



REVIVE 2024 Pilot

Good for the planet
Good for your buildings
Quality assured results

Overview

Outcome goals, process goals

Updates to the standard in response to public comments

Tiers

Certification Guidebook updates

QA Workbooks

Software Tool & Resources

REVIVE 2024 Pilot
A retrofit standard for all
kinds of existing buildings



Outcome goals

- Resilience
- Health
- Decarbonization

Process goals

- Quality assurance
- Openness

Thanks to all who commented on the public review draft



~ 15 unique commenters

~ 550 comments

Responded to individually

Response Options

Accepted

A: Accepted comment as submitted

Amin: Accepted, with minor changes
(same approach to the issue)

Abut: Accepted, in principle (a different
response to the issue is proposed)

Rejected

R: Rejected

Rbut: Rejected, except as noted
(majority of comment is not accepted)

Deferred

More: More information is needed

Doos: Deferred, Out-of-Scope

DL: Deferred, Late

Outcome Goals

Resilience | Air sealing, insulation, seismic, PV, batteries...

+

Health | Radon, Carbon monoxide, mold...

+

Decarbonization | Electrification, community solar, low-carbon choices...





Resilience Performance Protocol & Criteria

- Simulate seven-day outages, in extreme weather.
- Whole building remains habitable, not just a protected zone.
- On-site PV and batteries provide limited power.
- Assume full design occupancy for residential.
- Reduced ventilation rate 5 cfm/person.

Winter Resilience Criteria

- Zero hours below 35°F
- Limited degree-hours
≤ 216 SET-hours*, below 54°F
(*similar to LEED pilot credit)
- Critical electrical loads covered

Summer Resilience Criteria

- Zero hours of Heat Index in Danger
- Zero “deadly days”
- Critical electrical loads covered



Health and Hazards

EPA

1. Asbestos
2. Belowground contaminants (except radon)
3. Building products/material emissions
4. Carbon monoxide and other combustion appliance emissions (nitrogen oxides, VOCs and particulates)
5. Environmental tobacco smoke
6. Garage air pollutants (CO, benzene and other VOCs)
7. Lead
8. Moisture (mold and other biologicals)
9. Pests
10. Polychlorinated biphenyls
11. Radon
12. Wood smoke and other solid fuel emissions
13. Heating, ventilating and air conditioning (HVAC) equipment
14. Combustion safety, vented combustion appliances
15. Combustion safety, unvented combustion appliances
16. Source or local exhaust ventilation
17. Whole-dwelling ventilation for distributed contaminant sources
18. Home safety
19. Protecting IAQ during construction
20. Jobsite safety

Infectious aerosols

FEMA, IBHS

SEISMIC

FLOOD, TSUNAMI

HAIL

WIND

ICE DAMS, SNOW LOAD

WILDFIRE / smoke

Decarbonization

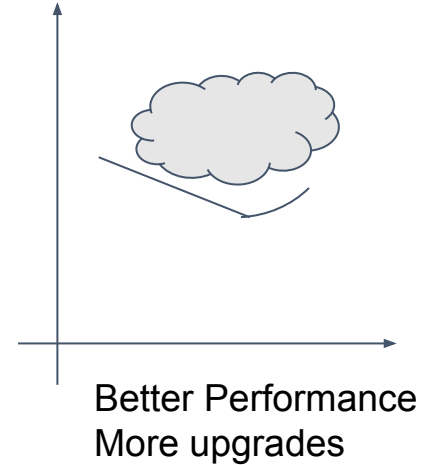
Cost Metric = Sum of these annualized costs:

- Direct energy cost. E.g. site kWh * \$/kWh = \$
- Direct building retrofit measures cost (material & labor)
including building-level electrification cost. E.g. ft3 of stuff * \$/ft3 = \$
- Cost of carbon -- upfront/embodied. CO2e kg * \$0.25/kg = \$
- Cost of carbon – operating. CO2e kg * \$0.25/kg = \$
- Energy system transition cost. E.g. new solar + storage. \$/W * W = \$

Plus additional decarbonization effort

- Electrification, renewable sources
- Embodied carbon

Life cycle cost



- Design as if there's a cost of carbon.
- Minimize total life cycle cost.



Process Goal – Quality Assurance

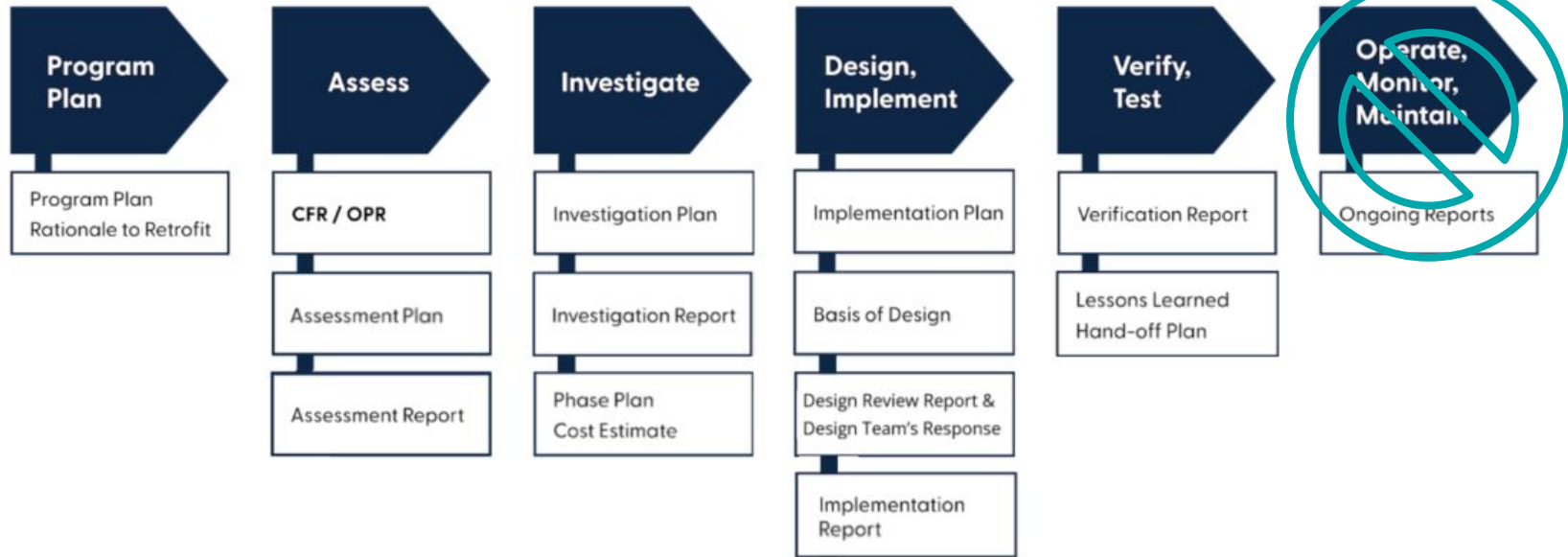
Compliance is documented

Zoning

Permit

C.O.

BPS



Process goal – Openness for Scalability

The Standard Document

- Written in code-mandatory language.
- All calculation protocol spelled out, for requirements on modeled performance.

Roles:

- Owner —————→
- Authority —————→
- Commissioning Provider —————→
- Verification & Testing Providers —————→

The Certification Program

- Our certification to the standard.
- Maintain open-source calculation engine.

Corresponding Roles for our certification to the standard:

- Owner
- Phius
- CPHC®
- Phius Raters & Verifiers

Owner is responsible for
Review & Approval of reports
on Elective Requirements



Top changes in response to comments

- Consistently distinguished requirements for residential versus nonresidential.
- Reimposed a specific post-retrofit air-tightness requirement.
- Batteries not strictly required – a tier is added where electrical operation during an outage does not have to be carbon-free.
- Electrification required by the final retrofit phase rather than the initial phase.
- No monitoring required for residential buildings.



