



**B U I L T  
S M A R T<sup>SM</sup>**

# **Technical Specifications**

**[www.seattle.gov/light/conserves/resident](http://www.seattle.gov/light/conserves/resident)  
(206) 684-3800**



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## **INTRODUCTION**

The BUILT SMART Program from Seattle City Light encourages developers of new low and mid-rise residential buildings of at least 5-units to reach beyond standard practice in incorporating electricity-saving features. Financial incentives help pay the additional cost of higher efficiency options, and City Light staff provide technical assistance to help meet efficiency goals. This document describes the specific requirements called for in buildings participating in the program.

BUILT SMART buildings must exceed established thermal performance thresholds for walls, ceilings, floors, windows and doors, incorporate efficient common area lighting, and meet the Washington State Ventilation and Indoor Air Quality Code. Developers can also choose to go beyond these basic requirements to take advantage of optional incentives for common area lighting controls, efficient light fixtures within individual units, efficient clothes washing machines, heat pump and fan upgrades, high-performance thermostats and energy efficient elevators.

Buildings that do not meet BUILT SMART's building envelope requirements, or which are not heated with electricity, can still participate in one of BUILT SMART's "Lighting and Options" packages. To do so, these buildings meet minimum common area lighting efficiency thresholds and choose among the optional electricity-saving measures mentioned above.

If you have specific questions or need more information, please contact your BUILT SMART representative at 206-684-3800.

## **CHAPTER 1 – QUALIFYING A BUILT SMART BUILDING**

### **1.1 Existing Codes and Regulations**

These specifications are intended to meet or exceed applicable existing building codes and Federal regulations. In any case, where a Federal, State or local code or regulation exceeds these requirements, that code or regulation applies.

### **1.2 Qualifying a Building**

A building design must be reviewed and authorized by your BUILT SMART representative and a BUILT SMART Agreement must be executed. The building must meet Section 1.5 through one of the three Prescriptive Path options.

Buildings must meet all requirements in order to qualify for a BUILT SMART incentive, including thermal efficiency, HVAC, indoor air quality and required lighting.

### **1.3 Calculating Building Incentives**

**1.3.1** All BUILT SMART buildings that meet all minimum values for thermal shell upgrade incentives shall be paid incentives based on square footage of individual thermal component upgrades of the building.

**1.3.2** The BUILT SMART “diligent inspection” incentive shall be paid on the gross square footage of the residential floor areas.

**1.3.3** Required interior common area lighting incentives are calculated based on their improvement over Energy Code lighting power density allowances.

**1.3.4** Incentives for exterior lighting, interior lighting controls, in-unit lighting, whole house fans, and heating controls are based on a per-fixture rebate.

### **1.4 Plans Review**

Building plans and any design changes must be reviewed and verified by a BUILT SMART representative. A copy of the architectural plans of the building shall be provided for the BUILT SMART Program permanent files.

## 1.5 Envelope Requirements for Electrically Heated Multifamily Residences

To qualify for the Built Smart Full-measure Program, buildings must follow one of the three compliance paths below. Buildings with greater than 25% glazing to floor area are not eligible for the BUILT SMART Program.

Option	% Glazing to Floor Area	Glazing U-Value Max	Unglazed Doors U-Value	Attic Ceiling	Vaulted or Flat Ceiling	Wall Above Grade	Wall Below Grade	Elevated Slab Over Heated Space	Elevated Slab Over Unheated Space	Under Floor	Slab On-Grade Perimeter
I <sup>1</sup>	Up to 12% & 2x4 Wall	U-0.33 <sup>4</sup>	U-0.19	R-49 Adv <sup>5</sup>	R-38	R-15 Int <sup>6</sup>	R-15	See Footnote 7	See Footnote 8	R-30	R-10
II <sup>2</sup>	Up to 12% & 2x6 Wall	U-0.33 <sup>4</sup>	U-0.19	R-49 Adv <sup>5</sup>	R-38	R-21 Int <sup>6</sup>	R-21	See Footnote 7	See Footnote 8	R-30	R-10
III <sup>3</sup>	12 - 25% & 2x6 Wall	U-0.33 <sup>4</sup>	U-0.19	R-49 Adv <sup>5</sup>	R-38	R-21 Int <sup>6</sup>	R-21	See Footnote 7	See Footnote 8	R-30	R-10

### Other Required Measures

In order to qualify for building envelope incentives, buildings must also install:

- Common Area Lighting ..... See Chapter 6 for specifications
- Whole House Fan Timers ..... See Chapter 5 for specifications

### Incentives Available for Optional Measures

Builders are not required, but are encouraged to take advantage of incentives for:

