

Executive Summary

A wide range of technologies, management practices, and financing solutions are available to help building owners improve the resilience of their properties. This fact sheet defines common resilience improvements and provides key considerations for identifying, prioritizing, and implementing these improvements across a commercial building portfolio. It also discusses common barriers to resilience improvements and reviews various third-party financing solutions that can help overcome these barriers.

This fact sheet was developed as part of a Better Buildings Financial Ally roundtable including partners, allies, and stakeholders.

Overview

Resilience projects in commercial buildings typically take the form of retrofits that improve the envelope, structure, or systems of the property. During natural disasters, energy and electrical power availability is one of the more vulnerable aspects of building operation, so these improvements often aim to make building energy systems more robust, independent, and/or efficient.

Most resilience projects can be divided into three categories, shown in the box on the right. **Energy Supply** projects help ensure that critical building systems can continue operating during a grid or fuel supply interruption. **Resource Conservation** projects reduce the energy and water demands of a building, increasing the amount of time it can operate on backup power and reducing the impact of disruptions. **Structure Hardening** projects mitigate property damage, injury, and system outages in the event of disaster.

Some building owners—particularly those with shorter hold periods—do not consider climate and resilience impacts to be a short-term risk, though that sentiment [is beginning to change](#). Many resilience projects have high upfront costs of implementation, and some projects may not have a simple payback that is within an owner's hold period. However, calculations of the simple payback of resilience often do not include factors such as avoided damage costs, increased marketability and safety, insurance premium reductions, ability to attract competitive investment, and other financial aspects that may be less obvious.

COMMON RESILIENCE PROJECTS

Energy Supply

- ▶ Renewable energy
- ▶ Combined heat and power (CHP)
- ▶ Battery storage
- ▶ Backup generation
- ▶ Microgrid
- ▶ Electric vehicle charging

Resource Conservation

- ▶ Efficient lighting and HVAC
- ▶ Water efficiency measures
- ▶ Building envelope improvements

Structure Hardening

- ▶ Seismic retrofits
- ▶ Wind-resistant roofs and windows
- ▶ Flood mitigation

Implementing Resilience Improvements

Building owners may benefit from adopting a systematic opportunity assessment process to identify potential resilience improvements at individual assets and across the portfolio. This may take the form of a checklist, site visits, property team interviews, or other strategies to collect information on the state of resilience-related practices, technologies, and structural considerations in an easily comparable way. In addition to existing buildings, many building owners have implemented a due diligence process for evaluating these risks and opportunities for new properties that come into the portfolio through new acquisitions and new developments, as well as major renovations.

Once the risks and opportunities are determined, building owners should screen and prioritize potential improvements. A first step may be to determine the most at-risk properties in terms of:

- Value-at-risk
- Impacts to net operating income

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- Human health and safety
 - Mission-critical operations
 - Other factors (see [Building the Financial Business Case for Resilience Fact Sheet](#))

The list of improvements can be further refined by flagging properties with the most easily or cost-effectively addressable improvements—as well as those with the most critical need—for priority investment. Properties where tenant operations are most vulnerable and/or where tenants are requesting additional resilience measures may also be elevated in priority. In addition, owners may wish to identify properties where resilience improvements provide (or can be done jointly with projects that provide) other benefits such as improved energy efficiency, renewable energy generation, energy storage, or addressing deferred maintenance. These considerations can be formalized into a portfolio-wide or region-wide resilience improvement plan—and ultimately asset-level plans—to guide implementation.

Financing Resilience Improvements

Access to capital is crucial to implementing resilience improvements at scale. Resilience improvements are often passed over in favor of other organizational priorities, despite long-term financial co-benefits such as lower energy costs and reduced insurance premiums. While some building owners may be able to fund these projects internally, many owners rely on financing to cover upfront costs. The project finance industry is increasingly addressing this challenge by offering financial products specifically designed to enable resilience improvements, with recent examples of major resilience initiatives financed through property-assessed clean energy (PACE), green bonds, efficiency-as-a-service, and other approaches. There are diverse financing options available to help commercial building owners address common barriers to resilience improvements.

Common Barriers to Financing Resilience Improvements

When looking to finance and implement resilience projects, building owners often face several barriers:

- **Quantifiable return:** While energy cost savings are simple to quantify, savings from risk avoidance, potential insurance discounts, and other indirect factors are more difficult to calculate. The long-term financial benefits of resilience can also be “lumpy” and unpredictable: resilience improvements help prevent major financial losses, but the timing and magnitude of these losses are uncertain, making it difficult to incorporate them into calculations of financial return.
- **Scale:** The sheer scale of investment needed to improve resilience of diverse risks across a building portfolio can be daunting, particularly if it requires working with multiple local or regional service providers rather than a few enterprise-scale providers.
- **Project complexity:** Resilience projects often require multiple technology types and vendors, increasing the complexity and transaction cost of these projects for both building owners and financiers.
- **Long-term nature:** The longer-term nature of investing in resilience can be challenging for building owners with short hold periods, high hurdle rates for investment, or high discount rates. While many resilience improvements provide some immediate benefits, their most valuable contributions tend to occur over many years or decades.
- **Information gap:** Many building owners are not aware of the third-party financing options and providers that are available to them, and the various ways these transactions can be structured to meet the owner’s needs (e.g. long financing terms, off-balance sheet options, financing that transfers automatically upon building sale). The [Better Buildings Financing Navigator](#) is an online tool to help public and private sector organizations find financing solutions for energy efficiency and

renewable energy projects.

