Unit Turnover Guide to Energy Improvements
A SSAFE Template

Residential units at senior living communities turn over regularly due to deaths and movements within the facility (e.g., from an independent living cottage to an IL apartment, an assisted living unit, or a health care center). The transition period between old and new residents is the ideal time to renovate cottages and apartments because (a) the work can be completed with a minimum of disruption to residents living nearby; (b) a "freshened up" apartment or cottage is easier to market to prospective new residents, and (c) the capital costs of renovations are spread over multiple years, thus easing the budgetary impact in any given year.

Too often in the past cottage/apartment renovation projects have focused almost exclusively on improving the appearance and functionality of living units (e.g., replacing worn floor coverings, patching/painting interior walls, and replacing outdated appliances). In contrast, little attention has been devoted to upgrading attic and wall insulation, sealing air leaks around doors and windows, and otherwise improving the energy efficiency of the building envelope. Nor has attention been directed to installing state-of-the-art heating and cooling equipment. This situation must change as senior living communities prepare for the effects of climate change. Improvements in energy efficiency not only result in lower greenhouse gas emissions but also reduce future energy costs.

The purpose of this Guide is to identify important elements of a cottage/apartment turnover plan as it impacts energy efficiency. Recommendations contained in this Guide can and should be tailored to the specific circumstances facing a given residential retirement community. Communities are encouraged to use this Unit Turnover Guide to create their own written unit turnover protocol and plans that reflect the unique features of different types of residential units on campus.

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Ideally, energy efficiency improvements in apartments and cottages should draw upon the results of a comprehensive, campus-wide energy audit. This turnover Guide, however, is meant to apply regardless of whether the results of a recent energy audit are available. The recommendations contained in this Guide are mindful of the overarching goals of SSAFE's Energy Audit RFP template: https://SSAFE.org/rfp

- 50% reduction in carbon emissions by 2030,
- Carbon neutral by 2050

Well-qualified contractors and follow-up inspections are critical to the successful implementation of the actions recommended in this Guide. For this reason, consideration should be given to hiring a qualified, 3rd party consultant to oversee building envelope upgrades and, if planned renovations involve structural improvements, an architectural or engineering firm to prepare construction documents. Given the sizable dollars being invested, you want to be sure the renovations achieve the desired results.

We hope that this Guide will be useful to your campus as you pursue your energy conservation and resiliency goals. Because we aim to improve this Guide on a continuing basis, we would appreciate receiving feedback on your experiences, including copies of your adapted turnover checklist/protocol, suggestions for improving this Guide, and a summary of lessons learned during the cottage/apartment turnover process. Please send your feedback to SSAFE at info@ssafe.org.

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UNIT TURNOVER GUIDE TO ENERGY IMPROVEMENTS

Senior Stewards
Acting For the Environment

Created by

Senior Stewards Acting for the Environment (SSAFE)
SSAFE is a 501c3 Non Profit
Kendal-inspired network of elder communities
in action on the path to net-zero emissions.
Contact: info@ssafe.org

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Unit Turnover Issues to Address by Category

Air Infiltration

Recommended air sealing standards based on the International Energy Conservation Code (IECC), version 2021 in combination with energy recovery ventilation for retrofitted units that meet these standards. Zones 1-2: ≤ 3 ACH50; Zones 3-4: ≤ 2.5 ACH50; Zones 5-7: ≤ 2 ACH50; Zone 8: ≤ 1.5 ACH50; Attached dwellings: ≤ 3 ACH50. (see: https://basc.pnnl.gov/images/iecc-climate-zone-map)
Blower door testing is required to determine air leakage rate. Refer to the standards above. If the test shows a leakage rate above allowable limits, corrective action is needed and may require an infrared or smoke test to locate the problem. Perform infrared testing with thermal imaging camera while blower door is running which allows for more definite observations of air leakage.
Ensure that all attic penetrations in ceiling (light fixtures, tub/shower values; etc) and soffit are sealed.
Ensure adequate sealing and insulation of the attic hatch.
Check for air leakage around exterior doors (including storm doors if present), preferably based on blower door test results. Adjust and replace door seals and sweeps where necessary. Alternatively, upgrade doors and/or add storm doors.
Check sealant around all windows; inspect seals between operable window sashes. Remove and replace cracked/missing caulking around windows; replace seals on windows with signs of cracking/age/tears. Eliminate leakage in shim space around window frame.
Inspect flashing around chimney and other roof penetrations. Verify that there is a tight seal. Repair and re-seal if necessary.
Check for air leaks between concrete slab and siding. Install necessary insulation and seal gaps.
Test air tightness before and after corrective actions are completed.
Once the unit is sufficiently airtight, ensure adequate outside air including heat recovery ventilation.

