

Submitting a Mixed-Use Project for PHIUS+ 2015 Certification

Overview

New-construction mixed-use projects come in two basic variants – in the first case, the usage types are known at design time. In the second case, part of the building is designed for and finished for known usage types, and part of it is designed for some form of “shell lease”, wherein a tenant leases the unfinished shell of a building and agrees to complete construction by installing ceilings, plumbing, HVAC systems, electrical wiring, or even insulation. The degree of finish offered varies and is sometimes denoted by terms such as “cold dark box,” “warm white box,” which are not completely standardized. This document addresses certification and energy modeling protocol for both these cases, wherein the building is new construction and consists mostly of spaces “F” designed to be finished for known uses, and a smaller part “UF” intended for some form of non-residential shell lease.

PHIUS+ Mixed-Use Approach

It is encouraged to certify the whole building, but this is not required. Certification may be sought for part of the building only, even if all usage types are known at design time, as long as most of the building by floor area (50% or more) is within the scope of the planned certification.

Residential and non-residential parts of the building may be certified separately or together as a whole building. Due to software limitations, separate energy models are required if part of the building is residential and other parts non-residential, even if it is being certified as a whole building. Multifamily common spaces that primarily serve the residents can be included in a residential energy model.

Parts F and part UF of the project must be separately metered and have separate mechanical systems. The predicted energy use can then be compared to actual usage.

Also, separate systems allow for flexibility in accommodating the differing schedules and capacities for the different usage types within the project. However, if all the usage types are known, the mechanical engineer may find it possible / advantageous to design a system with a shared storage for low-temperature space conditioning.

It should be kept in mind that for any spaces that change tenants, (post-construction), modeled energy use may vary from predicted energy use.

If, between pre-certification and final certification, prospective tenants can be found for the parts UF who are able and willing to meet the constraints of whole-building certification in their build-out plans, the entire building may be certified.

In keeping with the PHIUS+ Certification Guidebook (Section 3.3), the source energy allowance for residential spaces is calculated on a per person basis, and for nonresidential spaces on a per square foot basis.

Office and retail spaces do not qualify for an additional source energy allowance for process loads, but restaurants and groceries do. Contact PHIUS about process load allowances for other usage types.

General recommended practices include:

- Thermally isolating residential spaces from a nonresidential portion to some extent (for soundproofing and other considerations).
- Air sealing should also be done to separate the two parts to prevent odor transference.

PHIUS Protocol for modeling Unfinished spaces (UF):

- Internal gains of 1 BTU/hr.ft²
- Continuous ventilation rate of 0.3 air changes per hour
- Ventilation heat recovery efficiency matching the average for the rest of the building

In general, there are 4 unique paths, listed below.

A) Whole Building Certification– One combined certification for Residential and Non-Residential

Separate energy models must be constructed for residential and nonresidential parts.

An overall source energy limit for the building applies, consisting of a per person portion for residential space, per-square-foot portion for nonresidential space, and additional custom process load allowance for some usage types. For details please refer to the equation below.

$$\left(Res_{use} * Res_{Occ} * 3.412 \frac{kBTU}{kWh} \right) + \left(Non - res_{use,fin} * iCFA_{non-res,fin} \right) \leq$$

$$\left(6200 \frac{kWh}{yr} * Res_{Occ} * 3.412 \frac{kBTU}{kWh} \right) + \left(38 \frac{kBTU}{ft^2.yr} * iCFA_{non-res,fin} \right) + PLA$$

Res_{use} = Primary Energy use in residential portion in kWh/person.yr

Res_{Occ} = Occupancy of residential portion

$Non - res_{use,fin}$ = Primary Energy use in kBtu/ft².yr of non-residential finished space

$iCFA_{non-res,fin}$ = Non-residential iCFA of finished space only

PLA = Process Load Allowance (case by case basis)

Space conditioning energy targets apply to the building as a whole and the floor area includes both parts. For details please refer to the equation below.

$$(X * iCFA_{res}) + (X * iCFA_{non-res}) \leq X_{limit} * (iCFA_{res} + iCFA_{non-res})$$

X_{res} = Specific Heating demand or Cooling Demand (kBTU/ft².yr), Heating Load or Cooling Load (BTU/ft².hr) modeled for the residential portion

$X_{non-res}$ = Specific Heating demand or Cooling Demand (kBTU/ft².yr), Heating Load or Cooling Load (BTU/ft².hr) modeled for the non-residential portion

X_{limit} = Certification limit for the climate location in kBTU/ft².yr or BTU/ft².hr

$iCFA_{res}$ = Residential iCFA

$iCFA_{non-res}$ = Non-residential iCFA

B) Whole Building Certification – Separate Residential and Non-Residential Certifications

Residential and nonresidential parts of the building are both modeled separately and certified separately, that is, they meet the certification criteria individually.

This separated approach is recommended for projects where the nonresidential spaces include a part UF. This way, the energy design for a main residential portion of the project can be settled earlier.

C) Partial Building Certification – One combined certification for Residential and Non-Residential

Same as A) above, except that only part of the building (50% or more by floor area) is certified.

D) Partial Building Certification - Separate Residential and Non-Residential Certifications

Same as B) above, except that only part of the building (50% or more by floor area) is certified.



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		Whole Building		Partial Building	
		One combined certification for Residential and Non-Residential	Separate Residential and Non-Residential Certifications	One combined certification for Residential and Non-Residential	Separate Residential and Non-Residential Certifications
Modeling/ Certification	Separate energy models for residential and non-residential	X	X	X	X
	All building floor area included in certification	X	X		
	At least 50% of building floor area must be modeled and certified.			X	X
	Unknown non-residential spaces may not be certified alone.		X		X
	Model unfinished space with internal heat gains of 1 BTU/hr.ft ² , a ventilation rate of 0.3 ACH, and ventilation heat recovery efficiency at the average for the rest of the building	X	X	X	X
Source Energy Allowance	Determined for building by applying a mix of residential and non-residential allowance to certified spaces	X		X	
	Determined by space type (residential/non-residential)		X		X
Space Conditioning Targets	Apply to whole/certified portion of building	X		X	
	Apply to partial building and must be met in each energy model		X		X