- Common Area Lighting Controls ..... See Chapter 6
- In-Unit Lighting ..... See Chapter 6
- Efficient Clothes Washers ..... See Chapter 7
- Heating Thermostats ..... See Chapter 8
- HVAC Upgrades ..... See Chapter 8
- Energy Efficient Elevator Systems ..... See Chapter 9
- Commercial Area Upgrades ..... See Chapter 10

## FOOTNOTES to chart on page 3

1. For buildings with up to 12% glazing to floor ratio and 2x4 exterior wall construction.
2. For buildings with up to 12% glazing to floor ratio and 2x6 exterior wall construction.
3. For buildings with glazing to floor percentages of 12% to 25% with 2x6 exterior wall construction.
4. Glazing U-Factors Area Determination: U-values shall be assigned to all glazing units according to the NFRC Table for sizes of all product types: Residential or Non-Residential Model Sizes. Glazing U-Values based on the NFRC Certified Products Directory ([www.nfrc.org](http://www.nfrc.org)). Total area weighted U-value for sum of all individual windows located in the residential portions of the building is required. The determination of the percentage of glazing in a multifamily building, in relation to the total square foot floor area of the multifamily building, shall use the total gross square foot of only the residential floors of the building as the basis for the percentage calculation.
5. Advanced-Frame Attic: Any combination of heel height, insulation material and baffles that provides the required ventilation space and a minimum of R-38 insulation at the interior edge of exterior walls. The insulation shall increase to the full R-value at the highest rate allowed by the roof pitch and taper down to reach the outside edge of the exterior wall or to blocking between rafters.
6. Intermediate Framing: Wood-framed on 16-inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners and each opening is framed by two studs. All headers shall be insulated with a minimum of R-10 insulation. Interior partition wall and exterior wall intersections shall be fully insulated in the exterior wall.

<u>Weighting Factors</u>	Studs and Plates	0.18
	Insulated Cavity	0.78
	Headers	0.04

(Units with steel framing must have U-Factors equal to intermediate-framed wood walls.)

7. Elevated Residential Slab (ERS) Over Heated Space
  - If slab and building footprint *are equal*: R-10 (F-0.05) is required around slab perimeter.
  - If slab is *greater than* the building footprint: R-15 (U-0.057) is required above slab.  
(If the above requirements are *not* met, incentives will be not paid for the first level units located on ERS.)
8. Elevated Residential Slab (ERS) Over Unheated Space
  - If slab and building footprint *are equal*: R-30 (U-0.031) is required below slab and R-10 (F-0.05) is required around slab perimeter; **OR** R-15 (U-0.057) is required above slab.
  - If slab is *greater than* the building footprint: R-15 (U-0.057) is required above slab.  
(If the above requirements are *not* met, incentives will not be paid for the first level units located on ERS.)
9. Elevated Residential Slab (ERS) Over Heated or Unheated Space - Calculated Method
  - The requirements in footnotes 7 or 8, above, must be met in order for the units on the elevated residential slab to be eligible for BUILT SMART incentives.
  - If any BUILT SMART measures are used to calculate ERS below minimum values required, all calculations must be reviewed by the BUILT SMART representative to determine program eligibility and incentive levels. See Appendix C for details.

## CHAPTER 2 – REQUIRED INSPECTIONS

Incentive payments shall be made only after all incentive measures have been installed and inspected by a BUILT SMART representative. BUILT SMART measures are eligible for one re-inspection to make necessary corrections. Any subsequent re-inspections of that specific measure or portion of that measure, if required, will be subject to a \$50.00 re-inspection fee per re-inspection. Any re-inspection fees will be subtracted from the final BUILT SMART incentive payment for that project.

A BUILT SMART inspector must conduct and document all of the following inspections during construction to confirm project incentive eligibility.

