

program manual



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Energy Smart Services

from



Seattle City Light



ENERGY SMART SERVICES PROGRAM MANUAL

**Commercial & Industrial
Energy Management Services
Seattle City Light**

Effective: September 30, 2002



solutions & incentives for business



Energy Smart Services

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business

SECTION 1

ENERGY SMART SERVICES OVERVIEW



- Welcome to the Energy Smart Services Program Manual. Inside, you will find the service descriptions, specifications, forms and instructions you need to participate in Seattle City Light's conservation services for medium and large businesses.
- City Light has a successful 25 year history of meeting its customers' growing demand for electricity by focusing on energy efficiency. It makes good financial sense to use what we have wisely before looking to buy power from other sources.
- Energy Smart Services partners with customers to offer technical assistance and financial incentives to help integrate efficient technologies and strategies into their businesses.
- In existing facilities, as well as new construction projects, customers are making buildings more efficient, improving their bottom lines, and freeing up money for new initiatives. And they are improving performance: efficient and well-designed lighting improves the work atmosphere; industrial process improvements speed up production lines; and HVAC improvements enhance tenant comfort.
- It's not about doing without or scaling back. It's about making cost-effective investments in efficiency to get more work out of each kilowatt-hour purchased.

from  Seattle City Light

Section 1. Energy Smart Services Overview

- Summary of Services
- How To Use This Manual
- How to Apply
- Application for Service

Summary of Services

Seattle City Light's steadfast commitment to energy efficiency as a cost-effective resource provides an opportunity for customers to reduce energy costs and enhance business performance. Through Energy Smart Services, City Light offers its medium and large commercial, industrial, institutional and governmental customers a comprehensive menu of energy efficiency services including a wide variety of financial incentives and technical assistance intended to flexibly meet their needs. Efficiency improvements benefit both the customers and Seattle City Light since customers pay lower electricity bills and Seattle City Light is able to defer investment in costly new generation capacity and power purchases. What follows in this section is an overview of Energy Smart Services' offerings.

FINANCIAL INCENTIVES FOR ECM INSTALLATION

Energy Smart Services encourages customers to reach beyond standard practice and use promising new technologies. By helping to pay for the additional cost of the higher efficiency option, Energy Smart Services aims to motivate customers to purchase more efficient equipment than they would in the absence of funding. Sometimes the selection of equipment is the same as it would have been without Seattle City Light funding, but funding is nevertheless requested. Funding such a project would result in what is known as a "free rider." The structure of the program discourages free riders in order to provide the best possible investment of utility funding and the broadest benefits to the community.

Energy Smart Services works in conjunction with the normal business relationships between the customer and private sector service providers. The customer, usually the building owner or manager, chooses the designers and installation contractors for the project. The firms and individuals providing these services to the customer are referred to within the context of Energy Smart Services as "trade allies." The conservation projects that receive Seattle City Light funding are developed through a collaborative process between the customer, trade ally(s), and the Seattle City Light Energy Management Analyst. The members of the project team work together to obtain a project description that meets the goals of all three parties.

1. Simple Rebates

Simple Rebates offer a flat per-unit funding amount, making them the easiest way to participate in the Energy Smart Services program. Simple Rebates are currently available for the following:

- Exit sign replacements with no more than 5 input watts (existing buildings only): \$30 per sign
- Exit sign retrofits (existing buildings only): \$20 per sign
- Wall-mounted occupancy sensors (except where required by code): \$30 per sensor
- Ceiling-mounted occupancy sensors (except where required by code): \$90 per sensor

2. Standard Incentives

Standard Incentive funding levels and savings calculations are determined using standardized calculations presented on the program's *Funding Calculation Worksheets*. The standardized worksheets and specifications can be downloaded directly as Excel and .pdf files at the Program's Web site, www.EnergySmartServices.com. Once finalized, the worksheets and specifications become part of the contract between the customer and Seattle City Light. Standard Incentives are offered for the following technologies:

Lighting

- T5, T8 fluorescent lamps, ballasts, and fixtures (with electronic ballasts)
- Compact fluorescent (with detachable lamps)
- Metal halide
- High pressure sodium
- Low pressure sodium
- Central lighting controls

Heating, Ventilation and Air Conditioning (HVAC)

- Chillers
- Air conditioners
- Heat pumps
- Variable speed drives retrofitted on HVAC variable air volume fans

Premium Efficiency Motors

3. Custom Incentives

Any Energy Conservation Measure that reduces kWh consumption without fuel switching may be considered for funding using a customized funding calculation if the measure isn't already covered by a Standard Incentive. Examples of technologies covered by Custom Incentives include but are not limited to: HVAC and industrial controls, daylighting, high efficiency transformers, elevators, variable speed drives in industrial applications, and the latest high-efficiency industrial process equipment. This option gives Energy Smart Services the flexibility to support leading edge technologies and technologies specific to particular industrial or commercial facilities.

4. Points to Remember Regarding Financial Incentives for ECM Installation

- The purpose of Energy Smart Services installation incentives is to help the customer purchase equipment that is more efficient than what he or she would have purchased in the absence of funding.

- With the exception of the Simple Rebates, funding levels are calculated on a project-by-project basis.
- The scope of work and the funding amounts are finalized in a contract between Seattle City Light and the customer.
- A contract **must** be executed between the customer and Seattle City Light **before** equipment is purchased or installed.

TECHNICAL ASSISTANCE SERVICES

1. Facility Assessments

Energy Smart Services offers free “Facility Assessments” for existing facilities. The Facility Assessment includes a review of the facility’s electricity consumption patterns, recommendations of Energy Conservation Measures, and Operations and Maintenance Measures for the customer’s consideration, and estimates of energy savings and Energy Smart Services funding available. Energy conservation measures selected by the customer then become eligible for a Financial Incentives for ECM Installation contract.

2. Energy Analysis Assistance

Through Energy Analysis Assistance, customers can receive funding for in-depth energy analysis of Custom Incentive opportunities by a consultant they select and hire. The Energy Analysis Assistance contract is based on a consultant’s proposal to analyze a specific list of measures using methodologies explained in the proposal. Energy Analysis Assistance is typically offered for new construction projects, major remodels, or complex Energy Conservation Measures recommended for retrofit of an existing facility. Energy Analysis Assistance helps designers and customers include a discussion of the annual costs of electricity and the amount of Energy Smart Services funding availability for an expanded list of design options. An Energy Analysis Assistance contract must be signed with City Light before the analysis is performed.

3. Building Commissioning

Building commissioning is a systematic process for ensuring that the energy systems within a facility perform in accordance with its design intent, contract requirements, and the owner’s operational needs. Seattle City Light provides financial and technical support for the building commissioning process in new construction and major remodel projects with construction budgets over \$5 million. Consideration may also be given to campuses or other multiple building facilities that meet the construction cost threshold if considered collectively. There are currently no retro-commissioning or re-commissioning services for existing facilities through Energy Smart Services.

City Light funds support: (1) development of a commissioning plan early in the building development process and (2) assessment of energy impacts from commissioning activities.

4. Lighting Design Lab

The Lighting Design Lab offers training and support for commercial and industrial lighting designers, contractors and building owners through the use of its consultation services, electric lighting mock-up facilities, and classroom training opportunities. Seattle City Light supports the Lab as a source of reliable guidance and information on the use of energy efficient lighting practices in commercial and industrial spaces. City Light staff work closely with the Lab to help customers choose lighting systems that enhance their business objectives.

5. Assistance with LEED™ Certification for Sustainable New Buildings

Seattle City Light encourages building owners and developers to incorporate sustainable building goals early in building programming and design. Sustainable measures use natural resources efficiently, prevent pollution, and improve the economic, environmental, and social well being of current and future generations. Seattle City Light and members of Seattle's Green Building Team offer significant technical resources to help customers formulate their ideas and work through design processes. The LEED™ Incentive Program provides financial grants of \$15,000 or more to building owners and developers who incorporate meaningful and cost-effective sustainable building ideas into their projects and commit to pursuing LEED™ (Leadership in Energy and Environmental Design) certification.

6. Climate Wise Greenhouse Gas Reduction Assistance

Climate Wise is a voluntary partnership program that encourages cooperation between public, private, and non-governmental sectors to promote environmental performance and greenhouse gas emissions reductions while boosting business productivity and profits. Climate Wise partners with commercial and industrial customers to identify business strategies that save money and help protect our climate. Climate Wise then supports these strategies with a coordinated approach including technical assistance, access to service offerings from a variety of agencies, financial incentives, peer exchange, public recognition, and marketing opportunities.

OPERATIONS AND MAINTENANCE

Equipment efficiency is dependent not only on the initial equipment selection, but also on careful operations and maintenance over the life of the equipment. Energy Smart Services promotes energy efficient operations and maintenance through a number of program elements. As part of free Facility Assessments, the customer receives a list of recommended Operations and Maintenance Measures that have a rapid payback due to low cost and high savings. When a contract is offered to the customer for an Energy Conservation Measure, the scope of work includes not only the capital upgrades covered by Energy Conservation Measures, but also specific O&M Measures for the systems directly affected by the Energy Conservation Measures. There is also a limited offering for funding of other O&M Measures at a rate of 1 cent per first year kWh savings.

PLUG LOAD SERVICES

Since 2001, Seattle City Light has been offering the free installation of a cold drink vending machine control device called "VendingMiser™" that can reduce energy use of these machines by up to 40%. Section 5–*Plug Loads Services*, shows how to arrange for installation of VendingMisers™ and makes other plug load energy efficiency recommendations.

How to Use This Manual

Seattle City Light is a municipal utility—a department of the City of Seattle. As a government agency, it must comply with specific Federal and State laws that regulate the distribution of public funds. Such regulations require that City Light carefully document funding agreements and the value it receives for any payments provided to customers. For this reason, an Energy Smart Services Contract is required for any incentive payments provided for conservation projects. Further, the terms of the Energy Smart Services contract require inspection and verification of the installation of conservation measures. This provides the necessary “due diligence” that ensures that Seattle City Light receives the expected value—reliable energy savings—that justify City Light’s investment.

City Light’s intent is to reduce program requirements to the essential minimum. The purpose of this manual is to clearly describe the available program services and benefits to customers, participation steps, contract requirements, and technical specifications. City Light also provides support tools in the form of electronic spreadsheets that standardize project definition and, in most cases, energy savings and incentive calculations. Finally, if this manual falls short in clarifying program features or requirements, additional information can be found on the Web site at www.EnergySmartServices.com or by calling the program at (206) 684-3254.

The manual is organized into five primary sections: *Energy Smart Services Overview*; *Financial Incentives for ECM Installation*, *Technical Assistance Services*; *Operations & Maintenance Services*; and *Plug Load Services*.

Section 2—*Financial Incentives for ECM Installation*, begins with general information and is then further subdivided into four sub-sections based on the financial incentive mechanisms used in particular situations. These describe financial incentives available for the installation of energy efficient equipment, and the process to apply and complete a successful project. Customers interested in applying for funding for specific technologies should focus not only on the specific sub-section, but should also pay careful attention to the first part of *Financial Incentives for ECM Installation*, where steps to participate and standard specifications related to all funding contracts can be found. Some sub-sections include samples of *Funding Calculation Worksheets*, which are easily identified by the colored paper on which they are printed.

At the end of the manual is a resource directory with useful referrals and Web site addresses for more information. A glossary of terms is also located here.

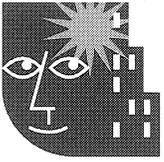
This manual will be updated over time to reflect changing codes, technologies and practices. To facilitate keeping the manual current, each section has an effective date on the bottom of the page. As changes are made, the most recent version of the manual will be located on the www.EnergySmartServices.com Web site. Customers can also call 684-3254 to verify they have the most recent version and request updates.

How to Apply

A customer interested in any of the services described in this Program Manual can get started by filling out a brief *Application for Service*. This can be done in a number of ways:

- Online at www.EnergySmartServices.com
- Over the phone at (206) 684-3254
- By mail (An application form and mailing information are provided on the following page of this manual.)
- By faxing the application form to (206) 684-3682

When an *Application for Service* is received it is forwarded to an Energy Management Analyst, who contacts the applicant within 10 days to understand their needs, help identify energy efficiency opportunities, and guide them through the conservation contracting process. Customers wishing to check the status of their application can do so by calling (206) 684-3254.



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City Light Use Only:	
Project #:	_____
Building #:	_____
EMA:	_____ Supv: _____
Service Rate:	_____

APPLICATION FOR SERVICE

Customer Name: _____

Facility Name: _____

Facility Address: _____

City State Zip

Contact Person: _____

Name Title

Mailing Address (if different from above) City State Zip

Phone Fax E-Mail Address

Have you spoken with anyone else at Seattle City Light about this project? No Yes

Who? _____

Primary use of facility (office, retail, hospital, manufacturing, etc.): _____

Building occupancy (lease, owner occupied, multi-sited: chain, franchise; other): _____

Area of Interest: New Construction Addition to Existing Facility Other
 (Please check all that apply) Remodel Equipment Replacement
 Facility Assessment Environment

Type of Project: Lighting
 Heating, ventilation, air conditioning (HVAC)
 Industrial Processes
 Other: _____
 (Please Describe)

(Optional) What kind of assistance would you like from City Light?

Please return this form to:

Seattle City Light
 C & I Energy Management Services, MS 3436
 700 5th Avenue – Suite 3300
 Seattle, WA 98104-5031

VOICE: (206) 684-3254
 FAX: (206) 684-3682
 WEB: EnergySmartServices.com
 EMAIL: bizcon@seattle.gov



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SECTION 2

FINANCIAL INCENTIVES FOR ECM INSTALLATION



- Seattle City Light offers generous financial incentives to promote the use of energy efficient technologies in medium to large businesses. Incentive amounts for Energy Conservation Measures (ECMs) are based on the amount of energy saved, and can range as high as 70% of the installation cost.
- For very straightforward technologies, City Light offers **Simple Rebates**: flat per unit amounts that make for fast and easy projects.
- Customers interested in commonly implemented HVAC, motor and lighting upgrades can participate in **Standard Incentives**. These take advantage of City Light's Funding Calculation Worksheets: simply enter data regarding the existing and proposed system and the worksheet calculates the savings and incentive amount.
- Finally, for those large or complex projects that don't fit the previous models, City Light staff will help craft **Custom Incentives** specific to the customer's situation. City Light's Energy Management Analysts work closely with customers to make it easy to find cost-effective, energy-saving solutions that meet their needs.

Section 2. Financial Incentives for ECM Installation

General

- Incentive Levels
- Financial Incentives for ECM Installation—Steps to Participate
- Checklist for Customers and Trade Allies
- Standard Specifications for All ECM Installation Incentives

2A. Simple Rebates

2B. Standard Incentives for Lighting

- Instructions
- Worksheets
- Standard Specifications
- Lighting Waste Disposal Form

2C. Standard Incentives for HVAC and Motors

- Instructions
- Worksheets
- Standard Specifications

2D. Custom Incentives

Incentive Levels

Energy Smart Services incentive levels are based on savings realized during the first year after an Energy Conservation Measure is installed. The following funding factors are automatically incorporated into the Funding Calculation Worksheets for Standard Incentives. For Custom incentives, the service life of the measure and corresponding funding factors are more important: see *Section 2D* of this manual. Many factors must be considered in arriving at a total incentive amount, such as the selection of the appropriate baseline, determination of the annual operating hours, and consideration of possible Energy Smart Services Cost Caps. The figures below are for general reference only and are subject to change.

Examples of Measures Funded	Incentive Amounts (applied to first-year energy savings)
New Lighting Fixtures T-8 fluorescent with electronic ballasts Metal halide High-pressure sodium Exit Signs*	13¢ per kWh saved—except 14¢ cents in new const. 13¢ per kWh saved—except 14¢ cents in new const. 13¢ per kWh saved—except 14¢ cents in new const. \$30 per sign
Retrofit Lighting T-12 to T-8 fluorescent Incandescent to fluorescent Exit Signs*	10¢ per kWh saved 10¢ per kWh saved \$20 per sign
Controls HVAC Central Lighting Daylighting Controls Occupancy sensors—wall mount* Occupancy sensors—ceiling mount*	17¢ to 20¢ per kWh saved 21¢ per kWh saved 17¢ to 20¢ per kWh saved \$30 per sensor \$90 per sensor
HVAC Equipment Chillers Air Conditioners Air-to-air heat pumps Hydronic heat pumps Variable speed drives for fans	23¢ or 29¢ per kWh saved 20¢ per kWh saved 20¢ per kWh saved 23¢ per kWh saved 23¢ per kWh saved
Efficient Transformers	23¢ per kWh saved
Motors Process loads Non-process loads	15¢ per kWh saved 23¢ per kWh saved

* Simple Rebates

Financial Incentives for ECM Installation– Steps to Participate

This section describes the basic steps required to receive funding for the installation of energy efficient equipment. Customers interested only in Simple Rebates should skip to Section 2A, where streamlined procedures are described.

Please note: In order to be eligible for funding the customer **must** have a contract with Seattle City Light before equipment is ordered.

1. Application

The customer submits an *Application for Service* and an Energy Management Analyst is assigned to the customer.

2. Project Development

The customer may initiate the development of a project in one of two ways: 1) ask City Light for a Facility Assessment or Energy Analysis Assistance to scope out and identify applicable Energy Conservation Measures, or 2) come to City Light with a request for funding for specific measures the customer has already developed. The Energy Management Analyst either develops the energy savings estimates or reviews estimates from another party. The owner then obtains bids for the Energy Conservation Measures.

If a customer or Trade Ally has a specific proposal in mind and wants to find out how much funding might be available, they should first determine whether the proposed Energy Conservation Measures fall under Simple Rebates, Standard Incentives, or Custom Incentives. If they fall under Simple Rebates or Standard Incentives, the appropriate *Funding Calculation Worksheets* can easily be filled out to estimate the available funding. Once a bid or cost estimate is obtained, a contract can be drawn up.

If the proposed measure doesn't fall under Simple Rebates or Standard Incentives, a bid and a clear description of what is being proposed will need to be provided to Seattle City Light, in which case Seattle City Light will provide a customized estimate of savings and funding. Alternatively, the customer can submit an estimate of savings and funding to be reviewed and possibly revised by Seattle City Light. Because levels of savings and funding sometimes depend on highly specific details or control setpoints, the level of funding cannot be calculated until the proposed measures are well defined.