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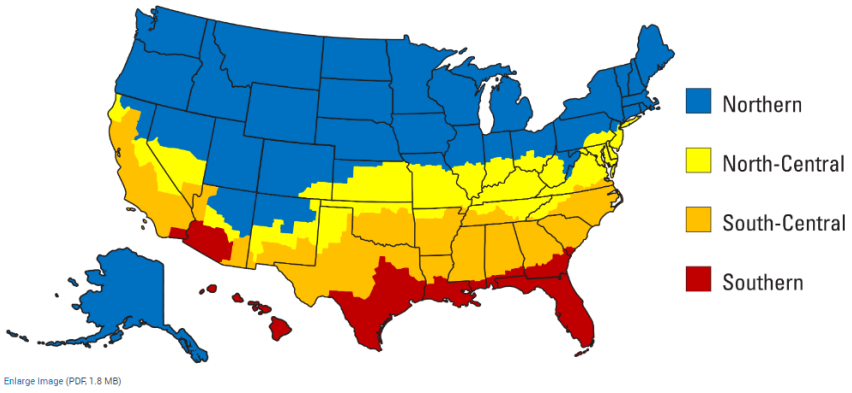
Insulation

Determine standard of insulation for your climate zone using Energy Star R-Values recommendations. (see: https://www.energystar.gov/saveathome/seal_insulate/identify-problems-you-want-fix/diy-checks-inspections/insulation-r-values)
Determine adequacy of ceiling insulation. Verify that it is evenly distributed with no gaps. Add insulation, as needed, to meet the recommended R value. [If there is a common attic, i.e. no firewall, it may be more efficient to upgrade insulation for multiple adjacent units. Consider upgrading insulation for multiple units even if there is no common attic.]
Check adequacy of wall insulation at various interior locations with an infrared measuring device. Add insulation, as needed, to meet standards identified above.
If practical, remove siding, apply insulating sheathing to the outer wall and replace siding. This will add R value and minimize thermal bridging of studs.Consider whether it is more efficient to do this for multiple, connected units.
Use 2x6 studs when building additions.
Upgrade windows to 2023 EPA standards with climate-specific window requirements and climate charts. (see: https://www.energystar.gov/products/residential_windows_doors_and_skylights/key_product_criteria)



WINDOWS			
Climate Zone	U-Factor[1]	SHGC[2]	
Northern	≤ 0.22	≥ 0.17	Prescriptive
	= 0.23	≥ 0.35	Equivalent Energy Performance
	= 0.24		
	= 0.25	≥ 0.40	
	= 0.26		
North-Central	≤ 0.25	≤ 0.40	
South-Central	≤ 0.28	≤ 0.23	
Southern	≤ 0.32	≤ 0.23	