- 2.1 Slab-On-Grade/Full Under-Slab Insulation.** Prior to concrete slab pour.
- 2.2 Exterior Wall Framing.** Prior to the installation of wall insulation, all enclosed exterior wall framing cavities (e.g. headers, corners) shall be insulated.
- 2.3 Ceiling/Roof Framing.** For adequate clearances to allow for full insulation coverage prior to installation of ceiling insulation.
- 2.4 Glazing.** All windows and glazed doors must meet the required U-Values based on the approved design criteria of your building. **IMPORTANT NOTE:** The window supplier must supply the BUILT SMART representative with a window schedule identifying total glazing square footage, window sizes, U-Value for each type of window/glass door, and the weighted average U-Value calculation. Your BUILT SMART representative must be notified by your general contractor upon window delivery to confirm material compliance.
- 2.5 Caulking and Air Sealing.** Prior to cover by insulation and/or gypsum wallboard.
- 2.6 Insulation.** Prior to cover by any other materials (polyethylene [or other sheet] vapor retarder, gypsum wallboard (GWB), etc.).
- 2.7 Vapor Retarder.** 1) For polyethylene and other sheet vapor retarders, prior to cover by GWB or other material. 2) For vapor retarder primer, at time of application. (Polyethylene vapor barriers are not recommended.)
- 2.8 Ventilation Exhaust Fans & HVAC Equipment.** Specifications and calculations must be verified for compliance before installation.
- 2.9 The Final Inspection will confirm the proper installation of:**
  - **Heating Thermostats.**
  - **Whole House Exhaust Fans.** Exhaust fans shall be tested for proper air flow. Proper fan timer operation shall be confirmed.
  - **Fresh Air Inlets.** The correct number of fresh air inlets and their proper operability will be confirmed in all units.
  - **Interior Door Undercuts.** ½-inch minimum door undercut will be confirmed.
  - **Lighting Fixtures & Controls.** Compliance and final count confirmed.
  - **Appliance Upgrades.** Model numbers confirmed.
  - **HVAC Equipment.** Equipment upgrades confirmed at final inspection.

## CHAPTER 3 – THERMAL EFFICIENCY & INSULATION DETAILS

The following required thermal efficiency details must be met when constructing a BUILT SMART building.

### 3.1 Roof/Ceiling Insulation Details

- 3.1.1 Minimum Attic Eaves Insulation.** A minimum R-38 ceiling insulation is required over the entire ceiling in attic framed roofs, including over the interior edge of the exterior wall. The ceiling insulation shall be installed out to the outer edge of the exterior wall to the fullest depth possible. (When attic insulation is blown in any attic not framed with advanced framing, all eaves must be insulated with minimum R-38 fiberglass batt insulation to a minimum of two feet in from the exterior walls.)
- 3.1.2 Recessed Fixtures.** Recessed fixtures in exterior ceilings (e.g. exhaust fans, recessed lights, heating equipment) shall be covered by the full depth of insulation required by the component assembly. (See Section 3.5.6 for Air Sealing details.)
- 3.1.3 Hatches.** Hatches connecting conditioned spaces to attics and crawlspaces shall be insulated to at least the minimum requirement for the appropriate component. The insulation shall be held in place in a permanent manner.

### 3.2 Wall Insulation Details

- 3.2.1 Exterior Wall Framing.** All exterior wall framing cavities shall be fully insulated.
- 3.2.2 Exterior Wall Framing Headers.** All headers shall be fully insulated to R-10, or maximum R-value possible in header cavity.
- Greater than 2 inch header cavity = High density fiberglass allowed.
  - Less than 2 inch header cavity = 1½ inch rigid foam required.
  - Less than 1 ½ inch header cavity = 1 inch rigid foam required.
- 3.2.3 Rim Joists.** All rim joists between floors shall be insulated to the above-grade wall R-Value. The insulation shall be installed in a permanent manner and include the required vapor barrier. All penetrations or openings in the rim joists between floors shall be fully caulked and sealed to limit air leakage.
- 3.2.4 Interior Stairwells and Elevator Shaft Walls.** All interior stairwell and elevator shaft walls adjacent to any residential unit, or any other conditioned residential space, shall be insulated to a minimum of R-21.

### 3.3 Elevated Residential Slab (ERS) Insulation

All elevated residential slabs must be insulated in one of the following manners for the residential units on that slab to be eligible for BUILT SMART thermal shall incentives.

**3.3.1** When ERS and building shell footprints are equal and above:

- **Heated space.** R-10 is required around the entire slab perimeter. (No under-slab insulation is required.)
- **Unheated space.** R-10 is required around the entire slab perimeter and R-30 is required below the slab; **OR** R-15 is required above the slab.

**3.3.2** When ERS and building shell footprints are unequal (slab footprint greater than the building) and above either **heated or unheated space** the entire residential building shell slab floor must be insulated to R-15 above the slab.

### 3.4 Door and Glazing Details

**3.4.1** All windows and glazed doors shall be NFRC certified and labeled.

**3.4.2** The window supplier is required to supply the BUILT SMART representative with a window schedule identifying total glazing square footage, window sizes, U-Value for each type of window/glass door, and average U-Value calculation.

### 3.5 Required Air-Leakage Control Details

**Sealing is required.**

**3.5.1** Around all window and door frames to control air-leakage.

**3.5.2** At all exterior penetrations in the rim joist framing including blocking where the floor joists are cantilevered to support an exterior deck.