For technologies that are unproven or difficult to analyze using standard energy savings engineering calculations, Seattle City Light may offer a contract for which the payment amount will be determined in part by the measured performance of the equipment once it's installed. This type of contracting is called "pay for performance."

3. Paperwork for an ECM Installation Contract

The following paperwork must be submitted to Seattle City Light by the customer to initiate an ECM installation contract (except that the estimate of energy savings may be developed by City Light).

- The initial **application**, filled out by the customer or trade ally.
- A completed **Contract Request Form**. After the project has been fully developed, the customer fills out this form to provide additional details necessary to write a contract, such as contact information and signing authorization.
- An **estimate of energy savings**, prepared by a Trade Ally or Seattle City Light Energy Management Analyst. For Standard Incentives or Simple Rebates, the calculation of savings is simply submitted on the appropriate *Funding Calculation Worksheets*. These forms can be downloaded at www.EnergySmartServices.com, or obtained from Seattle City Light by calling (206) 684-3254. For Custom Incentives, the energy savings calculations are customized in a report. See Section 2D—*Custom Incentives* for more detail.
- The **accepted bid** for the project, including cut sheets or manufacturer’s literature demonstrating compliance with Seattle City Light *Standard Specifications* and any performance data entered into the project’s *Funding Calculation Worksheets*. The bids are prepared by contractors and submitted to the customer for review before the customer submits them to Seattle City Light. If competitive bids have been solicited for the project, **all bids** should be submitted with the accepted bid. If a project is to be installed with the customer’s in-house labor, the customer may submit a budget rather than a bid.
- For lighting projects, a **drawing or sketch of fixture locations** prepared by a Trade Ally.

Normally, a bid and cut sheets are submitted prior to contract. In some cases, a contract will be issued before bids and equipment have been selected. In that case, the customer should provide bids and cut sheets to Seattle City Light before equipment purchase.

The customer is encouraged to solicit three bids and select the lowest. Otherwise the customer submits a justification for his bid selection and the Energy Management Analyst reviews the proposed per-unit costs for comparability to per-unit costs on similar previous projects to establish the costs that will be the basis for Seattle City Light incentive calculations.

4. Seattle City Light Review

Once the above paperwork is completed, the Energy Management Analyst reviews the savings and funding calculations for accuracy and completeness, and a Seattle City Light contract is initiated. For existing facilities, the Energy Management Analyst performs a “pre-inspection” of the site to ensure that descriptions of existing equipment are accurate.

5. Contract Execution

The Energy Smart Services financial incentives contract details the amount of funding provided, the project cost, kWh/year savings and project specifications. Seattle City Light mails two copies of the contract to the customer for signature. The customer signs both copies of the contract and returns them. Seattle City Light then signs both copies, keeping one and returning the other to the customer. Equipment may be ordered only after the contract has been signed by Seattle City Light and returned to the customer. *The customer is responsible for making sure that design consultants and contractors are aware of Seattle City Light contract requirements and that any design documents developed outside the Energy Smart Services contract are consistent with the specifications in that contract.* The customer signs a separate contract with the contractors who will do the work. The customer should seek prior written approval from the assigned Energy Management Analyst before making changes to the project, since changes to the project are likely to reduce Energy Smart Services funding.

6. Inspection and Payment

Upon completion of the installation, the customer calls Seattle City Light to schedule an inspection and provides the documentation required in the Seattle City Light contract, including invoices for funded Energy Conservation Measures. Payment is issued upon verification of contract compliance on the basis of on-site inspection and review of required documentation. If Energy Conservation Measures do not comply with the contract at the first inspection, the customer coordinates the contractor's work to correct the deficiencies, and then schedules a re-inspection and sign-off.

On pay-for-performance contracts, where the funding level is directly dependent on measured performance, the performance measurements are made as part of the inspection.

7. Maintenance of Equipment

The contract includes the requirement that the customer continues to operate and maintain the equipment over its service life. Seattle City Light is investing significant dollars and resources into energy conservation projects and wishes to ensure the estimated savings are realized.

Financial Incentives for ECM Installation Checklist for Customers and Trade Allies

This checklist summarizes key deliverables during the course of a project. For detailed information about submittals that will be required for payment, please see Program Manual *Standard Specifications* sections. If a contract has already been signed, please refer to the contract requirements.

Routing of Information:

- Documents are submitted by the customer to Seattle City Light

Timing for Proposal:

- Submit proposal at least one month before equipment is ordered

Documents to Submit for a Seattle City Light Contract:

For All Projects:

- Application for Service*
- Contract Request Form*
- Trade Ally's itemized bid or authorized signature on the Project Proposal Sheet(s)
- Catalog cut sheets
- Floor plan or sketch of proposed installation

For Standard Incentives:

- Completed *Funding Calculation Worksheets*, in electronic form

After Installation is Complete, Please Submit:

- Invoices
- Lighting Waste Disposal Form* (for lighting projects)

Standard Specifications for All ECM Installation Incentives

Energy conservation measure installations must comply with these specifications in order to qualify for Energy Smart Services funding. These specifications may be edited by Seattle City Light as necessary to apply to a specific project. In order to receive funding under this contract, a funding contract must be signed by Seattle City Light and the customer before the customer orders equipment.

1. Permits, Codes, and Regulations

Projects shall comply with all applicable Federal, State, and local codes and requirements, including but not limited to all applicable environmental requirements and all mechanical, electrical and building codes.

In the event work on the project disturbs asbestos or other hazardous materials, proper measures must be taken to ensure the safety of building occupants and to contain and/or remove and dispose of the materials in accordance with Federal, State, and local regulations.

If ventilation is directly affected by this project, the installation shall meet ASHRAE ventilation standard 62-89 or another applicable ventilation code or standard.

For buildings 45 years old or older, the Participant is responsible for contacting the State Office of Archaeology and Historic Preservation to ensure that the installation will be in compliance with historic building requirements. Phone (360) 586-3065 for information.

If a refrigerant is removed, it shall be recycled or disposed of in accordance with applicable regulations.

Helpful Phone Numbers:

- Business Waste Line (206) 296-3976
- Puget Sound Clean Air Agency (206) 343-8800
- State Dept of Ecology- NW Regional Office (425) 649-7000
- EPA Office of Waste and Chemicals Mgmt. (206) 553-1847

2. Equipment and Installation

Funded equipment must be clearly marked at the factory with the manufacturer and the model number in a manner that permits the use of manufacturer's literature to determine efficiency ratings.

All equipment shall carry a safety certification by an approved testing laboratory (UL, ETL, etc.) in an appropriate category.

Back-up equipment is not eligible for funding unless the back-up and lead (non-back-up) equipment is switched periodically. If the back-up and lead equipment are switched periodically,

the backup equipment and the lead equipment are each eligible for funding using half the annual kWh savings estimated for year-round use of either one.

3. Submittal Requirements

Submittals are to be addressed by the contractor to the customer.

The customer shall provide Seattle City Light with copies of the following prior to payment (except where noted that only the owner is required to have a copy):

- Itemized **invoices** broken down, at least, by Energy Conservation Measure.
- If the new equipment includes any controls: submit the **as-built sequences of operation** for the new equipment and a schematic drawing showing the locations of all new sensors. If the controlled values are measured by an energy management control system, submit a trend log demonstrating compliance with any setpoints and sequences given in these specifications. Compliance with setpoints is demonstrated by trending the setpoint and the measured actual value so the two can be evaluated and compared. All trend logs shall have the points (columns) clearly labeled and explained, shall run for at least five days, with data logged once every hour, and shall include the outside air temperature (for HVAC trends), date, and time. Each line of the trend log shall include at least 4 columns of data in addition to the date and time unless fewer than 4 data points are being trended. *Exception: This paragraph does not apply to occupancy sensors, photocells, or central lighting controls.*
- **Cut sheets** for any equipment that was not documented in the manufacturer's literature submitted with the bid. Cut sheets shall include all information required to demonstrate compliance with these specifications.
- An **as-built** version of the *Funding Calculation Worksheets* if changes have been made to a project funded under a Standard Incentive.
- A copy of the Project Summary Form signed by the customer.

The following as-built documents are to be left with the owner prior to Seattle City Light inspection. No copy is required for Seattle City Light:

- **Operation and Maintenance Manuals.** The O&M manual shall include warranties for all installed equipment, and all information required to maintain, operate, and where appropriate calibrate or program the installed equipment. Manufacturer's literature shall be marked to clearly identify the correct manufacturers and model numbers. The manual shall either be a three ring binder or some other type of notebook. On the cover, include the project name, customer name, date, and contractor name and address.
- Signed-off copies of any required DCLU **permits**.
- **As-built versions of the design specifications and drawings** (if design costs were included in the Energy Conservation Measure cost).

Seattle City Light does not review design documents for accuracy, and takes no responsibility for any aspect of the design. However, if design costs were included in the Energy Conservation Measure cost, the Energy Management Analyst checks that design documents for the measure have been completed and provided to the customer. If the design costs are included as part of the measure's costs, the design documents must be stamped by a Professional Engineer (P.E.).

4. Inspections

Upon project completion and submittal of required pre-payment documentation, the customer shall contact the Energy Management Analyst to schedule an inspection. If the Energy Management Analyst will not be able to reach the equipment and read the nameplate after installation, the customer shall schedule a progress inspection of the equipment on site **before** the equipment becomes inaccessible.

Seattle City Light will inspect the installation for the following:

- Equipment installation is complete and fully operational.
- Any Operations and Maintenance Measures (O&Ms) covered by the contract have been completed.
- The customer demonstrates familiarity with proper equipment operation and ability to review and change control setpoints and schedules.
- The as-built documents required under this contract to be provided to the customer are complete.
- Control setpoints and programming are consistent with any Seattle City Light contract requirements.
- All required permits have been approved and are posted on site at the time of the Seattle City Light inspection.

5. Payment

Payment is issued to the customer once contract compliance has been verified on the basis of submittal review and inspection. If deficiencies are identified during the post-installation inspection and submittal review, the customer is responsible for coordinating with the contractor until the deficiency is corrected, including sending in a new set of submittals or scheduling another inspection as needed. If the invoices or site observations indicate non-compliance with contract requirements, the funding level will be adjusted to reflect the actual installation.



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SECTION 2A

SIMPLE REBATES



- In order to make it as easy as possible for customers to participate, Seattle City Light offers **Simple Rebates** on two proven efficiency measures: **exit signs** and **occupancy sensors**.
- Customers need to get pre-approval from City Light before purchasing equipment, but the application process is easy, the technical requirements are few, and the incentive levels are set at a flat dollar amount. Despite the simplicity of the process, energy savings can be large for each unit installed.
- Since **exit signs** are on all day every day, energy and bill savings can really add up. New technologies have made great advances in energy efficiency, so switching to light emitting diode (LED) units instead of incandescent or even fluorescent lamps can produce significant energy savings.
- **Occupancy sensors** can be a good choice in areas only used for part of a given work day, such as individual offices, storage areas, and meeting rooms. They also save outside of normal work hours, since they turn off lights mistakenly left on at the end of the day that might go undetected for a long time.
- Simple rebates offer an easy way to use proven technologies to improve a building's energy efficiency, and a good place for customers to begin their energy conservation efforts.

Section 2A. Simple Rebates

- Simple Rebates
- Funding Calculation Worksheet
for Exit Sign Simple Rebates
- Funding Calculation Worksheet
for Occupancy Sensor Simple Rebates

Simple Rebates

Simple rebates, available for exit signs and occupancy sensors, offer a flat per-unit funding amount for rapid funding calculations and easy inspections. As with other types of installation incentives, a pre-inspection and contract are required prior to equipment purchase, and payment is issued once the Energy Management Analyst has confirmed that the installed equipment is fully functional and meets the equipment selection requirements given below.

1. Calculation of Funding

Simple rebates are available in the following amounts:

- New exit sign fixtures: \$30 per sign
- Retrofit of existing exit signs: \$20 per sign
- Wall-mounted occupancy sensors: \$30 per sensor
- Ceiling-mounted occupancy sensors: \$90 per sensor

The streamlined *Funding Calculation Worksheet* can be downloaded from www.EnergySmartServices.com electronically. Examples of occupancy sensor and exit sign worksheets are shown below. For information about funding other lighting conservation measures, see Section 2B–*Standard Incentives for Lighting*.

2. Selecting the Right Applications and Equipment

Occupancy Sensors. Simple rebates are available for occupancy sensors installed anywhere in an existing building. In new construction, the rebate is available only for applications not already required by the Energy Code. The selected sensors must meet the following requirements:

- Occupancy control must have local manual on/off switch.
- Manual override must offer the ability to turn the lights off when the space is occupied, but must not offer the ability to turn the lights on when the space is unoccupied.
- Must be UL Approved.
- Provide customer with manufacturer’s literature that explains how to calibrate the sensor if it has on-site calibration capability.

Exit Signs. Simple rebates are available for replacement of incandescent or fluorescent-lamped exit signs in existing buildings. The selected signs must meet the following requirements:

- Wattage not to exceed 5 watts (total for single or double face signs),
- Equipment shall be UL approved.
- Equipment shall have Energy Star Label.

3. Lighting Waste Disposal

Participant agrees to dispose of ballasts containing PCBs in accordance with Federal, State, and local regulations, including compliance with Environmental Protection Agency guidelines and the Toxic Substances Control Act. Discarded fixtures, lamps, and associated equipment must be removed from the project site and disposed of in compliance with Federal, State, and local regulations.

Prior to receiving the Seattle City Light payment, participants shall complete the Seattle City Light *Lighting Waste Disposal Form* attached to the contract. There are a number of public agencies and private firms that can assist with proper disposal of old fluorescent fixtures. King County Hazardous Waste provides financial assistance in some cases. For additional information concerning waste disposal requirements, please see the *Resource Directory* in this manual or check the program Web site at www.EnergySmartServices.com.

4. Steps to Participate in Simple Rebates

- 1) Customer completes and submits an Energy Smart Services Application for Service.
- 2) Customer or Trade Ally works with the Energy Management Analyst to ensure that the project qualifies as a Simple Rebate. Develops project scope of work and submits the Funding Calculation Form(s) and Contract Request Form. Does not purchase equipment until City Light approval is received.
- 3) Energy Management Analyst reviews and approves proposal.
- 4) An Energy Smart Services contract is drawn up, and two copies are sent to the customer. The customer signs both copies and returns them to City Light. Equipment may be ordered after the contract has been signed by Seattle City Light.
- 5) Customer signs a separate contract with a Trade Ally to install the equipment.
- 6) When the installation is complete, the customer signs the Project Summary Form indicating that the work is complete and schedules a site inspection with the Energy Management Analyst.
- 7) The Energy Management Analyst issues payment upon verification of contract compliance.

Seattle City Light / Energy Smart Services Funding Calculation Worksheet for Exit Sign Simple Rebates

Facility Name _____

Form Completed by _____

Date _____

(Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.)

I. EQUIPMENT SCHEDULE

Line #	Equip ID	Manufacturer / Model	New or Retrofit (enter N or R)	Quantity
1				
2				
3				
+Lines				
Click the button to add lines.			Total New Exit Signs:	
			Total Retrofitted Exit Signs:	
			Total:	

II. LOCATION

Line #	Equip. ID	Location (floor, room number)	New or Retrofit (enter N or R)	Quantity
1				
2				
3				
4				
5				
6				
+Lines				
Click the button to add lines.				

III. SAVINGS, REBATE & COST

Total Annual Energy Savings, kWh/yr	
Total SCL Rebate	
Cost, including WSST, materials and labor. (Filling out the cost information will not affect rebate amount.)	
Average cost per unit (automatically calculated).	

Notes:

- 1) The fixtures being replaced or retrofitted must be either incandescent or fluorescent.
- 2) The proposed exit signs: Must not exceed 5 watts per sign. Must be UL approved and have an Energy Star Label.
- 3) Seattle City Light estimates 212 kWh/yr savings for each exit sign replacement.
- 4) The Seattle City Light rebate is **\$20** for a retrofit kit and **\$30** for a new exit sign.
- 5) This form is not a guarantee of funding from Seattle City Light. That guarantee is only offered through a formal contract between the customer and Seattle City Light.

Seattle City Light / Energy Smart Services Funding Calculation Worksheet for Occupancy Sensor Simple Rebates

Facility Name _____ Form Completed by _____ Date _____

(Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.)

I. EQUIPMENT SCHEDULE

Line #	Equip ID	Manufacturer / Model	Wall or Ceiling Mount (enter W or C)	Quantity
1				
2				
3				
+ Lines				
Click the button to add lines.			Total Wall-Mounted Sensors:	
			Total Ceiling-Mounted Sensors:	
			Total:	

II. LOCATION

Line #	Equip. ID	Location (floor, room number)	Wall or Ceiling Mount (enter W or C)	Quantity
1				
2				
3				
4				
+Lines				
Click the button to add lines.				

III. SAVINGS, REBATE & COST

Total Annual Energy Savings, kWh/yr	
Total SCL Rebate Amount	
Cost, including WSST, materials and labor (Filling out the cost information will not affect rebate amount.)	
Average cost per unit (automatically calculated)	

Notes:

- 1) Funding is available only where occupancy sensors are **not** required by the Energy Code.
- 2) Occupancy sensors: Must be UL approved and have an override switch that can be used to turn the lights off when the space is occupied.
- 3) Seattle City Light estimates 211 kWh savings per year for each wall-mounted occupancy sensor and 702 kWh for ceiling-mounted sensor.
- 4) The Seattle City Light rebate is **\$30** per wall-mounted sensor and **\$90** per ceiling-mounted sensor.
- 5) This form is not a guarantee of funding from Seattle City light. That guarantee is only offered through a formal contract between the customer and Seattle City Light.
- 6) Contractor must provide customer with manufacturer's literature that explains how to calibrate the sensor if it has on-site calibration capability.



