

Appendix O: C-PACE RESILIENCE TECHNICAL STANDARDS

1. Defined Terms
2. Overview
3. Examples of Resilience Improvements
 - a. Climate Change Adaptation Examples
 - b. Nature-based Solution Examples
 - c. FORTIFIED Designation
 - ~~c.d.~~ Roof upgrades as Resilience Improvements
 - ~~d.e.~~ Other
4. Supporting Documentation
5. Resilience for New Construction

1. Defined Terms

This document is an appendix to the C-PACE Program Guidelines (the “Program Guidelines”) published by the Connecticut Green Bank (the “Green Bank”). Pursuant to the Program Guidelines, this appendix may be modified or amended by Green Bank, in its sole discretion, from time to time. Capitalized terms used but not defined herein have the meaning ascribed to them in the Program Guidelines.

2. Overview

Due to Public Act 22-6, an amendment to the C-PACE Statute (https://www.cga.ct.gov/current/pub/chap_298.htm#sec_16a-40g), the Standard SIR Technical Review process (described in Article IV, Section 2 of the Program Guidelines) for a project that improves the resilience of a property (each being a “Resilience Project”) is not applicable. Instead, C-PACE eligibility for Resilience Projects will be determined by the completion of resilience study that assesses the expected resilience cost savings of the Resilience Improvements over the useful life of such improvements before approving financing. While there is no minimum requirement of dollar savings that needs to be achieved, an assessment of cost savings, if any, must be completed. Resilience Projects should meet all current building codes, when applicable. Based on an identification of Resilience Improvements and completion of an assessment of resilience cost savings through a resilience study, the project will be eligible for C-PACE financing (“C-PACE Eligible Finance Amount”). Fees and interest associated with the C-PACE financing can be added to the C-PACE Eligible Finance Amount to determine the total C-PACE benefit assessment amount.

3. Examples of Resilience Improvements

Resilience Improvements help a building/property adapt to vulnerabilities that could interrupt business operations and impede the property owner's ability to stay open and functional. C-PACE financing for Resilience Projects is available to aid in these situations by providing the funding needed to adapt to such vulnerabilities. The following are examples of Resilience Improvements that can be assessed through a resilience study and considered for C-PACE financing:

- a. Climate change adaptation examples: The following are examples of challenges caused by climate change that can have negative effects on buildings and properties. Adapting to these challenges caused by climate change by reinforcing their structures through resilient building practices can help property and business owners stay open, functional, and operational.
 - a. Flood Management
 - b. Storm events/Extreme Weather
 - c. Wind
 - d. Fire
 - e. Sea Level Rise
 - f. Extreme Heat (MFH)
- b. Nature-based solutions: Infrastructure, including natural infrastructure, which promotes stormwater management, healthy vegetation, soils, and aquatic ecosystems to provide ecosystem services such as flood control and hazard risk reduction, e.g. bioswales, rain gardens, pervious surfaces, tree planting (native species and/or shade trees) and removal of dead trees, or natural ecosystem restoration (i.e. wetland, marshland, or other natural assets)
- c. FORTIFIED Designations: In an effort to reduce damage to residential, commercial and multifamily structures and help businesses re-open more quickly following severe weather, the Insurance Institute for Business & Home Safety (IBHS) developed FORTIFIED™ Commercial, a voluntary, resilient construction and re-roofing standard and designation/compliance program. FORTIFIED employs an incremental approach with three levels of designations available (listed below) so design professionals can work with building owners to choose a desired level of protection that best suits their budgets and resilience goals.
 - a. FORTIFIED Roof
 - b. FORTIFIED Silver
 - c. FORTIFIED Gold

d. Roof upgrades as Resilience Improvements: A roof upgrade project must be designed to meet the FORTIFIED Roof designation standards in order to be considered for approval under the Resilience Technical Standards in this Appendix.

~~d.e.~~ Other: Other vulnerabilities that could impede a building's ability to operate and are not listed above can also be reviewed for C-PACE financing. In order to be considered, a resilience study must still be completed, including an assessment of the cost savings associated with the proposed Resilience Improvement(s) and all other requirements listed in Section 4b. and Exhibit II of this Appendix.