**3.5.3** At the bottom of the wall plate where wall meets the slab floor.

**3.5.4** Around any penetrations in the building envelope to ducts, through-the-wall air inlet vents and accesses hatches.

**3.5.5** Around all outlets, switches, or other electrical boxes in the exterior walls, ceilings or floors. (Foam gaskets behind electrical cover plates meet this requirement.)

**3.5.6** For all recessed fixtures (e.g. wall heaters, exhaust fans, medicine cabinets, recessed lights, etc.): they shall be sealed to the assembly in all exterior walls and ceilings and in all ceilings between floors of stacked multifamily units.

### 3.6 Back Draft Dampers

Intermittently operated fans, or other non-heat recovery systems exhausting air from the building shall be ducted to the outside and have a back draft damper located in the exhaust duct.

## CHAPTER 4 – HVAC SYSTEMS

In order to receive shell measure or thermostat incentives, the primary heating system must be electric. The heating contractor is responsible for designing and installing the heating system to meet all UMC, NEC, applicable local codes and equipment manufacturers' requirements.

### 4.1 Heating and Cooling Thermostats

- 4.1.1 **Zone Systems.** Each separated heating system in the unit shall have at least one thermostat per zone mounted on an interior wall, at the manufacturer's recommended height, to regulate temperature. See Section 8 for details on the optional BUILT SMART thermostat incentive.
- 4.1.2 **Electric Forced Air Furnace (Non-Heat Pump).** For central furnace or similar type systems, a low-voltage, micro process-controlled programmable electronic thermostat shall be installed.
- 4.1.3 **Ducted Heat Pump Systems.** Heat pump thermostats used for both heating and cooling shall have a manual changeover feature or heating/cooling lockout to prevent cross cycling between heating and cooling. A programmable electronic setback thermostat shall be used and shall be of the ramped/intelligent recovery types to limit supplemental heats during the recovery period and have at least two set-back periods per day.
- 4.1.4 **Package Terminal Heat Pumps (PTHP [non-ducted]).** Heat pump thermostats used for both heating and cooling shall have a manual changeover feature or heating/cooling lockout to prevent cross cycling between heating and cooling.

### 4.2 HVAC Duct Sealing

All supply and return ducts, air handlers and plenums inside and outside the heated space shall be sealed at all joints and corners, including prefabricated joints and longitudinal seams. All joints in the HVAC ducts shall be mechanically fastened.

### 4.3 HVAC Duct Insulation

All HVAC ducts outside heated space shall be insulated.

- 4.3.1 **Rigid metal ducts and plenums** outside the heated space shall be insulated to R-19.
- 4.3.2 **Exhaust ducts** outside the heated space shall be insulated to R-8, minimum.

## CHAPTER 5 – INDOOR AIR QUALITY

This chapter applies to all buildings, not just those receiving the optional efficient fan incentives. All BUILT SMART residences shall meet the Washington State Ventilation and Indoor Air Quality (VIAQ) code, latest edition. Much of the information below comes directly from the VIAQ code. For complete code requirements, and in case of conflict between these documents, please refer to the VIAQ code at <http://www.seattle.gov/dpd/Codes>.

### 5.1 Whole-House Exhaust Airflow – Prescriptive Path

Residential buildings of four stories or less shall meet the current minimum and maximum fan flow requirements described in the appropriate chart below. For taller buildings please see the State VIAQ code.

#### 5.1.1 Intermittent Ventilation

Unit Square Footage	# Bedrooms	Min/Max Fan Flow at 0.25 in W.G.
Less than 500	2 or less	50-75 cfm
501 – 1000	2 or less	55-83 cfm
1001 – 1500	2 or less	60-90 cfm
501 – 1000	3	70-105 cfm
1001 – 1500	3	75-113 cfm

#### 5.1.2 Continuous Ventilation

# Bedrooms/Residence	Min. Fan Flow at 0.25 in W.G.	Max. Fan Flow at 0.25 in W.G.
1	30 cfm	60 cfm
2	50 cfm	75 cfm
3	60 cfm	90 cfm

NOTE: A single, continuously operating, integrated whole-house fan or fan pickup in one bathroom is acceptable if spot ventilation fans are provided in the kitchen and in the other bathrooms.

### 5.2 Whole-House Exhaust Airflow – Calculated Path

Whole-house ventilation systems not meeting the prescriptive path shall be calculated for exhaust airflow. The minimum combined measured airflow capacity shall be 0.35 ACH, but not less than 15 cfm per bedroom and 15 cfm for main living area. The maximum ventilation rate for non-heat recovery ventilation systems shall not exceed 0.5 ACH for residences greater than 1400 square feet or 0.65 ACH for residences less than 1400 square feet.