New construction

Retrofit

H/C performance



S/E performance



IAQ, moisture mgmt



EPA/DOE QA process



Existing condition investigation

Resilience performance

Life cycle cost performance

IAQ, moisture mgmt

Site hazard fortification

ASHRAE Cx process

Monitoring / OCx



Guidebook Updates & QA Workbooks

- The REVIVE Pilot Program will be detailed in Section 3 of the Phius Certification Guidebook v24
- The intent of the *Guidebook* is to support the requirements outlined in the *Standard*
- The Guidebook will address:
 - Phius' Certification Process
 - Certification requirements (per the Standard)
 - Modeling protocol (per the Standard)
 - Documentation requirements for each phase (for Phius Certification)

Phius REVIVE 2024 Pilot Certification Requirements

Table 3.3.0 Phius REVIVE 2024: Building Certification Requirements by Project Type			
Project Type	Single-Family, Duplexes & Townhouses	Multifamily	Non-Residential
Program Version	CORE & ZERO (for differences refer to Table 3.3.1)		
Co-requisite Requirements			
<u>Personnel</u>	Phius Certified Rater or Verifier with Multifamily Designation	Phius Certified Verifier with Multifamily Designation	Phius Certified Verifier
EPA Indoor airPLUS ³⁷	Construction Specifications Version 1 (Rev. 04)		
	Refer to Section 1.4.1.1	Refer to Section 1.4.1.2	
EPA ENERGY STAR ³⁸	Single-Family New Homes Version 3.2 Refer to Section 1.4.1.1 & Section 1.5.3.1	Multifamily New Construction (MFNC) Version 1.2 Refer to Section 1.4.1.2 & Section 1.5.3.1	
EPA Energy Savings Plus Health Guidelines	Publication No. EPA 402K21001	Publication No. EPA 402K21002	
ASHRAE Standard 227P	Section 7.5.5		
Energy Star Portfolio Manager	Monitoring recommend, but not required		Monitoring required per Section 3.3.4
Hazard Mitigation ³⁹			
Earthquake	Refer to Section 3.3.2		
Flood / Tsunami	IBHS FORTIFIED Commercial (Sec 3.2.4-3.2.5)		
Hail, Snow Loads & Ice Dams	Refer to Section 3.3.2		
Structural / High Wind	Refer to Section 3.3.2		
Wildfire	FEMA Risk "Relatively Moderate" or higher: Defensible Space & Home Hardening Self-Inspection Checklist		



Phius REVIVE 2024 Pilot Certification Requirements

**Table 3.3.0 Phius REVIVE 2024: Building Certification Requirements by Project Type
(continued)**

Project Type	Single-Family, Duplexes & Townhouses	Multifamily	Non-Residential
Program Version	CORE & ZERO (for differences refer to Table 1.3.1)		
<u>Phius Passive Conservation Requirements</u>			
Resilience	Winter and Summer requirements outlined in Section 3.3.3.3		
<u>Airtightness</u>	Blower door testing is required to show compliance with limits outlines in Section 3.3.3.2		
<u>Moisture Risk Mitigation & Comfort</u>	Opaque assembly, detailing and fenestration requirements are outlined in Section 1.3.3.3		
<u>Phius Active Conservation Requirements</u>			
Life Cycle Cost Limit	The ADORB cost for all projects must not exceed that of a baseline case*		



Phius REVIVE 2024 Pilot Certification Requirements

Table 3.3.1 Phius REVIVE 2024: Building Certification Requirements by Program Version		
Project Type	Single-Family, Duplexes, Townhouses, Multifamily and Non-Residential	
Program Version	CORE	ZERO
Renewable Energy		
On-Site Renewables	Credited with utilization factors applied as outlined in Appendix _.	Credited
Off-Site Renewables	Not credited.	Credited with utilization factors applied as outlined in Appendix _.
Battery Storage	Battery readiness required.	Required.
Combustion Equipment, Fireplaces and Appliances		
Space Heating (natural gas furnace, boiler etc...)	Allowed with electrification readiness criteria per Appendix _.	Not Allowed.
Domestic Hot Water (natural gas water heaters)		
Other Fossil-Fuel based Equipment		
Appliances (natural gas cooking, natural gas dryer etc...)		
Fireplace (Natural Gas)	Allowed if vented to the outside, with an airtight stove or fireplace box and electrification readiness criteria per Appendix _.	
Fireplace Insert or Wood Stove (Biomass-burning)	Allowed if vented to the outside, with an airtight stove or fireplace box.	
Fireplace (Open / Unvented / Ethanol)	Not Allowed.	



Phius REVIVE 2024 Pilot Certification Process - Part 1

Table 3.1.1 Phius REVIVE 2024 Process Matrix

AIA Project Phases	Phius Benchmarks		Guidebook	Phase Summary
Pre-Design (PD)	Phase 0 Programming		3.1.1	Rationale for Retrofit -A free online tool used to conduct a preliminary assessment for retrofit buildings Multi-Facility Planning -Project team makes an initial Program Plan and establishes the general scope of work to be completed
	Phase 1 Paperwork		3.1.2	Inquiry -Submitter requests a quote, invoice, & contract per building.
	Milestone 1 Project Registered		3.1.3	Registration -Initial registration fee is paid & contract is signed. -The project is now publicly visible on the Phius Certified Project Database. A Dropbox folder is shared by Phius with the Submitter.
Schematic Design (SD)	Phase 2 Assessment, Investigation & Review		3.1.4	Assessment & Investigation -Commissioning Provider (CxP) conducts existing building assessment and investigation, including creating and running the performance model Assessment & Investigation Review -CxP submits Assessment & Investigation deliverables to Phius -Phius Review & Feedback -CxP Revisions & Response -Repeat (as needed)
	Milestone 2 Assessment & Investigation Approval		3.1.5	Assessment & Investigation Approval -Phius approves the Assessment & Investigation deliverables. An official letter of approval is sent to the design team. -Phius creates and sends a Design Review Invoice which shall be paid before Phase 3 can begin.



Phius REVIVE 2024 Pilot Certification Process - Part 1

Corresponds with Standard section:

- 4.5: Programming

Phase 0 Programming	3.1.1	Rationale for Retrofit -A free online tool used to conduct a preliminary assessment for retrofit buildings Multi-Facility Planning -Project team makes an initial Program Plan and establishes the general scope of work to be completed
Phase 1 Paperwork	3.1.2	Inquiry -Submitter requests a quote, invoice, & contract per building.
Milestone 1 Project Registered	3.1.3	Registration -Initial registration fee is paid & contract is signed. -The project is now publicly visible on the Phius Certified Project Database. A Dropbox folder is shared by Phius with the Submitter.

Rationale for Retrofit	4.5.1.1 Intended Building Life:	Indefinite / Permanent	Cx Team Notes
	4.5.1.2 Building Functionality:	Existing function will be maintained	
	Existing Function	Residential: Multifamily Non-Residential: N/A	
	New Function	Residential: (Select, brevity) Non-Residential: (Select, brevity)	
	4.5.1.3 Site and Land Use:	Climate migration risk values will automatically populate based on the Climate Migration Map published by PROPUBLICA based on the County defined in the 'Program Plan' tab below.	
	4.5.1.3.1 Climate Migration	Project County: Centre County Heat Risk: 3 WB Risk: 4 Farm Crop Risk: 3 Sea Level Rise Risk: 1 Wildfire Risk: 2 Economic Risk: 4	
	4.5.1.3.2 Zoning	Typical Zoning Designation: Residential Specific Zoning Code: (Enter Zoning Code (i.e. R-1B)) Variance Needed? No	
	Final Considerations & Cx Team Acceptance:		
	This building may be an ideal candidate for retrofit. Please confirm acceptance of this determination by typing "X" in the box to the right.		

