

Technical Paper
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PACE Financing and Resilience in BC

Understanding best practices
from the United States and opportunities
for legislation and program design

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Executive Summary

Property Assessed Clean Energy (PACE) financing is a way to invest in energy efficiency upgrades, disaster resilience improvements, water conservation measures, or renewable energy installations for residential, commercial, and industrial property owners. Since its inception in California in 2007, the PACE market in the United States has evolved steadily. There are two broad forms of PACE financing: residential (R-PACE), focusing on the single-detached housing market; and commercial (C-PACE), which is inclusive of all multi-unit residential (MURB) buildings, and a variety of institutional, commercial, and industrial building typologies with numerous variations in ownership and tenure.

As British Columbia explores PACE program development, it is imperative to take an expansive view of potential co-benefits possible from this tool. In particular, some PACE programs in the US allow for resilience measures (e.g., climate change adaptation, seismic retrofits or enhancements, and fire and flood protections) to be included as part of investments made in a home or building. Building on the work of PACE BC, the Pembina Institute, the City of Vancouver, and the Canada Green Building Council, **this discussion paper outlines how BC C-PACE programs can contribute to greenhouse gas (GHG) reduction goals within CleanBC and help address adaptation and resilience needs identified in the forthcoming Climate Readiness Plan and numerous other adaptation and resilience initiatives.**

The key findings of this research are as follows:

- PACE financing programs in many US jurisdictions now include a wide range of climate mitigation, adaptation, and other resilience measures.
- C-PACE is increasingly used to bundle together both mitigation and resilience measures, saving building owners time and money; and, in some cases, helping preserve rental stock and keep non-profits and other institutions financially stable through more affordable credit.
- While uptake is still proportionally small (7 percent of total PACE loans in the US), interviewees foresee strong growth in resilience-inclusive C-PACE financing in the future, especially in response to new and forthcoming retrofitting regulations.
- Most program administrators, capital providers, and other actors advise avoiding overly prescriptive and conservative program designs to ensure a smooth customer experience while still providing consumer protections for building owners.



If BC means to successfully develop and implement a PACE Roadmap and pilot program, it will be critical to integrate resilience considerations into enabling legislation and program design. Our learnings from the US experience could lead to PACE becoming a core tool within our efforts to decarbonize existing buildings.

Why PACE/C-PACE? Why Now?



The overall purpose of PACE financing is to provide funds for home and business building improvements that directly produce environmental or hazard risk reduction benefits.

Rose, Adam, Wei, Dan.

“Impacts of the Property Assessed Clean Energy (PACE) program on the economies of California and Florida,”

USC Price School of Public Policy (2019)

Recognized as one of the fastest-growing asset classes in the country, PACE has proven to be a successful tool for supporting public policy initiatives, all without the use of public tax dollars or credits.

Ygrene

[Major PACE Loan provider]

Press Release (2019)

The Property Assessed Clean Energy (PACE) finance market has been evolving in the United States (US) since 2007, with California the first state to implement programs. There are two broad forms of PACE financing: residential (R-PACE), focusing on the single-detached home market; and commercial (C-PACE), which is inclusive of all multi-unit residential (MURB) buildings, and a variety of institutional, commercial, and industrial building typologies with numerous variations in ownership and tenure. In BC, the SFU Adaptation to Climate Change Team (ACT) and the Pembina Institute explored PACE in 2015, noting its potential to address climate mitigation and adaptation needs simultaneously. However, other than an unsuccessful, municipally financed “HELP” program at the City of Vancouver, little additional work has been done to date until now.

2020 has massively shifted the PACE conversation in British Columbia. After considerable advocacy, both from local governments and non-profit coalitions, such as PACE BC and Help Cities LEad, the opportunity for a PACE program is very much on the horizon. With the September 2020 announcement that the Province of British Columbia intends to create a PACE Roadmap, and parallel stated intentions from the City of Vancouver around a Retrofit Finance Roadmap (which will align with Provincial PACE work), a critical inflection point in retrofit financing in the province appears at hand. While there is tremendous activity now emerging around PACE, existing lobbying and technical research around PACE has not yet addressed the co-benefits associated with integrating building-scale resilience investments, particularly seismic solutions.

This short discussion paper provides the initial inquiry into these co-benefits, focusing on C-PACE and its application in the context of building resilience to natural hazards and climate risks.

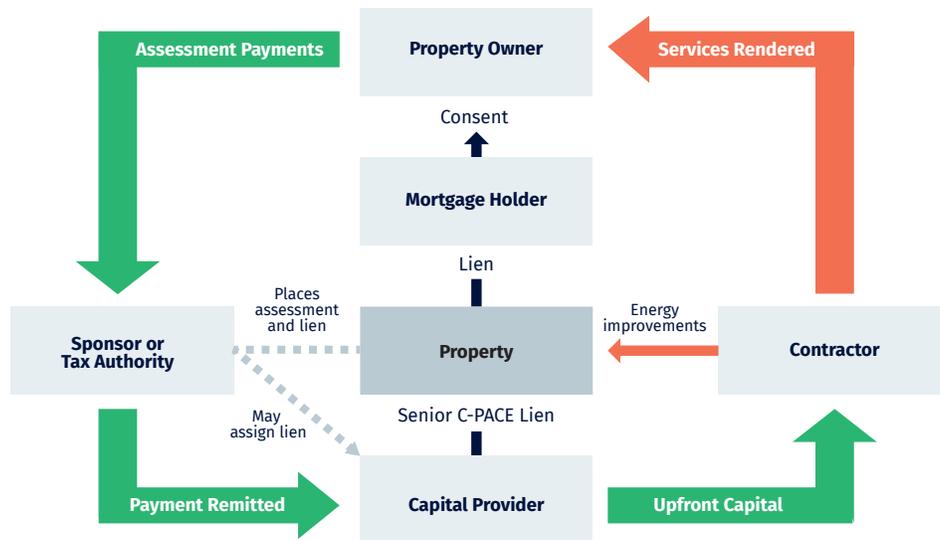
What is a Commercial PACE program?

The US Department of Energy describes a PACE program as follows:

PACE programs allow a property owner to finance the up-front cost of energy or other eligible improvements on a property, and then pay the costs back over time through a voluntary [property tax] assessment. The unique characteristic of PACE assessments is that the assessment is attached to the property rather than an individual.¹

Specifically, a Commercial PACE program uses the foundational construct of the lien-guaranteed loan, and orients that towards commercial, industrial and, in many US jurisdictions, non-profit and institutional owners.

A simplified overview of the C-PACE process



Source:
PACE Fund New Mexico.
“About.” (n.d)

¹ US Office of Energy Efficiency and Renewable Energy. “Property Assessed Clean Energy Financing,” *State and Local Solution Centre*. (2020). Accessed from: <https://www.energy.gov/eere/sisc/property-assessed-clean-energy-programs#commercial>

In the US, the C-PACE market is generally considered more evolved than the residential market (R-PACE). The latter has faced some difficulties along the implementation pathway because of its greater complexity; however, there is universal recognition that in the longer term, R-PACE has both a climate and economic development imperative.² While C-PACE has gone mainstream primarily from its application toward renewable energy and energy efficiency investment, it is increasingly being deployed for resilience benefits as well. Originally conceived to help building owners finance the cost of solar panels through a special tax assessment, C-PACE financing has evolved to finance many other building improvements that support public policy goals, such as energy and water efficiency/conservation, seismic safety, storm resilience, and wildfire hardening.³

C-PACE financing volume has doubled annually and is expected to grow to a multi-billion-dollar industry within the next five years.⁴ The payback terms of C-PACE financing (up to 30 years in most states) lower payments by spreading them over a longer period than most traditional financing allows. C-PACE can thus replace high-cost mezzanine financing – typically offered at interest rates of more than 10 percent – with alternative capital at a rate closer to six percent.⁵ This has caught the attention of savvy developers and policymakers, although there remains a need for education in some areas to help spread awareness to prospective users.⁶ PACE financing is uniquely attractive in that it is fixed-rate, fully amortized, fully transferable, and comes with only a minimal administrative cost to the public sector.

