



Energy upgrades as financial or strategic investment? Energy Star property owners and managers improving building energy performance



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HIGHLIGHTS

- Energy Star property owners/managers view energy as strategic or financial investments.
- Energy performance improvements and motivations differ by property type.
- Energy projects are most often funded by internal cash reserves.
- Motivations and funding sources differ by type of energy project.
- Environmental sustainability is an important criterion in many energy projects.

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ABSTRACT

Due to its significant carbon footprint and cost-effectiveness for upgrades, the commercial property sector is important for climate change mitigation. Although barriers to energy system changes, such as funding, financing and information, are well recognized, Energy Star property owners and managers are successfully overcoming these barriers and instigating energy efficiency upgrades, renewable energy installations, and behavior and management programs. To examine the decision-making process that leads to energy performance improvements, a national survey of property owners and management organizations of buildings that earned an Energy Star score of 75 or higher was conducted. The extent to which energy upgrades were considered strategic investments motivated by environmental sustainability or corporate social responsibility, or financial investments motivated by payback period or return-on-investment criteria, was contingent upon the property type and type of energy project. Environmental sustainability was found to be an important motivation for energy projects in office spaces in general, but in the case of smaller office spaces was often combined with motivations for corporate social responsibility. Energy projects on education properties were motivated by financial investment. Building envelope and mechanical efficiency upgrades were considered financial investments, while renewable energy, green roofs, and water conservation technologies were considered environmental sustainability initiatives.

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1. Introduction

The commercial building sector accounts for one-fifth of the total annual energy use in the United States, leading to 1000 million metric tons of CO₂ annually [1]. This is comparable to the

carbon footprint of industrialized countries such as Canada, France, Germany or Japan [2]. Energy use in commercial buildings is influenced not only by the existing technologies in place [3], but also by energy prices [4], social and behavioral factors [5–7], and management strategies [8,9]. Understanding the factors that drive the adoption of energy management practices and technology changes is therefore critical to reducing the carbon footprint in a cost effective manner [10–12].

Energy management is a sub-set of corporate environmental management, and various frameworks have been developed to explain how and why organizations undertake voluntary changes

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that improve the environmental sustainability of their operations [13–16]. AO Ervin et al. [15], for example, found that both institutional pressures (e.g. government regulations, investor demands, competitive dynamics, pressure from citizens groups) and utility maximization pressures (e.g. reducing costs, achieving a return-on-investment) acted as motivating factors for undertaking environmental management initiatives. Property owners/managers, in particular, are under constant pressure to improve operational performance by upgrading buildings to meet new building codes and reducing operating costs through changes to energy systems [17,18]. Building maintenance programs encourage changes that improve building energy performance by raising the operating efficiency of the heating, cooling, ventilation or lighting systems, reducing heating/cooling losses through the building envelope, or automating and managing energy information [4]. Renewable energy technologies are also becoming more attractive to the commercial sector, with installation costs for solar PV declining and overall installed capacity expected to increase over the coming decade [19]. But are these energy changes considered strategic investments [8], or are they simply financial investments as rational economic theories would suggest?

Owners/managers may make strategic energy investments in response to institutional pressures [14], and could therefore be motivated by corporate social responsibility, the need to comply with regulations, the desire to enhance shareholder value, or the goal of improving the environmental sustainability performance of the organization [20,21]. Strategic energy investments are measured in the contribution to competitive advantage that can be leveraged from the ancillary benefits of the investment (e.g. number of new tenants, metric tons of greenhouse gas emissions reduced) through the use of environmental metrics and communication strategies [22]. They are not considered economically rational, therefore, because they *do not directly* lead to a financial return. Financially motivated energy investments, on the other hand, aim to reduce operating costs and improve the bottom line, and are measured by return-on-investment or payback period (e.g. number of years to recoup initial investment) [8]. Although some businesses may avoid energy investments because they do not believe they are financially sound [23,8,9] argues that energy investments are more complex than previously thought and could include strategic and financial elements. Little is known, however, about the type of energy investment (strategic, financial, or a combination of both) preferred by different property owners/managers, as well as the extent to which the type of energy investment influences the energy performance of buildings.