Snip from the Phius REVIVE 2024 Pilot Assessment & Investigation Workbook

Phius REVIVE 2024 Programming Worksheet					EBCx Program Scope & Objectives				
 General	Owner Name: Super Cool Owner Submitter Name: Super Cool Submitter CPHC CxP Name: Really Good CxP CPHC CxP #: 12345 City: Boalsburg State: Pennsylvania County: Centre County Facility Quantity: 1				Program Mission Statement: (Purpose for Retrofitting) Additional Notes:				
	Facility Identification				Ranking Metrics				
	Facility Rank	Building Name	Existing Function	Approximate ICFA (sf)	Intended Function	Intended Building Life	Building Function	Climate Migration Score	Maintenance Needs
	1	Building 1	Residential	10,000	Residential	>30 yrs	No change	3 4	Moderate
	2	Building 5	Residential	15,000	Mixed-Use	>30 yrs	Moderate change	3 4	Minimal
	3	Building 3	Mixed-Use	15,000	Mixed-Use	>30 yrs	Slight change	3 4	Moderate
	4	Building 4	Vacant / None	10,000	Residential	>30 yrs	Complete change	3 4	Considerable
	5	Building 2	Industrial	13,000	Commercial	>30 yrs	Complete change	3 4	Considerable

Snip from the Phius REVIVE 2024 Pilot Multi-Facility Planning Tool



Phius REVIVE 2024 Pilot Certification Process - Part 1

Phase 2 Assessment, Investigation & Review	<u>3.1.4</u>	Assessment & Investigation -Commissioning Provider (CxP) conducts existing building assessment and investigation, including creating and running the performance model Assessment & Investigation Review -CxP submits Assessment & Investigation deliverables to Phius -Phius Review & Feedback -CxP Revisions & Response -Repeat (as needed)
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Corresponds with Standard sections:

- 5.1 IAQ & Moisture Risk Mitigation
- 5.2 Hazard Mitigation
- 8.6: Assessment Phase
- 8.7 Investigation Phase

General Note:

- This phase is anticipated to be the 'heaviest lift' in terms of CPHC (aka CxP) involvement, planning, and time commitment

Major Documentation Requirements

- Compliance Tool & supporting documentation
- MBEST Workbook (Multifamily projects only)
- Phius REVIVE 2024 Pilot Assessment & Investigation Workbook



Phius REVIVE 2024 Pilot Certification Process - Part 1

Table 3.4.2.0 Required Documentation for Phius REVIVE 2024: Phase 2 - Assessment & Investigation			
Compliance Tool			Phius 2024 REVIVEcalc Results & Supporting Documentation
Additional Documentation			DOE Multifamily Building Efficiency Screening Tool (MBEST) Workbook
Phius REVIVE 2024 Assessment & Investigation Workbook	Issues & Resolutions Log		Feedback channel between Cx team members
	Updated Program Plan		Completed for each individual building
	Rationale for Retrofit		Must be conducted for every building
	Site Hazard Mitigation Worksheet		Automatically generates project-specific requirements based on hazard zones
	Owner Worksheet		Basic facility information, documentation, & occupant survey
	Begin development of the CFR Document		
	Existing Buildings Commissioning (Cx) Plan - Part 1	Assessment Planning	IAQ Assessment site visit plan
		Investigation Planning	IAQ Investigation site visit plan
	Existing Buildings Commissioning (Cx) Report - Part 1	Current Facility Requirements (CFR)	Regulatory, financial, & functional requirements
			On-going commissioning (OCx)
			Facility Summary
		Additional Reports	IAQ Assessment & Investigation Reports
Initial Performance Modeling Report			
Initial phase plan report			
Site hazard risk report			
*For Multifamily residential projects only			



Phius REVIVE 2024 Pilot Certification Process - Part 1

Table 3.4.2.0 Required Documentation for Phius REVIVE 2024: Phase 2 - Assessment & Investigation

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	Begin development of the CFR Document		
	Existing Buildings Commissioning (Cx) Plan - Part 1	Assessment Planning	IAQ Assessment site visit plan
		Investigation Planning	IAQ Investigation site visit plan
	Existing Buildings Commissioning (Cx) Report - Part 1	Current Facility Requirements (CFR)	Regulatory, financial, & functional requirements
			On-going commissioning (OCx)
		Facility Summary	
Commissioning (Cx) Report - Part 1	Additional Reports	IAQ Assessment & Investigation Reports	
		Initial Performance Modeling Report	
		Initial phase plan report	
		Site hazard risk report	

*For Multifamily residential projects only

*For Multifamily residential projects only

These items correspond with the tabs included in the Assessment & Investigation Workbook

All sections should be complete before submitting to Phius for review



Phius REVIVE 2024 Pilot Certification Process - Part 1

Table 3.4.2.0 Required Documentation for Phius REVIVE 2024: Phase 2 - Assessment & Investigation

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	Site Hazard Mitigation Worksheet		Automatically generates project-specific requirements based on hazard zones
	Owner Worksheet		Basic facility information, documentation, & occupant survey
	Begin development of the CFR Document		
	Existing Buildings Commissioning (Cx) Plan - Part 1	Assessment Planning	IAQ Assessment site visit plan
		Investigation Planning	IAQ Investigation site visit plan
	Existing Buildings Commissioning (Cx) Report - Part 1	Current Facility Requirements (CFR)	Regulatory, financial, & functional requirements
			On-going commissioning (OCx)
			Facility Summary
		Additional Reports	IAQ Assessment & Investigation Reports
Initial Performance Modeling Report			
Initial phase plan report			
	Site hazard risk report		

*For Multifamily residential projects only

*For Multifamily residential projects only

Reports will be auto-generated in the background as the CPHC completes the Assessment & Investigation Workbook

The Phius reviewer will use these reports to verify that the Workbook has been fully completed



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook

Phius REVIVE 2024 Programming Worksheet

Cx Program Scope & Objectives

General

Owner Name:

Submitter Name:

CPHC CxP Name:

CPHC CxP #:

Street Address:

City:

State:

Zip Code:

County:

Facility Identification

Facility Rank	Building Name	Existing Function	Approximate ICFA (sf)	Intended Function
1				

Ranking Metrics

Intended Building Life	Building Function	Climate Migration Score	Maintenance Needs
		-	

Building Triage and Ranking

Program Plan | Rationale for Retrofit | Hazard Mitigation | Owner Worksheet | Current Facility Requirements | Phase 2 IAQ Assessment | Phase 2 IAQ Investigation | Phase 2 Performance Modelling | Issues & Resolutions Log

Start with the 'Program Plan' and complete tabs in order: left to right, top bottom



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook

Phius REVIVE 2024 Workbook:		Site Hazard Mitigation Worksheet		
5.2 Hazard Mitigation		Single Family Duplexes Townhomes	Multifamily Mixed-Use	Non-Residential
Use the resources for each hazard category below to determine which hazard mitigation requirements will be needed for certification. Use the '+' to the left to expand each section.				
Type 'X' to indicate project type (select ONE)		X		
EARTHQUAKE				
5.2.1 Earthquake	Seismic Design Category (SDC):	[Select Dropdown]	[Select Dropdown]	[Select Dropdown]
	IRC 2021 R301.2.2			
	w/ scope of FEMA P-507 (SF detached, wood frame)	[Select Dropdown]	n/a	n/a
	Seismic Performance Grade:	[Select Dropdown]	n/a	n/a
	Simplified Seismic Assessment Form			
Certification Requirement:		-	-	-
Compliance Resources:		FEMA P-50-1	-	-

Site Hazard Mitigation

- Use the resources in the worksheet for each hazard category to determine the applicable hazard zones (seismic design category, flood zone, etc.)
- Standard Section 5.2

- Automations are built-in to quickly establish project-specific site hazard mitigation requirements