Energy Smart Services

solutions &
incentives for
business

SECTION 2B

STANDARD INCENTIVES FOR LIGHTING



- **Lighting** is the biggest energy cost in many commercial buildings and an obvious place to start looking for savings. Since systems operate for long hours and lighting is relatively easy to replace, lighting efficiency projects often produce excellent energy savings and short payback periods. And from a facility management perspective, standardization of lamp types in a new system can greatly simplify inventory practices and ease of maintenance.
- For retrofits in existing facilities, the Standard Incentive Worksheets accurately estimate energy savings for proposed systems. The results of several installation options can be easily explored, and their kWh reductions, financial savings, incentive amounts, and payback periods compared.
- Since proposed systems in new construction and major retrofit projects must exceed current energy code requirements to qualify for financial incentives, Seattle City Light offers a higher incentive level to those projects that go beyond these already high levels of efficiency.
- But it's not all about efficiency and economics. Whenever a lighting system is replaced or lighting is selected for a new facility, there's an opportunity to improve comfort and aesthetics. Lighting upgrades can reduce visual fatigue, improve employee comfort, increase productivity, enhance learning in educational facilities, and increase sales in retail environments.
- At City Light, we recognize our customers' need for high performance, high quality lighting design. That's why we partner with private design professionals to help customers select lighting system upgrades that yield multiple benefits, enhancing lighting operation while saving energy.

from  Seattle City Light

Section 2B. Standard Incentives for Lighting

- Instructions for Filling out the Funding Calculation Worksheets for Lighting
- Funding Calculation Worksheets for Lighting in Existing Facilities
- Funding Calculation Worksheets for Lighting in New Construction
- Standard Specifications for Lighting
- Lighting Waste Disposal Form for Lamps and Ballasts

Instructions for Filling out the Funding Calculation Worksheets for Lighting

See also Section 2A–*Simple Rebates*, for information on exit signs and occupancy sensors.

1. Eligible Energy Conservation Measures

The following technologies are eligible for Energy Smart Services Funding:

- T5, T8 fluorescent lamps, ballasts, and fixtures (with electronic ballasts)
- Compact fluorescent (with detachable lamps)
- Metal halide
- High pressure sodium
- Low pressure sodium
- Central lighting controls

The following equipment is **not** eligible for funding:

- T12 and T10 fluorescent
- Unitary compact fluorescent (unless fixtures cannot be replaced and only unitary fit)
- Incandescent and halogen incandescent
- Mercury vapor
- Neon
- Low voltage

2. Selecting the Correct Funding Calculation Worksheets

Seattle City Light funding for lamps, ballasts and fixtures is based on a calculation of annual kWh savings for going from a “baseline” to the proposed lighting. Determining the proper baseline to use is key to accurately calculating funding amounts.

Regardless of the baseline selected for the energy savings calculations, all projects must conform to the requirements of the Energy Code, which makes a distinction between existing buildings and new construction.

New Construction. For new construction projects, the baseline is the lighting wattage allowed by the Energy Code, and the calculation of funding is made using the *Funding Calculation Worksheets for New Construction*.

Existing Facilities. For major remodels, the Energy Code is baseline and the New Construction Worksheets are used. If a lighting project would have gone forward with or without SCL funding, and the Energy Code establishes a maximum Lighting Power Allowance, the Energy

Code is baseline and the New Construction Worksheets are used. If a lighting project wouldn't have gone forward in the absence of Seattle City Light funding, the existing equipment may be used as baseline and the funding calculation is placed on the *Funding Calculation Worksheets for Existing Facilities*. The worksheets are in Excel and have built-in formulas. Information is entered into the highlighted areas and the white portions of the worksheets are filled out automatically. The worksheets should be completed electronically, and can be downloaded at www.EnergySmartServices.com.

3. For Projects Using the Energy Code As Baseline use “Worksheets for Lighting in New Construction”

In the *Funding Calculation Worksheets for Lighting in New Construction*, the lighting wattage allowed by the Energy Code is compared to the lighting wattage being proposed. The lighting wattage allowed by the Energy Code (the “lighting power allowance”, or LPA) is calculated as part of the building permit application and is approved by Design, Construction and Land Use (DCLU). Seattle City Light should receive a copy of the same paperwork submitted to and approved by DCLU in addition to the Energy Smart Services *Funding Calculation Worksheets*. In describing the proposed lighting, include all lighting to serve the square footage being addressed, per DCLU calculation requirements. In the Seattle City Light Fixture Schedule worksheet, enter a zero value for “material cost per fixture” in column “h”, for fixture types such as halogen that aren't eligible for Seattle City Light funding. See the list of eligible equipment, above.

4. For Projects Using the Existing Equipment As Baseline Use “Worksheets for Lighting in Existing Facilities”

The *Funding Calculation Worksheets for Lighting in Existing Facilities* include a description of the existing lighting and the proposed lighting.

Fixture Schedule Worksheet. The existing and proposed fixture types are described in the Fixture Schedule, with one line per fixture type. For the existing fixtures, typical input watts for various fixture types are provided in a reference table located near the end of the worksheet file.

For proposed fixtures, the watts will need to match the ballast manufacturer's rated input watts for the ballasts/lamp combination. For existing fixtures, the fixture input watts should not include lamps that have been removed from the fixtures. The total number of fixtures of each type is automatically calculated once the *Fixture Count Worksheet* has been filled out. The per-unit material cost is entered into this form and the total material cost is automatically calculated. Fixture retrofits are entered into the Fixture Schedule in the same way as a new fixture, except that the column “N or R” is marked “R”, for retrofit, and the proposed “Fixture Description” column should describe the type of retrofit.

Fixture Count Worksheet. Enter the fixture counts for existing and proposed fixtures by location, and the estimated annual savings are calculated automatically. For the description of the existing equipment, do not include fixtures that were disconnected or delamped before the project started.

Enter **N**, **R**, **A**, or **D** in column “g” to indicate whether the existing fixtures for that location are to be replaced with **N**ew fixtures, **R**etrofitted, left **A**s is, or **D**isconnected (or removed) but not replaced. If the number of new fixtures in a given location is less than the number that is being replaced, enter **N** not **D**. **D**, for disconnected (or removed), is only to be entered if fixtures are to be removed or disconnected in an area where no other lighting changes are being made. Fixtures to be disconnected or removed may also be entered for clarity in spaces receiving new fixtures, but this will reduce the funding level. The **D** option will rarely be used—primarily for reduction of lighting in overlit spaces. Fixtures that are being left unchanged may either be entered into the worksheet with the designation “As-is”, for clarity, or left out of the worksheet entirely. Their presence in the worksheet does not affect funding levels.

For column “c”, the codes to use for the Heating and Cooling System description are given in the “H & C Codes” reference table located on a separate tab near the end of the worksheet file. The hours of operation are the average burn hours for the lighting, which may be less than the facility hours of occupancy. The fixture type designations in columns “e” and “m” must be exactly the same as those used on the Fixture Schedule so that the corresponding fixture information can be automatically transferred.

Central Lighting Controls Worksheet. Central lighting controls are covered by a separate worksheet, and receive funding under a simplified calculation that assumes the controls reduce lighting consumption 20% for the fixtures they affect. See *Simple Rebates* for information about Energy Smart Services funding for occupancy sensor lighting controls.

Summary Form. If the Energy Smart Services lighting worksheets are used as the basis of a lighting bid, the Trade Ally completes and signs this form.

5. Drawings

In order to receive a Seattle City Light contract, the Trade Ally or customer provides drawings or sketches of floor plans showing where existing and proposed lighting fixtures are located. Fixture type designations should be consistent with those used on the Fixture Schedule worksheet, which is part of the *Funding Calculation Worksheets*.

If the information on the *Fixture Count Worksheet* is given by room number, it’s not necessary to submit a drawing of the fixtures, but floor plans showing the room locations should be provided.

6. Equipment Submittals

Equipment submittals must demonstrate compliance with the Energy Smart Services *Standard Specifications for Lighting* and must support the fixture wattages indicated on the *Funding Calculation Worksheets for Lighting*. The “type” designation used in the Lighting Worksheet Fixture Schedule must be clearly marked on the corresponding equipment submittals. Submittals must provide a picture of the device, and the manufacturer and model number. Clearly indicate the ballast manufacturer and model number(s) for each fixture type.

7. Inspections

During the inspection, the Trade Ally or owner must open up fixtures selected by the Energy Management Analyst to expose ballasts and lamps funded under the Seattle City Light contract.

8. Related Documents

The following documents should also be read before initiating a project funded by Seattle City Light.

- *Financial Incentives for ECM Installation–Steps to Participate*, located in Section 2.
- *Standard Specifications for Lighting* at the end of Section 2B. These specifications are attached to the Energy Smart Services ECM Installation Incentive contracts as requirements to be met prior to Seattle City Light payment.
- Section 2A–*Simple Rebates*. See this section for information on exit sign and occupancy sensor funding.
- For more detailed lamp and ballast disposal information, see the *Resource Directory* at the end of this manual.

Seattle City Light Energy Smart Services
GUIDE TO SELECTING the APPROPRIATE
WORKSHEETS for LIGHTING

Equipment to be Funded	Funding Calculation Worksheets for Lighting in Existing Facilities	Funding Calculation Worksheets for Lighting in New Construction
<p style="text-align: center;">Lamps, Ballasts or Fixtures (other than exit signs)</p>	<ul style="list-style-type: none"> ■ Fixture Schedule ■ Fixture Counts ■ Summary 	<ul style="list-style-type: none"> ■ Energy Code Baseline ■ Fixture Schedule ■ Fixture Counts ■ Summary
<p style="text-align: center;">Central Lighting Controls</p>	<ul style="list-style-type: none"> ■ Central Lighting Controls 	<p style="text-align: center;">N/A</p>
<p style="text-align: center;">Exit Signs</p>	<p style="text-align: center;">See Section 2A, <i>Simple Rebates</i></p>	<p style="text-align: center;">N/A</p>
<p style="text-align: center;">Occupancy Sensors</p>	<p style="text-align: center;">See Section 2A, <i>Simple Rebates</i></p>	<p style="text-align: center;">See Section 2A. <i>Simple Rebates</i></p>

**Seattle City Light / Energy Smart Services
Funding Calculation Worksheets for Lighting in Existing Facilities
- Fixture Schedule -**

Facility name _____
 Form completed by _____ Date _____

(Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.)

Existing Fixtures										Proposed Fixtures									
ID	Fixture Type / Description	Lamp Type	Lamp Watts	# Lamps/ Fixture	Ballast Type	Input Watts/ Fixture	Quantity	ID	N or R	Fixture Description (manufacturer / model)	Lamp Type	Lamp Watts	# Lamps/ Fixture	Ballast Type	Input Watts/ Fixture	Material Cost / Fixture	Quantity	Total Material Cost	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	
Total:																			

Click the button to add lines.

Instructions

General. In section 2B of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheets for Lighting*. These worksheets apply only if the Energy Code is not baseline. Otherwise use the *Funding Calculation Worksheets for Lighting in New Construction*.
Columns a and i, ID. Assign an identifier (ID) to each existing and proposed fixture or retrofit type. For example, E1, E2 . . . for existing, and P1, P2 . . . for proposed. Use the same identifiers in the *Fixture Count* worksheet and to identify cut sheets. Do not include part of the fixture description in the fixture ID column. The fixture description is in another column.
Column b, Fixture Type. Examples: wrap, troffer, strip, recessed can, indirect, wall-sconce, wall-wash, flood, low-bay, high-bay, pendant, industrial, etc.
Columns c and l, Lamp Type. i: Incandescent, H: Halogen, F: Fluorescent, MV: Mercury Vapor, HPS: High Pressure Sodium, LPS: Low Pressure Sodium, MH: Metal Halide, CF: Compact Fluorescent, T12, T8, T5, etc.
Columns f and o, Ballast Type. Enter either E for Electronic, M for Magnetic or EEM for Energy Efficient Magnetic, and (optional) SO for Standard Output, LO for Low Output, HO for High Output.
Column g, Input Watts/Fixture. Input wattages for the existing fixtures may be found in *Lighting Reference Table 2, Fixture Wattages*, provided under a separate tab.
Column j, New or Retrofit Fixture. Enter N for new fixture or R for retrofit kit
Column q, Material Cost per Fixture. Material costs before tax. Labor and miscellaneous costs can be included in the *Summary* worksheet. **Fill this column only if these worksheets are used as a bid.**

**Seattle City Light / Energy Smart Services
Funding Calculation Worksheets for Lighting in Existing Facilities**

- Summary -

**If sections IIB and VIII are filled in, this Summary may be submitted in lieu of a bid.
The non-shaded entries are automatically filled in.**

Facility Name: _____

City: _____

State: _____

Zip Code: _____

I. Savings Summary

Total Annual Electrical Energy Savings _____

Total Annual Dollar Savings at the average annual electrical rate of: _____ ¢ / kWh _____

II. Project Cost (Fill in part A or part B.)

A. Total Cost Based on Attached Bid _____

B. Total Cost Based on Attached Worksheets

Sum of material costs documented on attached worksheets _____

Labor Cost _____ hours @ _____ / hr _____

Misc. Cost (please list) _____

Washington State Sales Tax @ 8.8% _____

Total _____

III. Savings-Based Funding Calculations

New Fixtures (13 ¢ / kWh-yr. savings) _____

Retrofitting Fixtures (10 ¢ / kWh-yr. savings) _____

Removed Fixtures (10 ¢ / kWh-yr. savings) _____

IV. Calculation of Funding

Value of Savings to SCL _____

Cost Cap (70% of Total Cost) _____

The project is not eligible for ESS funding if the total incentive amount is less than \$500.

V. Estimated Seattle City Light Funding

This figure is the lesser of the two numbers calculated under section IV, above. This is an ESTIMATE only, and is subject to review by Seattle City Light. The funding amount is finalized in the SCL contract offered to the customer.

VI. Net Customer Cost

VII. Project Simple Payback for Customer

Incentives are reduced as necessary to yield a simple payback to the customer of no less than 6 months.

VIII. Contractor Information (Complete, sign & date this portion if this sheet and attachments are submitted in lieu of a bid.)

Company Name: _____

Contractor Name: _____

Street Address: _____

City: _____

State: _____

Zip Code: _____

Email Address: _____

Phone: _____

Fax: _____

Authorized Signature: _____

Date: _____

The project description and costs shown in this proposal are valid until _____ (date)

Note: These worksheets apply only if the Energy Code is not baseline. Otherwise use the *Funding Calculation Worksheets for Lighting in New Construction*.

Seattle City Light / Energy Smart Services
Funding Calculation Worksheets for Lighting in Existing Facilities
- Central Lighting Controls -

Facility name _____

Form completed by _____

Date _____

(Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.)

Line #	Location	H & C Code	Control Description / Model (manufacturer, brand, etc)	Qty	Total kW Affected	Average Operating Hrs / Yr	kWh / Yr Savings	
a	b	c	d	e	f	g	h	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
+Lines	Click the button to add lines.							
Total:								

III. COST & FUNDING

Cost	Cost related to the project	
Cost Type	Total, Material, or Incremental (enter T, M or I)	
Cost Cap	25% of Total Cost, 50% of Material Cost, 100% of Incremental Cost	
Value of Savings to SCL	21¢ x kWh/yr Savings	
Max SCL Incentive Amount	The lesser amount of the Value of Savings and the Cost Cap	

Instructions

General. These worksheets apply only if the Energy Code is not baseline. Otherwise use the *Funding Calculation Worksheets for Lighting in New Construction*. See the *Instructions for Filling out the Funding Calculation Worksheets for Lighting* in section 2B of the Program Manual. This form is not a guarantee of funding from Seattle City Light. That guarantee is only offered through a formal contract between the customer and Seattle City Light.

Column c, Heating and Cooling System Code. See the *Lighting Reference Table 1. Heating and Cooling System Codes*, under a separate tab near the end of this workbook.

Column f, kW Affected. Enter the total kW connected to, and therefore affected by, this control.

Column g, Average Operating Hours per Year. Enter average existing operating hours per year of the fixtures connected to these controls.

Column h, kWh/yr Savings. For SCL funding calculations, the savings assumed to be 20% of the current energy use by these fixtures.

Seattle City Light / Energy Smart Services
Funding Calculation Worksheets for Lighting in New Construction
- Baseline, Energy Code -

Facility name _____

Form completed by _____

Date _____

(Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.)

Line #	Location			Energy Code Power Allowance			Annual Use	
	Location (floor, room number)	Floor Area (SqFt)	H & C Code	Occupancy Description (retail, office, classroom, etc)	Watts / SqFt Allow'd	Total kW Allowed	Hours / Yr	kWh / Yr
a	b	c	d	e	f	g	h	i
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
+Lines	Click button to add lines.							
		Total Area:		Total kW Allowed:				

Instructions

General. See the *Instructions for Filling out the Funding Calculation Worksheets for Lighting* in section 2B of the Program Manual. These worksheets apply only if the Energy Code is not baseline. Otherwise use the *Funding Calculation Worksheets for Lighting in New Construction*.

Column d, Heating and Cooling System Code. See the *Lighting Reference Table 1. Heating and Cooling System Codes* under a separate tab near the end of this workbook for the codes to enter here.

Column f, Allowed Watts per Square Foot. Enter the watts per square foot allowed by the Energy Code.

Column h, Hours per Year. Enter the average hours per year that the fixtures will be on.

Seattle City Light / Energy Smart Services
Funding Calculation Worksheets for Lighting in New Construction
- Fixture Counts -

Facility name _____

Form completed by _____

Date _____

(Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.)

Line #	Location Name (floor, room number, etc)	H & C Code	Hours / Year	Fixture ID	Quantity	# Lamp / Lamp Watts	Input Watts / Fixture	kW	kWh / Yr	
a	b	c	d	e	f	g	h	i	j	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
+Lines	Click button to add lines.									
					Total:				Total:	
					Estimated Annual Savings:					

Instructions

General. The *Funding Calculation Worksheets for Lighting in New Construction* are also used for lighting in existing facilities if the Energy Code is baseline. In section 2B of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheets for Lighting*.

Column c, Heating and Cooling System Code. See the *Lighting Reference Table 1. Heating and Cooling System Codes*, under a separate tab near the end of the workbook.

Column d, Hours/year. The hours per year on this worksheet must match the hours per year given in the *Baseline, Energy Code* worksheet. For that reason, fixtures serving areas with different LPAs (lighting power allowances) should be entered under separate rows in this worksheet.

Column e, Fixture ID. Use the same fixture IDs as were entered in the Fixture Schedule worksheet.

Column g, # Lamp / Lamp Watts. The number of lamps per fixture, and the watts per lamp.