Resilience Financing Options

Building owners with enough capital on-hand may choose to fund resilience projects through CapEx or OpEx budgets or other structured investment programs. This approach allows the owner to capture the full financial benefits of resilience projects rather than paying a portion of any savings to a financing provider. See the [internal funding fact sheet](#) for more information. This fact sheet is not resilience specific, but the funding methods described can be applied to resilience projects.

Building owners that do not have sufficient capital or would prefer to direct internal resources elsewhere can turn to third-party financing solutions to cover resilience project costs. The table below summarizes common financing solutions for resilience upgrades and the associated pros and cons:

Financing Option	Description
Commercial Property Assessed Clean Energy (PACE)	<p>Long-term, fixed rate, transferable, non-recourse financing that is secured by a public benefit assessment on real property</p> <p>Advantages</p> <ul style="list-style-type: none"> ➤ PACE provides 100% financing for hard and soft costs of qualified resilience projects ➤ Long-term financing can improve cashflow ➤ Financing is connected to the building in the event of a sale <p>Disadvantages</p> <ul style="list-style-type: none"> ➤ PACE is only available in jurisdictions with PACE-enabling legislation ➤ Some programs have a required level of energy savings that must be realized through the project to qualify ➤ PACE is typically an asset-level financing solution and one agreement is not easily scalable across a building portfolio that spans multiple PACE jurisdictions
Energy Savings Performance Contracting and Efficiency-as-a-Service	<p>Paid-from-savings approaches where the owner works with a financier and/or contractor to implement measures, typically with a performance guarantee</p> <p>Advantages</p> <ul style="list-style-type: none"> ➤ Guaranteed performance and measurement and verification (M&V) ➤ Agreements are often scalable for portfolio-wide initiatives ➤ Off-balance sheet potential (for as-a-service solutions) <p>Disadvantages</p> <ul style="list-style-type: none"> ➤ May be limited to energy/water improvement measures ➤ Large minimum project sizes may limit some project scopes

Leases and Loans	<p>Traditional financing solutions commonly used to pay for energy or resilience projects as well as other goods and services</p> <p>Advantages</p> <ul style="list-style-type: none"> ➤ Simple, quick, and accessible for most building owners ➤ Can be used to scale for portfolio-wide solutions <p>Disadvantages</p> <ul style="list-style-type: none"> ➤ Leases and loans do not provide the benefits of some of the more specialized financing solutions, such as performance guarantees (e.g. energy service agreements, energy performance contracts) or automatic transferability (e.g. commercial PACE)
<p>Green Bonds</p>	<p>Long-term debt instruments to raise a large amount of funds for a variety of energy, water, and resilience projects</p> <p>Advantages</p> <ul style="list-style-type: none"> ➤ Bond proceeds can be used to fund a range of energy and resilience projects, and projects of different scales can be pooled into a larger bond issuance ➤ Bonds are typically considered low-risk for issuers and capital can be raised at low interest rates <p>Disadvantages</p> <ul style="list-style-type: none"> ➤ Green bonds are typically large (\$250+ million) and may not be feasible or appropriate for some building owners

The landscape for resilience financing is evolving and innovative solutions are continually in development. For instance, green banks are offering loan products specifically tailored for resilience projects such as Connecticut Green Bank’s Microgrid Financing Program.

Better Buildings Resilience Financing Case Studies

Learn more about different financing options for resilience projects through case studies from Better Buildings Financial Allies:

- The Better Buildings [Commercial PACE for Resilience Toolkit](#) contains several case studies highlighting different resilience measures implemented using PACE.
- [Connecticut Green Bank](#) and [Centrica Business Solutions](#) partnered to finance and implement a microgrid solution that provides critical facilities in the City of Bridgeport, CT with efficient and reliable electrical power. [See case study.](#)
- [Citi](#) used an energy service agreement (ESA) to deliver a CHP system and efficiency upgrades at its London data center. [See case study.](#)

Next Steps

For building owners looking to implement and potentially finance resilience projects, below are some suggested next steps and additional resources:

- Understand feasibility and priority for implementing projects using the suggested steps in the “Implementing Resilience Improvements” section above. The size and scope of the potential

projects will help determine the appropriate financing mechanisms.

- Understand what internal capital (if any) can be accessed to fund potential projects.
- Assess which preferences for financing are important (on- or off-balance sheet, appetite for performance risk, etc.) to narrow down the list of external financing options.
- Determine if there are available subsidies, incentives, or city/state/utility programs that could be leveraged to support financing efforts or lower the overall cost. For more information on available opportunities, visit the [Database of State Incentives for Renewable Energy](#) and the U.S. Department of Energy's [Tax Credits, Rebates, & Savings Database](#).
- Consider using the [Better Buildings Financing Navigator](#) to explore the range of third-party financing options available and connect directly with Financial Allies who may be able to finance your project.
- The [Better Buildings Efficiency-Resilience Nexus](#) has additional guidance and resources to help organizations improve resilience.