Phius REVIVE 2024 Workbook:		Site Hazard Mitigation Requirements		
5.2 Hazard Mitigation		Single Family Duplexes Townhomes	Multifamily Mixed-Use	Non-Residential
Use the resources for each hazard category below to determine which hazard mitigation requirements will be needed for certification. Use the '+' to the left to expand each section.				
Type 'X' to indicate project type (select ONE)		X		
EARTHQUAKE				
5.2.1 Earthquake	Seismic Design Category (SDC):	D	[Select Dropdown]	[Select Dropdown]
	IRC 2021 R301.2.2			
	w/ scope of FEMA P-507 (SF detached, wood frame)	Yes	n/a	n/a
	Seismic Performance Grade:	C+	n/a	n/a
	Simplified Seismic Assessment Form			
Certification Requirement:		Design to improve to Grade B+ or higher	-	-
Compliance Resources:		FEMA P-50-1	-	-
FLOOD				
HAIL				
STRUCTURAL / HIGH WIND				
SNOW LOAD & ICE DAMS				
WILDFIRE				



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook

Phius REVIVE 2024 Workbook: Owner Worksheet		8.6.1 Facility Information	Additional Notes
Facility Summary	Project Name:	Please enter building name in 'Program Plan' tab below	
	Year Constructed:	[Select Dropdown]	
	Known Prior Renovations?	[Select Dropdown]	
	Existing ICFA (sf):	Please enter approximate ICFA in 'Program Plan' tab below	
	Number Bedrooms:	[Select Dropdown]	
	Number Bathrooms:	[Select Dropdown]	
	Existing Occupants:	[Select Dropdown]	
	Roof / Ceiling Insulation:	[Select Dropdown]	
	Wall Construction:	[Select Dropdown]	
	Foundation Type:	[Select Dropdown]	
	Cooling System:	[Select Dropdown]	
	Heating System:	[Select Dropdown]	
	Hot Water System:	[Select Dropdown]	
	Ventilation System:	[Select Dropdown]	
	Available Facility Documents	Construction Documents:	[Select Dropdown]
Systems / Facility Manuals:		[Select Dropdown]	
Existing consultant reports:		[Select Dropdown]	
Utility rates / supplier info:		[Select Dropdown]	
Utility meter / submeter location:		[Select Dropdown]	
Operations / maintenance report:		[Select Dropdown]	
Annual maintenance cost breakdown:		[Select Dropdown]	
Onsite energy production:		[Select Dropdown]	
	Low-cost repair budget:	[Select Dropdown]	
		8.6.2 Occupant Survey	Additional Notes
General	Age Range of Occupants:	[Select Dropdown]	
	Acoustical Privacy:	[Select Dropdown]	
Noise	Ambient noise negatively impacting concentration:	[Select Dropdown]	
Thermal	Perception of Summer comfort:	[Select Dropdown]	
	Perception of Winter comfort:	[Select Dropdown]	
Visual	Adequate lighting for tasks / activities:	[Select Dropdown]	
	Light quality:	[Select Dropdown]	
	Lighting color discrimination:	[Select Dropdown]	
	Problematic light flicker:	[Select Dropdown]	
	Glare:	[Select Dropdown]	
	Difficulty seeing computer screen:	[Select Dropdown]	
Indoor air quality	Adequacy of light levels:	[Select Dropdown]	
	Air Quality (general):	[Select Dropdown]	
	Unpleasant odors:	[Select Dropdown]	

Facility Information & Occupant Survey

- CPHC to work through this section with the owner to establish basic what is known about the existing building
- Aims to capture high-level building information
- No 'Select Dropdowns' should be left. Each should have a selection (n/a is an option)
- Standard Sections 8.6.1 & 8.6.2



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook



Phius REVIVE 2024 Workbook: Current Facility Requirements (CFR)

Facility Summary

The Cx team should interpret and synthesize the information provided by the Owner up to this point. Create a comprehensive project narrative in the space to the right

[Complete the facility summary once facility requirements are determined below]

General Requirement:

The retrofitted building shall meet the requirements of Phius REVIVE 2024. The retrofitted building shall also meet the owner-directed and owner-elected requirements listed below.

Owner-Elected Facility Requirements

Each owner-elected deliverable must be completed, proven, and accepted by Phius in order to become Final Certified. The Cx Team will be expected to address deliverables during Phase 2: Design

*Requirement ID
Work with the Owner to define specific facility requirements. Create a unique name for each owner-elected deliverable below*

*Description
Briefly describe each owner-elected requirement*

Date Added

8.6.4.1 Facility Requirements

FR1 Regulatory

FR1.1

FR1.2

FR1.3

FR1.4

FR1.5

FR2 Financial

FR2.1

FR2.2

FR2.3

FR2.4

FR2.5

FR3 Functional

FR3.1

FR3.2

FR3.3

FR3.4

FR3.5

8.6.4.1.1 *Critical Loads & Occupancy

Use the 'Critical Loads & Occ' tab below to define information on critical process loads and occupancy schedules during outage periods

Current Facility Requirements

- CPHC to work through this section with the owner to establish regulatory, financial, and functional general requirements
- Aims to capture high-level building needs
- Teams limited to 15 CFR items to limit potential scope-creep
- Encouraged, but not required
- All elected deliverables must be met to earn final certification
- When all requirements are determined, the CPHC should summarize them in the 'Facility Summary' field of the worksheet
- Standard Sections 8.6.4



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook



Phius REVIVE 2024 Workbook: Assessment

Instructions	Site Visit Log			
Phase 2 (part 1): Assessment 8.6.5.1 IAQ Assessment Site Visit Planning <i>With respect to the EPA energy savings plus health documents, list the assessment protocol items that can be accomplished in a walkthrough in columns 'E' and 'F'. Expand each section using the '+' to the left. Complete the initial assessment site visit once each Assessment Protocol item is addressed. Then, complete columns 'G' and 'H' to indicate the findings of the site visit. The EBCx team should use the site visit log to the right to record the overall status of the Assessment phase, the date of each visit, and any valuable site visit notes. During these site visits, the Cx Team should also collect measurements and begin compiling existing building documentation.</i>	Team Members	Assessment Complete?	Date	Notes
		[Select Dropdown]		
		[Select Dropdown]		
		[Select Dropdown]		
		[Select Dropdown]		
		[Select Dropdown]		
<u>EPA Energy Savings Plus Health IAQ Guidelines</u>		[Select Dropdown]		
Priority Issue 1: Asbestos	CxP Assessment Planning Notes <i>Complete pre-assessment</i>	Assess or Defer	CxP Assessment Reporting Notes <i>Complete post-assessment</i>	Status?
Priority Issue 2: Below Ground Contaminants (Except Radon)	CxP Assessment Planning Notes <i>Complete pre-assessment</i>	Assess or Defer	CxP Assessment Reporting Notes <i>Complete post-assessment</i>	Status?
Priority Issue 3: Building Products & Material Emissions	CxP Assessment Planning Notes <i>Complete pre-assessment</i>	Assess or Defer	CxP Assessment Reporting Notes <i>Complete post-assessment</i>	Status?

On-site Assessment & Investigation

- CPHC to first complete the assessment **PLANNING** (columns D & E)
- Following the initial site visit, CPHC should complete the assessment **REPORTING** notes & update the issue status (columns F & G)
- Log all site visits
- Repeat for Investigation
- Standard Sections 8.6.7.2 & 8.7.6.1

Phase 2 IAQ Assessment

Phase 2 IAQ Investigation



Cells in the 'IAQ Investigation tab' are HIGHLY dependent on the assessment tab. Make sure to choose ALL 'Select Dropdown' options in column G before moving to the next section



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook



Phius REVIVE 2024 Workbook: Assessment

Instructions

Site Visit Log

Priority Issue 1: Asbestos

CxP Assessment Planning Notes
Complete pre-assessment

Assess or Defer

CxP Assessment
Reporting Notes
Complete post-assessment

Status?