### 5.3 Whole-House Exhaust Fan Controls

Intermittently operating, whole-house exhaust fans shall have both automatic and manual controls. Automatic controls shall include time clock or cycle timers with a minimum of three on/off periods per day and be set to provide at least 8 hours of mechanical ventilation per day. Control pins shall not be removable.

### 5.4 Individual Room Outdoor Air Inlets

All residential units shall have a minimum of two outdoor air inlets provided in the living/dining areas. Each bedroom shall have one outdoor air inlet.

### 5.5 Formaldehyde Reduction Measures

All structural components such as softwood plywood, particle board, wafer board and OSB shall be identified as :EXPOSURE 1", "EXTERIOR", or "HUD-Approved".

## CHAPTER 6 –LIGHTING

### 6.1 Introduction

**Required lighting upgrades.** In order to qualify for any BUILT SMART incentives, a building's common area lighting and most exterior lighting must meet program requirements as described in this chapter. Common areas are those areas outside the living units that have electrical components connected to the common house meter, and can include: lobbies; entryways; halls; stairwells; lounges; community rooms; exercise rooms; and laundry rooms.

**Optional lighting.** The Seattle City Light BUILT SMART program encourages builders to take advantage of optional incentives towards the installation of the following:

- Efficient light **fixtures** dedicated to the individual living unit and connected to its meter. Includes both in-unit fixtures and exterior entry fixtures.
- Lighting **controls** in common areas.

### 6.2 Submittal Requirements for Lighting

All fixture and control specifications must be reviewed and approved prior to installation. The following lighting information should be submitted for review at the time of building application and will be required before final incentive payment:

- 6.2.1** A fixture schedule itemized by location (common area, exterior, in-unit, etc). If exact fixture numbers are not known at time of application, a detailed estimate will be accepted as a placeholder. Actual incentives will be based on the number of fixtures verified at final inspection.
- 6.2.2** Manufacturers' specification sheets for all fixture types. If fixture models have not yet been selected, these can be submitted after initial application, but must be submitted before final inspection and payment.
- 6.2.3** Common area lighting incentives are based on estimated energy savings. To determine the incentive amount, please also submit for common areas:
- a set of architectural drawings, including a reflective ceiling plan
  - common area square footage measurements, by floor
  - estimated annual operation hours for each distinct area
  - Total common area installed watts (excluding exit lights of 5 watts or less).
- 6.2.4** Any details unavailable at time of initial application must be submitted as soon as possible afterwards, and before final inspection and payment.

## 6.3 General Lighting Specifications Applicable to All Lighting

- 6.3.1** Eligible technologies include fluorescent (T-8 or smaller), 2-piece compact fluorescent, metal halide, high-pressure sodium, and central lighting controls. Ineligible technologies include T-10 and T-12 fluorescent, one-piece screw-in compact fluorescent, incandescent (including halogen), mercury vapor, neon, and low voltage.
- 6.3.2** All lamps must have a CRI of 70 or better (except high-pressure sodium lamps).
- 6.3.3** All fixtures and controls must be hardwired.
- 6.3.4** Linear fixtures (tubes) must have high power factor ballasts.
- 6.3.5** All exterior fixtures must be suitable for damp or wet location, where required.
- 6.3.6** Where required, recessed lighting must be air-sealed. See Seattle Energy Code section 502.4.4.
- 6.3.7** Where fixtures are switched on and off more than once a day, they must switch on without flicker. The time needed between switching the lamp on and it starting continuously and remaining illuminated must be one second or less. Fixtures may use “rapid start”, “programmed start”, or “instant on” technologies.
- 6.3.8** Where fluorescent lamps are used, low mercury content is strongly urged.

## 6.4 Required Interior Common Area Lighting

All interior common area lighting must meet the BUILT SMART General Lighting Specifications above. Common area fixtures may have electronic or magnetic ballasts, although City Light prefers electronic.

Interior common area lighting incentives are based on efficiency improvements over the Energy Code’s Lighting Power Allowances of 1.0 watt per square foot for multifamily buildings and 1.5 watts for nursing homes and senior housing (Washington Energy Code, Table 15-1). BUILT SMART requires lighting power densities of 0.8 watts per square foot or less for standard multifamily housing, and 1.3 watts per square foot or less for nursing homes and senior housing. The lighting power density is calculated by dividing the total input watts in the common areas by the common area square footage. Consistent with the Washington State Energy Code (Section 1530), exit signs of 5 watts or less are not included in the calculation. The incentive is calculated using the actual installed lighting, and is based on the wattage reduction below the lighting power allowance.