Seattle City Light Energy Smart Services Funding Calculation Worksheets for Lighting in New Construction

- Summary -

If sections IIB and VIII are filled in, this Summary may be submitted in lieu of a bid.
The non-shaded entries are automatically filled in.

Facility Name: _____

Street Address: _____ City: _____ State: _____ Zip Code: _____

I. Savings Summary

Total Annual Electrical Energy Savings _____
Total Annual Dollar Savings at the average annual electrical rate of _____ ¢ / kWh _____

II. Material Costs (Complete section A or B. Exclude fixtures, such as halogen, that aren't eligible for funding.)

A. Material Cost Based on Attached Bid _____
B. Material Cost Based on Attached Worksheets _____
Sum of material costs documented on attached worksheets _____
Washington State Sales Tax @ 8.8% _____
Total _____

III. Savings-Based Funding Calculations

Lighting (14 ¢ / kWh-yr. savings) _____

IV. Funding Calculations

Value of Savings to SCL _____
Cost Cap (50% of Material Cost) _____
The project is not eligible for ESS funding if the total incentive amount is less than \$500.

V. Estimated Seattle City Light Funding

This figure is the lesser of the two numbers calculated under section IV, above. This is an ESTIMATE only, and is subject to review by Seattle City Light. The funding amount is finalized in the SCL contract offered to the customer.

VI. Net Customer Cost

VII. Project Simple Payback for Customer

Incentives are reduced as necessary to yield a simple payback to the customer of no less than 6 months.

VIII. Contractor Information (Complete, sign & date this portion if this sheet and attachments are submitted in lieu of a bid.)

Company Name: _____ Contractor Name: _____

Street Address: _____ City: _____ State: _____ Zip Code: _____

Email Address: _____ Phone: _____ Fax: _____

Authorized Signature: _____ Date: _____

The project description and costs shown in this proposal are valid until: _____ (date)

Seattle City Light Energy Smart Services Funding Calculation Worksheets for Lighting

- Lighting Reference Table 1. Heating and Cooling System Codes -

Use this table to find the **Heating and Cooling System ("H&C") Code** inputs
for the *Fixture Counts* worksheet.

Heating and Cooling System Types		Heating and Cooling System Code	kWh Adjustment Factor ¹	
Fixtures Located Indoors WITHOUT Air Conditioning	No electric heating (unheated, or heated by some other fuel)		A	1
	Electric resistance heat	Building is 1-3 stories	B	0.67
		Building is 4 or more stories	C	0.83
	Heat pump heat	Building is 1-3 stories	D	0.83
		Building is 4 or more stories	E	0.92
Fixtures Located Indoors WITH Air Conditioning	No electric heating (unheated, or heated by some other fuel)		F	1
	Electric resistance heat	Building is 1-3 stories	G	0.78
		Building is 4 or more stories	H	0.94
	Heat pump heat	Building is 1-3 stories	I	0.94
		Building is 4 or more stories	J	1
Fixtures Located Outside		K	1	

1) **KWh Adjustment Factor.** This column is included for information only. The Adjustment Factor is automatically used in the *Funding Calculation Worksheets* when you enter the Heating and Cooling System Code in the *Fixture Counts* worksheet.

Seattle City Light Energy Smart Services Funding Calculation Worksheets for Lighting

- Lighting Reference Table 2. Fixture Wattages -

The **input watts / fixture** given in this table may be used in the *Fixture Schedule* worksheet descriptions of the existing fixtures. For input wattages of proposed equipment, use information from manufacturers' cut sheets, not this table.

Fluorescent Fixtures

Lamp Type	Lamp Rated Watts	Number of Lamps	Input Watts/ Fixture Standard Ballast	Input Watts/ Fixture "Energy Efficient" Ballast
F40 T12, Standard	40	2	96	86
F40 T12, Energy Efficient	34	2	81	74
F96 T12, Standard	75	2	173	158
F96 T12, Energy Efficient	60	2	138	123
F96 T12, HO, Standard	120	2	257	237
F96 T12, HO, Energy Efficient	95	2	227	207
F96 T12, VHO, Standard	225	2	450	-
F96 T12, VHO, Energy Efficient	195	2	415	-
F40 T12, Standard	40	3	148	134
F40 T12, Energy Efficient	34	3	129	105

High-Intensity Discharge Fixtures

Lamp Type	Lamp Rated Watts	Number of Lamps	Input Watts/Fixture
Mercury Vapor	75	1	94
	100	1	127
	175	1	205
	250	1	286
	400	1	440
	1000	1	1090
Metal Halide	175	1	210
	250	1	300
	400	1	460
	1000	1	1055
High Pressure Sodium	35	1	45
	50	1	63
	70	1	87
	100	1	130
	150	1	175
	250	1	305
	400	1	465
1000	1	1100	
Low Pressure Sodium	18	1	31
	35	1	60
	55	1	80
	90	1	125
	135	1	178
	180	1	200

Standard Specifications For Lighting

These specifications do not cover exit signs and occupancy sensors, which are handled as “Simple Rebates”.

1. Related Documents

Standard Specifications for All ECM Installation Incentives apply to this project.

2. Technologies Not Funded

Energy Smart Services provides funding for a wide variety of lighting technologies. However, the following are not eligible for funding:

- T12, T10 Fluorescent
- Unitary Compact Fluorescent
- Incandescent
- Halogen
- Mercury Vapor
- Low Voltage
- Neon

3. General Requirements

All fixtures shall be certified for the specific type of application (wet, dry, damp, etc).

The rated input wattages shall be published by the manufacturer for each funded ballast and lamp combination and shall agree with fixture wattages used in the *Funding Calculation Worksheets*.

4. Fluorescent Ballasts (Except Those Serving Compact Fluorescent Lamps)

All T8 and T5 ballasts shall meet ANSI C82.11-1993 (High Frequency Fluorescent Lamp Ballasts) and UL 935 standards and bear the appropriate UL label. The following additional requirements must also be met:

- The power factor (PF), for 4 foot T8 & T5 shall be greater than or equal to 95%. Ballasts serving other lamp types must have a power factor greater than or equal to 90%
- Total harmonic distortion (THD) shall be less than or equal to 20%
- The manufacturer shall provide written warranty against defects in material and workmanship, including replacement, for five years from date of manufacture

- Ballasts shall be electronic
- Ballasts shall have a Class A sound rating
- Ballasts for T5 and T5HO lamps shall be “Program Start” (as defined in ANSI C82.11) and shall have end-of-life detection
- Ballasts shall not contain PCBs
- Ballasts shall be UL 935 listed, Class P, Type 1 Outdoor CSA Certified where applicable

5. Fluorescent Ballasts Serving Compact Fluorescent Lamps

- Electronic ballasts covered by this specification shall withstand input power line transients as defined in ANSI C62.41 (High Frequency Fluorescent Lamp Ballasts).
- The lamps shall be detachable so they can be replaced without replacing the ballast.
- Ballasts with detachable lamps shall have end-of-life detection.
- The power factor for all ballasts shall be 90% or higher.
- Total harmonic distortion (THD) of the input current shall not exceed 33% of the fundamental 60 Hz. current.
- Electronic ballasts shall comply with FCC rules and regulations Part 18, concerning Electromagnetic & Radio Frequency Interference (EMI and RFI).
- Electronic ballasts shall meet ANSI C82.11-1993 (High Frequency Fluorescent Lamp Ballasts).
- All equipment covered by this specification shall be Class “P” thermally protected where required by code.
- The ballast shall be capable of starting the designated lamp at the minimum temperature established by the lamp manufacturer. Integral units shall state minimum starting temperature.
- All ballasts shall be class “A” sound rated.
- Ballasts shall not contain PCBs.

6. High-Intensity Discharge (HID) Fixtures

Existing mercury vapor (MV) fixtures for retrofit with high-pressure sodium lamps (HPS) and ballasts must be certified by the manufacturer to accommodate the new components.

7. Delamping

To receive funding for delamping, the lamps must be removed and the wiring to the corresponding tombstones removed. The removal of wiring to the tombstones must be done in a manner that meets all applicable fire and electrical safety standards and codes. The delamped configuration must be one of the lamp configurations listed on the ballast.

8. Fixture Disconnect

If a fixture is to be disconnected and left in place, all of the tombstones, lamps and ballasts must be removed from the fixture, and the electrical wiring to the fixture must be removed to the J-box. This will be verified during inspection.

9. Operations and Maintenance Manuals

Provide an operations and maintenance manual that includes at least the following: Operating and calibration instructions for all occupancy sensors, photocells and other lighting controls; written warranties for controls and ballasts; manufacturer and model numbers for compact fluorescent fixture components so that removable lamps can be replaced; and information about where replacement lamps and ballasts can be purchased by the customer.

10. Disposal

Dispose of ballasts containing PCBs in accordance with Federal, State, and local regulations, including compliance with Environmental Protection Agency guidelines and the Toxic Substances Control Act. Discarded fixtures, lamps, and associated equipment shall be removed from the project site and disposed of in compliance with Federal, State, and local regulations. Prior to disposal, lighting waste shall be properly stored, labeled and transported. Before a project is approved for final payment, the customer is required to certify they have complied with these regulations by submitting a *Lighting Waste Disposal Form* (included here).

There are a number of public agencies and private firms that can assist with proper disposal. King County Hazardous Waste provides financial assistance in some cases. For additional information and referral specifics concerning waste disposal requirements, please see the *Resource Directory* in this manual or check the program Web site at www.EnergySmartServices.com. A copy of the Seattle City Light *Lighting Lamp and Ballast Waste Disposal Guidelines* are available at that Web site, and may be ordered by calling Seattle City Light at 684-3254.

11. Submittals

Prior to payment, the customer shall submit:

- A signed copy of the attached City Light *Lighting Waste Disposal Form*
- An as-built set of floor plans showing the proposed fixture locations (if any changes have been made)
- As-built *Funding Calculation Worksheets* (if any changes have been made)

12. Inspection

If any equipment will be inaccessible after installation, the Energy Management Analyst must be called to the job site to inspect the equipment after delivery and before it is installed. Also contact the Energy Management Analyst after the installation is complete and fully functional for an on-site inspection. During Seattle City Light inspections, a qualified person (customer or

Trade Ally) shall open fixtures selected by the Energy Management Analyst to expose ballasts and lamps funded under the Seattle City Light contract.

The Energy Management Analyst will check that the numbers entered into the *Funding Calculation Worksheets* are accurate. If the equipment counts or efficiency ratings have changed, the calculated energy savings and incentive amounts will be recalculated.

Lighting Waste Disposal Form for Lamps and Ballasts

Project Address _____

Utility Account Number _____

SCL Contract Number _____

Lighting Installer Firm Name _____

All lamps and ballasts have been disposed of in accordance with all applicable federal, state and local waste disposal regulations. These include the U.S. EPA and Washington Department of Ecology's Universal Waste Rules for disposal of lamps containing mercury, and the U.S. Toxics Substances Control Act and EPA Rules for disposal of ballasts containing PCBs.

Number of LAMPS disposed _____

LAMP disposal firm name _____

Disposal method (check all that apply)

Recycled Recycling firm name: _____

Hazardous waste disposal facility

Municipal landfill

In King County, the municipal landfill option is restricted to small quantity generators with written waste clearance from Public Health, (206) 296-4633. Elsewhere, check with landfill/transfer station operator, local health department, or solid waste agency.

Number of BALLASTS disposed _____

BALLAST disposal firm name _____

Disposal method (check all that apply)

Recycled Recycling firm name: _____

Transported to commercial store or destination hazardous waste disposal facility

The "Transported..." option may include temporary storage, treatment, incineration, recycling and/or final disposal to a destination hazardous waste landfill.

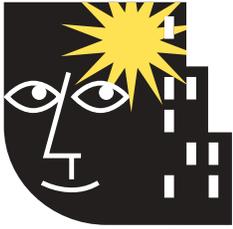
Authorized Signatures:

Lighting Installer

Owner Representative

(date) _____

(date) _____



Energy Smart Services

solutions &
incentives for
business

SECTION 2C

STANDARD INCENTIVES FOR HVAC & MOTORS



- When making a large capital investment in an energy intensive piece of equipment, it's worth taking a close look at long term operating costs. This section provides a streamlined method for determining the benefits of higher efficiency in commonly installed **HVAC** equipment. By entering data for high performance equipment into the applicable Funding Calculation Worksheets, energy savings and incentive amounts can be determined quickly and easily. These can then be weighed against known equipment costs to make the most informed equipment selection.
- Besides yielding energy and bill savings, HVAC investments have the potential to improve occupant comfort, improve indoor air quality, and reduce occupant complaints.
- **Motors** are the invisible "drivers" of many building and industrial functions. Selection of new premium efficiency motors- supported by Energy Smart Services Financial Incentives - is usually a wiser choice than rewinding old motors.

Section 2C. Standard Incentives for HVAC and Motors

- Instructions for Filling Out the Funding Calculation Worksheets for HVAC and Motors
- Funding Calculation Worksheets for HVAC and Motors
- Standard Specifications for Chillers, Heat Pumps, Air Conditioners, and Motors
- Standard Specifications for Variable Speed Drives and Inverter Duty Motors

Instructions for Filling out the Funding Calculation Worksheets for HVAC and Motors

ELIGIBILITY

The following equipment is eligible for funding:

- Chillers
- Air Conditioners
- Heat Pumps
- Variable Speed Drives (VSDs) retrofitted on HVAC variable air volume fans
- National Electrical Manufacturers Association (NEMA) Premium Efficiency Motors

Back-up equipment is not eligible for funding unless the back-up and lead (non-back-up) equipment is switched on a regular basis. If the back-up and lead equipment are switched on a regular basis, the backup equipment and the lead equipment are each eligible for funding using half the annual kWh savings estimated for year-round use of either one.

GENERAL INSTRUCTIONS

1. Use of Spreadsheet Software

HVAC Standard Incentives are quickly calculated using the *Funding Calculation Worksheets*. The electronic file containing these worksheets can either be downloaded from the web at www.EnergySmartServices.com, or obtained upon request from Seattle City Light by calling (206) 684-3254. The worksheets should be filled out electronically rather than by hand.

2. Project Costs

The customer or trade ally should either enter the material cost (equipment and WSST) or the incremental cost (the difference between two bids, one for equipment that just meets code and one for the proposed equipment). Then the “Cost Type” is entered: “M” for material cost, or “I” for incremental cost.

3. Final Determination of Funding Level

The Energy Management Analyst will review the worksheet(s) and reserves the right to adjust the amount of funding as a result of this review. Funding amounts are only finalized in the Seattle City Light contract, and funding is only available if a contract is issued before equipment is purchased.

4. Multiple Funding Sources

If a project will receive conservation funding from multiple utilities, Seattle City Light caps the Energy Smart Services incentive amount so that the sum of all utility funding does not exceed 70% of the total Energy Conservation Measure cost.

CHILLERS, AIR CONDITIONERS AND HEAT PUMPS

1. Baseline

The baseline for chillers, air conditioners and heat pumps is the Energy Code for projects in existing facilities as well as projects in new construction, except when a heat pump replaces electric resistance heat in an existing facility. Energy Code baseline efficiencies are automatically provided in the *Funding Calculation Worksheets*.

2. Energy Codes

The baseline efficiency for equipment installed in the City of Seattle is taken from the Seattle Energy Code, which is the same as the Washington State Code concerning efficiencies for heat pumps and air conditioners. Two worksheets are provided for chillers, one for projects in Seattle, and the other for projects that fall under the Washington State Code.

3. Efficiency Ratings

The funding calculations are based on formal industry **standard seasonal** efficiency ratings required by the Energy Code and developed by the American Refrigeration Institute (ARI), a manufacturers' association. Full-load efficiency ratings, and efficiency ratings at conditions specific to a project, are not accepted. For example, NPLV efficiency ratings are not accepted for chiller and air conditioner funding calculations. The complexity and variety of standard efficiencies (e.g. SEER, HSPF, IPLV, COP) and equipment categories is necessary for compatibility with industry standards and the Energy Codes. The worksheets automatically convert the multiple types of efficiency ratings to a common set of units.

4. Hours of Operation

“Equivalent full load hours” are equal to the hours of operation multiplied by the average load factor. These have been standardized in the Seattle City Light calculations, taking into account computer analyses of prototype buildings, and surveys of facility operators to evaluate the typical run times and loading levels on various types of equipment.

5. Multiple Identical Units

A single *Funding Calculation Worksheet* may be used for multiple units with the same model number. For multiple units with different model numbers, use a separate worksheet for each model number.

6. Small Air Conditioners and Air-to-air Heat Pumps

Air to air heat pumps are covered under both the *Air to Air Heat Pump* worksheet, and the *PTAC and PTHP* worksheet. Small air conditioners are covered under both the *Air Conditioner* worksheet and the *PTAC and PTHP* worksheet. The ARI standards determine which equipment falls under which category. The efficiency rating given in the manufacturer's literature will probably make the appropriate category clear.

7. Air-to-air Heat Pumps

The "*Air-to-air Heat Pump*" *Worksheet* contents change automatically depending on whether the baseline is electric heat and whether or not the baseline has air conditioning. Before printing out the form for a hard copy, make sure the yes/no responses to the questions about the baseline have been filled in.

VARIABLE SPEED DRIVES

1. Scope

The Standard Incentive calculation for VSDs applies only to variable speed drives retrofitted onto existing variable air volume HVAC air distribution systems. For other VSD applications, a Custom Incentive calculation is used.

2. Purchase of Inverter Duty Motors

If the customer or contractor decides that a new motor would be necessary for reliable operation under VSD operation, an inverter duty motor may be purchased and included in the cost of the VSD Energy Conservation Measure. The inclusion of the motor doesn't change the energy savings attributed to the measure, but may increase the funding level if the measure is limited by the Cost Cap.

MOTORS

1. Eligibility

For all constant-speed motor applications, motors with a NEMA Premium Efficiency rating are eligible for funding using the *Funding Calculation Worksheet for NEMA Premium Efficiency Motors*. Motors serving back-up equipment are not eligible for funding unless the back-up and lead (non-back-up) equipment is switched on a regular basis. If the back-up and lead equipment are switched on a regular basis, the backup equipment and the lead motors are each eligible for funding using half the annual kWh savings estimated for year-round use of either one.