2 Personal communication, Ken Odell. He suggested that in California there has been different levels of success stories with PACE for smaller residential projects, which can be difficult due to owners' familiarity with getting into C-PACE programs, where there is a higher level of sophistication to structure and understanding funding.

3 Morningstar Credit Ratings. *Natural Disaster Retrofitting Is Likely to Drive PACE Growth*. (2018) <https://ratingagency.morningstar.com/PublicDocDisplay.aspx...>

4 Shift Zero Carbon Building Alliance. "Commercial Property Assessed Clean Energy and Resilience (C-PACER) Financing in Washington," n.d. Accessed from: <https://shiftzero.org/pace/>
PACE Nation. "PACE's Impact," (2020). Accessed from: <https://pacenation.org/>

5 McKernon, Woolsey. "From Solar to Seismic: The rise of commercial pace finance as a mainstream source of cost-effective capital," *Clean Fund*. (2018) Accessed from: <https://www.cleanfund.com/news-and-events/news/from-solar-to-seismic/>

6 Personal communication, Shelley Hack, PropertyFit

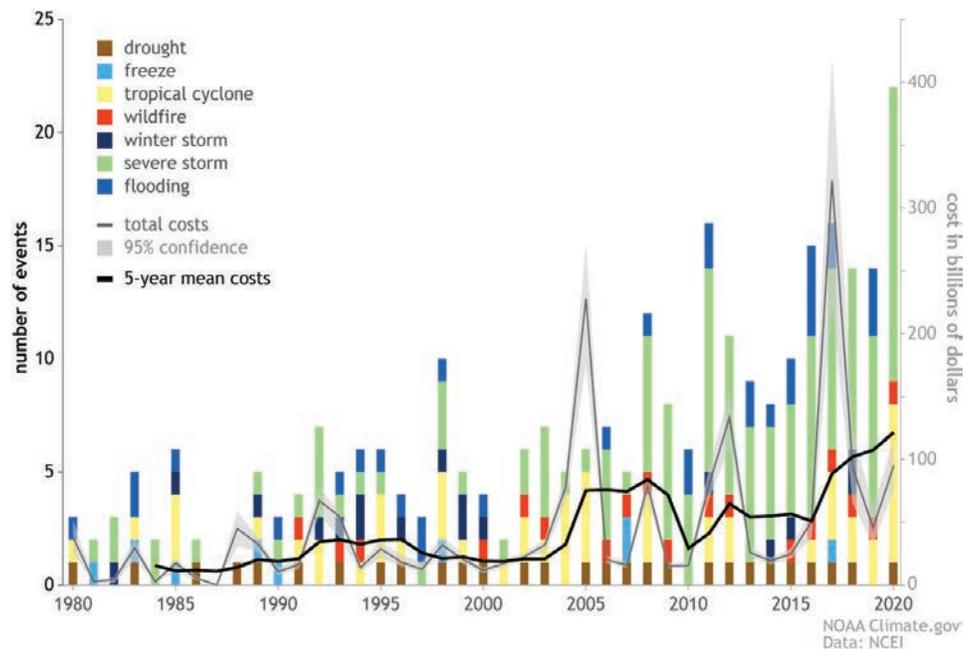
Why Resilience?

The total cost of extreme weather events is estimated to grow to over \$4 trillion by 2050.

National Ocean and Atmospheric Agency (NOAA) Billion-dollar Weather and Climate Disasters: Overview (2019)

The rise of natural hazard events associated with a rapidly changing climate is causing increasing losses across society, and exposure to major or seismic events continues to grow as urban agglomerations expand and densify in high hazard areas. A large portion of financial loss from hazard events is attributed to damage to buildings and associated loss of revenues (e.g., business disruptions, lost income from rental revenues etc.). The proliferation of multibillion-dollar natural disasters in North America – from wildfires in California and Fort McMurray, Alberta, to major riverine flooding in Calgary, Alberta – has sounded a wake-up call for increasing resilience in the built environment.

Billion-dollar disasters and costs (1980-2020)



Source:
National Ocean and Atmospheric Agency (NOAA) [Billion-Dollar Weather and Climate Disasters: Overview](#). (2020)

C-PACE is a financing tool that can also be leveraged to better prepare properties and protect their value via greater resilience. It is a tool that has been developed and deployed to serve the public good – in this context,

preserving and enhancing the value of buildings while simultaneously reducing damage and losses (direct and indirect) from climate and natural hazard events. As resilience needs to grow from increasing storms, sea-level rise, and earthquakes, and owners' desires to have the most efficient asset with the lowest utility expenses, C-PACE is gaining prominence as a cost-effective, and sometimes even foundational, tool.⁷

C-PACE programming addresses some of the unique resilience challenges that have previously been seen as barriers to reducing risk. The following are some illustrative examples:

Resilience challenge: No “payback” on investment

While addressing climate and seismic risk in buildings has many benefits in terms of life safety, faster return to occupancy, higher lease rates, more stable occupancies etc., it is often described as “no payback” as there may not be a direct, quantifiable capital return in the near future. Sometimes this is because it is uncertain when the next significant seismic event or major storm will happen or how many such events will occur within a given time frame of financial consideration or building life expectancy.

“Some resiliency projects (particularly those that do not have an energy-saving component) generate little or no direct savings, so lower interest rates spread over a long period can smooth out the cash flow impact for building owners. In addition, many resiliency projects involve retrofits to systems or structures that are integral to the operation of a building (e.g., seismic improvements to a foundation) and therefore cannot serve as collateral. The added security of C-PACE financing can reduce the lender’s risk in the absence of meaningful collateral, resulting in better terms.”⁸

To illustrate using the energy efficiency example, most building owners are uncertain about how long they will own a building, so they often choose to make only efficiency improvements that produce a quick payback (e.g. often in less than four years). Such quick payback improvements often only save 10 to 15 percent on energy consumption, whereas more significant investments with longer payback periods could achieve greater efficiency. This kind of short-term action is also true for resilience measures such as seismic improvements, which may not have any immediate economic payback but do improve the health and safety of building occupants, reduce insurance premiums,⁹ and increase a building’s lifespan.¹⁰ Accordingly, the long-term, fixed rates of PACE requiring no up-front capital help improve the incentive scenario for making resilience improvements.

7 McKernon, Woolsey. “From Solar to Seismic: The rise of commercial pace finance as a mainstream source of cost-effective capital,” *Clean Fund*. (2018) Accessed from: <https://www.cleanfund.com/news-and-events/news/from-solar-to-seismic/>

8 US Department of Energy *Commercial PACE Financing for Resiliency*. (2020) Accessed from: https://betterbuildingsolutioncenter.energy.gov/sites/default/files/attachments/CPACE_for_Resiliency_Fact_Sheet_6_11_18.pdf

9 Insurance premium reductions apply in the US context only

10 Shift Zero Carbon Building Alliance. *PACER Frequently Asked Questions for Washington* (2020) Accessed from: <https://docs.google.com/document/d/1qs3JL-s7AMzf8QWEdPGI5VjQVeLkphBFNY1jrp8YhM/edit#heading=h.5bfgzxm79es1>

Resilience challenge: Fear of acknowledging risk and past hazard events in areas where any property has been impacted, as it leads to reduced property values.