4. Supporting Documentation

The applicant must submit the following documents to the Green Bank, in a form acceptable in their discretion. All additional supporting documents, including but not limited to, calculations, analyses, photos, previous studies/reports, and design/construction documentation should also be submitted for review:

- a. Pre-Study Worksheet, if applicable (Exhibit I)
- b. Resilience Study that must include the following, as outlined in Exhibit II:
 - Property Overview
 - Identification of Vulnerabilities
 - Adaptation Proposal
 - Assessment of Cost Savings Analysis
 - Implementation Timeline
- c. FORTIFIED supporting documentation, applicable forms and back-up documentation submitted to the project's evaluator for review and determination of compliance. See all requirements and how to get started with FORTIFIED here (<https://fortifiedhome.org/getting-started/>). Only applicable-required if designing for a FORTIFIED Designation, including but not limited to roof upgrade projects as Resilience Improvements.

5. Resilience for New Construction

Aside from generally qualifying to be included in the TECC calculation as defined above in Section 4, Resilience Improvements can be incorporated into a C-PACE New Construction project in one of two ways (outlined below), and may or may not incorporate energy measures. Please note that Resilience Improvements can also be financed as a stand-alone C-PACE project and can follow the Resilience Technical Standards as outlined in Appendix O. Resilience Improvements following the Resilience Technical Standards as outlined in Appendix O could be eligible for up to 100% in C-PACE financing:

- Adding prescriptive resilience measures to an energy project as Bonus Measure(s), defined in the New Construction Appendix N, for a maximum of 10% additional of the TECC in C-PACE financing.
- Using the FORTIFIED program and designing for one of the 3 levels of building standards to qualify for up to 20% of the TECC in C-PACE financing. Projects choosing to meet one of the FORTIFIED standards may also incorporate additional Bonus Measures, for up to an additional 10% of the TECC in C-PACE financing. Lastly, Projects that are also designing for Net Zero may be eligible for up the maximum of 35% of the TECC in C-PACE financing.

Refer to Table 3 found in Appendix N for a full overview of the different levels of available C-PACE financing for Resilience in New Construction projects.

Exhibit I - Pre-Study Worksheet

To be completed prior to conducting a resilience study

Business Overview:

Property Ownership Entity Name: _____

Property Owner Contact Name & Title: _____

Contact Phone Number: _____ Contact Email: _____

Property Address: _____

Property Type: _____ Non-Profit: YES NO

Property Overview:

FEMA Flood Zone: YES NO (If YES, complete Box 1. If NO, complete Box 2)

1.

FEMA Flood Zone of Structure: _____ BFE _____; Adjacent Flood Zone: _____ BFE _____

FEMA Flood Zone of Additional Property: _____ BFE _____; Adjacent Flood Zone: _____ BFE _____

2.

Do you have local site-specific flooding: YES NO

If YES, please describe: _____

Building Plans Available: YES NO Structure Age: _____ Historic: Y N Maybe

First Floor Elevation (FFE): _____ Elevation of Lowest Horizontal Beam *if on pilings*: _____

Structure: Wood Frame Steel Frame Cement Block Masonry

Foundation: Slab-on-grade Crawl Space Basement Pilings/Pier

Number of Steps to First Floor: _____ steps **UP / DOWN**

First Floor Contains: _____

Water Supply (check all that apply)

Well Public Water System We are a regulated non-community water system

Sanitary Wastewater (check all that apply)

Septic System Sanitary Sewer System Treatment System

Regulated large Subsurface sewage disposal

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How long have you owned the building? _____

Do you have any intention of selling this building? ___ YES ___ NO If so, when? _____

Property Overview Continued:

What building or site improvements have you already made, if any?

What measures do you have in place to address potential hazards?

What resources do you utilize, or what groups do you belong to, that may be able to provide support during an emergency?