If a motor is served by a variable speed drive (VSD), it is not eligible for Energy Smart Services funding as a high efficiency or premium efficiency motor. A new inverter-duty motor purchased for reliable system performance with a variable speed drive is included as part of the VSD funding calculation. It is not included as an additional energy savings but as part of the total VSD measure cost. See section on VSD funding.

2. Definitions

The minimum efficiencies required of the NEMA Premium Motors can be found on the NEMA Web site, or in the *Motor Reference Table* located at the end of the HVAC and motor *Funding Calculation Worksheets*.

3. Energy Savings and Funding Level Calculations

If the Energy Code is used as the baseline, motors are funded using a quick and easy Standard Incentive for Motors. Under special circumstances, an existing motor, not the Energy Code, may be used as baseline, in which case funding is issued as a Custom Incentive.

Energy Code as Baseline— Standard Incentive

When the Energy Code is baseline, use the *Funding Calculation Worksheet for NEMA Premium Efficiency Motors*. The Energy Code must be used as baseline for motors if any of the following is true:

- The project is new construction or a major remodel
- The motor is to go into an existing facility, but is not replacing an existing motor
- The new motor is larger (Hp) than the motor it is replacing
- The new motor is replacing a motor that is broken or no longer in use
- The motor is under 75 Hp

If any of the above conditions apply, and if the motor is not covered by the Seattle or Washington State Energy Code, the EPACT efficiency levels must be used as baseline. At the time of this printing, the Seattle and Washington State Energy Codes and EPACT minimum motor efficiencies are the same, so the *Funding Calculation Worksheet for NEMA Premium Efficiency Motors* has broad application.

For convenience, motor purchases that do **not** meet any of the above conditions may also be funded using the Energy Code as the baseline.

Existing Motor as Baseline—Custom Incentive

Downsizing Oversized Motors. If a motor doesn't fall under one of the categories for which use of the energy code is required as baseline, and if the existing motor is less than 50% loaded, the existing motor may be used as baseline for downsizing. Use a Custom Incentive calculation.

Replacing Large Standard Efficiency Motors. If a motor doesn't fall under one of the categories for which use of the energy code is required as baseline, and if a motor is standard, not "energy efficient", the existing motor nameplate efficiency may be used as the basis of a Custom Incentive. For motors 100 Hp and greater, the actual load factor must be measured to avoid overestimating the savings. For motors less than 100 Hp, the savings should be calculated assuming either a 70% load factor, or using a measured load factor.

RELATED DOCUMENTS

Section 2—*Financial Incentives for ECM Installation—Steps to Participate.*

Section 2—*Standard Specifications for All ECM Installation Incentives.* These specifications are attached to the Energy Smart Services contracts as requirements that must be met prior to Seattle City Light payment.

**Seattle City Light Energy Smart Services
Funding Calculation Worksheets
for HVAC and Motors**

- Funding Calculation Worksheet for Chillers in Seattle
- Funding Calculation Worksheet for Chillers outside Seattle
- Funding Calculation Worksheet for Air Conditioners
- Funding Calculation Worksheet for Air-to-Air Heat Pumps
- Funding Calculation Worksheet for Hydronic Heat Pumps
- Funding Calculation Worksheet for Packaged Terminal Air Conditioners (PTAC), and Packaged Terminal Heat Pumps (PTHP)
- Funding Calculation Worksheet for Variable Speed Drives for HVAC VAV Systems
- Funding Calculation Worksheet for NEMA Premium Efficiency Motors

Seattle City Light / Energy Smart Services FUNDING CALCULATION WORKSHEET for CHILLERS to be Installed in Seattle

In section 2C of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheets for HVAC and Motors*.
Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.
Multiple identical chillers may be covered on a single sheet.

Facility Name	Form Completed by	Date
Manufacturer / Model Number	Chiller on-site identifier, such as CH-1	

I. BASELINE EFFICIENCY RATINGS From the 2012 Seattle Energy Code, Table 14-1C

Equipment Type	Rated Cooling Capacity (tons)	Check One	Efficiency	
			IPLV (Btuh / Btuh)	Equivalent kW / ton
Air Cooled - With Condenser	all capacities		3.05	1.15
Air Cooled - Condenserless	all capacities		3.45	1.02
Water Cooled	less than 40 tons		5.05	0.70
	from 40 up to but not including 150 tons		5.25	0.67
	from 150 up to but not including 300 tons		5.90	0.60
	300 tons and greater		6.40	0.55
Is the chiller centrifugal, water-cooled, and NOT exposed on the roof? Enter Y for Yes or N for No.				

II. ANNUAL ENERGY SAVINGS

A	Baseline IPLV in kW / ton	From table above		kW / ton
B	Proposed IPLV in kW / ton ¹	If the manufacturer gives the IPLV in kW / ton, enter it here, and do not fill out line C.		kW / ton
C	Proposed IPLV in Btuh / Watt ¹	If the manufacturer gives the IPLV in Btuh / Watt, enter it here. Do not fill out line B		Converted kW / ton
D	Efficiency Improvement	(line A) - (line B), or (line A) - (line C)		kW / ton
E	Equivalent Full Load Hours ²	Use 1,100 if air handler(s) served by this chiller have 100% OSA economizer, otherwise use 1,600		hrs / yr
F	Cooling capacity / Chiller	Rated at ARI Standard Rating Conditions		tons
G	Energy Savings per Chiller	(line D) x (line E) x (line F)		kWh / yr
H	Number of Chillers	Use one sheet per type of chiller		
I	Total Cooling Capacity	(line F) x (line H)		tons
J	Total Energy Savings	(line G) x (line H)		kWh / yr

III. COST & FUNDING

K	Chiller Cost	Enter either the material cost or the incremental cost.	
L	Type of cost entered on row K	Material or Incremental cost (enter M, or I)	
M	Cost Cap	50% of Material Cost, or 100% of Incremental Cost	
N	Value of Savings to SCL	For water-cooled centrifugal chillers not exposed on roof, (line J) x \$0.29 / kWh, for all other chillers, (line J) x \$0.23 / kWh	

Seattle City Light Use Only

Approved Funding Amount ³	Approved by (initial):	Date	
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Footnotes:

- 1) Proposed efficiency rating shall be based on ARI 550/590.
- 2) Equivalent full load hours are the hours per year the equipment is on, multiplied by the average load factor.
- 3) This form is not a guarantee of funding from Seattle City Light. Funding can only be guaranteed through a formal contract between the customer and Seattle City Light.

**Seattle City Light / Energy Smart Services
FUNDING CALCULATION WORKSHEET for
CHILLERS to be Installed Outside Seattle**

In section 2C of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheets for HVAC and Motors*.
Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.
Multiple identical chillers may be covered on a single sheet.

Facility Name	Form completed by	Date
Manufacturer / Model Number	Chiller on-site identifier, such as CH-1	

I. BASELINE EFFICIENCY RATINGS from the 2009 WA State Energy Code, Table 14-1C

Equipment Type	Rated Cooling Capacity (tons)	Check One	Efficiency	
			IPLV (Btuh / Btuh)	Equivalent kW / ton
Reciprocating	all capacities		5.05	0.70
Screw and Scroll	less than 150 tons		5.20	0.68
	from 150 up to but not including 300 tons		5.60	0.63
	300 tons and greater		6.15	0.57
Centrifugal	less than 150 tons		5.25	0.67
	from 150 up to but not including 300 tons		5.90	0.60
	300 tons and greater		6.40	0.55
Is the centrifugal chiller water-cooled and NOT on the roof? Enter Y for Yes or N for No.				

II. ANNUAL ENERGY SAVINGS

A	Baseline IPLV in kW / ton	From table above		kW / ton
B	Proposed IPLV in kW / ton ¹	If the manufacturer gives the IPLV in kW / ton, enter it here and do not fill out line C.		kW / ton
C	Proposed IPLV in Btuh / Watt ¹	If the manufacturer gives the IPLV in Btuh / Watt, enter it here. Do not fill out line B.		Converted kW / ton
D	Efficiency Improvement	(line A) - (line B), or (line A) - (line C)		kW / ton
E	Equivalent Full Load Hours ²	Use 1,100 if air handler(s) served by this chiller have 100% OSA economizer, otherwise use 1,600		hrs / yr
F	Cooling capacity / Chiller	Rated at ARI Standard Rating Conditions		tons
G	Energy Savings per Chiller	(line D) x (line E) x (line F)		kWh / yr
H	Number of Chillers	One form per type of chiller		
I	Total Cooling Capacity	(line F) x (line H)		tons
J	Total Energy Savings	(line G) x (line H)		kWh / yr

III. COST & FUNDING

K	Chiller Cost	Enter either the material cost or the incremental cost.	
L	Type of Cost entered on row K	Material or Incremental cost (enter M, or I)	
M	Cost Cap	50% of Material Cost, or 100% of Incremental Cost	
N	Value of Savings to SCL	For water-cooled centrifugal chillers not exposed on roof, (line J) x \$0.29 / kWh, for all other chillers, (line J) x \$0.23 / kWh	

Seattle City Light Use Only

Approved Funding Amount: ³	Approved by (initial):	Date:
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Footnotes:

- 1) Proposed efficiency rating shall be based on ARI 550/590.
- 2) Equivalent full load hours are the hours per year the equipment is on, multiplied by the average load factor.
- 3) This form is not a guarantee of funding from Seattle City Light. Funding can only be guaranteed through a formal contract between the customer and Seattle City Light.

Seattle City Light / Energy Smart Services FUNDING CALCULATION WORKSHEET for AIR CONDITIONERS

In Section 2C of the Program Manual, see the *Instructions Filling out the Funding Calculation Worksheets for HVAC and Motors*.
Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.
Multiple identical air conditioners may be covered on a single sheet.

Facility Name	Form Completed by	Date
Manufacturer / Model Number	Air Handling Unit on-site ID(s), such as AHU-3	

I. BASELINE EFFICIENCY RATINGS - From the Seattle Energy Code, Table 14-1A

Equipment	Rated Cooling Capacity (Btuh)	Check One	Efficiency (Btuh / Watt)	
Air-Cooled - Split Systems	less than 65,000		10.00	SEER
Air Cooled - Single Package	less than 65,000		9.70	SEER
Air Cooled	from 65,000 up to but not including 135,000		10.30	EER
	from 135,000 up to but not including 240,000		9.70	EER
	from 240,000 up to but not including 760,000		9.70	IPLV
	760,000 and greater		9.40	IPLV
Water or Evaporatively Cooled	less than 65,000		12.10	EER
	from 65,000 up to but not including 135,000		11.50	EER
	from 135,000 up to 240,000		11.00	EER
	greater than 240,000		10.30	IPLV

II. ANNUAL ENERGY SAVINGS AND FUNDING

A	Baseline Efficiency	from table above	Btuh / Watt
B	Proposed Efficiency ¹	from manufacturer's literature ¹	Btuh / Watt
C	Efficiency Improvement	(1 / line A) - (1 / line B)	Watt / Btuh
D	Equivalent Full Load Hours ²	Use 1,100 if there is 100% outside air capability, otherwise use 1,600	hrs / yr
E	Cooling Capacity in Btu / hr per Unit	Rated at ARI Standard Rating Conditions	Btuh
F	Estimated Energy Savings per Unit	[(line C) x (line D) x (line E)] / 1000	kWh / yr
G	Number of Air Conditioners	Use one sheet per type of air conditioner.	
L	Total Cooling Capacity	[(line E) x (line G)] / 12,000	tons
H	Total Energy Savings	(line F) x (line G)	kWh / yr

III. COST & FUNDING

I	Air Conditioner Cost	Enter the material cost or the incremental cost.	
J	Type of Cost entered on row I	Material, or Incremental Cost (enter M, or I)	
K	Cost Cap	50% of Material Cost, or 100% of Incremental Cost	
L	Value of Savings to SCL	(line H) x \$0.20 / kWh	

Seattle City Light Use Only

Approved Funding Amount ³	Approved by (initial):	Date:
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Footnotes:

- 1) Performance rating to include compressor, condenser, and air distribution fans. The proposed efficiency rating must be based on ARI 210/240 (for under 135,000 Btuh capacity) or ARI 340/360 (for 135,000 Btuh or above).
- 2) Equivalent full load hours are the hours per year the equipment is operating multiplied by the average load factor.
- 3) This form is not a guarantee of funding from Seattle City Light. Funding can only be guaranteed through a formal contract between the customer and Seattle City Light.

**Seattle City Light / Energy Smart Services
FUNDING CALCULATION WORKSHEET for
AIR-TO-AIR HEAT PUMPS**

In Section 2C of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheets for HVAC and Motors*.
Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.
Multiple identical heat pumps may be covered on a single sheet.

Facility Name _____ Form Completed by _____ Manufacturer & Model Number _____ Date _____

I. BASELINE DESCRIPTION

IMPORTANT: The contents of this form change automatically based on responses to the following questions. For this reason, a hard-copy printout is only relevant for the specific baseline conditions selected below.

- For new construction: No baseline description is required; the baseline automatically becomes the Energy Code.
- For an existing facility: **Will the proposed heat pump replace electric resistance heat?** Enter Y for Yes, N for No.....
- For an existing facility: **Does the area to be served by the proposed heat pump already have air conditioning?** (Y/N)

II. BASELINE AND PROPOSED EFFICIENCY RATINGS

Fill out the row which corresponds to the type and cooling capacity of your heat pump unit(s), then continue with Section III.		Check One	Baseline ¹			Proposed ² (from manufacturer's literature)	
			Cooling		Heating	Cooling	Heating
Type	Rated Cooling Capacity (Btu / hr)		col. a	col. b	col. c	col. d	
Split System	less than 65,000		10.0 SEER	6.8 HSPF	SEER	HSPF	
Single Package	less than 65,000		9.7 SEER	6.6 HSPF	SEER	HSPF	
Split System or Single Package ³	65,000 up to 134,999		10.1 EER	3.2 COP	EER	COP	
	135,000 up to 239,999		9.3 EER	3.1 COP	EER	COP ¹	
	240,000 and greater		9.2 IPLV	3.1 COP	IPLV	COP ¹	

III. ENERGY SAVINGS, COST & FUNDING

A	Cooling efficiency improvement ¹	col. a - col. C, converted to watt/Btuh	Watt / Btuh	Cooling
B	Cooling capacity	from manufacturer's literature	Btuh	
C	Cooling equivalent full load hours ⁴	700	hrs / yr	
D	Cooling energy savings per heat pump	(line A x line B x line C) / 1,000	kWh / yr	
E	Heating efficiency improvement	col. b - col. D, converted to watt/Btuh	Watt / Btuh	Htg
F	Heating equivalent full load hours ⁴	1,000	hrs / yr	
G	Heating energy savings per heat pump	(line E x line B x line F) / 1,000	kWh / yr	
H	Total energy savings per heat pump	line D + line G	kWh / yr	Total
I	Number of identical heat pumps	Use the sheet per type of heat pump		
J	Total cooling capacity	(line B x line I) / 1,000	Tons	
K	Total energy savings	line H x line I	kWh / yr	Cost & Funding Caps
L	Heat Pump Cost	Enter the material cost or the incremental cost.		
M	Type of Cost entered on row L	Material or Incremental cost (enter M, or I)		
N	Cost Cap	50% of Material Cost, or 100% of Incremental Cost		
O	Value of Savings to SCL	line K x \$ 0.20 / kWh		

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Approved Funding Amount ⁵	Approved by (initial):	Date:
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Footnotes:

- 1) If the proposed heat pump is replacing electric resistance heat, the baseline heating efficiency is automatically set to 1. If the heat pump is replacing electric resistance heat, and the space currently has no air conditioning, the new heat pump's annual cooling energy is automatically calculated and subtracted from the heat pump kWh savings (and the improvement in efficiency is shown as a negative number). The higher the new heat pump's cooling efficiency, the lower the amount subtracted from savings
- 2) Proposed ratings must be based on ARI 210/240 (for under 135,000 Btuh capacity) or ARI 340/360 (135,000 Btuh and above).
- 3) For capacities 65,000 Btuh and greater, the COP rating is to be for outdoor air temperatures 47°F db and 43°F wb.
- 4) Equivalent full load hours are the hours per year the equipment is operating multiplied by the average load factor.
- 5) This form is not a guarantee of funding from Seattle City Light. Funding can only be guaranteed through a formal contract between the customer and Seattle City Light.

Seattle City Light / Energy Smart Services FUNDING CALCULATION WORKSHEET for HYDRONIC HEAT PUMPS¹

In Section 2C of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheets for HVAC and Motors*.
Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.
Multiple identical heat pumps may be covered on a single sheet.

Facility Name _____ Form Completed by _____ Manufacturer & Model Number _____ Date _____

I. BASELINE AND PROPOSED EFFICIENCY RATINGS

Fill out the row which corresponds to the type and cooling capacity of your heat pump unit(s), then continue with Section II .	Check One	Baseline (City & State Energy Codes)				Proposed (from manufacturer's literature) ²			
		Cooling		Heating		Cooling ³		Heating ³	
		col. a	col. b	col. c	col. d				
Rated Cooling Capacity (Btu / hr)									
less than 17,000		11.2 EER	4.2 COP	EER	COP				
17,000 up to 134,999		12.0 EER	4.2 COP	EER	COP				

II. ENERGY SAVINGS, PROJECT COSTS, ESTIMATED FUNDING

A	Cooling efficiency improvement	1 / col. a - 1 / col. c	Watt / Btuh	Cooling
B	Cooling capacity per heat pump	from manufacturer's literature	Btuh	
C	Cooling equivalent full load hours ⁴	-----	900 hr / yr	
D	Cooling energy savings per heat pump	(line A x line B x line C) / 1,000	kWh / yr	
E	Heating efficiency improvement	.293 / col. b - .293 / col. d	Watt / Btuh	Htg
F	Heating equivalent full load hours ⁴	-----	1000 Hr / yr	
G	Heating energy savings per heat pump	(line E x line B x line F) / 1,000	kWh / yr	
H	Total energy savings per heat pump	line D + line G	kWh / yr	Total
I	Number of identical hydronic heat pumps	use one sheet per type of heat pump		
J	Total cooling capacity	(line B x line I) / 12,000	Tons	
K	Total energy savings	line H x line I	kWh / yr	Cost & Funding Caps
L	Heat Pump Cost	Enter the material or the incremental cost.		
M	Type of Cost entered on row L	Material or Incremental cost (enter M or I)		
N	Cost Cap	50% of material cost, or 100% of incremental cost		
O	Value of Savings to SCL	line K x (\$ 0.23 / kWh)		

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Footnotes:

- 1) If the proposed heat pump is evaporatively cooled, or cooled by ground water, a separate, custom calculation is used by SCL. Those applications were left off this sheet to simplify the funding calculation form for the most common type of hydronic heat pump.
- 2) Proposed efficiencies must be rated based on ARI/ISO 13256-1.
- 3) The cooling EER is rated at a 86°F entering water temperature (EWT). The heating COP is rated at a 68°F EWT.
- 4) Equivalent full load hours are the hours per year the equipment is operating multiplied by the average load factor.
- 5) This form is not a guarantee of funding from Seattle City Light. Funding can only be guaranteed through a formal contract between Seattle City Light and the customer.