C-PACE financing can help overcome this challenge by keeping both equipment and the financing with the property. Also, building owners who are having trouble selling their properties in areas prone to hazard events may find that C-PACE-financed resilience improvements help attract buyers.¹¹

Case Study – Context and Business Case for Resilience in Vancouver
Increasing the resilience of the built environment in BC and, in particular, finding new financing mechanisms to do so, has been repeatedly identified in the City of Vancouver’s Earthquake Strategy (2017), the update to the Climate Adaptation Strategy and Action Plan (2018), the Resilient City Strategy (2019), the BC Government’s CleanBC Strategy, and Preliminary Strategic Climate Risk Assessment, the Government of Canada’s various climate action and resilience strategy, and numerous other studies, reports, and strategies at all levels of government.

Spurred by the success of the BC Energy Step Code and Vancouver’s Zero Emissions Building Plan, an existing buildings code or other retrofit regulations in both the BC Building Code and Vancouver Building Bylaw are expected by 2024 at the latest. The success of these existing building codes and the risk reduction and resilience-building actions called for in the above strategies and risk assessments will depend on effective funding and finance programs, such as PACE. For energy efficiency alone, the Pembina Institute estimates the need to retrofit 30,000 buildings across the province each year to meet 2050 GHG reduction targets. Accordingly, there is a pressing need for a broader configuration of incentives and easy financial solutions to address the low-carbon resilience needs for both new and existing buildings.

Nowhere is this more acutely felt than in the Lower Mainland, Over two-thirds of the provincial population resides in an area exposed to major hazards: three types of seismic events, coastal flood and sea-level rise (SLR), major riverine flooding on the Fraser River, pluvial and urban flooding, and wildfires and extreme heat. In BC, our collective understanding of the seismic hazard (e.g., Cascadia Subduction Zone, Basin effect etc.) present in the southwest of the province has changed dramatically over the past 30 years. Meanwhile, the large majority of buildings with designs based on a now outdated hazard understanding remain in service. Accordant knowledge of seismic risk in the building stock has evolved rapidly as well, with the current trend in seismic design leaning towards designing for performance-based resilience outcomes, rather than life safety, which is what is currently provided by national and provincial codes.

¹¹ Morningstar Credit Ratings (2018) *Natural Disaster Retrofitting Is Likely to Drive PACE Growth*.



Case Study

Context and Business Case for Resilience in Vancouver

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With regards to climate hazards, the 2018 update to the City's Climate Adaptation Strategy notes:

[Local climate projections] translate to a range of impacts such as: increased risk of health and safety impacts for frontline communities including those in lower quality housing, isolated seniors and the

12 Frappé-Sénéclauze, Tom-Pierre, Heerema, Dylan; and Tam Wu, Karen. *Deep Emissions Reduction in the Existing Building Stock Key elements of a retrofit strategy for B.C.* (Pembina Institute, 2017) Accessed from: <https://www.pembina.org/pub/building-retrofits>

homeless population; new and existing buildings being maladapted in terms of thermal comfort, water ingress, durability etc.; increased loss of trees and vegetation; and increased street, property and shoreline flooding.¹³

Specific to some of the major threats and stressors that Vancouver (and many other BC communities) face, seismic and flooding are two of the most expensive and widely dispersed challenges. Each has significant economic and social costs associated with existing vulnerabilities.

Furthermore, nearly 60 percent of carbon pollution in Vancouver comes from the burning of natural gas for heat and hot water in our buildings. The switch from natural gas to electricity in existing buildings in Vancouver could reduce these emissions by as much as three-quarters. While this carbon reduction imperative has pushed Vancouver to adopt increasingly stringent regulations for existing buildings, a significant barrier to the City introducing GHG limits is the financial barriers faced by B and C class commercial office and retail building owners. These owners can be highly resistant to new regulations that will require their builds to undergo deep emissions retrofits, although these projects can have positive net present values. This is because these owners face significant challenges in financing the requisite work due to high levels of debt, strong competing demands for the capital they can access, and the “split incentive” where much of the energy cost-savings from these owner investments accrue to the tenants.

PACE helps address many of these considerations and concerns via the triple benefits of being fixed rate, fully amortized and fully transferable. The experience in Los Angeles is instructive here, where smaller multi-family buildings account for a majority of the 15,000 commercial apartment buildings identified for seismic retrofits. While large commercial property owners have access to more capital resources, owners of these modest four- and six-unit buildings are left searching for alternatives to credit-based financing. PACE programs fulfill this need, enabling property owners to access financing for energy efficiency, water conservation, and renewable energy upgrades, as well as the seismic retrofits that are becoming increasingly mandated.¹⁴ In Vancouver, and throughout much of BC, these simple, smaller, and less well-capitalized buildings are the bulk of much of our affordable housing stock and are therefore of prime importance to retrofit and protect.

Accordingly, as BC looks to develop a PACE program, it is imperative that resilience to the major hazards of concern in a given area – in Southwest BC or the Lower Mainland in this discussion paper – are included in holistic program development. Multiple policy pressures are converging for both existing and new buildings.

¹³ City of Vancouver. *Climate Adaptation Strategy, 2018 Update*. Appendix B, Pg., 1. Accessed from: <https://council.vancouver.ca/ctyclerk/cclerk/20181205/documents/cfsc1.pdf>

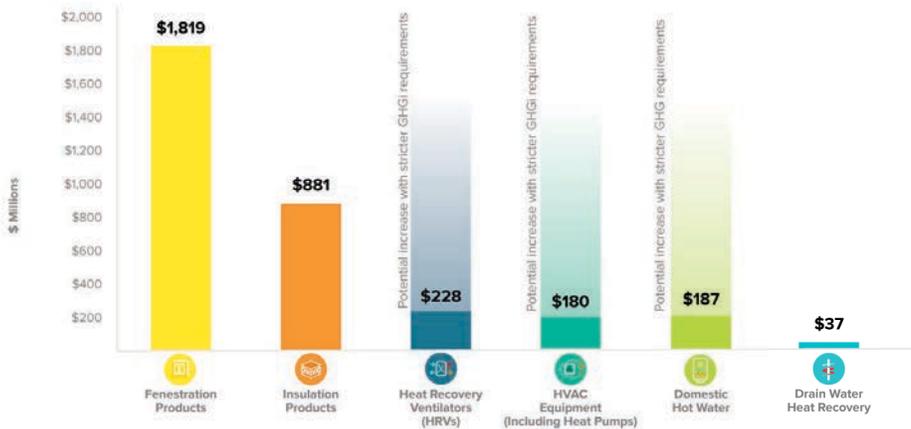
¹⁴ Ygrene *PACE Makes Seismic Retrofits Feasible for Property Owners*. (2017) Accessed from: <https://ygrene.com/blog/pace-makes-seismic-retrofits-feasible-property-owners>

There are synergies both from a design and construction perspective, as well as a finance perspective in taking a “low-carbon resilience (LCR)” approach (i.e., addressing carbon mitigation and natural hazard risk reduction concurrently). This approach does require unprecedented collaboration. Transformational change requires coordination between those working on equity and affordability, green buildings and renewable energy, hazard and risk assessment, seismic and flood resilient design etc. This long called-for collaboration becomes very tangible when it comes to buildings: if you are retrofitting a building, what are the synergies that can be achieved in terms of carbon reduction and increasing resilience? Given what we know about current and projected hazards and the necessity of drastically reducing emissions, how can we forego maladaptation across mitigation and adaptation imperatives in a new building?