Asbestos

AP1.1
Determine Potential Asbestos
Hazard

Find out when house was built

Walkthrough
assessment

House built post-1980, no concern

No further investigation
required



Phius REVIVE 2024 Workbook: Investigation

Instructions

Site Visit Log

Priority Issue 1: Asbestos

CxP Investigation Planning Notes
Complete pre-investigation

Current status?

CxP Investigation
Reporting Notes
Complete post-investigation

Final status?

Asbestos

AP1.1
Determine Potential Asbestos
Hazard

No further
investigation required

[Select Dropdown]



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook



Phius REVIVE 2024 Workbook: Assessment

Instructions

Site Visit Log

Priority Issue 1: Asbestos

CxP Assessment Planning Notes
Complete pre-assessment

Assess or Defer

CxP Assessment
Reporting Notes
Complete post-assessment

Status?

Asbestos

AP1.1
Determine Potential Asbestos
Hazard

Find out when house was built

Walkthrough
assessment

House built ~1940s. May contain
asbestos

Needs further investigation



Phius REVIVE 2024 Workbook: Investigation

Instructions

Site Visit Log

Priority Issue 1: Asbestos

CxP Investigation Planning Notes
Complete pre-investigation

Current status?

CxP Investigation
Reporting Notes
Complete post-investigation

Final status?

Asbestos

AP1.1
Determine Potential Asbestos
Hazard

Review list of potential asbestos-containing
building components

Needs further
investigation

Asbestos suspected.

Remediation required



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook

Phius REVIVE 2024 Workbook: Performance Modeling	
8.6.5.2 Initial Performance Modeling <i>Refer to section 3.4.2 of the Phius 2024 Certification Guidebook for certification modeling protocol and REVIVEcalc instructions. Use the following checklist to confirm that all modeling documentation has been collected and uploaded to the project Dropbox.</i>	8.6.5.2 Initial Performance Modeling Documentation Checklist
Runlist	Uploaded to Dropbox? ("X" = Yes)
'.csv' File	
Geometry	Uploaded to Dropbox? ("X" = Yes)
'.ldf' File	
Existing Building Drawings	Uploaded to Dropbox? ("X" = Yes)
Schematic Plans	
ICFA Takeoff (est.)	
Schematic Elevations	
Assembly Assumptions	
Equipment Assumptions / Specs	
Databases	Uploaded to Dropbox? ("X" = Yes)
Carbon Correction	
Construction (Assemblies)	
Materials	
Windows	
Weather Files	Uploaded to Dropbox? ("X" = Yes)
'.ddy' File	
'.epw' File	
Results Table	Uploaded to Dropbox? ("X" = Yes)
'.csv' File	

Initial Performance Modeling

- CPHC should have gathered all information needed for initial performance modeling by the time all assessment & investigation items are complete
- The CPHC should use the initial performance modeling checklist in the workbook to make sure that they have compiled all of the documentation needed to run the REVIVEcalc analysis
- Standard Section 6



Phius REVIVE 2024 Pilot Assessment & Investigation Workbook

Milestone 2 Assessment & Investigation Approval	<u>3.1.5</u>	Assessment & Investigation Approval -Phius approves the Assessment & Investigation deliverables. An official letter of approval is sent to the design team. -Phius creates and sends a Design Review Invoice which shall be paid before Phase 3 can begin.
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- Assessment & Investigation Workbook submitted to Phius with:
 - REVIVECalc supporting documentation
- Phius will review and give feedback on the submission until all deliverables have been met
- Phius will award Assessment & Investigation Approval
- Project will then begin **Phase 3: Design**



Phius REVIVE 2024 Pilot Certification Process - Part 2

Table 3.1.1 Phius REVIVE 2024 Process Matrix (continued)

AIA Project Phases	Phius Benchmarks	Guidebook	Phase Summary
Design Development (DD) / Construction Drawings (CD)	Phase 3 Design & Review	3.1.6	Design -Selection of design approach based on performance modeling completed during the investigation phase Design Review -CxP document upload -Phius Review & Feedback -CxP Revisions & Response -Repeat (as needed)
Bidding & Procurement	Milestone 3 Design Certification	3.1.7	Design Certification -The design is certified by Phius. An official letter of design certification will be sent to the design team

- Standard Section 8.8
- Compliance workbook still in development
- Design approach selected from options determined during initial performance modeling



Phius REVIVE 2024 Pilot: Required Design Documentation

Table 3.5.1.0 Required Documentation for Phius REVIVE 2024: Phase 3 - Design

Phius REVIVE 2024 Design Workbook	Issues & Resolutions Log		Feedback channel between Cx team members
	Approach Declaration		Define the selected retrofit approach
	Existing Buildings Commissioning (Cx) Plan - Part 2	CFR Deliverables Plan	Complete the workbook sections relating to the CFR deliverables solutions
		Passive Systems Plan	Complete the workbook sections relating to passive design strategies
		IAQ Remediation Plan	Complete the workbook sections relating to IAQ remediation strategies
		Active Systems Plan	Complete the workbook sections relating to active building systems
		Site Hazards Mitigation Plan	Complete the workbook sections relating to site hazard mitigation strategies
	Existing Buildings Commissioning (Cx) Report - Part 2	Design Review Report	Automatically updated based on acceptance, rejection and/or feedback on established design deliverables
Construction Documents			Refer to Section 1.4.4 for all possible required CDs* Refer to Section 3.5.4 for possible retrofit-specific required documentation
*Required documentation for retrofit projects is based on the specific selected approach. Not all projects will have the same documentation requirements			



Phius REVIVE 2024 Pilot Certification Process - Part 2

Construction Administration (CA) / Commissioning (Cx)	Phase 4.1 Implementation, Observation & Testing	3.1.8	Onsite Review -Rater/Verifier performs site visits and communicates all changes to the Submitter/CxP -All changes should be recorded in the Phius REVIVE Workbook Multi-Phase Projects -When all phases are complete, the project will be eligible to submit documentation for final certification
	Phase 4.2 Final Review	3.1.8	Final Review -Rater/Verifier Provider document upload -Phius Review & Feedback -Rater/Verifier Provider Response -Repeat (as needed)
Post-Construction (PC)	Milestone 4 Final Certification	3.1.9	Final Certification -The as-built project is Final Certified by Phius when all project phases are complete. A digital certificate and physical plaque will be sent to the project team. -Building resumes typical or new intended operation



- Standard Section 8.9
- Compliance workbook still in development



Phius REVIVE 2024 Pilot: Required Final Documentation

Table 3.6.1.1 Required Documentation for Phius REVIVE 2024: Phase 4 - Implementation

Phius REVIVE 2024 Implementation Workbook	Issues & Resolutions Log		Feedback channel between Cx team members
	Existing Buildings Commissioning (Cx) Plan - Part 3	Final CFR	Add additional CFR deliverables to the Implementation Workbook as needed
		Final Phase Plan	If doing a phased retrofit, use the Phase Planner to track phase deliverables, construction schedules, etc.
		Final M&V Plan*	Use the M&V Planner to schedule and track the completion of M&V requirements
		Final Maintenance Plan	Record strategy for maintaining implemented measures (i.e. filter replacement schedule)
	Existing Buildings Commissioning (Cx) Report - Part 3	Executive Summary	Summarize the implemented measures, and indicate possible future improvements.
		Final Findings & Recommendations	Update the performance analysis based on findings during the implementation process
		New Discovery Report	Record any new discoveries made during Implementation that may impact the project's ability to meet the certification requirements. Describe method of resolution.
		Final Testing & Verification Report	Complete the required checklists to verify that all tests have been performed and that all documentation has been collected and provided to Phius for Final Review
		Final Training Report**	Schedule and track any training sessions for ongoing maintenance and operation of building systems