Seattle City Light / Energy Smart Services
FUNDING CALCULATION WORKSHEET for
Packaged Terminal Air Conditioners (PTAC) and Packaged Terminal Heat Pumps (PTHP)

Use this form for heat pump or air conditioner funding if the proposed equipment falls under the ARI definition of a Packaged Terminal Air Conditioner or Packaged Terminal Heat Pump.
 In Section 2C of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheets for HVAC and Motors*.
Complete the shaded areas only. The non-shaded areas are calculated and filled in automatically.
Multiple identical units may be addressed on a single form.

Facility Name _____ Form Completed by _____ Manufacturer & Model Number _____ Date _____

I. BASELINE AND PROPOSED EFFICIENCY RATINGS

Fill out the row which corresponds to the type of equipment and type of project, then continue with Section II.		Baseline ¹				Proposed ²	
		Cooling		Heating		Cooling rated at 82°F db	Heating
		Proposed Rated Cooling Capacity in Btuh	Calculation input	EER	Calculation input	COP	From Manufacturer's Literature
Equipment and Project Types ³	col. a	col. b	col. c	col. d	col. e	col. f	col. g
PTAC, new construction		14.7		na	na	EER	na
PTAC, replacement		13.1		na	na	EER	na
PTHP, new construction		14.5		3.2		EER	COP
PTHP, replacement		13.0		2.9		EER	COP

II. ENERGY SAVINGS, COST & FUNDING

A	Cooling efficiency improvement	$1 / \text{col c} - 1 / \text{col f}$	Watt / Btuh	Cooling
B	Cooling capacity	from manufacturer's literature	Btuh	
C	Cooling equivalent full load hours ⁴	-----	700 hr / yr	
D	Cooling energy savings per unit	$(\text{line A} \times \text{line B} \times \text{line C}) / 1,000$	kWh / yr	
E	Heating efficiency improvement	$0.293 / \text{col e} - 0.293 / \text{col. g}$	Watt / Btuh	Htg
F	Heating equivalent full load hours ⁴	-----	1,600 Hr / yr	
G	Heating energy savings per unit	$(\text{line E} \times \text{line B} \times \text{line F}) / 1,000$	kWh / yr	
H	Total energy savings per unit	line D + line G	kWh / yr	Total
I	Number of identical PTAC or PTHP	Use one sheet per type of PTAC.		
J	Total cooling capacity	$(\text{line B} \times \text{line I}) / 12,000$	Tons	
K	Total energy savings	line H x line I	kWh / yr	Cost & Funding Caps
L	Cost	Enter the material cost or the incremental cost.		
M	Type of Cost entered on row L	Material or Incremental cost (enter M or I)		
N	Cost Cap	50% of material cost or 100% of incremental cost		
O	Value of Savings to SCL	line K x (\$ 0.20 / kWh)		

Seattle City Light Use Only

Approved Funding Amount ⁵	Approved by (initial):	Date:
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Footnotes:

- 1) Baseline efficiencies are taken from the Seattle and State Energy Codes. **If the proposed heat pump is replacing resistance heat in an existing facility, SCL will create a Custom Incentive calculation.**
- 2) Proposed ratings must be based on ARI 310/380.
- 3) Use the "new construction" category for replacements unless the existing unit has sleeves < 16 " high and < 42 " wide.
- 4) Equivalent full load hours are the hours per year the equipment is operating multiplied by the average load factor.
- 5) This form is not a guarantee of Seattle City Light funding. Funding can only be guaranteed through a formal contract between Seattle City Light and the customer.

**Seattle City Light / Energy Smart Services
FUNDING CALCULATION WORKSHEET for
VARIABLE SPEED DRIVES serving HVAC VAV SYSTEMS**

In Section 2C of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheets for HVAC and Motors*.

Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.

Facility Name _____

Form Completed by _____

Date _____

I. ELIGIBILITY

Use this form to calculate SCL funding for VSDs to replace inlet vane or discharge damper controls on supply and return fans serving HVAC variable air volume (VAV) air distribution systems in existing buildings.

II. ANNUAL ENERGY SAVINGS

Line	Manufacturer / Model Number	Application: Supply Fan or Return Fan (SF or RF)	Number of Motors	Rated Horsepower per Motor	Total Rated Horsepower	Hours per Year Motor is On	Annual Energy Savings (kWh/yr)
			col. a	col. b	col. c = a x b	col. d	col. e = c x d x 0.148
1							
2							
3							
4							
5							
6							
7							
8							
+Lines	Click button to add lines.						
A	Total						

III. COST & FUNDING

B	VSD Cost	Enter the total cost of the VSD.	
C	Type of Cost entered on row B	Enter T.	
D	Cost Cap	70% of total cost	
E	Value of Savings to SCL	(line A, col. e) x \$ 0.23 / kWh	

Seattle City Light Use Only

Approved Funding Amount ¹	Approved By (initial):	Date:
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Footnotes

- 1) This form is not a guarantee of funding from Seattle City Light. Funding can only be guaranteed through a formal contract between Seattle City Light and the customer.
- 2) Column a. A single line may be filled out for multiple identical VSDs (same motor hp and same VSD model). In that case, enter the number of identical VSDs (and motors) here.

**Seattle City Light / Energy Smart Services
FUNDING CALCULATION WORKSHEET for NEMA PREMIUM EFFICIENCY MOTORS**

In section 2C of the Program Manual, see the *Instructions for Filling out the Funding Calculation Worksheet for HVAC and Motors*.
Complete the shaded areas only. The non-shaded areas are calculated and filled out automatically.

Facility Name	Form Completed by	Date
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I. ELIGIBILITY

SCL funding is not available for motors controlled by VSDs.

II. ANNUAL ENERGY SAVINGS & FUNDING

Line	Manufacturer / Model Number	Location and Application	# of Motors	HP per Motor	Total Rated HP = a x b	Run Hours Per Year	Application Code C = Commercial I = Industrial	kW Reduction per Motor	Motor Funding Coefficient	Total kWh / Yr Savings = a x d x f	Value of Savings to SCL = a x d x g
			col. a	col. b	col. c	col. d	col. e	col. f	col. g	col. h	col. i
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
A	Click button to add lines										
			Total								

III. COST & FUNDING

B	Motor Cost	Enter the material or the incremental cost.
C	Type of Cost entered on row B	Material or Incremental Cost (enter M or I)
D	Cost Cap	50% of Material Cost, or 100% of Incremental Cost
E	Value of Savings to SCL	(line A, col. i)

Seattle City Light Use Only

Approved Funding Amount:
Approved By (initial):
Date:

Instructions

General. This form is not a guarantee of funding from Seattle City Light. Funding can only be guaranteed through a formal contract between the customer and Seattle City Light.
Column a, Number of Motors. Multiple identical motors may be entered on a single line.
Column e, Application Code. Enter C for motors serving commercial loads such as HVAC fans and pumps. Enter I for motors used in industrial processes.
Columns f and g. The kW reduction and motor funding coefficients are automatically transferred from the *Motor Reference Table*, located on a tab near the end of this workbook.

Seattle City Light / Energy Smart Services NEMA Premium Efficiency Motors

- Motor Reference Table -

The KW reduction and funding amounts in the Motor Funding Calculation Form are automatically taken from this table.

In order to be eligible for funding, the selected motor must have a rated full load nominal efficiency that is no less than the NEMA Premium Efficiency.

Motor Hp	NEMA Premium Efficiency ¹	Commercial Loads ²		Industrial Loads ³	
		Estimated kW Reduction	Motor Funding Coefficient	Estimated kW Reduction	Motor Funding Coefficient
1	85.5%	0.0222	\$0.0052	0.0222	\$0.0033
1.5	86.5%	0.0270	\$0.0063	0.0270	\$0.0040
2	86.5%	0.0359	\$0.0084	0.0359	\$0.0054
3	89.5%	0.0607	\$0.0141	0.0607	\$0.0091
5	89.5%	0.0667	\$0.0155	0.0667	\$0.0100
7.5	91.0%	0.1216	\$0.0283	0.1216	\$0.0182
10	91.7%	0.1400	\$0.0326	0.1400	\$0.0210
15	93.0%	0.1851	\$0.0431	0.1851	\$0.0278
20	93.0%	0.2468	\$0.0575	0.2468	\$0.0370
25	93.6%	0.2890	\$0.0673	0.2890	\$0.0433
30	94.1%	0.3063	\$0.0714	0.3063	\$0.0459
40	94.1%	0.2626	\$0.0612	0.2626	\$0.0394
50	94.5%	0.4456	\$0.1038	0.4456	\$0.0668
60	95.0%	0.4933	\$0.1149	0.4933	\$0.0740
75	95.0%	0.3943	\$0.0919	0.3943	\$0.0591
100	95.4%	0.7562	\$0.1762	0.7562	\$0.1134
125	95.4%	0.6516	\$0.1518	0.6516	\$0.0977
150	95.8%	0.6885	\$0.1604	0.6885	\$0.1033
200	95.8%	0.9181	\$0.2139	0.9181	\$0.1377

- 1) According to the National Electric Manufacturers Association (NEMA), a motor must have a Full Load Nominal Efficiency rating no less than the one given here in order to classify as a "NEMA Premium Efficiency" motor. Make sure purchased motors meet this classification.
- 2) For commercial loads, the baseline is the Seattle Energy Code (SEC, effective date 10/01)
- 3) For industrial process loads, the baseline for these calculations is EPACT (same as SEC at this time).

Standard Specifications for Chillers, Heat Pumps, Air Conditioners, and Motors

RELATED DOCUMENTS

Section 2—*Standard Specifications for All ECM Installation Incentives* applies to this project.

EQUIPMENT AND INSTALLATION

1. Chillers, Heat Pumps and Air Conditioners

Funded equipment must have a permanently affixed metal nameplate with the manufacturer, model number, and rated capacity either engraved or baked on at the factory. The nameplate must be located where it is readable once the equipment has been installed.

The rated efficiency of the installed equipment must meet or exceed the “proposed” efficiency given in the attached Seattle City Light *Funding Calculation Worksheets*. (Exception: If the rating given on the *Funding Calculation Worksheet* is in kW/ton, which is the inverse of an efficiency, the rating of the installed equipment shall be no greater than that given in the calculation form.) The rating conditions on which the efficiency ratings in the contract are based must also be used in determination of the efficiency rating for the installed equipment. For example, full load efficiencies cannot be substituted for weighted average, or seasonal efficiencies, and NPLVs cannot be substituted for IPLVs.

2. Chillers

Water-cooled chillers must be capable of operating reliably with condenser water supplied at temperatures down to 75°F. The cooling tower return water temperature setpoint (not to be confused with the cooling tower design condition) shall be no greater than 75°F.

Chiller controls shall provide proportional/integral (PI) control of the chilled water supply to avoid a drop in the chilled water supply temperature at low loads.

3. Air-to-air Heat Pumps

The control system must lock out back-up heat (including baseboards) at outside air temperatures above 50°F. If baseboards cannot be locked out, they must be removed completely. The control system shall minimize use of supplemental heat during start-up, morning warm-up, and defrost conditions. During normal operations, electric resistance heat is only to be used as the second stage of heating in the event the heat pump is unable to meet the load. Heat pump installations, like other HVAC projects, must meet the requirements of the Energy Code, including but not limited to requirements for a 5F deadband between heating and cooling setpoints, economizer requirements, and night setback requirements. All air-to-air heat pump installations shall include new thermostats fully compatible with the heat pumps they control.

4. Motors

Each motor shall have a Nominal Full Load Efficiency rating that is NEMA Premium or greater.

Motors shall have a permanently attached, factory mounted, metal engraved nameplate that clearly gives the following information:

- Manufacturer
- Model number
- Rated nominal full load efficiency
- Rated horsepower

No funding is available for motors driven by a VSD.

If the new motor horsepower is 100 Hp or more, and the motor is not being upsized or downsized, the rated operating speed of the new motor must be the same as the rated operating speed of the existing motor. If the rated operating speed of the existing motor is unknown, or cannot be found in a new Premium Efficiency motor, the speed of the driven equipment shall be measured before the motor is replaced, and the sheaves shall be replaced or adjusted (for variable pitch sheaves) until the speed of the driven equipment after the installation of the new motor is the same as before. Running equipment at a higher speed, particularly on constant speed pumps and fans, will generally reduce or even negate the savings gained from use of a higher efficiency motor.

The inrush current for high efficiency motors is sometimes greater than for a comparable lower-efficiency motor. The contractor shall either propose a motor that doesn't have an increased inrush current, or shall replace any parts of the electrical service to the motor that need greater capacity to handle the higher inrush current.

SUBMITTALS

Invoices shall be itemized with quantities, manufacturers, and model numbers.

Standard Specifications for Variable Speed Drives and Inverter Duty Motors

1. Related Documents

Section 2—*Standard Specifications for All ECM Installation Incentives* apply to this project.

2. General

This specification is intended primarily for variable speed drive (VSD) installations for variable air volume (VAV) fan systems but could be used for blowers, cooling towers and pumps if appropriately applied.

All VSD components and installations will meet or exceed all applicable State and local codes, and standards to include: ANSI, NEMA, NEC, NFPA and Factory Mutual.

3. Equipment

The VSD shall be of a large enough capacity to operate the motor at 60 Hz.

If a new motor is being purchased to allow reliable operation under VSD control, that motor must have an Inverter Duty rating. It must also be sized large enough to operate the driven equipment at full capacity.

For applications where the driven equipment was previously staged on and off in response to variations in load, the installed equipment shall have the capability of automatically staging on and off the equipment in addition to the automatic variation in speed.

The VSD shall convert 60 Hz utility power to adjustable frequency and voltage output power, providing adjustable motor speed from 10% to 115% of nameplate motor speed. If a pulse width modulated output is used, the VSD output carrier frequency shall be variable from 5 KHz to 15 KHz. The VSD shall not create a voltage rate of change greater than 1000 volts/microsecond or a peak voltage greater than 1000 volts to ground at the motor when connected to the VSD. The VSD shall include 3% input line reactors.

Power line noise shall not exceed the current distortion limits and line notch depths defined in IEEE Standard 519-1992, "IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems".

In hospitals and other facilities when there is concern about RFI interference, the VSD shall not emit radiated RFI in excess of the limitations set forth in the FCC Rules and Regulations, Part 15 for Class A computing devices. For these facilities, pulse width modulation type drives shall include RFI filters and carry an FCC compliance label.

The VSD will have a digital meter to indicate percent of motor's speed in Hz and motor's load in Amperes.

The VSD shall be capable of operating any standard NEMA rated, “off the shelf” squirrel cage induction motor of 50% to 100% of the VSD capacity. It must be possible to substitute a new, rewound or smaller motor without replacing or making hardware modifications to the VSD.

The VSD will be equipped with at least two pass-through frequency bands to avoid unstable frequencies. The VSD will be able to operate with $\pm 10\%$ fluctuation in the line voltage; $\pm 2\%$ fluctuation in the frequency; and $\pm 5\%$ phase imbalance.

The VSD will also be able to operate from 0°C to 40°C and up to 90% relative humidity.

Total VSD voltage distortion shall not exceed 5% and total displacement power factor will not be less than 94% at all speed levels. VSD efficiency must be at least 95%.

The VSD shall be designed to be able to continually operate at 110% of nameplate load of the motor to which the VSD is applied and sustain a 115% overload for 15 seconds. The VSD full load amperage rating shall meet or exceed NEC Table 430-150. The VSD shall provide the motor with electronic overload protection in compliance with NEC Article 430-2.

The VSD shall have separate acceleration and deceleration rates providing 0 to 100% motor speed modulation in a period of time adjustable from 3 to 60 seconds. The VSD shall have low frequency/low voltage start with linear adjustable ramp-up.

The VSD shall be mounted in a NEMA rated enclosure, suitable for the designed location. It is assumed that for each motor to be speed controlled, it will have its own independent VSD, unless otherwise approved by Seattle City Light.

4. Installation

For applications where the driven equipment was previously staged on and off in response to variations in load, the controls shall continue to use automatic on-off controls as a means of staging the equipment in response to variations in load. Thus if the VSD has reduced the speed down to its minimum setting and the load continues to drop, the controls will automatically shut off the driven equipment as the next stage of control.

For VAV systems and variable flow hydronic systems, the static pressure sensor shall be mounted in a location that will provide a stable and reliable static reading, as far away from the fan discharge as possible. The sensor location must be approved by Seattle City Light. The fan static pressure shall not be higher than the static pressure prior to the VSD installation.

The owner must inform Seattle City Light of any existing duct or building pressurization problems on the premises or any other existing facility problem that may affect the proper operation of the VSD and the long-term energy savings calculated in the Seattle City Light contract.

Existing fan outlet dampers or inlet vanes shall be fixed in the open position or completely removed. Duct over-pressurization protection should be installed in case of VSD or sensor failure.

Wire length between the VSD and motor shall be less than 60 feet and the wire length between VSD and filtering devices shall be less than 2 feet.

5. Inspection

For VSD installations that exceed a total of 50 Hp, the VSD manufacturer shall provide start-up commissioning of the VSD and its optional circuits by a factory certified service technician who is experienced in start-up and repair services. The commissioning agent shall be the same personnel that will provide the factory service and warranty repairs at the customer's site. Sales personnel shall not be acceptable as commissioning agents.

The owner will demonstrate to Seattle City Light that the drive is fully operational and that it accelerates/decelerates smoothly for the full range expected in response to the drive input signal. Acceleration/deceleration rates shall be documented in writing.

