2009 Technical Specifications

www.seattle.gov/light/conserve/resident
(206) 684-3800

Seattle City Light
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INTRODUCTION

The BUILT SMART Program from Seattle City Light encourages developers of new residential developments of at least 5 units to design beyond standard practice in incorporating electricity saving features in their projects. Financial incentives provided by City Light help pay the additional up-front cost of higher efficiency options. City Light staff will provide technical assistance to evaluate energy efficiency measures and provide guidance on emerging technologies that support program efficiency goals.

Developers can also choose to go beyond these basic requirements and take advantage of optional incentives, including: common area lighting controls, whole house fans, Energy Star light fixtures within individual units, efficient clothes washing machines and refrigerators, heat pumps, shower heads, and energy efficient elevators. This document outlines program eligibility, technical specifications, and incentive and rebate amounts.

Key Features of the BUILT SMART Program

- Financial incentives to offset additional costs of energy efficient measures
- Technical assistance and design guidance for emerging energy-efficient technologies
- Energy saving features throughout the project, from envelope to lighting and appliances

If you have specific questions or need more information, please contact a BUILT SMART representative:

Beth Rocha, beth.rocha@seattle.gov. 206-684-5945

Meghan Pinch, meghan.pinch@seattle.gov. 206-684-3901
CHAPTER 1 –BUILT SMART Program Eligibility

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 is more restrictive than these requirements, that code or regulation applies.

1.2 Qualifying a Building
1.2.1 Buildings with a greater than 25% ratio of residential glazing to residential floor area are not eligible for the BUILT SMART Program.

1.2.2 Eligible projects include new residential construction, new residential units established with a Change of Use permit, and substantial building rehabilitations. Projects must have a minimum of five units.

1.2.3 All BUILT SMART projects must improve upon the Seattle Energy Code lighting power allowances (SEC, Table 15-1) for common areas by at least 20% (on a per category basis); see BUILT SMART program Chart 6-1: Lighting Power Density Allowance by Use.

1.2.4 Buildings eligible for BUILT SMART’S Full Measure Program must have electric heat and wood-framed construction.

1.2.5 Buildings with heating and assembly types other than those mentioned in 1.2.4 can qualify for BUILT SMART’s Lighting & Options Program. The Lighting & Options program includes most items found in the Full Measure Program, excluding those for insulation and windows. (Note: If gas water heat, the project will not qualify for WashWise or shower heads).

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

1.3.2 Required interior common area lighting incentives are calculated based on their improvement in kWhs over the Energy Code lighting power allowances.

1.3.3 Incentives for other items are based on either first year kWh savings or have a fixed, per-unit incentive. For a detailed list of incentives, please see Appendix A- BUILT SMART Incentives.
1.4 Plan and Specification Sheet Review

Building plans and any design changes must be reviewed and verified by a BUILT SMART representative. A copy of the plans containing architectural, electrical, mechanical, and structural drawings shall be provided for the BUILT SMART Program’s permanent files.

Manufacturers’ specification sheets are required for all products eligible for incentives and rebates (light fixtures, windows, exhaust fans, occupancy sensors, etc.). These sheets can be submitted after initial application, but must be received by the inspector prior to inspection. Purchase orders for qualifying washers and refrigerators must be submitted before final inspection and payment.

1.5 Incentives Available for Optional Measures

Projects are encouraged to take advantage of optional incentives for:

- Common Area Lighting Controls ........ .....See Chapter 6
- In-Unit Lighting................................. .....See Chapter 6
- Appliances ............................................. .....See Chapter 7
- HVAC Upgrades................................. .....See Chapter 8
- Elevator Systems............................... .....See Chapter 9
- Commercial Area Upgrades..................... .....See Chapter 10
CHAPTER 2 – REQUIRED INSPECTIONS

Incentive payments shall be made only after all incentive measures have been installed and inspected by a BUILT SMART representative. If inspections are not scheduled when required and the measures cannot be verified, then incentive amounts will be reduced at the discretion of the inspector. **A BUILT SMART inspector must conduct and document all of the following inspections during the following construction phases 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.** Prior to installation of ceiling insulation, framing will be inspected for adequate clearances to allow for full insulation coverage. Insulation is required to be inspected before covered.

2.4 **Fenestration.** 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, Air Sealing and Insulation.** Prior to cover by any other materials (polyethylene [or other sheet] vapor retarder, gypsum wallboard (GWB), etc.).

2.6 **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.)

2.7 **Ventilation Exhaust Fans & HVAC Equipment.** Specifications and calculations must be verified for compliance before installation.

2.8 **The Final Inspection will confirm the proper installation of:**

- **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.
- **Shower heads.** Less than or equal to 1.75GPM.
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 **Door and Glazing Details**

3.3.1 All windows and glazed doors shall be NFRC certified and labeled.

3.3.2 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.

