



Housing Development Consortium of Seattle-King County

Exemplary Buildings Program

Advancing Ultra-Efficient Buildings in Affordable Housing

PROGRAM SPECIFICATIONS

GENERAL OUTLINE

1. Employ Integrated Design to achieve cost and performance efficiencies that do not compromise the number of affordable housing units delivered.
2. Design and construct to an exemplary standard that balances health, comfort, life cycle cost, durability, usability, maintainability and operational effectiveness, including:
 - a. All electric (no use of fossil fuels, with exception for emergency power systems)
 - b. An exemplary building envelope
 - c. Balanced ventilation with heat recovery
 - d. Electric heat pump domestic hot water with efficient distribution design
 - e. Energy Star appliances and efficient lighting
 - f. Utilize low-flow fixtures to conserve water and lower utility costs
 - g. Design for maximum renewable energy on site & install when feasible
 - h. Ensure appropriate commissioning to achieve the intended performance
3. Train facility staff to optimize operation of building systems and educate residents in conserving water and energy.
4. Share design and monitored performance results with the Exemplary Building Task Force (EBTF) so the information can be maintained and shared with other affordable housing stakeholders in an open source program.

SPECIFIC MEASURE RECOMMENDATIONS

1. Employ Integrated Design from the start to achieve cost efficient design and to enable:
 - a. Compact form and efficient floor plan for both cost and energy efficiencies; recommended enclosure area to conditioned floor area ratio ≤ 1.0 .
 - b. Design structure using advanced wood framing techniques.
 - c. Apartment bathrooms are located back-to-back where possible.
 - d. Reduced glazing percentage (25% or lower window-to-wall percentage), with window openings located within stud centers and use of standardized window dimensions.
 - e. Integration of building systems into the building design from an early phase of design.
 - f. Employ whole building modeling to optimize energy & water.
 - g. Target one of the following modeled energy performance thresholds:
 - ≤ 20 EUI (annual energy (kBtu) use intensity per SF of building floor area), or
 - 40% less annual energy than a WSEC performance baseline, assuming standard design HVAC for apartments is electric resistance space heat and including DHW distribution losses, or
 - Meets PHIUS+ Standard modeled performance requirements.

2. Design and build to an exemplary standard

a. Exemplary building envelope:

- Improved airtight measures.
Measured air leakage: ≤ 0.17 cfm/ft² @ 75Pa
- Review and reduce thermal bridging at foundation, floors, balconies, decks and roof.
- Component targets (overall targets):
 - Windows: $\leq U-0.22$, SHGC optimized by orientation and ideally located within framing centers.
 - Slab-on-grade floors: $\geq R-10$, continuous below slab TB at perimeter.
 - Above-grade floors: $\geq R-35$
 - Above-grade walls: $\geq R-23$
 - Roof: $\geq R-49$

b. Balanced ventilation with heat recovery:

- Fan system power efficiency ≤ 0.8 cfm_{supply}/Watt
- Sensible recovery efficiency (SRE) $\geq 75\%$

c. Electric heat pump domestic hot water with efficient distribution design.

- Design for efficient layout and sizing of piping systems.
- For central distribution systems:
 - Provide back to back unit/bathroom design where feasible.
 - Peer review of system design with EB Task Force recommended engineer
 - Efficient circulation of hot water to reduce energy and water consumption.
 - Insulate hot water supply and recirculation piping beyond code.
- Provide backup electric water heating systems and equipment monitoring system to help maintain on-going efficiency.

d. Energy Star appliances and efficient lighting:

- Design common area lighting to be ≤ 0.35 Watts/SF lighting power density (LPD).
- Install most energy and water efficient appliances feasible .
- Utilize heat pump dryers when installed in apartments.

e. Design for maximum renewable energy on site & install when feasible:

- Maximize roof top design for Photovoltaic layout.
- Reduce interference from roof top equipment.
- Install to maximum extent feasible with support from EB Task Force.

f. Utilize low-flow fixtures to conserve water and lower utility costs.

- Install plumbing fixtures to meet updated [WA State water product standards](#).

g. Ensure appropriate commissioning (Cx) to achieve the performance as designed.

- Utilize a third-party Cx professional, who is engaged no later than the end of schematic design.

3. Train facility staff to optimize operation of building systems and educate residents in conserving water and energy

4. Document the design and performance results to share with EBTF and other developers

- a. Document materials, equipment and building layout as designed and installed
- b. Report monitored performance results and in-service maintenance issues
- c. Share data with HDC Exemplary Buildings Task Force in an open source program