately 6 percent. If the forgone energy savings are factored into the calculation of an NPV for that project, the external financing NPV is superior after approximately one year of lost savings. Moreover, the attractiveness of external financing compared to waiting to self-fund at a future date grows and compounds with each day of delay. To date, the college has still not implemented the previously identified upgrades.

## Decision-making Bias in Project Evaluation

Regrettably, energy upgrades are not properly evaluated because of three decision-making biases. There is often an approval bias for highly visible projects such as remodeling the façade or lobby of a building rather than upgrading cooling and heating equipment located in the basement. Additionally, many energy upgrades are not "shiny," and they don't generate excitement or urgency since replacing an aging boiler, for example, is not only expensive (at face value) but uses well-proven, traditional equipment.

Energy upgrade projects face an added decision-making hurdle because they are not considered core to an organization's business. For example, consider how a hospital system evaluated two different projects. The first project involved the upgrade and replacement of an existing HVAC system within one of their hospitals. The second project involved the purchase of equipment and the buildout of existing space within the hospital to house a new angioplasty room. The hospital system, like many organizations, had a strong bias towards projects that fit squarely within its mission (i.e., providing state-of-the-art service to patients) versus the upkeep of its plant and facilities. For the angioplasty room and equipment, the project was assessed based on its potential to generate added revenue from performing procedures over the coming years. This decision-making framing resulted in an estimated simple payback period on the angioplasty project of roughly three years while the HVAC project payback was close to 30-years. The result was a prioritization of expansion over improving the efficiency of existing operations.

Energy upgrade projects can also encounter the bias towards business-as-usual.[5] Key decision makers within an organization often seek to preserve the status quo. There can be little incentive to break norms and push for the approval of a project that includes new, sustainable energy technologies or the use of innovative financing solutions or business models. In addition, capital budgeting processes can be rigid and not well suited to the added explanation and review that is required to properly evaluate an energy upgrade project. This either means that an energy upgrade project is not considered at all or, if it is, the way in which it is presented often dooms it from the start.

## Breaking the Cycle

The solution is simple: Organizations need to get back to basics and correctly apply the fundamental principles of cost-benefit analysis to investments in energy upgrade projects. This requires thinking critically about the real costs and benefits of projects to avoid internal biases that regularly lead to suboptimal decisions. Specifically, organizations need to:

- **Update the capital budgeting process.** Organizations need to fully understand and enumerate the benefits of investing in sustainable energy upgrade projects (both the savings and avoided costs) in the same way they value revenue growth in proposals for investments in their core business. Too many organizations either fail to include – or place a heavy discount on – the value of items like lower energy use and avoided operations and maintenance expense, emergency repair costs, penalties, and business downtime that results from aging or failing energy equipment.[6] These are tangible benefits to the core business that can be quantified using internal expense records (e.g., having the facilities team review past costs incurred or time spent on added labor, etc.). Further, organizations can utilize external experts skilled in implementing energy upgrade projects, including independent engineers, energy service companies, and local utilities. Applying added capital budgeting rigor will significantly alter and improve the economic profile of energy upgrade projects.

- **Acknowledge (and budget) the cost of inaction.** A critical, and common, mistake made by organizations is rejecting an energy upgrade because of the belief that they will "get to it next year." But "next year" rarely happens and the cost of delay is quantifiable. Organizations need to incorporate sensitivity analyses that look at the costs and benefits of a project if it is done now versus later. For example, incorporating the costs of a likely emergency repair on aging cooling equipment could significantly change the economic profile of an upgrade project. In addition, inaction or delay could result in missing out on currently available incentives that might expire (for example, local utility program rebates or federal tax incentives).
- **Quantify productivity, safety, and health benefits.** A growing body of research is quantifying the productivity, safety, and health benefits of energy upgrades, and there is now evidence that investing in healthy buildings offers significant returns. According to the Atlantic Council, the United States loses an average of $100 billion annually from heat-induced declines in labor productivity.[7] An International Energy Agency report highlights the potential benefits of energy upgrades including improved physical health, such as fewer respiratory and cardiovascular conditions, and fewer sick days.[8]
- **Building capacity.** Organizations must work to improve baseline skills and capabilities to effectively apply a cost-benefit analysis to a proposed upgrade project. This includes training existing staff as well as utilizing external experts to conduct independent reviews to support the analysis of projects. External service providers also need to upgrade their capabilities to clearly make the case to organizations for energy upgrade projects. This requires identifying multiple options and presenting better documentation of costs and benefits of each possible upgrade as well as presenting project returns and their effects on profits.[9]