3.4 **Required Air-Leakage Control Details**

Sealing is required:

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

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

3.4.3 At the bottom of the wall plate where wall meets the slab floor.

3.4.4 Around any penetrations in the building envelope to ducts, through-the-wall air inlet vents and access hatches.

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

3.4.6 All recessed fixtures (e.g. wall heaters, exhaust fans, medicine cabinets, recessed lights, etc.): shall be sealed to the assembly in all exterior walls and ceilings and in all ceilings between floors of stacked multifamily units.
CHAPTER 4 – HVAC SYSTEMS

4.1 General Requirements

In order to receive shell measure 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. Incentives are available for systems that exceed Energy Code requirements.
CHAPTER 5 – INDOOR AIR QUALITY

5.1 General Requirements


CHAPTER 6 – LIGHTING

6.1 Introduction

Required lighting upgrades. In order to qualify for any BUILT SMART incentives, a building’s common area 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, corridors, stairwells, lounges, community rooms, exercise rooms, laundry rooms, and other similar areas.

Optional lighting. The Seattle City Light BUILT SMART program encourages builders to take advantage of optional incentives for 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, 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 over code. To determine the incentive amount, please also submit for common areas:
- a set of architectural drawings, including a reflective ceiling plan;
- electrical plans with typical in-unit lighting plans;
- common area square footage measurements, by floor;
- estimated annual operation hours for each area; and
• 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 always before final inspection and payment.

6.3 General Lighting Specifications Applicable to All Lighting

6.3.1 Eligible in-unit technologies include Energy Star approved fluorescent (T-8 or smaller), 2-piece compact fluorescent, LEDs. LED fixtures must be Energy Star, Lighting Design Lab (LDL) or Design Lights Consortium (DLC) certified.

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 Where required, recessed lighting must be air-sealed.

6.3.6 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.

6.3.7 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 section 6.3 above, except for 6.3.1. 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 for multifamily buildings (Washington Energy Code, Table 15-1). BUILT SMART threshold requirements for Lighting Power Density are as follows:
### BUILT SMART Program Chart 6-1:

**Lighting Power Density (LPD) Allowance by Use**

<table>
<thead>
<tr>
<th>Use</th>
<th>2009 Seattle Energy Code Allowance (watts/sq ft)</th>
<th>BUILT SMART Requirement (watts/sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking Garages</td>
<td>0.20</td>
<td>0.18</td>
</tr>
<tr>
<td>Common Areas, corridors, restrooms, elevator lobbies</td>
<td>0.80</td>
<td>0.65</td>
</tr>
<tr>
<td>Exercise Center</td>
<td>0.88</td>
<td>0.73</td>
</tr>
<tr>
<td>Office/ administrative areas</td>
<td>0.90</td>
<td>0.75</td>
</tr>
<tr>
<td>Main floor building lobbies</td>
<td>1.10</td>
<td>0.90</td>
</tr>
<tr>
<td>Laundry rooms</td>
<td>1.20</td>
<td>0.96</td>
</tr>
<tr>
<td>Workshops</td>
<td>1.20</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Additional uses are listed in Table 15-1, Seattle Energy Code. Assume a BUILT SMART requirement of 80% of 2009 SEC lighting power allowance.

The incentive is calculated using the actual installed lighting, as confirmed by inspection, and is based on the wattage reduction below the lighting power allowance. Common area lighting calculation worksheets are available from your BUILT SMART representative.

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 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 available for fixtures installed in the following spaces:

- kitchens
- dining rooms
- stairwells
- bathrooms
- entryways (interior)
- entry porches (exterior)
- bedrooms
- 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 serve as primary entries to the unit. Incentives are paid on only one light fixture each per bedroom and bathroom.
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.

Track lighting fixtures with multiple lamps count as one fixture for Energy Star rebate purposes.

6.6 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 or a lighting power density calculation, depending on the lighting design scheme. 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.

6.7 Lighting for Commercial Areas within the Building

Interior and exterior lighting that is dedicated to commercial space is not eligible for BUILT SMART incentives. For buildings with a combination of commercial and residential spaces, residential spaces and amenities may be included in the BUILT SMART program. Commercial incentives may be available through City Light’s Smart Business Program.

6.8 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 are available for clothes washers served by electric hot water. Incentive amounts vary between $50 and $100 depending on clothes washer efficiency. For qualifying models and financial incentives, please check http://www.washwiserebate.com/rebates/qualifications.html or call the WashWise hotline at 1-866-632-4636.

7.2 Refrigerators
BUILT SMART offers a $30 incentive for Energy Star qualified models.
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 To be eligible for an incentive payment, fan must have a noise rating of one sone or less, unless mounted remotely and acoustically isolated from the living space.
    8.1.4 Whole house fan motors shall be rated for continuous use.

8.2 In-Unit Heat Pump/Air Conditioning Specifications
    8.2.1 All heat pump/air conditioning upgrade incentives shall be calculated using Seattle City Light’s Heat Pump Calculation Worksheet, which is available from a BUILT SMART representative.
    8.2.2 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.
    8.2.3 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.