Outbuildings

System	Description	Notes
External Features	External Flood Control	__Seawall __Bulkhead __Bern
	External Wall Material	
	Grading Around Site	__Towards __Away __Neither
First Floor (FF)	Floor Material	__Hardwood __Cement __Carpet
	Internal Wall Material	__Drywall __Wood __Cement __Metal
	Major Appliances	
Basement (if applicable)	Floor Material	__Hardwood __Cement __Carpet
	Internal Wall Material	__Drywall __Wood __Cement __Metal
	Major Appliances	
Low Entry Points into Building	Doorways	
	Windows	
	Utility Openings	
	Other	
Utility Room (U.R.)	Contains	
	Location	__Basement __First Floor __Upper Level __Outdoors
	Notes	

Property Event History

	Coastal Flood		Riverine Flood		High Wind		Heavy Snow		Tropical Event		Extreme Heat		Other Event: _____	
	Date: _____		Date: _____		Date: _____		Date: _____		Date: _____		Date: _____		Date: _____	
<i>Impact Circle selection</i>	Site	Structure	Site	Structure	Site	Structure	Site	Structure	Site	Structure	Site	Structure	Site	Structure
	Equipment	Inventory	Equipment	Inventory	Equipment	Inventory	Equipment	Inventory	Equipment	Inventory	Equipment	Inventory	Equipment	Inventory
	Human	Access	Human	Access	Human	Access	Human	Access	Human	Access	Human	Access	Human	Access
	Tech & Data	Business Closed	Tech & Data	Business Closed	Tech & Data	Business Closed	Tech & Data	Business Closed	Tech & Data	Business Closed	Tech & Data	Business Closed	Tech & Data	Business Closed
Event Name														
Description of Loss														
Remediation Implemented														
Loss Due to Event (A)														
Remediation Cost (B)														
Total Loss Incurred (A+B)														
Notes														

Power Outages:

Please complete below questions if your business has ever lost power:

Were these outages during extreme weather events? ___ Yes ___ No

Was the business closed due to these outages? ___ Yes ___ No

How many days was your business closed? _____ days

How many days were you without power? _____ days

Did you use a generator to operate through the outage? ___ Yes ___ No

Was the generator already on-site or did you transport one to the property? _____

Was Heat available during the outage? ___ Yes ___ No

Was AC available during the outage? ___ Yes ___ No

Was potable water available from the faucet during the outage? ___ Yes ___ No

Could you dispose of sanitary wastewater during the outage? ___ Yes ___ No

Was anything lost due to the power outage? (i.e. equipment, food, supplies, IT, data) ___ Yes ___ No

What was lost?

What caused the loss? (i.e. lack of refrigeration)

Has an outage affected your customers? ___ Yes ___ No

Has an outage affected communications? ___ Yes ___ No

Is your business located in a microgrid? ___ Yes ___ No

A microgrid is a system of buildings or properties connected to an independent power source.

Have you utilized any resources during an outage, such as Chamber of Commerce, to help speed up restorations?

If so, please elaborate: _____

Property Flooding:

Please complete below questions if your business is in a flood zone:

Name of Flood Source (river name, coastal, etc): _____

Scenario from Exposure Analysis: _____

Distance from High Water Mark: _____

Do you have an Elevation Certificate? YES NO

Have you had difficulty accessing your building due to street flooding?

- If yes, how frequently? _____

Do you have space to store storm preparedness materials (Sandbags, plywood, etc)? Y N

Is the business located on the coastline? ___YES ___NO (If yes, please complete table)

Type:	Wetland	Beach	Dune	Bluff	Notes	
Material:	Sand	Gravel	Boulder	Bedrock		
Environment:	Erosive	Depositional				
Stabilization:	Vegetation	Rip – Rap	Seawall / Bulkhead Groin / Breakwater		Wood/Cement/ Metal/Stone/Other	

Utility	Location				Relative Elevation	Notes
	U.R	Basement	FF	Outdoors		
Elevator					___ ft	
HVAC: Condensers					___ ft	
A/C – window / wall					___ ft	
Water Heater					___ ft	
Furnace					___ ft	
Electrical Panel					___ ft	
Electrical into Building					___ ft	
Electrical Outlets					___ ft	
Plumbing: Potable					___ ft	
Fuel Tanks					___ ft	
Generator					___ ft	
Dumpster					___ ft	
Other					___ ft	

Property Flooding Cont.: *Please complete below questions if your business is in a flood zone*

	Secure	Other
Fuel tanks / Generators	Y / N ?	
Garage and Bay Doors	Y / N ?	
Chemical Storage	Y / N ?	
Moorings	Y / N ?	
Dock	Y / N ?	
Parked Vehicles / Boats	Y / N ?	
Septic Tank	Y / N ?	
Generator	Y / N ?	
Dumpster / Spent Oil	Y / N ?	
Material that could become debris	Y / N ?	
Buildings / Out Structure	Y / N ?	
Fence (non-seawall)	Y / N ?	
Equipment	Y / N ?	
Laydown or Storage Areas	Y / N ?	
Other	Y / N ?	