In Vancouver, and BC more broadly, there is a reliance on real estate values and associated industry as an economic driver. Ensuring that our built environment is adapted for low-carbon resilience is not only a pressing imperative but also a huge economic opportunity – with the capacity to create thousands of high-value green jobs while reducing carbon emissions, increasing safety, boosting wellness, and building community resilience. **As the Vancouver Economic Commission identified in 2019, the Metro Vancouver-wide implementation of the BC Energy Step Code and Vancouver’s Zero Emission Building Plan is generating over \$3 billion in new product demand by 2032, and the potential for the retrofit economy (especially if it is resilience inclusive) would be well over one billion dollars in just the City of Vancouver.**

Demand for Building Products

Metro Vancouver, new construction, 2019-2032 forecast (cumulative)



Source: Vancouver Economic Commission. [Metro Vancouver Green Building Market Forecast, 2019](#). (2019)

The following table aims to capture an order of magnitude of relevant buildings (e.g., units/assessed values, typology/archetype) that would benefit from PACE programming in Vancouver. This includes of resilience-focused retrofits. Furthermore, PACE programming could be designed to address the “major hazards of concern” of any given geography.

BOX 1 – Hazards of concern and applicable building stock in the City of Vancouver.

Seismic vulnerabilities

The City of Vancouver is currently undertaking extensive modelling, in partnership with local universities, other cities, Natural Resources Canada, the BC Building Standards and Safety Branch (BSSB), and others, to understand the vulnerabilities, exposure, and other challenges related to seismic threats in the built environment. Preliminary modelling is further articulating the immense scale of the challenge we face, and the need for a variety of tools, including financing, to help address them.

Of Vancouver’s 90,000 buildings, only 12 percent are multi-unit residential (MURBs) or commercial and industrial (excluding the public sector), yet they are home to more than 50 percent of the city’s population and all of its non-residential land uses. Based on this recent modelling, seismic vulnerabilities, and the costs associated with addressing them in MURBs, commercial and industrial buildings, are immense:

- More than one in five of Vancouver’s MURBs are at risk of seismic damage to the extent it would impact the function of the building (i.e., disruption and/or displacement).
- More than one in three of Vancouver’s non-MURB non-residential buildings are at risk of damage to the extent it would impact the function of the building (i.e., loss of function).
- \$530 million (2019) is the low-end cost estimate for minimal compliance retrofits for vulnerable MURBs, industrial, and commercial buildings, based on permit values and using the average costs of San Francisco retrofits.
- \$1.275 billion (2019) is the high-end cost estimate for minimal compliance retrofits for vulnerable MURBs, industrial, and commercial buildings based on permit values and average costs of San Francisco retrofits.

Riverine and coastal flooding vulnerabilities

The City of Vancouver has integrated a standard of one metre of sea level rise into its building bylaw and other land use and infrastructure policy. Approximately \$1 billion (2013) of flood management infrastructure investment would be needed by 2080 to protect \$28.6 billion (2019 BC Assessment) in land and buildings within the flood plain if a “protect” approach was taken. Best practice would be to integrate/build redundancy through parcel-level resilience measures (i.e., in addition to any planned/funded upgrades to structural, more regional-scale flood protection measures).

Continued on next page.



- The 2019 land value of buildings and properties in the current flood plain of the City of Vancouver is \$28.6 billion.
- The 2019 land value of buildings and properties in the False Creek flood plain of the City of Vancouver is \$19.0 billion.
- The 2019 land value of buildings and properties in the Fraser River flood plain of the City of Vancouver is \$5.9 billion.

Systemic financial risk

- A major seismic event in the Lower Mainland is expected to have severe financial repercussions, potentially causing a collapse of the insurance sector and associated financial contagion¹⁵
- Many lenders rely on diversification to manage risks associated with natural hazards. This is not plausible for some actors in BC, since many local lenders do not have geographic diversification¹⁶

It is possible that a collaborative approach to programs such as C-PACE financing to support risk management, require that a collection of actors – such as building owners, contractors, developers, local authorities, capital providers and mortgage holders (e.g. local credit unions), appraisers, the insurance sector, and Natural Resources Canada – convene to work out what's best for the province overall. The federal government is looking at BC to determine how such a collaborative approach to addressing these financial risk considerations and building the incentivization economy might work.

¹⁵ CD Howe Institute. *Fault Lines: Earthquakes, Insurance, and Systemic Financial Risk* (2016) Accessed from: https://www.cdhowe.org/sites/default/files/attachments/research_papers/mixed/Commentary%20454_0.pdf

¹⁶ Personal communication, Dan Oprescu, BC Financial Services Authority

C-PACE Program Variations and Configurations

This section describes some of the variations and key considerations for success in C-PACE programs in the US, and the **configuration and mechanics of C-PACE financing mechanisms** with the ability to undertake building-scale resilience measures, including seismic retrofits and climate change adaptation measures.

Enabling Legislation: Specificity in eligible improvements

Of crucial importance to C-PACE successfully integrating resilience measures is the “enabling legislation” that allows for creating PACE programs. This state, district, or provincial enabling legislation must allow for resilience measures to be included. In interviews, numerous policymakers, lenders, and other PACE practitioners noted that many programs have repeatedly returned to legislative processes to expand the number and types of measures covered under a PACE program, sometimes creating “PACE fatigue.”¹⁷ They all stressed that a more effective or prudent approach is to allow for flexibility at the outset of legislative development, in financial regulations, (for example, by not mandating savings to investment (SIR) ratios for eligible investments), and ensuring that a broad range of measures, including resilience, are allowed from the outset. Furthermore, a mechanism to allow for updates and innovations to be included at a programmatic (rather than legislative) level can also be extremely helpful.

In its traditional form, enabling legislation (state or provincial) must enable taxing entities to levy C-PACE liens on property. There needs to be corresponding local legislation authorizing the taxing entity to do this as well. Both sets of legislation should authorize resilience upgrades as eligible improvements both for retrofit and new construction of buildings. Technical standards should not be overly restrictive in capping the number of proceeds a developer can use to fund eligible improvements. (e.g. allowing a developer to fund 100 percent of the cost of the resilience improvement with C-PACE). More restrictive systems are generally held to discourage participation.¹⁸

Programs across the US differ in terms of specificity of eligible improvements, some listing the specifics and others leaving it broad/open for interpretation. This was a common area of comment throughout the interviews, with PACE practitioners citing the benefits of short, flexible enabling legislation so programming can be adapted to meet the demands of the market and emergent public policy goals.

Important to note is that, **in parallel to the legislative development, a core priority for the government must be to send clear market signals via policy and regulation regarding long-term zero carbon and resilience performance targets and goals.** Doing so cements the need for building owners to start reviewing their performance and developing capital strategies to ensure effective compliance.

¹⁷ Personal communication, Shelley Hack, PropertyFit

¹⁸ Personal communication, Genevieve Sherman, Greenworks Lending

Project Applicability: Retrofit and new construction

Today, of the US states with active C-PACE programs, most allow financing for both existing buildings and new construction projects. However, these programs impose different eligibility rules and documentation requirements, and neither local governments nor the C-PACE industry has yet settled on a uniform approach – not surprising, considering this is a result of the rapid growth and emergent nature of the programming. The American-based [C-PACE Alliance](#) is supporting ongoing standardization.