8.3 Common Area Heat Pump/Air Conditioning Specifications
    8.3.1 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.
    8.3.2 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.
    8.3.3 All equipment shall have a permanently affixed nameplate that shows the manufacturer, model number and equipment load ratings.

8.4 Equipment Verification and Inspection
    8.4.1 A BUILT SMART representative must review all documentation and approve calculations prior to installation.
    8.4.2 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 of 10 horsepower or less, serving 7 landings or fewer. 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:

\[
\text{Elevator horsepower} \times 500 \text{ kWh (savings per horsepower)} \times \$0.23 \text{ per kWh saved.}
\]
CHAPTER 10 – COMMERCIAL AREA UPGRADES

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

If you are interested in incentives for commercial spaces please contact the Smart Business Program if the space will be occupied by a small commercial rate tenant. Anchor tenants may be eligible for incentives through Energy Smart Services (206-684-3800).

For complete Smart Business Program information, please e-mail or call Marilou Trias at Marilou.Trias@seattle.gov or 206.684.4293 or Charles Valentin at charles.valentin@seattle.gov or 206.684.4215 or Wayne Knipple at wayne.knipple@seattle.gov or 206.684.4286.
APPENDIX A – BUILT SMART INCENTIVES

1. Incentives for Required Lighting Measure

A. Interior Common Area Lighting Incentives

- Incentives are based on wattage reductions below the lighting power allowances listed in the Seattle Energy Code, Table 15-1.

<table>
<thead>
<tr>
<th>Use</th>
<th>2009 Seattle Energy Code Allowance (watts/ sq ft)</th>
<th>BUILT SMART Requirement (watts/ sq ft)</th>
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<td>1.20</td>
<td>0.96</td>
</tr>
<tr>
<td>Workshops</td>
<td>1.20</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Additional uses are listed in Table 15-1, Seattle Energy Code. Assume a BUILT SMART requirement of 80% of 2009 SEC lighting power allowance.

- Incentives are awarded at $0.23 per first year kWh savings. Common area lighting calculation worksheets are available from your BUILT SMART representative.
## 2. Thermal Envelope Incentive Tables

### Windows

<table>
<thead>
<tr>
<th>Average Weighted U-Value</th>
<th>kWh Saved per Sq.Ft.</th>
<th>$ Per kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>U-.30</td>
<td>1.288</td>
<td>$0.75</td>
</tr>
<tr>
<td>U-.29</td>
<td>1.543</td>
<td>$0.75</td>
</tr>
<tr>
<td>U-.28</td>
<td>1.798</td>
<td>$0.75</td>
</tr>
<tr>
<td>U-.27</td>
<td>2.053</td>
<td>$0.75</td>
</tr>
<tr>
<td>U-.26</td>
<td>2.308</td>
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<tr>
<td>U-.25</td>
<td>2.563</td>
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<tr>
<td>U-.24</td>
<td>2.818</td>
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</tr>
<tr>
<td>U-.21</td>
<td>3.583</td>
<td>$1.00</td>
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</table>

### Insulation: Above-Grade Walls

<table>
<thead>
<tr>
<th>U-Value</th>
<th>$ Per kWh</th>
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</thead>
<tbody>
<tr>
<td>R-21 Int. + R-5</td>
<td>$1.00</td>
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</table>

### Insulation: Under Slab-on Grade

<table>
<thead>
<tr>
<th>Type &amp; U-Value</th>
<th>$ Per Square Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-5 under slab on grade</td>
<td>$0.75</td>
</tr>
</tbody>
</table>
## INCENTIVES FOR OPTIONAL MEASURES

<table>
<thead>
<tr>
<th>Measure</th>
<th>Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bi-Level Lighting in stairwell</td>
<td>$70 each (5 stories and fewer = $46/ea.)</td>
</tr>
<tr>
<td>In-unit LED hardwired fixtures (Energy Star, LDL, or DLC approved)</td>
<td>$25 each</td>
</tr>
<tr>
<td>In-unit ENERGY STAR fixtures (fluorescent &amp; hardwired)</td>
<td>$25 each</td>
</tr>
<tr>
<td>ENERGY STAR refrigerators</td>
<td>$30 each</td>
</tr>
<tr>
<td>Whole House Fans</td>
<td>$25 each</td>
</tr>
<tr>
<td>Elevators (10 HP max., 7 landings or fewer)</td>
<td>$0.23 per kWh saved – savings per horsepower</td>
</tr>
<tr>
<td>Heat Pumps for in-unit and common areas</td>
<td>$0.23 per kWh Saved over code</td>
</tr>
<tr>
<td>Efficient Shower Heads</td>
<td>$20 each</td>
</tr>
<tr>
<td>Clothes Washers high efficiency</td>
<td>$50-100 each</td>
</tr>
<tr>
<td>Custom measures that save electricity</td>
<td>$0.23 per kWh saved</td>
</tr>
</tbody>
</table>