Disaster Preparedness Questions:

What are the hazards that could impact your business? _____

Which hazards do you perceive as the biggest threat? _____

Are you concerned about your business' future hazard exposure? ___ Yes ___ No

Do you feel you are financially prepared for a disaster? ___ Yes ___ No

Do you have access to onsite/offsite storage for inventory, chemicals, equipment) ___ Yes ___ No

Do you have electronic data backups for your business files? ___ Yes ___ No

Do you have a formal plan in place for:

Preparations for an event? ___ Yes ___ No

Response during an event? ___ Yes ___ No

Recovery from an event? ___ Yes ___ No

Are your employees aware of the details of these plans? ___ Yes ___ No

Have you created an Emergency Employee Contact List? ___ Yes ___ No

How are employees notified in the event a natural disaster requires the business to close? _____

What support is available for employees if the business is closed for an extended period? _____

Do you communicate closures/schedule changes to customers? ___ Yes ___ No

Do you communicate with suppliers/customers if your building is inaccessible? ___ Yes ___ No

Have you experienced supply chain disruptions? ___ Yes ___ No

How long would you be able to stay in business if you had to close for an extended period of time?

Under what conditions would you relocate or take special storage precautions?

Who would you contact for information/assistance during an extreme weather event? (i.e. state/local government, chamber, etc.)?

Insurance and Risk Reduction Questions

Do you have flood insurance for the building? ___Yes ___No

Do you have contents insurance? ___Yes ___No

Do you have other disaster insurance? ___Yes ___No

How aware of you of the details of your insurance policy, such as what is covered under your policy? *Completely Unaware* 1 2 3 4 5 *Completely Aware*

Is there insurance information you feel would be helpful to receive? ___Yes ___No

What kind of information? _____

What would be the most effective method of delivery for this information (brochure, workshop, Webinar)? _____

Are you aware of risk reduction assistance programs? ___Yes ___No

Are you aware of risk reduction options? ___Yes ___No

Are these risk reduction options accessible to you? ___Yes ___No

Exhibit II - RESILIENCE STUDY REPORT REQUIREMENTS

The outline below is the required list of information to be included in a resilience study that will be presented to the Green Bank for consideration for approval of C-PACE financing. A Pre-Study Worksheet (Exhibit I) should be completed prior to a resilience study, but is not required in all cases. If designing for a FORTIFIED designation, all applicable forms and back-up documentation submitted to the project's evaluator for review and determination of compliance can be used as a resilience study. This could include, but is not limited to: site photos, design & structural drawings, and/or construction specifications. Please note that an assessment of the cost savings is always required in order to be considered for approval of C-PACE financing.

1. **Property Overview:** a narrative describing the location (full address), age of structure(s), property's use history, ownership structure, etc. It should also include a description of any previous environmental remediation work and/or resilience measures completed.
2. **Identification of Vulnerabilities:** a detailed summary of the vulnerabilities to be addressed. Please include information about recent events that may have impacted the property, including any photo/written documentation of damage/losses, estimated costs of previous losses or impacts to your business, and previous actions taken to prevent losses, if any.
3. **Adaptation Proposal:** a proposal and narrative describing in detail the adaptation measures to be completed to address the above identified vulnerabilities. The proposal should also include a detailed breakdown of each cost that will be associated with the adaptation proposal. Drawings, plans, previous proposals, etc. should be included as attachments to the resilience study and referenced in the narrative.
4. **Proposed Savings Analysis:** calculations accompanied by a narrative describing the savings, if any, that will be associated with the proposed adaptation measures. Savings should be represented in a dollar value and can include such things as operational savings, lost capital avoided, insurance savings, etc. All backup documentation associated with the savings calculations (i.e. insurance costs, previous maintenance bills, lost revenue due to business closure) should be included as attachments to the resilience study and referenced in the narrative. Please note that while there is no minimum requirement of savings that needs to be achieved, an assessment of cost savings, if any, must be completed.
5. **Implementation Timeline:** narrative describing the proposed timeline for implementing the adaptation measures described in the study, including anticipated start date, project duration, phases of completion, etc.