Allowing C-PACE for new construction projects provides owners and developers with a cost-effective way to incorporate energy efficiency and resilience measures from a building's inception, whereas these measures can often be value-engineered out otherwise.¹⁹ Property owners may have the ambition and desire to incorporate new technologies or approaches into their design, only to see suggested improvements cut out to meet budget demands. As codes become more stringent, as they have in California – from energy efficiency and seismic requirements to water conservation – developers of new buildings may require supportive financial options simply to meet codes.²⁰

Interviews with PACE lenders and practitioners suggest that in some projects, the entire PACE allocation of the capital stack goes to meeting seismic code for new construction (e.g., in California, where the state seismic code requirements are quite stringent). In this type of project, an engineering firm reviews the design and budget for the PACE-eligible seismic components before it's approved by the lender.²¹ Generally, PACE is quite an attractive prospect, especially for new construction (i.e., 20 to 30 percent of construction costs are PACE eligible improvements, at a rate of 6.5 percent instead of 10 percent or more).²²

Financial Regulations: Openness and flexibility

There is a wide variety in PACE programs and how they approach regulating or programmatically constraining the financial engineering of projects. Some C-PACE programs have a required level of energy savings that must be realized through the project for them to qualify; this is commonly referred to as the savings-to-investment ratio (SIR). SIR requirements can vary among C-PACE programs, but generally, the ratio must be above one, meaning that savings generated from the project over the term of the C-PACE assessment exceed the cumulative tax assessment. In some cases, this can make resilience improvements that do not yield sufficient energy savings ineligible. In other cases, there are exceptions to required SIR for certain types of resilience measures (e.g., seismic retrofits in California), or SIR can be improved by

¹⁹ McKernon, Woolsey. "From Solar to Seismic: The rise of commercial pace finance as a mainstream source of cost-effective capital," *Clean Fund*. (2018) Accessed from: <https://www.cleanfund.com/news-and-events/news/from-solar-to-seismic/>

²⁰ Personal communication, Dana White, Greenworks Lending

²¹ Ibid

²² Personal communication, Justin White and Casey Dailey, Western Riverside Council of Governments (WRCOG)

bundling with additional qualified energy measures. Each program has different rules and requirements that must be understood before moving forward.²³

Most capital providers are explicit that successful PACE programs should not include SIRs in the legislative requirements, as these types of calculations can frustrate prospective users, and limit the market transformation and economic development ability of this tool.

Loan-to-value (LTV) or assessment-to-value (ATV) regulations are also common in many jurisdictions, and function as a cap on the total amount of money that may be borrowed via a PACE mechanism. They work by creating a maximum ratio of the value of a loan to the overall valuation of the applicable property. Ratios vary greatly, with the US Department of Energy noting in 2018 that, “Virginia’s Department of Mines, Minerals and Energy (DMME) developed a guide that suggests the ratio be no more than 20 percent. Texas also uses 20 percent, and Connecticut and New York use 35 percent. Lower ratios may make it harder for smaller building owners, e.g., small business owners, to qualify projects.”²⁴

For new construction, in many jurisdictions the **annual assessment can be as much as 20 percent of the total LTV** of the property based on the as-completed valuation from the senior lender. **Additionally, the annual assessment amount can be up to 5 percent of the appraised value.** Given the costs of the PACE-eligible improvements, it is easy to qualify the C-PACE eligible improvements to take advantage of the maximum amount.²⁵ The following image illustrates some of the challenges and potential solutions regarding SIR and LTV requirements.

Analysis: PACE Financial Constraints

Financial constraints across commercial and residential markets

| | Savings-to-Investment Ratio (SIR) Requirements | Loan-to-Value (LTV) Requirements |
|--------|--|---|
| C-PACE | Present in some statutes or guidelines; programs may offer exceptions. | Present in many statutes or guidelines; unclear if exceptions ever permitted. |
| R-PACE | Not standard for most programs; considered cost prohibitive. | Standard for most programs; considered vital to consumer protection. |

Barrier: With regards to C-PACE, there are scenarios where SIR and LTV are prohibitive to executing projects, particularly projects where the revenue/savings stream is minimal or difficult to quantify.



Examples: Energy and Non-Energy

Possible Program Designs Options:

- Broaden savings definition to include more than energy costs (e.g., Alabama includes insurance savings).
- Allow exemptions or waivers for certain projects (e.g., above a certain threshold).
- Encourage multi-measure bundling, or defer to local governments to define SIR requirements based on market.

Source:
US Department of Energy – Office of Energy Efficiency & Renewable Energy. (2018)

23 US Department of Energy. *C-PACE for Resiliency Fact Sheet*, US Department of Energy (2018). Accessed from: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/CPACE_for_Resiliency_Fact_Sheet_6_11_18.pdf

24 US Department of Energy. *Lessons in Commercial PACE Leadership: the Path from Legislation to Launch*. (2018). Pg., 25

25 From *Solar to Seismic* (2018)

Program Administration: Centralized and decentralized

C-PACE programs also vary in how they are administered, from state-centralized to decentralized. In Texas, for example, the programs are decentralized, but the state provides the “PACE in a box” program to provide consistency. In California, there are regional entities such as the Western Riverside Council of Governments (WRCOG) that administer PACE programs, – acting as a centralizing point and program administrator for a variety of financing plans from private lenders. Some consistency across regions, counties and even states are desirable, as those who hold real estate portfolios across these geographic boundaries can find it confusing when the rules and structures are so varied. Again, the C-PACE Alliance is helping to evolve this standardization in the US.²⁶ Interviews and research support the finding that strong, broad, and holistically developed PACE enabling legislation (e.g., that includes a meaningful range of mitigation, adaptation, and resilience measures) is the critical foundation of success no matter what program model is chosen.

PACE practitioners suggested using a multidisciplinary team to build PACE programming, including – from finance and banking, the seismic and resilience space, those with energy and renewables expertise, builders, legal experts, and many others. This approach would help to derive a holistic sense of program inclusions, and how to frame the program effectively. Practitioners also suggested the program be designed in such a way as to ensure that private financiers will achieve enough volume of capital to make it worthwhile, as this volume question is top-of-mind for lenders. Along these lines, consideration might be given to a “bundling” approach, such that several smaller projects could be bundled for capitalization and/or, as illustrated below, encourage “multi-measure bundling.”

“We see C-PACE as the intelligent, innovative solution for earthquake retrofit, clean energy, and resilience, of all kinds,” said Yat-Pang Au, CEO of Veritas Investments, San Francisco’s largest owner and operator of multifamily and retail mixed-use property. “Lenders, regulators and other constituents are finally getting comfortable with C-PACE, and it’s appreciated by owners facing significant, and more frequently mandated financial obligations. We need flexible sources of capital like PACE.”

²⁶ Personal communication, Shelley Hack, PropertyFit

Prevalence of C-PACE Projects Inclusive of Resilience

This section outlines the **prevalence (e.g., project numbers, size and dollars invested)** of resilience-inclusive PACE-financed projects in the US, with an emphasis on C-PACE.

PACE for resilience is quite popular among coastal areas in California; from California to Oregon for seismic; in Florida for hurricanes; in Texas for hurricanes and stormwater; and in Oklahoma for stormwater and wind.²⁷ In one example provided, FEMA dollars (i.e., federal grant money for disaster recovery) were used in addition to PACE finance to retrofit and bring a building up to code in the coastal city of Santa Paula, California after damaging flooding occurred. This is an illustrative example of how public grant money can be combined with private financing to support resilience objectives.

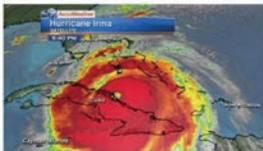
PACENation, which tracks the overall evolution of the PACE market in the US, pegs the resilience-oriented improvements in the C-PACE market at a 7 percent share of a \$1.9 billion total market in 2019 (or \$135.1 million). While the prevalence of C-PACE investments directly related to resilience appears relatively low, it is growing rapidly and is likely underrepresented in this PACENation statistic (for example, with water conservation investments that double as resilience and mitigation measures). The growth is largely driven by new PACE programs emerging that have the benefit of learning from previous programs' shortcomings. For example, Washington State released their PACE programming in 2020 with resilience considerations already embedded (i.e., "C-PACER"), having learned from earlier programs that had to add resilience considerations via legislative amendments.

This figure will need to rise exponentially, annually, and rapidly across both the R-PACE and C-PACE markets to address existing risks and tackle emerging risks. The following image provides further indications of the rapidly growing investments in resilience being generated via PACE programming (in this example, R-PACE).

Market Activity: R-PACE Anecdotes

R-PACE

- In 2017, Renew Financial reported that 45% of their projects in Florida were wind mitigation projects including shutters, impact windows, and doors.
- In the wake of Hurricane Irma, there was a noticeable uptick in PACE financing.