Organizations cannot afford to use a capital budgeting playbook that does not work for energy upgrade investments. Sustainable energy upgrades improve resilience and are increasingly being recognized as foundational to an organization's ability to operate. For example, a number of school districts in the U.S., including Boston and Denver, are installing air quality monitors in classrooms and data is made available to parents and administrators to see the real-time indoor air quality that their students are breathing.[10] This shift to measuring and reporting indoor air quality and temperature should be viewed as a healthy building mandate and is a clear signal that investing in energy upgrades will be a foundational business priority—as essential as the indoor air we breathe.[11]

It is time that organizations address their decision-making biases and start to accurately value the benefits of sustainable energy upgrade projects and present the costs of delaying these investments. Getting this wrong is not an option nor is it good for business.

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1. Sustainable energy upgrades (also commonly referred to as retrofits) are climate-positive investments that save energy and/or lower greenhouse gas (GHG) emissions compared to alternative options.
2. For example, the Rocky Mountain Institute estimates that organizations can reduce operating expenses by implementing comprehensive upgrades which can reduce energy use in buildings by up to 50%. Significant productivity gains are also possible as highlighted in the International Energy Agency's "Efficient World Scenario" which estimates that manufacturing firms could produce almost twice as much gross value-added output per unit of energy input by 2040 by implementing energy upgrades.
3. At a global level, the International Energy Agency estimates that sustainable energy upgrades like high efficiency lighting and HVAC systems and pumps and motors can achieve 40% of the total GHG emission reductions required to meet the Paris Agreement on climate change.
4. Under EaaS, a service provider funds 100% of the upfront cost of a project and organizations pay for measured, realized energy savings and/or sustainable energy output (e.g., delivery of cooling and heating, or renewable energy). Outsourcing solutions are common in manufacturing, transportation and software, but are less understood for energy upgrades. Projects implemented under EaaS may be viewed as off-balance sheet and do not adversely impact an organization's ability to borrow.
5. *Harvard Business Review*. **hbr.org**.
6. On penalties, regional initiatives, like Local Law 97 (LL97) in New York City and the Building Energy Reporting and Disclosure Ordinance (BERDO) in Boston, combine climate disclosure with financial penalties for large buildings that do not meet designated GHG emission limits. This will provide clear, added economic impetus within capital budgeting discussions to act on retrofits.

7. *Atlantic Council*. **atlanticcouncil.org**
8. IEA (2019), Multiple Benefits of Energy Efficiency, IEA, Paris **iea.org**., License: CC BY 4.0
9. While our focus in this paper is on improving decision-making at the individual organization or enterprise or firm level, government can play a role here by providing incentives, sharing information, offering guidelines, regulations or issuing directions to induce firm- industry- or society-wide change
10. New York City is considering following suit and may decide to install indoor air quality monitors in schools and government buildings. See Joseph Allen. “It’s time for companies to monitor workplace air quality” Harvard Business Review. November 2023.
11. In California, a new regulation went into effect in July 2024 that establishes required safety measures for indoor workplaces to prevent worker exposure to the risks of heat illness. Employers are required to manage indoor air temperature and provide cooling areas if the indoor air reaches 82 degrees. *State of California, Department of Industrial Relations*. **dir.ca.gov**.

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