Air Leakage ≤ 0.3 cfm/ft²
[1] Btu/h·ft²·°F
[2] Solar Heat Gain Coefficient

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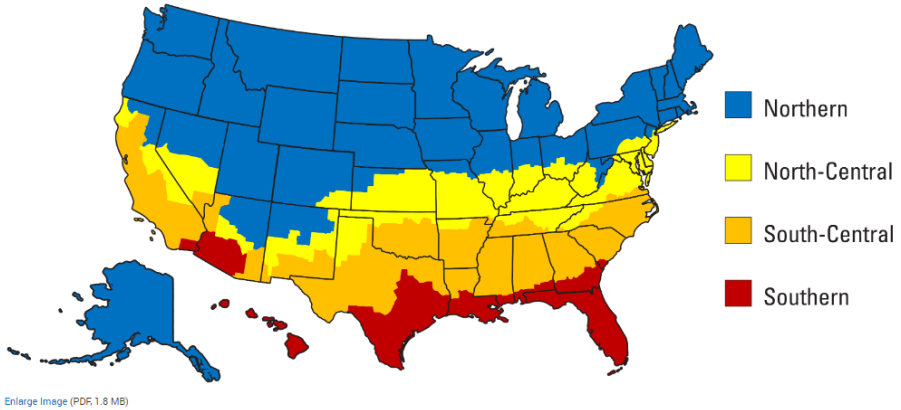
When upgrading doors use the 2023 EPA standards with climate-specific door requirements and climate charts. Storm doors need only be single-glazed. (see: https://www.energystar.gov/products/residential_windows_doors_and_skylights/key_product_criteria)



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DOORS			
Glazing Level	Climate Zone	U-Factor[1]	SHGC[2]
Opaque	All Zones	≤ 0.17	No Rating
≤ ½-Lite	All Zones	≤ 0.23	≤ 0.23
> ½-Lite	Northern	≤ 0.26	≤ 0.40
	North-Central		
	South-Central	≤ 0.28	≤ 0.23
	Southern		

Air Leakage for Sliding Doors ≤ 0.3 cfm/ft²
Air Leakage for Swinging Doors ≤ 0.5 cfm/ft²
[1] Btu/h·ft²·°F
[2] Solar Heat Gain Coefficient

Insulate hot and cold water lines in non-conditioned space.

Create an insulated gap between the slab and the patio. Insulation between slab and the ground. And insulate between slab and concrete walkway, if those are touching.

HVAC

Verify that all ductwork joints on dryers that vent through the attic are secured with code-approved tape or fasteners. Repair loose or missing ductwork tape or fasteners. Ensure the ductwork runs are efficient and are easy to clean.

Upgrade to energy efficient heat pumps that meet the latest Energy Star standards.
Replace gas or electric resistance heat with a high-efficiency heat pump for heating and cooling. Replace inefficient heat pumps with high-efficiency models.

If using forced-air heating/cooling, test ducts for air loss and seal using mastic.

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If the AC unit or heat pump is not replaced at this time, thoroughly inspect and adjust for efficient operation. Eliminate coolant leaks.
Ensure that all ductwork in unconditioned space is insulated.

Lighting

Check all permanent and facility-provided moveable light fixtures. Replace incandescent & fluorescent light bulbs with LED bulbs.
Help residents replace incandescent & fluorescent light bulbs with LED bulbs in resident-owned personal lighting fixtures.
Install motion detection lighting inside and outside where applicable.
Control outside lighting with a photocell so it turns off during daylight hours.
Add dimmer switches. (Ensure you also install dimmable fixtures and dimmable LED bulbs.)

Energy Efficient Appliances

Replace outdated and inefficient kitchen appliances with EPA certified products. (see https://www.energystar.gov/products)
When hot water equipment is replaced, replace it with a heat pump hot water heater or point of use hot water heater. Where feasible, consider heat pumps that are capable of performing both functions (hot water/heating and/or heating/AC).
Replace natural gas appliances with electric appliances. Offer induction cooktops as an option.
Install programmable thermostats in residential units where they are not currently available and train residents to use them. Consider the interaction of heat pumps and night time setbacks.
Add timer on bathroom heater
Add timer on bathroom vent fan
Wrap hot water heaters with blankets (R7-11)

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Reduce Heat/Cooling Load

Install attic exhaust fan to reduce heat build up.
Install ceiling fans and/or wiring to prepare for ceiling fans
If roof shingles are being replaced as part of unit turnover, replace with high-reflective value shingles

Water Conservation

When replacing bathroom and kitchen plumbing fixtures see the EPA WaterSense guidelines. (see:https://www.epa.gov/watersense) These would include faucets, showerheads, and toilets.
Install low-water-use washing machines and dishwashers.

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