Renew Financial Residential PACE Eligible Projects



- **PACE Financing is compatible with disaster recovery:**
"Homeowners place their claim concurrently with obtaining a PACE assessment and pay off the assessment once they receive their insurance reimbursement."
(N. Schneider, Renew Financial, 2018)

Source:
 US Department of Energy. [Better Buildings Residential Network Peer Exchange Call Series: Efficiency and Resilience Improvements with PACE Financing](#) (March 14, 2019)

27 Personal communication, Dana White, Greenworks Lending

A USC Price School of Public Policy Analysis, conducted in 2019, performed a regional economic impact analysis of one of the leading firms in the PACE market – Ygrene Energy Fund Inc. From 2013–2018, Ygrene provided more than \$1.16 billion to finance upwards of 54,500 property improvement projects in over 500 cities and counties, primarily in the residential sectors of California and Florida.²⁸ Although the paper focuses mainly on R-PACE lending impacts, many of the implications and insights also apply to C-PACE programming.

Distribution of Contract Dollars of Ygrene PACE Financing among Improvement Categories (in thousands of 2015\$)

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Total |
|-------------------------------------|----------------|-----------------|------------------|------------------|------------------|------------------|------------------|
| CA | | | | | | | |
| Hurricane Mitigation | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |
| Building Envelope Energy Efficiency | \$259 | \$2,782 | \$18,718 | \$57,171 | \$68,486 | \$22,405 | \$169,821 |
| Solar | \$802 | \$7,904 | \$40,024 | \$151,942 | \$77,342 | \$25,537 | \$303,552 |
| Energy-Efficient Windows and Doors | \$104 | \$1,322 | \$10,357 | \$32,767 | \$35,132 | \$9,420 | \$89,102 |
| HVAC Efficiency | \$180 | \$2,437 | \$26,083 | \$55,680 | \$32,828 | \$9,919 | \$127,126 |
| Water Conservation | \$36 | \$533 | \$4,393 | \$17,170 | \$25,276 | \$9,505 | \$56,913 |
| Lighting Efficiency | \$5 | \$75 | \$631 | \$2,263 | \$4,576 | \$1,208 | \$8,758 |
| High-Efficiency Water Heating | \$0 | \$0 | \$0 | \$171 | \$1,934 | \$709 | \$2,814 |
| Earthquake Mitigation | \$0 | \$0 | \$0 | \$0 | \$387 | \$975 | \$1,362 |
| High-Efficiency Pool Equipment | \$0 | \$0 | \$0 | \$30 | \$338 | \$132 | \$500 |
| CA Total | \$1,386 | \$15,051 | \$100,207 | \$317,193 | \$246,300 | \$79,810 | \$759,947 |
| FL | | | | | | | |
| Hurricane Mitigation | \$67 | \$2,369 | \$10,794 | \$42,086 | \$141,849 | \$78,621 | \$275,786 |
| Building Envelope Energy Efficiency | \$72 | \$2,569 | \$9,141 | \$27,566 | \$12,074 | \$6,912 | \$58,334 |
| Solar | \$6 | \$223 | \$970 | \$3,317 | \$7,500 | \$7,469 | \$19,485 |
| Energy Efficient Windows and Doors | \$6 | \$207 | \$757 | \$2,979 | \$3,405 | \$2,707 | \$10,061 |
| HVAC Efficiency | \$21 | \$765 | \$2,826 | \$5,644 | \$17,013 | \$8,407 | \$34,676 |
| Other | \$0 | \$4 | \$14 | \$74 | \$64 | \$88 | \$244 |
| Lighting Efficiency | \$7 | \$243 | \$193 | \$637 | \$421 | \$260 | \$1,760 |
| High-Efficiency Water Heating | \$0 | \$0 | \$0 | \$32 | \$165 | \$140 | \$337 |
| Earthquake Mitigation | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |
| High-Efficiency Pool Equipment | \$0 | \$0 | \$0 | \$20 | \$216 | \$32 | \$268 |
| FL Total | \$179 | \$6,379 | \$24,695 | \$82,355 | \$182,707 | \$104,637 | \$400,951 |

Source:
Rose and Wei, 2019

The figures in this table represent a general upward trend in project dollars invested into **hurricane and earthquake mitigation** in the two states (i.e. California and Florida). Ygrene continues to expand its product offering for resilience and natural hazard preparedness, with approximately half of the projects financed allocated for resiliency, hazard mitigation, and hurricane preparedness.²⁹

In the C-PACE market, PACE practitioners who were interviewed discussed the growing opportunities they would like to take advantage of in the C-PACE-for-resilience space. For example, in California, there is a mandate for hospital retrofits, where many of the required seismic retrofits are valued in the

28 Rose, Adam; Wei, Dan. *Impacts of the Property Assessed Clean Energy (PACE) Program on the Economies of California and Florida* (2019) Accessed from: <http://schwarzenegger.usc.edu/institute-in-action/article/impacts-of-the-property-assessed-clean-energy-program-on-the-economies-of-c>

29 Ygrene “Ygrene PACE Securitizations Over Last Nine Months Tops Half A Billion Dollars,” Press Release by Ygrene.(2019) Accessed from: <https://www.prnewswire.com/news-releases/ygrene-pace-securitizations-over-last-nine-months-tops-half-a-billion-dollars-300789064.html>

\$30-40 million range. However, there are some difficulties funding these owing to restrictions related to funding government properties and non-profit requirements for revenue.³⁰ Although there are no existing mandates for retrofit of tall buildings in California, the seismic retrofit of these structures is typically in the \$100 million range and represents another bankable and important opportunity. This is because these structures represent a significant risk, not only as independent structures but also for surrounding buildings (the cordoning effect).³¹

Several practitioners cited lack of staff capacity and lack of general awareness in the market as current barriers to growing their C-PACE retrofit finance practices, though several firms interviewed noted they were expanding year-over-year to meet demand.³² Another practitioner noted that complete recapitalization events will become a big source of future C-PACE funding, and referenced the example of unreinforced masonry (URM) buildings in Portland. As these buildings come up for renewal, C-PACE programming will figure into seismic resilience financing. URM buildings are considered one of the highest benefit-cost ratios for PACE retrofit categories, as the table on the next page illustrates.³³ Notably, these are also a huge class of vulnerable buildings within British Columbia and a major source of existing affordable rental stock. There have been ongoing efforts to implement URM retrofit mandates in Portland, which would create a push for these total recapitalization events.

Benefit Cost Ratios (BCR) for PACE Hurricane Improvement Types

| PACE Improvements | Residential BCRs | Commercial BCRs |
|---|------------------|-----------------|
| High-Impact Windows | 1.38 | 1.43 |
| High-Impact Doors - Standard | 1.38 | 1.43 |
| Wind Resistant Roofing | 2.51 | 2.61 |
| Wind Resistant Shingles | 2.51 | 2.61 |
| Storm Shutters | 1.38 | 1.43 |
| Roof Deck Attachment Strengthening | 2.93 | 3.05 |
| Opening Protections/Garage Doors | 1.38 | 1.43 |
| Roof to Wall Reinforcement | 1.96 | 2.04 |
| Secondary Water Barrier | 2.51 | 2.61 |
| Waterproofing - Basement Membrane | 3.30 | 3.43 |
| High-Impact Doors | 1.38 | 1.43 |
| Gable-end Bracing | 3.84 | 3.99 |
| Hurricane Protection-Impact Windows & Doors | 1.48 | 1.54 |
| Hurricane Protection-Other | 1.93 | 2.00 |

Source:
Rose and Wei, 2019

30 Personal communication, Dana White, Greenworks Lending. Described how they are prohibited from lending to government, and there are some challenges re: the requirements for nonprofits to have revenues, which are often driven by bonds.