For VAV installations, the owner will demonstrate that the VAV boxes are in proper working order and will repair any deficiencies, if found.

6. Submittals

The owner will provide installation submittals that include: a detailed written sequence of operation; control schematics; FLA rating; quantity and Hp rating of the VSD; description of the proposed drive speed input signal; and a written description of any output signals to the energy management control system (EMCS). VSD specifications must be submitted and approved by Seattle City Light.

As-built documents will be verified as being received by the owner and checked for accuracy. At a minimum, these documents will include (1) operation and maintenance manuals, (2) warranty description, (3) written controls sequence with schematics, and (4) a copy of the signed-off final building permit. All documentation will be reviewed and approved by Seattle City Light before the inspection is considered complete.

The drive manufacturer and controls contractor will provide at least one hour of customer operator training on operation and service diagnostics to the owner at the time of the equipment commissioning.

The owner shall show proof that the VSD's and associated equipment are warranted from the seller for a period of at least one year from the time of beneficial use. The warranty will include all labor and materials necessary to repair or replace defective equipment.

7. Equipment Recommendations (items recommended but not required by City Light)

The VSD should provide protection against the following:

- Normal transients, surges and spikes of 2.3 times the peak line voltage for 1.3 milliseconds.

- Phase-to-phase or phase-to-ground faults. The output should disconnect without blowing a fuse. The system should not rely upon an isolation transformer.
- Excessively high or low DC bus voltage or incoming voltage.
- Excessive or absent speed control signal.
- Excessively high peak current. Instantaneous over-current trip circuits shall continuously monitor peak currents and shall provide protection when a high limit setting is surpassed.
- Individual motor overload.
- Over-temperature within the VSD enclosure.
- The VSD shall have a limited number of automatic restarts per a specific time period, as determined by the operator.
- The VSD shall have torque limit override and regeneration protection during speed modulation.
- No conductors shall carry power to the enclosure door in excess of 3 amps, 130 VAC and 50 VDC. In general, the high power section shall be mounted behind the control and processing circuits. Heat sinks shall be back-mounted.
- The VSD shall have a door-mounted Hand/Off/Auto switch and manual speed control. In Hand, the VSD output frequency is adjusted by the manual speed control. In Auto, the VSD shall be started and stopped via a remote dry contact (switched port shall not exceed 24 volts at 1 amp) and the speed shall be in proportion to a 0 to 10 VDC or 4 to 20 ma control signal.
- The VSD shall have a display panel and keyboard for setup, display of existing conditions (output frequency, voltage, amperage and runtime) and self-contained diagnostics. These diagnostics shall include power ON indication, bus charge indication and specific cause of fault indication. All setup programming shall be maintained in non-volatile storage so that no reprogramming will be necessary upon start up following a complete 90-day power loss.
- The VSD shall have a summary alarm dry contact indicating any protective circuit shutdown or failure.
- Provide an across-the-line starter that bypasses the VSD. Provide a “Drive/Off/Line/Test” switch on the VSD or bypass panel door. In “Drive”, the motor will be powered by the VSD. In “Off”, the motor shall not run. In “Line”, the motor shall be powered across the line and the VSD shall be disconnected from both the motor and line power. In “Test”, the motor shall be powered across the line and the drive shall be attached to line power but not to the motor.
- The VSD will have manual speed control capability.

- Each piece of equipment and the motor shall be separately grounded. Each ground lead shall be braided, kept to a minimum length and bonded to a common earth ground.
- The VSD shall automatically reset due to under-voltage, over-voltage, phase loss, or over-temperature faults.
- Motor noise, as a result of the VSD, shall be limited to three dB over across-the-line operation, measured three feet from the motor's centerline.



Energy Smart Services

solutions &
incentives for
business

SECTION 2D

CUSTOM INCENTIVES



- Sometimes technologies just don't lend themselves to standardization. At other times the technologies are straightforward, but they need to interact in complex or site-specific ways. For situations like these, Energy Smart Services offers **Custom Incentives**. Custom Incentives provide the flexibility to respond to specific operating conditions and design challenges. City Light staff will work with design teams to identify innovative ways to achieve efficiency goals tailored to the customer's specific needs.
- Energy Smart Services funds the implementation of emerging new technologies, as well as upgrades to equipment unique to specific industrial and commercial settings. Projects lending themselves to this kind of treatment include compressed air systems, HVAC controls, daylighting, large new construction projects, high efficiency transformers, elevators, and industrial controls and process equipment.
- Through Custom Incentives, Energy Smart Services gains the flexibility to offer funding for any Energy Conservation Measure that saves on-site electricity without fuel switching. Thorough initial project development by the design team can maximize energy savings, and can yield very attractive payback periods. Since the project goes beyond standard design, documentation is required to prove energy savings, including performance data on existing equipment and rigorous analysis of expected energy savings. The reward is a project tailored to the individual customer's needs that provides excellent efficiency, system operation improvements, and very large energy savings.

from  Seattle City Light

Section 2D. Custom Incentives

- Purpose and Scope
- Application and Process
- Selecting Energy Conservation Measures for Analysis
- Identifying the Baseline
- Overview of Funding Formulas
- Calculating the Value of Savings to Seattle City Light
- Calculating the Cost Cap
- Writing a Custom Incentive Report

Custom Incentives

PURPOSE AND SCOPE

The purpose of Custom Incentives is to offer the customer full flexibility in the range of projects eligible for Energy Smart Services funding. Any Energy Conservation Measure that reduces kWh without fuel switching may be considered for funding using a customized funding calculation if the measure isn't already covered by a Simple Rebate or Standard Incentive. Technologies covered by Custom Incentives include but are not limited to:

- The latest high efficiency industrial process equipment
- Controls for HVAC and industrial processes
- Daylighting
- Elevators
- Motors (see note below)

Most, but not all, motors are handled as Standard Incentives. See the *Instructions for Filling out the Funding Calculation Worksheets for HVAC and Motors* in Section 2C for an explanation of which motors may be handled as Custom Incentives and which are covered as a Standard Incentive.

APPLICATION AND PROCESS

In order to receive technical assistance for developing a Custom Incentive proposal, the customer fills out an Energy Smart Services *Application for Service* and sends it to Seattle City Light.

The customized energy savings calculation that becomes the basis for Energy Smart Services Custom Incentives may be performed by a consultant, contractor, or City Light Energy Management Analyst. For more information about these options, read about Facility Assessments and Energy Analysis Assistance in Section 3 of this manual.

If an Energy Conservation Measure is to be funded through a Custom Incentive, three types of information are required to determine the level of funding available: what the Energy Conservation Measure consists of (a design or proposal), how much energy it is likely to save, and how much it will cost. This information is formalized in a Custom Incentive Report, a Facility Assessment Report, or an Energy Analysis Report, each of which provides the estimated energy savings, a technical description of the Energy Conservation Measure (specifications that become part of the contract), and the estimated funding amount.

The rest of this section explains how a Custom Incentive measure is documented for funding.

SELECTING ENERGY CONSERVATION MEASURES FOR ANALYSIS

Recommendations and analysis are broken down into specific Energy Conservation Measures to allow the customer to select a scope compatible with available budgets and company goals. Each measure should include only one technology type so that the savings, cost, and funding

information generated for each can be compared usefully to other similar projects. For example, multiple cooling tower fans, and their respective controls, might be included in a single Energy Conservation Measure, but a solar window film wouldn't be included in that same measure, even though the solar film might affect the savings calculation for the cooling tower fans.

Energy analysis is only part of the work required to develop a successful Energy Conservation Measure. Equally important is a clear description of what is being proposed, and careful consideration of whether the proposed measure would satisfy the full range of the customer's needs for comfort, safety, productivity, equipment operability and maintainability. The faster the description of an Energy Conservation Measure can be pinned down, the more rapidly the energy conservation analysis will proceed.

In developing a full description or design of the measure, the customer may receive input from contractors, manufacturer's representatives and/or design consultants. Design consultants hired to produce Energy Conservation Measure designs are typically electrical or mechanical engineers licensed in the state of Washington who have experience with the types of measures under consideration.

The Energy Management Analyst will also offer to help the customer develop a list of Energy Conservation Measures (see the *Facility Assessment* and *Energy Analysis Assistance* parts of Section 3 of this manual). For projects that change ventilation levels, the Energy Smart Services program requires that the installation meet ASHRAE ventilation standard 62-89 or another applicable code or standard. Normally, the specification of ventilation rates and assurance that they comply with a given standard would be performed by a design consultant.

The development of a project description or design should be well coordinated with the Custom Incentive analysis so that the analysis and the description of the project ultimately cover the same ground.

IDENTIFYING THE BASELINE

1. Background and Definitions

The purpose of Energy Smart Services is to offer the customer financial incentives to purchase equipment that is more efficient than what he or she would have purchased in the absence of funding. In short, it is the goal of the program to influence design and equipment selection to save electricity. The starting point for any calculation of energy savings or cost is therefore the identification of "what the customer would have done" in the absence of Energy Smart Services funding.

"What the customer would have done" is referred to as the "baseline". Energy savings are therefore defined as the difference in energy consumption between the baseline and the "proposed" Energy Conservation Measure. The cost, likewise, is calculated as the difference in cost between the baseline and the proposed Energy Conservation Measure, and is referred to as the "incremental cost." If, for example, a customer were considering high efficiency lighting for a new building, the incremental cost of the higher efficiency lighting would be the difference in cost between two lighting systems, not the total cost of the higher efficiency lighting system.

2. What Would the Customer Have Done Without Funding?

Determination of the baseline is the first step in calculations of energy savings because the selection of the baseline has a strong influence on the amount of funding available.

Often it is not possible to know what the customer would have done in the absence of Seattle City Light funding, so the program has requirements concerning baseline selection. These requirements are intended to prevent financial incentives from going toward levels of efficiency that are no different than what the customer would have purchased without funding.

The efficiency of the existing equipment is often considered the baseline. For example, if the equipment appears to be in good working condition, it is often determined that the owner would not upgrade his equipment in the absence of Energy Smart Services funding. Therefore the funding calculations are based on the total cost of the installation. However, if any of the following conditions apply, the baseline becomes either the Energy Code, or (for equipment not covered by the Energy Code) standard practice:

- The project is new construction
- The project is a major remodel
- Equipment is being up-sized
- Equipment installed is not replacing other equipment
- Broken equipment is being replaced that must be replaced soon anyway in order to maintain a safe, comfortable, fully functional facility
- Old equipment being replaced that has become too expensive or difficult to maintain

The *Resource Directory* at the end of this manual explains where to find copies of the current Energy Codes. Inside the City of Seattle, the Seattle Energy Code applies; outside the City of Seattle, the Washington State Energy Code applies.

For replacement of broken Energy Smart Services-funded equipment before the expiration of its assumed service life, the baseline is the existing equipment as though it were functioning properly.

The same baseline should be used to calculate the energy savings as is used to calculate the incremental cost of a measure.

3. Adjusting the Baseline to Reflect Recommended O&Ms

If the baseline is the existing equipment (not Energy Code or standard practice), an adjusted baseline must be created that reflects completion of any O&Ms that will be required as part of the Energy Smart Services Financial Incentives for ECM Installation contract. The Custom Incentive Report will specify the Operations and Maintenance Measures needed to put the systems affected by Energy Conservation Measures into proper operation.

4. Adjusting the Baseline to Reflect Other Measures

If there are interactions between the savings of multiple Energy Conservation Measures, the energy savings calculations should be calculated using a rolling baseline, specifying the sequence in which the measures are analyzed, and ensuring that the baseline for each measure reflects the installation of measures earlier in the sequence.

OVERVIEW OF FUNDING FORMULAS

The Seattle City Light funding for a Custom Incentive is equal to the lesser of the following two amounts:

The Value of Savings to SCL = estimated annual kWh savings x the funding factor

The Cost Cap = incremental cost up to 70% of the total cost

CALCULATING THE VALUE OF SAVINGS TO SCL

The Value of Savings to SCL approximates the value of the expected energy savings of the measure over its service life. It equals the estimated annual energy savings (kWh) times a funding factor that is based on the expected measure life and the assumed value of energy.

1. The Funding Factor

To find the funding factor for a given measure, first look up the expected service life in Table 2D-1, then look up the funding factor given for that service life in Table 2D-2.

2. Annual Energy Savings

In order to assure a reasonable level of accuracy, the following requirements identify the minimum level of complexity for annual energy savings calculations used as the basis for a Custom Incentive.

If the equipment being proposed will experience a variable load, the customized energy savings calculation must involve at least the complexity of a bin calculation. The variables affecting the load and/or equipment efficiency are identified, and the hours of operation per year are broken down into bins of operation representing various load levels. The number of hours of operation per year is identified for each bin, and the baseline and proposed efficiencies at each bin level are introduced, with the savings per bin equal to the (hours per year in that bin) x (kW baseline - kW proposed). Unless the measure under analysis is a control that varies hours of operation, the hours per year in each bin are not to vary between the baseline and the proposed, nor are they to be adjusted after the project goes to contract.

Any on-site measurements used to calibrate the energy savings calculation must include a record of the operating conditions at which the measurements were made so that if baseline and post-installation kW readings are compared, they are compared for specific bin conditions.

Table 2D-1: Service Lives (in Years)

<i>yrs</i>	<i>Equipment Description</i>	<i>yrs</i>	<i>Equipment Description</i>
BUILDING ENVELOPE		HVAC	
20	Double Glazing	12	Air Conditioners*
18	Heat Mirror	15	Air Terminals
14	Low Emmissivity Coating	20	Boilers
7	Solar Shade Film	20	Chillers, water cooled not exposed*
10	Tinted Or Reflective Coating	15	Chiller, air cooled or exposed on roof*
20	Insulation	20	Cooling Towers
10	Air Curtain		Controls: see Miscellaneous
		15	Coils
DOMESTIC WATER HEATERS		15	Compressors
10	Heat Pump	15	Economizers
12	Point-Of-Use	10	Low leakage dampers
15	Solar	20	Fans
		18	Furnaces
LIGHTING		15	Heat Exchangers
	Fixtures fixtures, lamps, ballasts*		Heat recovery: See Misc.
		12	Heat pumps, air to air*
MISCELLANEOUS		15	Heat pumps, hydronic*
12	Controls	15	Pumps, Base Mounted
15	Heat Recovery	10	Pumps, Pipe or wall Mounted
15	Motors And Drives*	10	Make-Up Air For Exhaust Hoods
20	Reciprocating Engines	15	Radiant heaters
15	Thermal Energy Storage	15	VAV air distribution systems
15	Transformer	10	Unit heaters, electric
30	Steam Turbines	20	Unit heaters, hot water or steam
REFRIGERATION			
14	Unequal Parallel Refrigeration		
11	Refrigeration Case Cover		
3	Strip Curtain		

* = Equipment funded through Standard Incentives, not Custom Incentives. See explanation and Energy Smart Services *Funding Calculation Worksheets* in Section 2.

Table 2D–2: Energy Smart Services Funding Factors

<i>Measure Life</i>	<i>Industrial Process Loads</i>	<i>Non-Process Loads</i>	<i>Measure Life</i>	<i>Industrial Process Loads</i>	<i>Non-Process Loads</i>
years	\$/kWh	\$/kWh	years	\$/kWh	\$/kWh
1	.01	0.02	16	0.15	0.24
2	.02	0.04	17	0.15	0.26
3	.03	0.06	18	0.15	0.27
4	.04	0.08	19	0.15	0.28
5	.05	0.10	20	0.15	0.29
6	.06	0.11	21	0.15	0.30
7	.07	0.13	22	0.15	0.30
8	.08	0.14	23	0.15	0.31
9	.09	0.15	24	0.15	0.32
10	.10	0.17	25	0.15	0.33
11	.11	0.18	26	0.15	0.34
12	.12	0.20	27	0.15	0.35
13	.13	0.21	28	0.15	0.35
14	.14	0.22	29	0.15	0.36
15	.15	0.23	30	0.15	0.37

* “Non-process Loads” include lighting, HVAC, and refrigeration in both commercial and industrial facilities. “Industrial Process Loads” involve equipment directly related to manufacturing, such as steel furnaces.

The most commonly used variable to identify bins for energy savings calculations is outdoor air temperature. The loading on heating and cooling equipment varies with weather and outside air temperature and affects the efficiency of several kinds of equipment found in commercial and industrial facilities.

If energy savings for variable-load equipment are calculated using a computer simulation, the assumptions and inputs to the simulation must be made available for review by Seattle City Light, and the nature of the analysis made by the simulation must be explained in the Custom Incentive Report.

CALCULATING THE COST CAP

The Cost Cap = the incremental cost up to 70% of the total cost.

The purpose of Energy Smart Services funding is to help the customer pay the additional cost of buying equipment that is more efficient than he or she would have purchased in the absence of funding. The calculation of the “incremental cost” is intended to approximate that additional cost of going to a higher efficiency. Stated more formally, the incremental cost is the cost of going from the baseline to the proposed condition.

1. Calculating the Incremental Cost

If the baseline is the existing equipment, the incremental cost is equal to the total cost of the measure (labor, materials, WSST, and design). This generally comes into play when the customer is not already required to replace the equipment, (e.g. replacing fully functional lighting). If the baseline is the Energy Code or standard practice, the customer must spend some amount of money regardless of City Light incentives (e.g. code is already mandating certain efficiency levels) and so the incremental cost is less than the total cost. Incremental cost may then be calculated by any of the following three methods:

- The difference between the bid amount for the baseline and the bid amount for the proposed (including materials, labor, WSST, and incremental design costs)
- 25% of the total measure cost (materials, labor, WSST, & incremental design costs)
- 50% of the material cost (including WSST)

The first method—obtaining two bids—is preferred, because it provides the most accurate information to the customer and the utility. The other two methods are provided as an alternative in case the amount of time required for the first method seems excessive. The Energy Management Analyst and customer may choose any of these three methods.

Design Costs. The incremental cost may include design costs for going from the baseline to the proposed if the design was performed and stamped by a Professional Engineer (P.E.) and the design includes a reasonably complete set of design documents (specifications, and, where useful, scaled drawings). The design costs included in the total cost are not to exceed 10% of the total measure cost.

A project may include many components which are beneficial to the customer but don't contribute to energy efficiency. In calculating the energy conservation measure cost, leave out any components that are in both the baseline and the proposed, and include only components that are either directly responsible for the estimated energy savings, or essential to proper operation of the equipment needed to achieve the estimated energy savings. As stated above, design costs are limited to 10% of the total measure cost.