Seattle City Light recommends that all common areas in multifamily buildings have a minimum of 5 foot-candles over the entire interior common area spaces being considered. Reference the most recent edition of the IESNA Lighting Handbook for details.

## 6.5 Required Exterior Lighting

Residential exterior building and landscape lighting connected to the common house meter must meet the BUILT SMART General Lighting Specifications, and must be controlled by a photocell that prevents operation during daylight hours. Incentives are offered as flat per-fixture rebates. See “Appendix D: BUILT SMART Incentives”.

Exterior areas that must meet Washington State Energy Code efficiency requirements, such as garages and parking areas, are not eligible for the flat rebate.

## 6.6 Optional Lighting (In-unit and Porch Light)

Light fixtures connected to the individual living unit’s meter are eligible for a flat per-fixture rebate. All optional fixtures must meet the requirements of the General Lighting Specifications, must utilize electronic ballasts and **must be Energy Star rated fixtures**.

Rebates may be installed in the following spaces:

kitchens	entryways (interior)
dining rooms	entry porches (exterior)
stairwells	bedrooms
bathrooms	hallways

Incentives are not paid on fixtures installed in closets or laundry rooms. Incentives are also not paid on fixtures on porches, decks or lanais that do not also serve as entries.

BUILT Smart representatives reserve the right to deny incentives to lighting locations that are not appropriate for the technology, or where excessive numbers of light fixtures are installed.

## 6.7 Optional Lighting Controls for Common Areas

Lighting controls that sense occupancy or light levels in common areas are eligible for a flat per-control rebate. All control specifications must be reviewed and approved by the Built Smart representative prior to installation. Ceiling-mounted controls must regulate multiple fixtures – ceiling fixtures that have their own individual control do not qualify for the ceiling-mounted control incentive. Occupancy sensors shall automatically reset to sensing mode after manual override or testing operation.

## 6.8 Lighting for Commercial Areas within the Building

Interior and exterior lighting that is dedicated to commercial space is not eligible for BUILT SMART incentives. Commercial incentives may be available through City Light’s Energy Smart Services Program (206) 684-3254. Buildings with a combination of commercial and residential spaces will be evaluated on a case by case basis.

## 6.9 Exceptions

This program allows flexibility for specific and unique architectural details. Any exception from these lighting requirements must be reviewed and approved the BUILT SMART Program representative and be part of the Built Smart Agreement.

## CHAPTER 7 – OPTIONAL RESIDENTIAL APPLIANCES

### 7.1 Clothes Washers

Incentives vary between \$50 and \$100 depending on clothes washer efficiency. For qualifying models and financial incentives, please check Seattle City Light's WashWise web site at [www.seattle.gov/light/conserves/resident/washwise](http://www.seattle.gov/light/conserves/resident/washwise) or call the WashWise hotline at 1-866-632-4636.

## **CHAPTER 8 – OPTIONAL HVAC UPGRADES**

### **8.1 Energy Efficient Whole House Fans (see also Chapter 5 - IAQ)**

- 8.1.1 Fan must meet the Uniform Mechanical Code, Chapter 4 requirements.
- 8.1.2 Fan must draw less than 30 watts. Whole-house fans serving multiple living units may be served on a case by case basis. These must meet all BUILT SMART requirements and draw less than 30 watts per living unit.
- 8.1.3 Fan must have a noise rating of 1.5 sones or less, unless mounted remotely and acoustically isolated from the living space.
- 8.1.4 Controls must comply with Section 5.3, Whole-house Exhaust Fan Controls.
- 8.1.5 Whole house fan motors shall be rated for continuous use.

### **8.2 Thermostats**

- 8.2.1 To qualify for the optional BUILT SMART thermostat incentive, each thermostat shall have numerical degree settings and shall have accuracy of +/- 2 degrees Fahrenheit or less.
- 8.2.2 Both electronic and vapor diaphragm thermostat types are allowed. Bi-metal thermostats do not qualify for the incentive.

### **8.3 In-Unit Heat Pump/Air Conditioning Specifications**

- 8.3.1 All heat pump/air conditioning upgrade incentives shall be calculated using Seattle City Light's Heat Pump Calculation Worksheets in Appendix B or available from a BUILT SMART representative.
- 8.3.2 Components and installation shall meet all applicable state and local codes and standards including the Washington State Energy Code/Seattle Energy Code Chapter 14, table 14-1D.
- 8.3.3 A set of product specification sheets must be submitted to a BUILT SMART representative that includes equipment capacity, efficiency ratings (SEER, EER, COP and IPLV). Steady State values are not acceptable. All equipment shall have a permanently affixed nameplate that shows the manufacturer, model number and equipment load ratings.