31 Applied Technology Council. *San Francisco Tall Buildings Study*. (2018) Accessed from: https://www.onesanfrancisco.org/sites/default/files/inline-files/ATC-119-1_SF_TallBuildingsStudy_FINAL.pdf
See section 3, subsection re: Cost Implications

32 Personal communication, Dana White, Greenworks Lending

33 Rose and Wei (2019), See BCRs of PACE seismic retrofit categories, p. 37

Scope of Resilience Measures

This section outlines the traditional **scope of resilience measures included and/or allowable within existing C-PACE programs** (e.g., envelope retrofits, advanced technologies, design and modeling work, recommissioning plans, etc.).

As noted, different programs have differing levels of prescriptiveness regarding eligible improvements. One local practitioner suggested that adaptations of PACE for BC should not be too prescriptive regarding the list of actions could be undertaken or applicable to financing. Similar to the transformation underway with building codes, – there could be a move towards a performance-based approach in the program – as opposed to a list of eligible measures. One approach in the US has been to list the eligible improvements. However, this does not exclude innovative or different approaches to achieve the same objectives. There does seem to be an additional administrative burden here for both the applicant/project proponent and the financier in terms of a review and adjudication type function. The following image illustrates the range of measures named explicitly in legislation as of mid-2018. These measures have evolved significantly in the past two years as states race to incorporate resilience-oriented standards into their programming.

Measures Expressly Named in Legislation*

| Eligible Measures | States |
|--|--|
| Electric vehicle charging infrastructure | CA, CO, FL, IL, MN, NY, RI, UT |
| Energy storage | MA, UT |
| Flood mitigation or “water barriers” | AL, FL |
| Microgrids | CT |
| Seismic retrofit | CA, OR, UT |
| Stormwater management | CA, D.C., NE |
| Water conservation | AR, CA, D.C., GA, IL, KY, MI, NE, TX, VA, WI |
| Wind resistance | AL, FL |

Source:
US Department of Energy, Office of Energy Efficiency & Renewable Energy

*Current as of June 18

Resilience projects typically take the form of retrofits that improve the envelope, structure, or systems of a building. Because energy is one of the more vulnerable aspects of building operation, improvements often aim to make building energy systems more robust, independent, and/or efficient.³⁴

34 US Department of Energy. *C-PACE for Resiliency Fact Sheet*, US Department of Energy (2018). Accessed from: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/CPACE_for_Resiliency_Fact_Sheet_6_11_18.pdf

Examples of C-PACE eligible improvements:

Energy efficiency (all of US)

- Direct and indirect costs for material, labour, and soft costs related to project design, evaluation, demolition, installation, and construction necessary to implement energy efficiency (HVAC, thermal barrier), water conservation, and renewable energy measures.

Seismic (California)

- Upgrades to buildings for ground-up (i.e. new) construction, existing structure retrofits, and renovations. In all cases, improvements must be permanently affixed to the property.

Seismic (California and Oregon):

- Structural retrofits (superstructure strengthening), including: foundations and soil treatment, lateral support systems, shear walls, moment and brace frames, diaphragm strengthening, foundation connection system, structural connection system, masonry reinforcement.
- Non-structural retrofits (supplemental bracings and supports), including: Lighting, ceilings, equipment, fire sprinklers, ductwork, emergency shut-off system, standby generator.
- Indirect and soft costs, architecture and engineering fees, including: surveys and permitting, contractor general conditions and fees, financing, legal and other fees.

Fire Resilience (California):

- Building hardening and fire-resistant building materials, including: fire-resistant roofing, vents, dual-paned tempered glass windows, ignition-resistant walls, irrigation.³⁵ Alterations to existing cell-phone towers looking to fund “smoke detection technology” (e.g., a farmer in Napa Valley who owns the land upon which the tower sits).

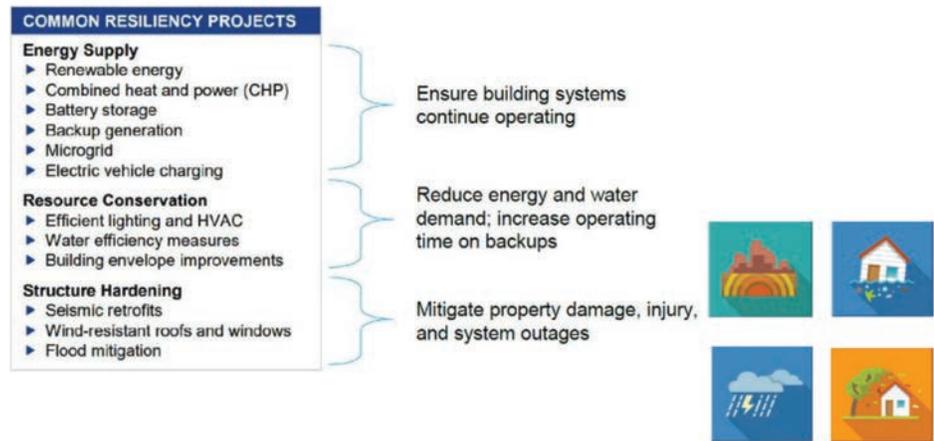
Weather Resilience (Florida):

- Building hardening and storm-resistant building materials, including: foundation strengthening, high-impact doors and windows, roof-to-wall reinforcement, sea walls, secondary water barrier, storm shutters, waterproofing – basement membrane, wind-resistant roofing.

³⁵ Cleanfund. *Pace Eligible Improvements*. (2020) Accessed from: <https://www.cleanfund.com/what-is-pace/pace-eligible-improvements/>

Ideally, BC’s seismic resilience efforts should focus on achieving higher performance levels (i.e., making buildings functional/allowing for occupancy post-event) with eligible improvements not restricted to providing life safety. The following image summarizes the various ways in which “resilience improvements” are conceptualized, essentially capturing the low-carbon resilience imperative.

Resiliency through Energy and Non-energy Measures



Source:
 Combined image from the Better Buildings Solution Centre and US Department of Energy, Office of Energy Efficiency and Renewable Energy

Case Studies

The following case studies illustrate how C-PACE for resilience is being applied to retrofits and new builds.

Retrofit:

Verity Health's Seton Medical Center Campus

Daly City, California

CleanFund partnered with Petros PACE Finance to provide funding for a seismic upgrade at Verity Health's Seton Medical Center Campus using C-PACE financing. This \$40 million project is the largest in C-PACE's history, with upgrades allowing the hospital to meet California's mandatory Hospital Facilities Seismic Safety Act and ensure the long-term safety and continued service of this acute care facility. Energy-efficiency improvements will be implemented in the building in conjunction with the seismic upgrades, taking advantage of the building envelope's exposure during the project. As of March 2018, the project is fully funded but still undergoing implementation. This implementation model is part of the [Better Buildings Commercial PACE for Resiliency Toolkit](#).

Retrofit:

The KEX Hostel Energy and Seismic Upgrade

Portland, Oregon

Green Light Development used PropertyFit C-PACE financing to implement energy-efficiency and seismic improvements as part of the adaptive reuse project on the Vivian Apartment Building. The project converted the historic apartment/retail building into an upscale hostel and gastropub while reducing energy costs and meeting seismic requirements.

The development team discovered that PropertyFit could provide a solution to both energy efficiency and seismic issues by providing low-cost financing for seismic retrofits along with an overhaul of the building's energy and water components to implement high-efficiency technologies. The \$3.5 million commercial PACE loan provided by PACE Loan Group slotted well into the capital stack by replacing expensive and difficult-to-acquire debt with 20-year, fully amortized financing, reducing the project's blended capital cost. The remainder of the \$12.3 million capital stack comprised a \$7 million equity investment from Green Light and a \$1.5 million construction loan.