To address these questions, this study focuses on commercial buildings that have an Energy Star score of 75 or higher, and are therefore in the top 25 per cent of energy performance for buildings of the same type from across the United States. The Energy Star program was launched in 1995 to support property owners/managers wishing to improve the energy performance of their buildings by benchmarking energy use against a national database of similar buildings [24]. It considers the energy performance of the whole building, including heating, ventilation, and cooling systems, building envelope, and energy management systems. Credit can also be given for renewable energy options, which are entered as a nil-contribution to the emissions profile of the building. To receive an Energy Star label, properties must provide one year of energy bills and have an engineering analysis conducted by a third party to assess actual energy use in order to confirm that they have reached the threshold of 75 or greater on a scale of 1–100. The building is certified with an Energy Star label for one year, and reapplication is necessary for subsequent years [25,26]. The Energy Star program has proven itself effective by reducing over 100 million metric tons of greenhouse gas emissions and saving \$9 billion annually [24].

2. Barriers, benefits and drivers of energy performance improvements

Much literature has identified and described the barriers and benefits faced by the property owners/managers who consider making energy upgrades. Important barriers include high initial installation costs, difficulty in securing financing, lack of access to funding [27–32], the landlord/tenant divide² [5,32–35], payback periods of more than a few years [36], information barriers and transaction costs³ [30,37–39], and low and subsidized energy prices [40]. Three key barriers that can limit owners/managers from implementing *additional* upgrades are the perception that an organization's buildings are already energy efficient, difficulty in accessing affordable and credible external expertise, and the unavailability or cost of funds/financing [29]. Barriers specific to financing energy upgrades include short-term loan repayment requirements, opportunity costs of alternative investments with larger or quicker returns, and the inability to accurately assess the risks and rewards of energy technologies [30,41,11,39,36].

These barriers can be overcome within the organizational decision-making process in three ways: by placing emphasis on the benefits of energy upgrades, by improving knowledge and access to information, and by increasing access to resources for funding or financing. Considering the first way, energy upgrades can be carried out as part of environmental sustainability programs that emphasize the energy savings *and* emissions reduction benefits [37,42,43], or corporate social responsibility (CSR) initiatives that attempt to directly enhance public image and indirectly leverage economic benefits [44–49]. CSR programs can help highlight ancillary benefits, including those derived from improvements in occupant experience such as indoor air quality [50] or expected returns from higher rents, higher occupancy, decreased operating costs (via energy costs), or increased property values [17,18,51–53]. Energy upgrades can expect to garner an increase in shareholder value for investor-owned properties [54]. In some jurisdictions, energy upgrades can help comply with building codes or changing regulations [33], and therefore act as a risk minimization strategy. The first objective of this study, therefore, was *to examine if energy performance as measured by an increase in Energy Star scores was influenced by the type of energy investment, characterized as either strategic investments motivated by environmental sustainability, corporate social responsibility, compliance with regulations, or shareholder value, or as financial investments motivated by economic metrics such as return-on-investment or payback period. Additionally, this study aimed to identify whether owners/managers who conducted multiple retrofits were motivated by more than one factor.* For example, if an owner/manager carried out building envelope upgrades as well as mechanical efficiency improvements, were they motivated by environmental sustainability for both categories of upgrade? This will help to clarify the nature of energy investment programs as strategic, financial, or a combination of both.

The improvement of knowledge and access to information can be aided through the use of the Environmental Protection Agency's (EPA) Portfolio Manager [24]. The Portfolio Manager allows users to manage energy and water consumption for all of their properties and buildings, estimate the carbon footprint associated with their buildings, set environmental investment priorities, and verify and track progress of specific projects [55] while providing a system for measuring and benchmarking against

² The landlord/tenant divide is where the occupants (tenants) of buildings do not pay their own energy bills, are not aware of their own patterns of consumption, and are constrained from making decisions related to energy installations [38].

³ Transaction costs include: management overhead; information gathering, analysis and application; production disruptions; and staff replacement and training [30].

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