*For non-residential projects only

**Only for projects which include property/building managers or operators other than the building Owner



Phius REVIVE 2024 Pilot Certification Process - Part 3

Table 3.1.1 Phius REVIVE 2024 Process Matrix (continued)			
AIA Project Phases	Phius Benchmarks	Guidebook	Phase Summary
On-going Commissioning (OCx)	Phase 5.1 Monitoring	<u>3.1.10</u>	Monitoring -Non-residential projects are required to register with and allow Phius access to the Energy Star Portfolio Manager
	Phase 5.2 Ongoing Commissioning (Optional)	<u>3.1.10.2</u>	Ongoing Commissioning (OCx) & Monitoring Electives -Additional monitoring and commissioning electives are encouraged for all projects, but not required

- Monitoring may become required in future versions, but for now is optional for all residential projects
- Non-residential projects required to register and provide Phius access to ENERGY STAR Portfolio Manager



Performance calculation tool and resources

REVIVEcalc v24.2.0

Synopsis:

- Better tools yield better buildings
- Provide a tool that is designed to support specific calculations
- Enable parametric design
- Automate menial tasks
- Current version made in house for quick updates
- Database options for quick use



REVIVEcalc v24.2.0

FAQ:

- Why can't we just use WUFI Passive?
 - WUFI Passive is a static calculation engine, not hourly. WUFI Plus cannot model equipment.
- I hear E+ is difficult, I don't like coding?
 - The tool is a GUI interface that automates a lot of the E+ modeling, and we have distilled this to a geometry file and 50 inputs.
- How do I learn how to do this?
 - Training videos, email support, and guidebook / standard documentation are resources.



REVIVEcalc v24.2.0

Inputs

User Input IDF
(Geometry)

User Input CSV
(Run List)

Static Databases

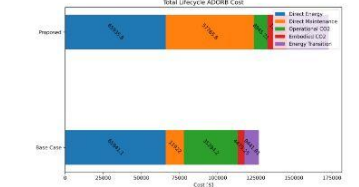
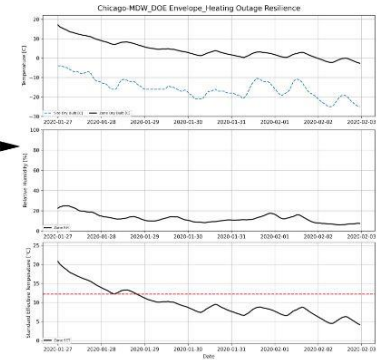
Cambium Database
Country Emissions Database

User Editable Databases

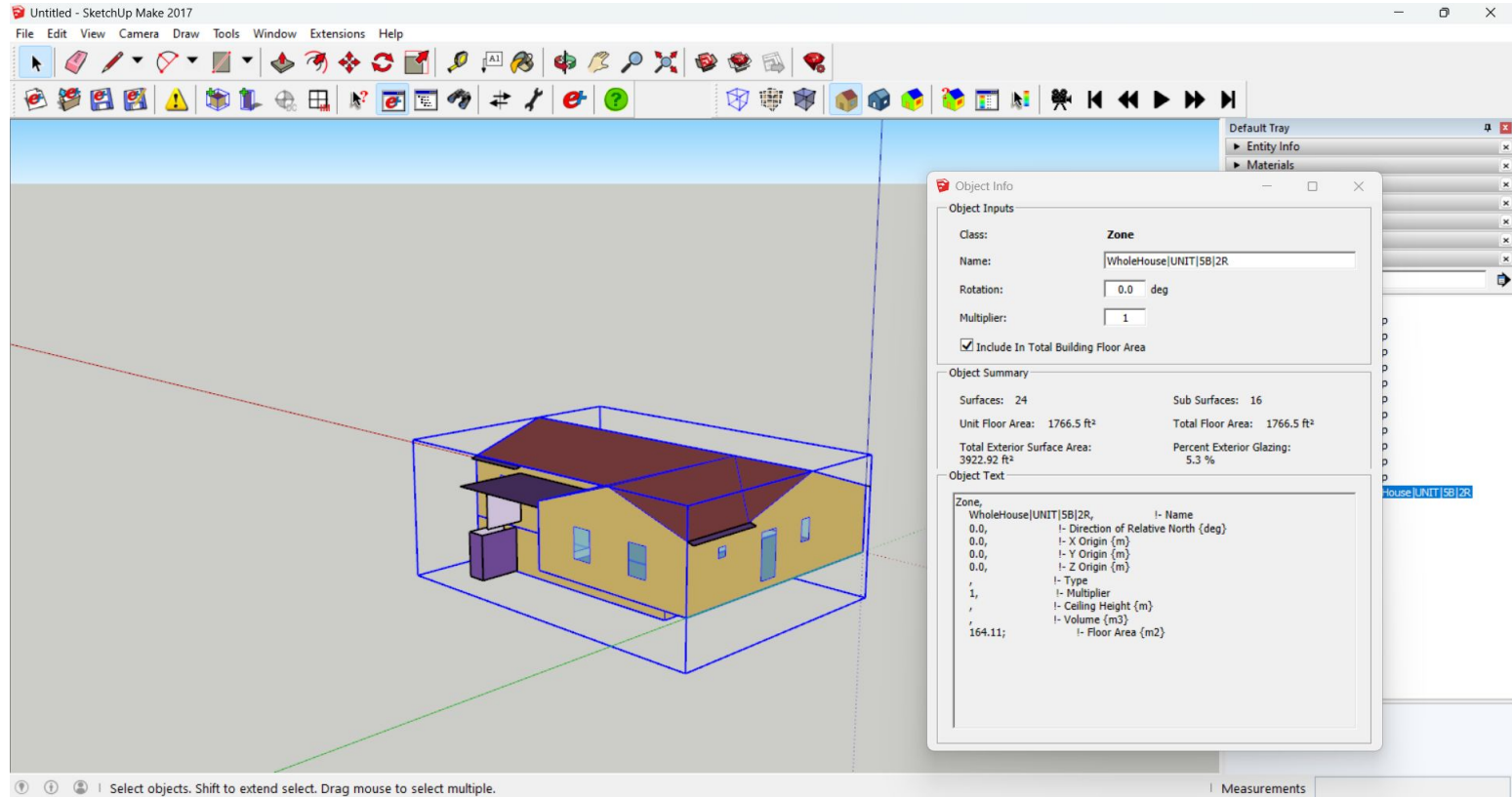
Carbon Correction Database
Construction Database
Material Database
Window Database