New Build PAE Living Building

Portland, Oregon

Gerding Edlen used PropertyFit commercial PACE financing to complete the project capital stack for Portland's first Living Building. The mixed-use building – consisting of class A office and retail space – will generate more energy and water than it consumes and is designed to be the largest commercial Living Building in the world. The project also integrated improved seismic performance, in part by applying PACE financing.

The seismic/structural design was to Risk Category (RC) IV, enabling a building lifespan of more than 500 years. RC IV frames, required for essential facilities such as hospitals, are 50 percent more resistant to seismic forces than RC II frames, the minimum needed for office buildings.³⁶



New Build Seniors Housing

Santa Rosa, California

In a seniors housing project, undertaken via Greenworks Lending, the bulk of the PACE allocation went to seismic costs. The project's total budget was \$41 million (hard, soft, and land costs). The total PACE allocation was \$6.8 million, with \$5.6 million allocated to seismic (82 percent of PACE and 14 percent of the total budget). \$500,000 was allocated to concrete garage, \$759,000 to structural steel, \$845,000 to shoring, \$152,000 to structural engineering and architect fees. In other words, 14 percent of the entire budget was seismically related – 20 percent of hard costs – to meet state code.³⁷

³⁶ PropertyFit About – Case Studies (2020) Accessed from: <http://www.propertyfitoregon.com/about/#case-studies>

³⁷ Personal communication, Dana White, Greenworks Lending

Caveats and Considerations

Caveats

PACE financing is not a perfect solution in and of itself. The financing mechanism has its critics, like any other program option. Due to its narrow scope, this discussion paper does not delve into potential limitations of PACE programming – which is covered in other, broader sources addressing PACE programming for BC. Suffice it to say that PACE is one solution among many for addressing a massive challenge: improving existing and new buildings from a low-carbon resilience perspective. This requires a “portfolio approach,” or combination of multiple financing tools, regulatory measures, and other sectors and government activities.

Furthermore, finance and funding are not the only barriers to enhancing resilience in Vancouver and BC’s built environment. Local practitioners have cited additional challenges, such as zoning bylaws, height restrictions, and view cones as challenges for seismic upgrades or more resilient designs within the City of Vancouver and elsewhere. By comparison, for flooding, flood-resilient foundations cost virtually nothing, but changing industry habits and practices remains a challenge. This has been a recurring theme from the Understanding Risk BC (URBC) symposiums: moving towards multi-hazard design for resilience by bringing together actors across the science-policy-action space. There is a need to bridge the gaps between what we know about local hazards and risks, designing and building for low-carbon resilience, and applying those techniques and approaches on the ground.

One practitioner interviewed suggested that to achieve broad buy-in, building owners must see themselves as part of the more general “community resilience” narrative (i.e., not just as property owners from a bricks-and-mortar sense). Part of this is the conceptualization that “resilient buildings” house tenants and provide income for owners, despite shocks and stressors.³⁸

³⁸ Personal communication, Ken Odell, MHP Engineering

On Equity, Diversity and Inclusion

PACE programming addresses equity in part by increasing access to finance and eliminating the credit challenge for less “sophisticated” property owners, which can in turn filter down to tenants or small business operators in vulnerable buildings.

PACE programs can also be specifically designed with equity and inclusion in mind. For example, PropertyFit (Oregon) has a strong commitment to advancing social equity by increasing economic opportunity for historically disadvantaged populations and creating equitable access to living-wage jobs and wealth creation opportunities. The program explicitly seeks to support a marketplace that is inclusive and supportive of certified disadvantaged, minority and women (DMW) owned firms’ participation in energy efficiency, renewable energy, water conservation, and seismic retrofit industries.³⁹

As part of any portfolio approach of government and industry action, an equity-focused project origination approach (via coaching, coordination, and effective application and program design) can ensure that a program like PACE effectively and justly addresses vulnerabilities of those most in need. Furthermore, in an ideal scenario PACE unlocks some or all existing incentive dollars that could be channelled towards communities and individuals facing one or more systemic barriers.

³⁹ PropertyFit. *Social Equity Commitment*, (2020). Accessed from: <http://www.propertyfitoregon.com/about/#case-studies>

Conclusions

According to the Canada Green Building Council, efficiency and climate mitigation measures in Canada's retrofit economy energy could generate \$32.5 billion in GDP and more than 260,000 new jobs by 2030.^[1] **However, by failing to account for resilience improvements to existing building stock, the estimated figure may well be short by several billion dollars.** Furthermore, these efforts will require supportive financing for new construction and more stringent code requirements for energy efficiency, public safety and resilience. This proactive work will help ensure that new stock avoids adding to the functional recovery burden in BC and or stalling economic development in the event of a major natural disaster.

As C-PACE financing rises in popularity in the US, owners and developers of commercial real estate have found it provides the improved flexibility and cost-of-capital that has earned a key role in the capital stack. Designed effectively, C-PACE can address the concerns of Class B and C commercial property owners related to existing stock. Meanwhile, Class A owners may continue on as early adopters, driving both market transformation and the retrofit and resilience economies.

British Columbia could learn from efforts in the United States to design a set of programs that ensure a vibrant, diverse credit ecosystem for building owners; strong and effective consumer and public finance protections; and an integrated, low-carbon resilience approach that addresses both hazards and opportunities. From a resilience perspective, the following components will be critical to effective BC PACE initiative:

- Integrating a broad range of decarbonization and resilience measures in the enabling legislation;
- Undertaking industry education and capacity building to ensure building owner and creditor uptake on the low-carbon resilience imperative, to effectively pair emissions reductions and efficiency measures with resilience work;
- Avoiding overly prescriptive and conservative program design considerations, especially difficult loan-to-value (LTV) requirements and any form of savings-investment ratio (SIR), while ensuring the protection of both borrowers and creditors; and
- Clarity within enabling legislation about local taxing authorities' non-liability for defaulted or other unpaid PACE assessments.

The successful integration of these priorities and imperatives may be critical to ensuring the long-term viability of our existing stock of affordable housing and commercial buildings.

It will be crucial to assemble a suite of effective policies in precise alignment with other initiatives, such as the BC Building Electrification Road Map, various local and provincial seismic strategies and programs, and future policy and regulatory moves related to retrofit codes.

Finally, resilience by its very nature, knows no spatial boundaries. As Vancouver and BC work to address seismic and climate vulnerabilities and stressors, taking a broader view of opportunities and challenges will be important. Because of similar climate ambitions, codes and standards, and risk profiles, there will be many opportunities for amplifying and scaling built environment retrofitting work across actors in the 'Cascadia' region of the Pacific Northwest. The Pacific Coast Collaborative, and the Pacific NorthWest Economic Region (PNWER) have both already made moves to recognize and address low-carbon resilience needs for the region's buildings, but there remains much more to be done. More coordination and shared problem solving can help realize both economic development and resilience objectives throughout the region.

Evidence from the US suggests PACE financing represents a meaningful tool to addressing two critical needs in our built environment: decarbonizing existing buildings and increasing our overall resilience. Developed with a fulsome low-carbon resilience approach, and integrated carefully with a social equity approach, its impacts could be profound.





About Vancouver Economic Commission

The Vancouver Economic Commission works to build a prosperous, inclusive and resilient economy for Vancouver, its businesses and its citizens. As the economic development agency for the City of Vancouver, VEC works to strengthen Vancouver's thriving economy by supporting local companies, attracting high-impact investment and promoting international trade. VEC collaborates with business, academia and government organizations to position Vancouver and British Columbia as a whole as a global destination for innovative, creative and sustainable business. VEC is recognized as a global leader in low carbon economic planning.

About Thrive Consulting

Jessica Shoubridge is the Owner and Principal of Thrive Consulting, a Whistler-based consultancy working globally on low carbon resilience, natural hazard management and planning, risk assessment and analysis, policy development and implementation.



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