### **8.4 Common Area Heat Pump/Air Conditioning Specifications**

- 8.4.1 Components and installation shall meet all applicable state and local codes and standards including the Washington State Energy Code/Seattle Energy Code Chapter 14, tables 14-1A or 14-1D.
- 8.4.2 A set of product specification sheets must be submitted to a BUILT SMART representative that includes equipment capacity, efficiency ratings (SEER, EER, COP and IPLV). Steady State values are not acceptable.
- 8.4.3 All equipment shall have a permanently affixed nameplate that shows the manufacturer, model number and equipment load ratings.

### **8.5 Equipment Verification and Inspection**

- 8.5.1 A BUILT SMART representative must review all documentation and approve calculations prior to installation.
- 8.5.2 After the equipment is installed, a BUILT SMART representative must inspect the installation to insure program compliance.

## **CHAPTER 9 – OPTIONAL EFFICIENT ELEVATORS**

The BUILT SMART Program offers incentives for the installation of energy efficient elevators. To qualify, elevators shall be alternating current (AC) gearless systems with synchronous permanent-magnet motors. The motor and bedplate structures of these elevators are an integral part of the hoisting devise.

The BUILT SMART incentive will be based on this formula:

Elevator horsepower x 800 kWh (savings per horsepower) x \$0.23 per kWh saved.

## **CHAPTER 10 – COMMERCIAL AREA UPGRADES, Reserved**

The BUILT SMART Program does not currently offer energy efficient incentives for commercial spaces.

If you are interested in incentives for those commercial spaces please contact the Seattle City Light new construction group at 206-684-3254 or on the web at [www.seattle.gov/light/conserves/business/cv5\\_ncp.htm](http://www.seattle.gov/light/conserves/business/cv5_ncp.htm)

## APPENDIX A – COMMON AREA LIGHTING CALCULATION WORKSHEETS

See this web site for common area lighting calculation worksheets:

[www.seattle.gov/light/conserves/resident/bsbinder/cv5\\_bs43.html](http://www.seattle.gov/light/conserves/resident/bsbinder/cv5_bs43.html) or contact your BUILT SMART representative.

## **APPENDIX B – HEAT PUMP UPGRADE CALCULATION WORKSHEETS**

See this web site for heat pump upgrade forms and calculation worksheets:

[www.seattle.gov/light/conservation/resident/bsbinder/cv5\\_bs44.html](http://www.seattle.gov/light/conservation/resident/bsbinder/cv5_bs44.html) or contact your BUILT SMART representative.

## APPENDIX C – ELEVATED RESIDENTIAL SLAB INSULATION CALCULATIONS

If the elevated residential slab (ERS) is not insulated to BUILT SMART minimums because you have calculated the required ERS insulation out through a trade off of another measure at a higher level than is required by code, then you must:

- Show your BUILT SMART representative what measures were used to calculate out the required ERS insulation. (NOTE: If you calculated out the required ERS insulation by installing another measure at a higher level than is prescriptively required by code, the building may be eligible for BUILT SMART incentives, *except* for the units directly above or below the ERS.)
- If better window U-values were used in order to calculate out the ERS, the following equation shall be used to determine BUILT SMART incentives (if any):

$$A - (C - I) = U$$

Where:

A = 0.36, assumed 0.40 code standard practice U-value

C = The maximum U-value needed to meet code

I = The U-value proposed to be installed

U = The U-value which determines the BUILT SMART incentive -see table in Appendix D.

### EXAMPLE

If the builder was required to install minimum U-.35 windows in order to calculate out the ERS insulation for code:

#### Option 1

But the builder proposes U-.30 windows to qualify for BUILT SMART, then:

$$0.36 - (0.35 - 0.30) = 0.31$$

The windows *qualify for a U-.31 incentive*. (See table in Appendix D.) NOTE: The windows on the first floor would *not* be paid an incentive due to the reduced performance of the uninsulated slab floor.

#### Option 2

But if the builder proposes U-.33 windows to qualify for BUILT SMART, then:

$$0.36 - (0.35 - 0.33) = 0.34$$

The windows *do not qualify* for an incentive because BUILT SMART requires a minimum of U-.33 after the calculation. (See table in Appendix D.)

## APPENDIX D – BUILT SMART INCENTIVES

### 1. Thermal Envelope

Incentive is based on an energy efficiency upgrade of each envelope measure as outlined in Chapter 1.