Analysis

Results

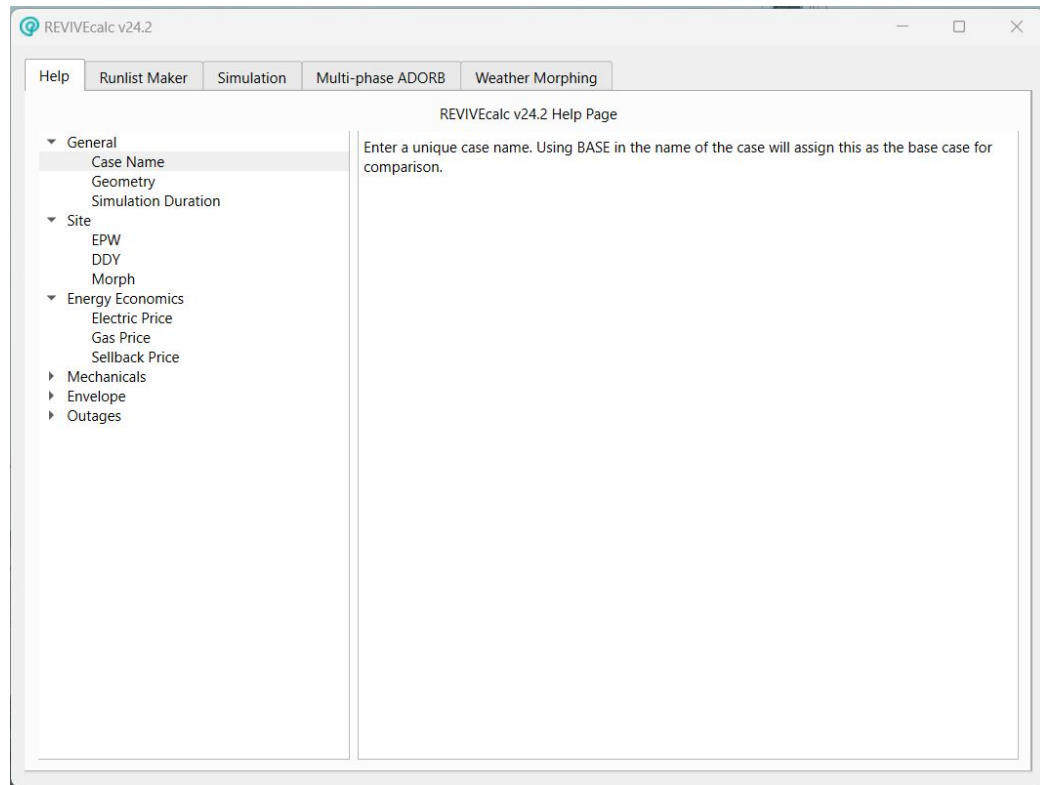


Geometry Input



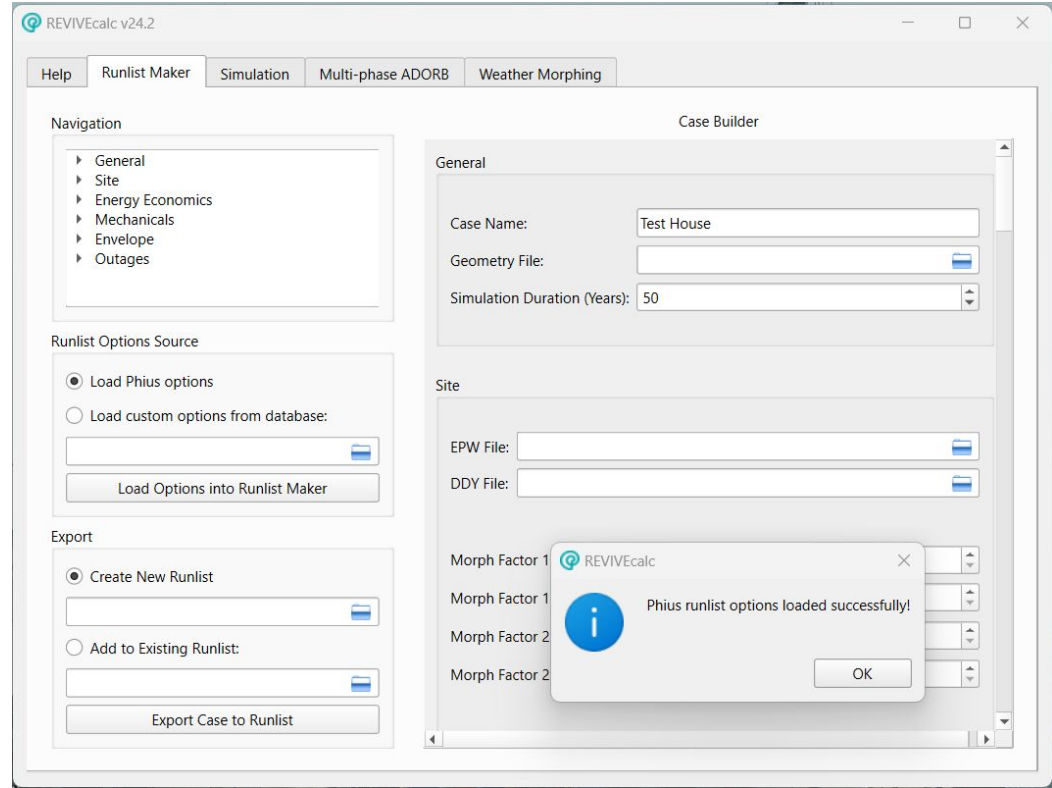
Help Screen

- Mirrors the guidebook
- Data tree aligns with runlist maker



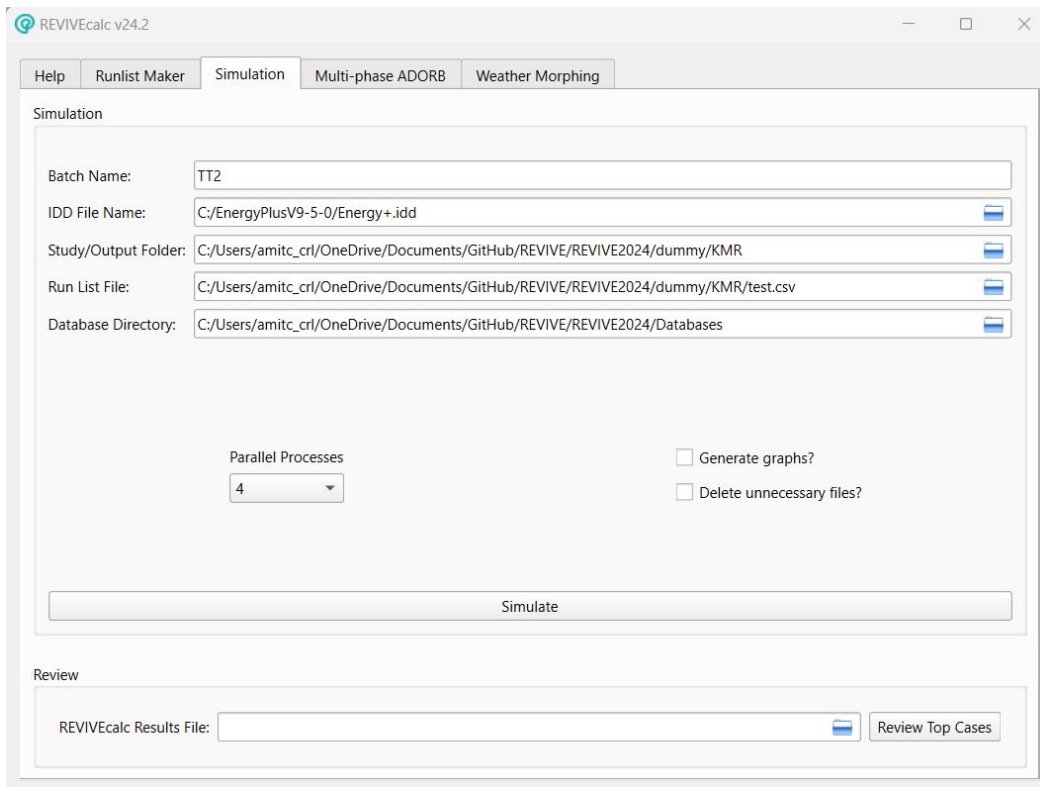
Runlist Maker

- Data tree aligns with help screen
- GUI input for making runlists
- Select most options from databases or dropdowns
- Can append cases to other run list



Simulation

- Calls run list to make models and simulate
- Saved results in folders
- Can do parallel processing



The screenshot shows the REVIVEcalc v24.2 application window. The 'Simulation' tab is active, displaying a form for configuring simulation parameters. The fields are as follows:

- Batch Name: TT2
- IDD File Name: C:/EnergyPlusV9-5-0/Energy+.idd
- Study/Output Folder: C:/Users/amitc_crl/OneDrive/Documents/GitHub/REVIVE/REVIVE2024/dummy/KMR
- Run List File: C:/Users/amitc_crl/OneDrive/Documents/GitHub/REVIVE/REVIVE2024/dummy/KMR/test.csv
- Database Directory: C:/Users/amitc_crl/OneDrive/Documents/GitHub/REVIVE/REVIVE2024/Databases

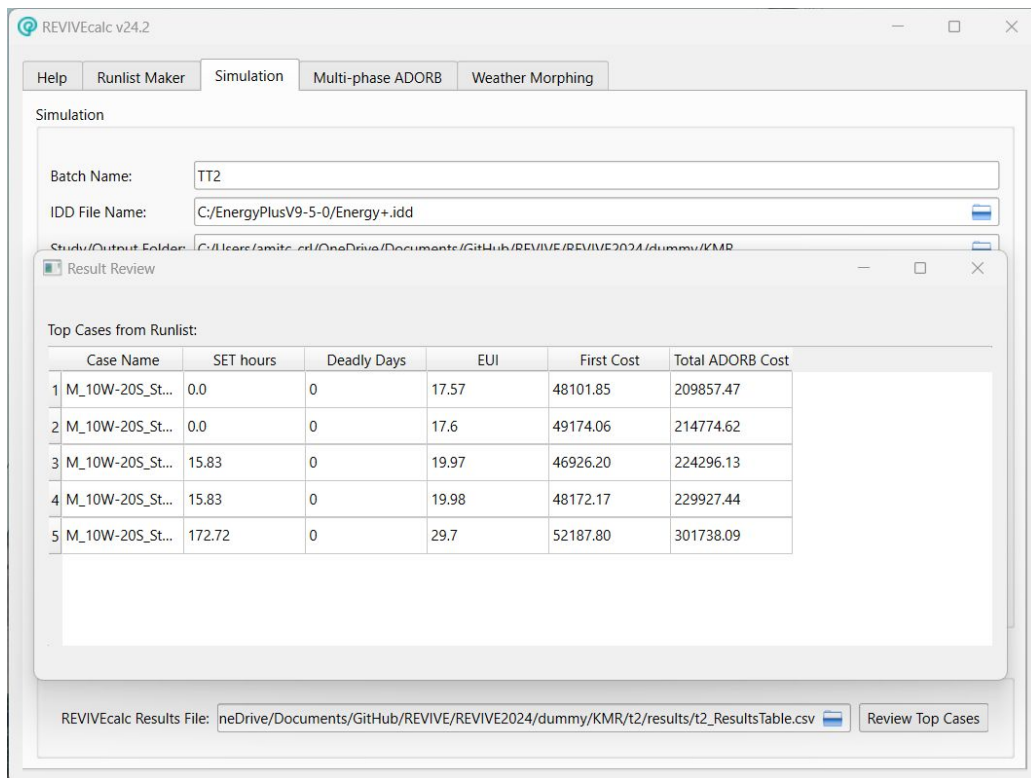
Below these fields, there is a 'Parallel Processes' dropdown menu set to '4'. To the right, there are two checkboxes: 'Generate graphs?' and 'Delete unnecessary files?', both of which are currently unchecked. A large 'Simulate' button is positioned below the configuration fields.

At the bottom of the window, there is a 'Review' section with a 'REVIVEcalc Results File:' label and an empty text box. To the right of this text box is a 'Review Top Cases' button.



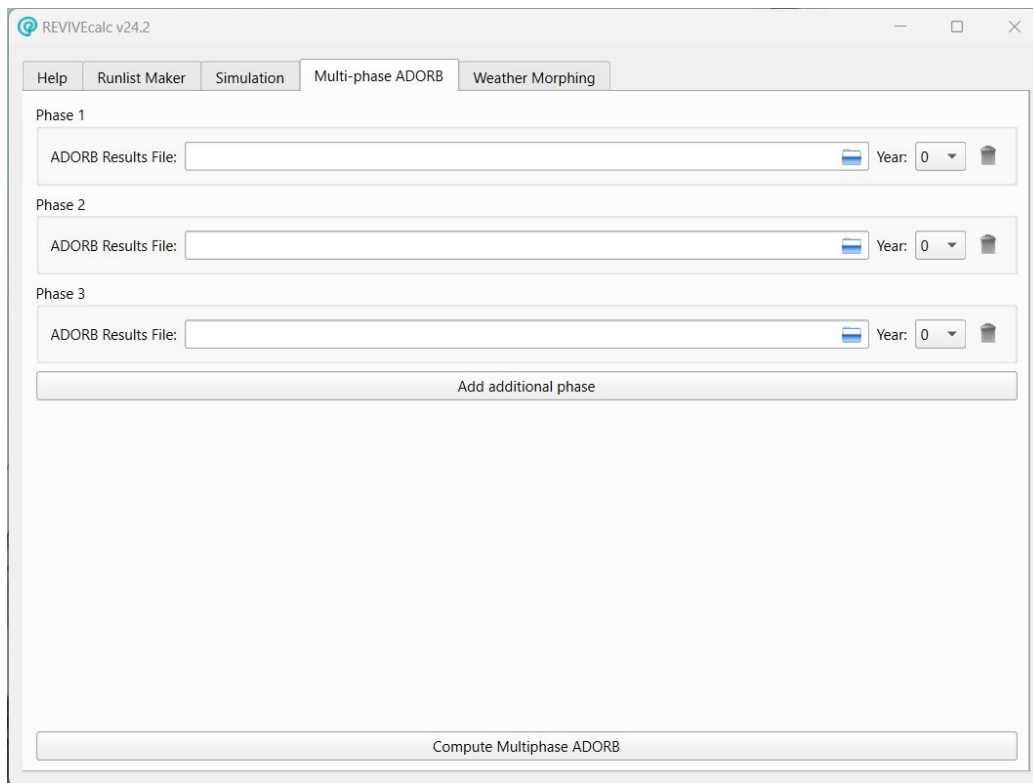
Simulation

- Quick results viewer sorts 5 lowest ADORB cost cases that meet resilience



Multiphase ADORB

- Combine 2-5 phases of ADORB costs to evaluate a multiphase retrofit.



The screenshot displays the REVIVEcalc v24.2 application window. The 'Multi-phase ADORB' tab is selected, showing a configuration interface for multiple simulation phases. The interface includes three visible phase sections, each with an 'ADORB Results File' input field, a file selection icon, and a 'Year' dropdown menu set to '0'. A button labeled 'Add additional phase' is located below the third phase section. At the bottom of the window, a large button is labeled 'Compute Multiphase ADORB'. The top of the window features a menu bar with options: Help, Runlist Maker, Simulation, Multi-phase ADORB, and Weather Morphing.



Weather Morphing

- Calculate morphing factors for weather files

The screenshot shows the 'Weather Morphing' tab in the REVIVEcalc v24.2 software. The interface includes a 'Site Weather Settings' section with an 'EPW CSV file' input field. Below this are two rows for 'Winter Outage Start' and 'Summer Outage Start', each with a month dropdown (set to 'January') and a day dropdown (set to '1'). Further down are five input fields for return extremes: 'Winter Return Extreme Dew Point', 'Winter Return Extreme Dry Bulb', 'Summer Return Extreme Dew Point', and 'Summer Return Extreme Dry Bulb', all currently set to '0.0'. A 'Compute Weather Morph Factors' button is located at the bottom of the settings panel.

REVIVEcalc v24.2

Help Runlist Maker Simulation Multi-phase ADORB Weather Morphing

Site Weather Settings

EPW CSV file:

Winter Outage Start: January 1

Summer Outage Start: January 1

Winter Return Extreme Dew Point: 0.0

Winter Return Extreme Dry Bulb: 0.0

Summer Return Extreme Dew Point: 0.0

Summer Return Extreme Dry Bulb: 0.0

Compute Weather Morph Factors



Questions

And answers



Attend the Pro Forum: October 21-23 2024