#### Incentive Tables for 2x6 Wall Construction

##### Windows (Required)

U-Value	12% Glazed kWh Saved	\$ Per Square Foot	25% Glazed kWh Saved	\$ Per Square Foot
U-.33	.524 kWh	\$0.39	.786 kWh	\$0.58
U-.32	.779 kWh	\$0.58	1.043 kWh	\$0.78
U-.31	1.034 kWh	\$0.77	1.301 kWh	\$0.95
U-.30	1.288 kWh	\$0.96	1.558 kWh	\$1.16
U-.29	1.543 kWh	\$1.15	1.815 kWh	\$1.36
U-.28	1.800 kWh	\$1.35	2.073 kWh	\$1.55

##### Ceilings (Required)

Type	12% Glazed kWh Saved	\$ Per Square Foot	25% Glazed kWh Saved	\$ Per Square Foot
Full Attic	.309 kWh	\$0.23	.309 kWh	\$0.23
Flat/Vaulted	.160 kWh	\$0.12	.161 kWh	\$0.12

##### Above-Grade Walls (Required)

U-Value	12% Glazed kWh Saved	\$ Per Square Foot	25% Glazed kWh Saved	\$ Per Square Foot
R-21 int	.235 kWh	\$0.17	.108 kWh	\$0.08
R-22 int	.270 kWh	\$0.20	.1144 kWh	\$0.10
R-23 int	.304 kWh	\$0.22	.179 kWh	\$0.13
R-21 int+R5	.552 kWh	\$0.41	.435 kWh	\$0.32

##### Under Slab On Grade (Optional)

Type & U-Value	12% Glazed kWh Saved	\$ Per Square Foot	25% Glazed kWh Saved	\$ Per Square Foot
R-5 Full Slab	.175 kWh	\$0.013	.186 kWh	\$0.13

## 1. Thermal Envelope, continued.

**Incentive Tables for 2x4 – up to 12% Glazed Area****Windows (Required)**

<b>U-Value</b>	<b>KWh Saved</b>	<b>\$ Per Square Foot</b>
U-.33	.535 kWh	\$0.40
U-.32	.780 kWh	\$0.60
U-.31	1.064 kWh	\$0.79
U-.30	1.329 kWh	\$0.99
U-.29	1.594 kWh	\$1.19
U-.28	1.858 kWh	\$1.39

**Ceilings (Required)**

<b>Type</b>	<b>KWh Saved</b>	<b>\$ Per Square Foot</b>
Full Attic	.309 kWh	\$0.23
Flat/Vaulted	.160 kWh	\$0.12

**Above-Grade Walls (Required)**

<b>U-Value</b>	<b>KWh Saved</b>	<b>\$ Per Square Foot</b>
R-15 int	.108 kWh	\$0.08

**Under Slab On Grade (Optional)**

<b>Type &amp; U-Value</b>	<b>KWh Saved</b>	<b>\$ Per Square Foot</b>
R-5 Full Slab	.179 kWh	\$0.13

## 2. Incentives for Required Lighting Measure

### A. Interior Common Area Lighting Incentives

- Incentives are based on wattage reduction below current multifamily common area lighting code.
- Requirement is maximum of .80 watt per square foot (maximum of 1.3 watts in Nursing Homes/Senior Housing) at \$0.20 per first year kWh saved.

### B. Exterior Common Area Lighting Incentives

- \$30.00 per exterior fixture connected to the house meter and controlled by a photocell.

## 3. Incentives for Optional Measures

### A. Optional Lighting (In-unit and porch lights)

- \$25.00 per light fixture connected to the living unit's meter

### B. Optional Controls for Interior Common Areas

- \$30.00 per wall mounted lighting control
- \$90.00 per ceiling-mounted lighting control

### C. Optional In-Unit Appliances – Clothes Washers

Incentive of \$25 to \$100 available depending on washer efficiency. Contact a BUILT SMART representative or visit the WashWise website ([www.savingwater.org](http://www.savingwater.org)) for details. This is a joint project with Seattle Public Utilities - paid by rebate coupon from SPU.

### D. Optional HVAC Measures

- Whole house fans: \$25.00 per energy efficient fan. Eligible whole-house fans serving multiple units may receive \$25 per living unit served.
- Electronic or vapor filled diaphragm thermostats: \$5 per thermostat
- Heat pumps and air conditioners (air to air, PTAC, and PTHP): \$0.23 per calculated kWh saved
- Other HVAC upgrades: incentive based on calculated kWh savings

### E. Optional Efficient Elevators

- \$0.23 per kWh saved (calculated by your BUILT SMART representative)