2. Combining Energy Conservation Measures to Reduce Effects of Cost Caps

Seattle City Light may sometimes choose to allow two Energy Conservation Measures to be combined for the calculation of an overall Cost Cap if doing so will encourage the customer to expand the scope of measures to be installed. For all cases, however, the Custom Incentive report will provide the energy savings, cost, and funding information broken down by Energy Conservation Measure. If the effect of the Cost Cap is reduced by combining Energy Conservation Measures, the funding is calculated both with and without combining, and the increase in funding is distributed between the Energy Conservation Measures in a manner proportionate to their estimated annual savings.

3. Funding from More than One Utility

Some Energy Conservation Measures reduce water or natural gas consumption as well as electricity. If the measure receives funding from multiple agencies, Seattle City Light funding will be adjusted so that the total of the grants is no more than 70% of the installed measure cost.

WRITING A CUSTOM INCENTIVE REPORT

For Custom Incentives, the savings and funding calculations are documented in a Custom Incentives Report. The report should be as concise as possible while offering the following sections and contents:

Summary. A summary of the recommended Energy Conservation Measures, including a brief description, the annual energy savings, cost, incremental cost, funding, and simple customer payback for each measure. Each Energy Conservation Measure shall be assigned a number ("ECM _") that will be used consistently through the report.

Facility Information. A short description of the facility, including a description of the use and occupancy patterns, the lighting and HVAC systems, heating fuel source, and any other major electrical loads. For existing facilities, refer briefly to any previous Energy Smart Services projects and any major renovation plans. Indicate the total kWh and cost of electricity for a clearly defined 12-month period.

Energy Conservation Measure Information (for each ECM). For existing buildings, describe the existing conditions relevant to the proposed Energy Conservation Measure. For new construction, describe the Energy Code baseline. For all projects, describe the proposed measure. Include in both the proposed measure and existing condition descriptions information about the controls, both manual and automatic, and the setpoints. Explain what variables influence the energy consumption of the equipment, and how the savings are calculated. List any O&Ms that should be performed on the system affected by the Energy Conservation Measure. Assign each O&M an ID number ("O&M _"). Explain the baseline selection, and the adjusted baselines (for O&Ms, and any rolling baseline for inclusion of other Energy Conservation Measures). The calculations themselves are to be included in the appendices.

Appendix 1—Specifications, for each Energy Conservation Measure and O&M.

Specifications clearly outlining any characteristics critical to achieving the estimated savings, submittal requirements, and inspection procedures. The specifications shall include for each measure at least the control sequence of operations, with setpoints, and the rated capacities and efficiencies.

Appendix 2—Energy Savings and Funding Calculations. Include all assumptions and equations used, and explain where all data came from. If results are presented in a table, for each column either indicate either where the data came from or provide the equation that links it to other columns. Cite sources.

Appendix 3—Bids. Include contractor's bid(s) to install or implement each of the Energy Conservation Measures. The bid(s) should show material, labor, and Washington State sales tax broken out for each of the proposed measures. The bids should also separate out expenses not

directly related to the measures themselves. Bids must be itemized with quantity, manufacturer and model number. If the incremental cost is to be evaluated as the difference between bids for the baseline and the proposed, include both bids for that measure, and identify which is the baseline and which is the proposed. If incremental cost is calculated as 50% of material costs, the bids must clearly identify material costs.

Appendix 4—For each Energy Conservation Measure, Catalog Cut Sheets. These are copies of manufacturer’s literature describing any new equipment to be installed at the facility. Performance characteristics (capacity, efficiency, durability, etc.) and safety certification by an approved testing laboratory (UL, ETL, etc.) should be clearly stated on the catalog cut sheets. Cut sheets must demonstrate compliance with the specifications.

Appendix 5. Floor Plans. Facility floor plans or schematic layout, and a sketch of each Energy Conservation Measure showing basic configuration of components.

Appendix 6. Consumption History. Monthly electric consumption for one year, a copy of the current Seattle City Light rate schedule, and a list of the building’s electric meters and general description of what each serves (if there is more than one and the information can be readily obtained).

OBTAINING CITY LIGHT FINANCIAL INCENTIVES CONTRACT

See the *Financial Incentives for ECM Installation—Steps to Participate* in Section 2 of this manual for information about Energy Smart Services contracts, inspections, and payment.



Energy Smart Services

solutions &
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SECTION 3

TECHNICAL ASSISTANCE SERVICES



- Today's buildings have increasingly complex technological needs. Not paying attention to energy performance can be a costly mistake. Further, new technologies offer efficiency and control opportunities difficult for busy facilities staff to track. That's where **Technical Assistance** comes in.
- Developers building new commercial spaces, or planning major renovations, will want to take advantage of our Building Commissioning Services, Energy Analysis Assistance, and Assistance With LEED™ Sustainability Certification, all of which work to maximize energy and environmental performance.
- Customers with existing buildings can have a City Light Energy Management Analyst perform a free Facility Assessment, providing an analysis and written report on existing conditions, as well as a summary of proposed improvements. Companies looking for ways to reduce greenhouse gas emissions can get help and support through the Climate Wise Program.
- Industrial plant managers recognize that identifying new efficiency technology for their specific process calls for specialized expertise. City Light can assist with the exploration of plant changes that can save energy while yielding production benefits.
- Let Seattle City Light work with you to effectively manage your facility's energy consumption. Technical Assistance from Energy Smart Services can help new buildings start off on the right path, and help existing buildings operate at peak efficiency.

from  Seattle City Light

Section 3. Technical Assistance Services

- Facility Assessment
- Energy Analysis Assistance
- Building Commissioning Assistance
- The Lighting Design Lab
- Assistance with LEED Certification for Sustainable New Buildings
- Climate Wise Greenhouse Gas Reduction Assistance

Facility Assessment

Commercial and industrial customers interested in making their facilities more energy efficient may receive a free Facility Assessment conducted by an Energy Management Analyst or a consultant hired by Seattle City Light.

During a Facility Assessment, the customer provides expertise about their business and their facility, and the Energy Management Analyst provides knowledge about energy efficient equipment, the Energy Smart Services program, and energy savings calculations. The result is a practical plan of action for how funding can be used to benefit both the utility and the customer by increasing the effectiveness of the electricity consumed.

GETTING STARTED

To get started, the customer sends Seattle City Light an Energy Smart Services *Application for Service*, and requests a Facility Assessment.

GATHERING INFORMATION

Once an Energy Management Analyst has been assigned to a project, he or she schedules a visit to the site. On site, the Energy Management Analyst performs the following activities:

- Meets with the customer's administrator to discuss the company's plans and goals so that the recommended conservation measures are consistent with the customer's business plan.
- Meets with operations staff to walk through the building and discuss operations patterns, equipment performance, and operations goals.
- Reviews mechanical drawings and operations manuals if they are available.
- Makes on-site measurements as appropriate and reviews any relevant trend logs from the building's control systems.
- On industrial sites, learns about the manufacturing process production patterns.
- Explains Energy Smart Services funding options and requirements and goes over the customer's electrical billing history with the customer.

THE FACILITY ASSESSMENT REPORT

The Energy Management Analyst next writes a Facility Assessment Report and provides a copy to the customer.

The report includes the following information:

- A description of the facility (square footage, year of construction, types of lighting, HVAC, and other loads.)

- A brief description of any previous Energy Smart Services projects at the facility and the time frame of any upcoming construction projects or changes in occupancy patterns
- A discussion of the electricity billing history and consumption patterns (daily, weekly, and seasonal, changes over the years, etc), and a copy of the customer's current Seattle City Light electric rate
- A list of Energy Conservation Measures, with estimated annual kWh savings and Seattle City Light funding for each
- A list of Operations and Maintenance Measures (O&Ms) that would offer the customer a rapid payback due to high energy savings and low cost
- Optional: For each of the recommended Energy Conservation Measures, a set of specifications covering the critical energy savings elements of the proposed measure. (Specifications address critical efficiency ratings and controls sequences assumed in the calculations. They also include any significant capacity ratings, and specification of any parameters the Energy Management Analyst considers critical to achieving the calculated savings. Includes a schematic sketch of the system layout.)
- If specifications aren't provided: A clear description of the proposed Energy Conservation Measures

The methods used to estimate energy savings for the recommended Energy Conservation Measures conform to the methods outlined for Simple Rebates, Standard Incentives and Custom Incentives in this Program Manual.

The scope of the Facility Assessment is adjusted to the complexity of the facility and the recommended measures. A preliminary set of rough calculations may be used to help the customer identify a scope of measures to be presented in the Facility Assessment if the customer wants to focus only on those measures that can be quickly implemented.

THE ACTION PLAN

From City Light's perspective, the goal of a Facility Assessment is to help the customer take action(s) yielding energy savings. To that end, the Energy Management Analyst works with the customer to develop a Facility Assessment Action Plan that builds on the recommendations in the Facility Assessment Report. The overall strategy taken in most Action Plans is the following:

- Immediate implementation of recommended Operations and Maintenance Measures (O&Ms)
- Immediate transition to project development for one or more capital Energy Conservation Measures
- Further investigation of one or more possible Energy Conservation Measures, potentially with additional technical assistance and support from Seattle City Light

MOVING FROM RECOMMENDATION TO INSTALLATION

The Facility Assessment Report and Action Plan become the springboard from which the customer may apply for Seattle City Light funding to install recommended Energy Conservation Measures. Once the Report and Plan have been completed, the following steps are taken to realize the potential energy savings that have been identified.

1. Review of Report Findings

The Energy Management Analyst provides a copy of the Facility Assessment Report and Action Plan to the customer and meets with the customer to identify a scope of work for a Financial Incentive for ECM Installation contract

2. Design

Once the customer has decided which measures to pursue, he may choose to hire a design consultant to complete a full design of some of the recommended Energy Conservation Measures. A full design typically includes a set of scaled drawings, equipment schedules (giving equipment performance at specific design conditions), and extensive specifications for the full range of the customer's design criteria (e.g. safety, comfort, worker or manufacturing equipment performance). A full design is most desirable if (1) the project is new construction, (2) a funded Energy Conservation Measure affects facility operation or safety, or (3) the project is going out for a competitive bid. For projects that change ventilation levels, the Energy Smart Services program requires that the installation meet ASHRAE ventilation standard 62-89 or other applicable code or standard. The customer should include compliance with this program requirement as part of the scope of work for the designer. Seattle City Light does not select design consultants or review design documents. When hiring a design consultant, the customer should make sure the design documents are consistent with Seattle City Light contract requirements.

3. Bids

The customer obtains bids for the Energy Conservation Measures he is interested in.

4. Seattle City Light Contract

The Energy Management Analyst finalizes the calculations of energy savings and City Light funding levels, and then a contract is signed between the customer and Seattle City Light. See the Program Manual Section 2—*Financial Incentives for ECM Installations*.

CONSERVING WATER AND NATURAL GAS

Seattle City Light encourages the customer to benefit from all available conservation programs. While performing a Facility Assessment, the Energy Management Analyst helps the customer take advantage of the technical assistance and grants that may be available from Seattle Public Utilities (SPU) for water conservation and Puget Sound Energy (PSE) for natural gas conservation.

Energy Analysis Assistance

PURPOSE

The purpose of Energy Analysis Assistance (formerly Design Assistance) is to provide the customers with in-depth analyses of proposed electrical Energy Conservation Measures not covered by Standard Incentives. Through Energy Analysis Assistance, engineering expertise is applied to a full range of commercial and industrial energy conservation strategies to produce cost and savings information and to assess the eligibility for Seattle City Light Custom Incentive funding.

SCOPE

Energy Analysis Assistance funding is offered for measures that show potential for considerable electrical energy savings and require detailed engineering analysis in order to realize the savings. This service is particularly useful for new construction projects. Through Energy Analysis Assistance, designers and customers are able to consider annual electric savings and Seattle City Light funding for alternative design options. In the case of existing facilities, Energy Analysis Assistance is applied to unusual applications and complex measures, particularly those that involve state of the art industrial process equipment.

The list of measures to be covered by an Energy Analysis Assistance contract is agreed upon in advance by the customer, the consultant, and the Energy Management Analyst. If there is a Standard Incentive that can be applied to a proposed Energy Conservation Measure, the measure will not be covered under an Energy Analysis Assistance contract.

OVERVIEW OF THE ENERGY ANALYSIS PROCESS

The Energy Analysis Assistance contract is based on a proposal by a consultant to analyze a specific list of measures using methods explained in the proposal. The customer selects and hires the consultant.

New Construction. In new construction and major retrofit projects, Seattle City Light offers a contract for 100% of the analysis cost agreed upon by Seattle City Light. Payment is made upon Seattle City Light approval of the Energy Analysis Report.

Existing Facilities. Seattle City Light offers the customer a contract for half the approved amount. Payment is made upon review and approval of the Energy Analysis Report by Seattle City Light. Reimbursement for the second half of the Energy Analysis is provided if the customer installs all measures with a payback of less than 2.5 years within 18 months of the payment for the first half of the Energy Analysis Assistance.

The rest of this section covers the following topics in more detail:

- Steps to Participate
- The Proposal
- The Energy Analysis Report
- Installation

STEPS TO PARTICIPATE

- 1) **Application.** The customer contacts Seattle City Light or sends in an *Application for Service* to begin discussions about the project.
- 2) **Scoping.** The Energy Analysis consultant, City Light Energy Management Analyst and customer work closely to specify the scope of the Energy Conservation Measures to be analyzed, analysis methodology, contents of the final report, and the budget and timeline for the analysis work. For new construction projects, these discussions will include the architect, and/or the mechanical and electrical design consultant(s). (Unless indicated otherwise, “consultant” is used here to mean the consultant who writes the Energy Analysis Report, not the design consultants, unless they are the same.) The customer’s willingness and ability to implement the measures once the analysis is complete are also assessed at this time. For existing facilities, the scoping process often involves a visit to the project site and an inventory of existing conditions.
- 3) **Proposal.** The consultant prepares a proposal and sends it to the customer. The proposal describes the scope of the analysis, budget, and timeline as agreed upon by the project team. See “The Proposal” section, below.
- 4) **Proposal Review by Customer.** The customer reviews the proposal and submits it to Seattle City Light.
- 5) **Proposal Review by Seattle City Light.** Seattle City Light reviews the proposal for accuracy, completeness, and reasonableness of cost.
- 6) **Contract for Energy Analysis.** Once the proposal has been approved, Seattle City Light prepares a contract stating the funding level available for the analysis work and the terms of the agreement. The contract is mailed to the owner.
- 7) **Customer Signature.** The customer signs two copies of the contract and returns them to Seattle City Light.
- 8) The customer signs a separate agreement with the consultant that clearly describes the scope and cost of the work.

- 9) **Analysis.** The consultant proceeds with the analysis of energy savings and Seattle City Light funding, following the requirements for Custom Incentives. The Energy Management Analyst provides guidance on analysis methodology and presentation of results. Intermediate checkpoints such as approval of the baseline may be required during the analysis.
- 10) **Measure Selection.** The cost-effectiveness of Energy Conservation Measures is often not known with enough accuracy to identify impractical options prior to the analysis. Therefore, once an initial analysis of the individual measure has been completed, the customer should decide (with assistance from the other members of the project team) which measures are practical to implement. If necessary, this recommended package of measures is then re-analyzed as a whole to account for interactions between the various measures.
- 11) **Energy Analysis Report.** The consultant submits a preliminary draft of the Energy Analysis Report to the customer and the customer forwards a copy to Seattle City Light for review.
- 12) **Review.** Seattle City Light reviews the preliminary draft for accuracy, completeness, compliance with the requirements given below under the “Energy Analysis Report” section, and consistency with the Seattle City Light contract. Seattle City Light makes a list of any changes or additions necessary for acceptance of the Energy Analysis Report.
- 13) **Modification.** The consultant submits to the customer a final draft of the Energy Analysis Report that responds to customer and Seattle City Light review comments. The customer forwards the final draft to Seattle City Light.
- 14) **Final Review.** The Energy Management Analyst reviews the final draft.
- 15) **First Payment.** After approval of the completed report, Seattle City Light mails a check to the customer for the contracted amount.
- 16) **Installation.** The project proceeds to a Financial Incentive contract between the customer and Seattle City Light.
- 17) **Final Payment.** The customer is reimbursed for the second half of the Energy Analysis cost when they install all recommended measures with a payback of less than 2.5 years, so long as the Energy Smart Services contract for their installation is signed within 18 months of payment for the Energy Analysis Report. Payment for the second half of Energy Analysis Assistance funding is made if and when all of the measures are installed and approved for payment.

THE PROPOSAL

In order to obtain a contract with Seattle City Light to cover the cost of the analysis, the consultant submits a proposal to the customer and to Seattle City Light. The proposal should be typed on letterhead, signed, dated, and addressed to the Energy Management Analyst. A sample proposal is provided at the Web site, www.EnergySmartServices.com. At a minimum, the proposal should include:

Description of the project.

- Customer's name
- Facility address and square footage
- Brief description of facility's HVAC and lighting systems, including heating fuel type
- Project description, square footage and total budget
- Project schedule (completion of schematic design, final design, and construction begins)

Description of Proposed Energy Conservation Measures.

Description of the Analysis Methodology. If computer modeling software will be used, include the name and version number of the software.

Other Contents of Report. Description of any other elements to be included in the final report. The project team will agree upon these other elements.

Cost Proposal Breakdown. The consultant's charges for performing the analysis should be broken down to show deliverables and the logical steps in the analysis. An example of a cost breakdown is shown in the table below. At a minimum, each line item should show billable hours, dollars/hour rate, and total dollars per line (hours * \$/hr). If elements in the scope of work are deleted after the contract is signed, the corresponding dollar amount will be deleted from the payment.

Sample Cost Breakdown for Proposal

<i>Elements</i>	<i>Hours</i>	<i>\$/Hour</i>	<i>Total</i>
1. Project management			
2. Site audit to gather data			
3. Baseline calculation (metering data, hand calculation, computer modeling)			
4. Review of baseline with Seattle City Light			
5. Adjusted baseline (unless hand calculation)			
6. Analysis of energy savings for each of the ECMs			
7. Cost Estimates of Installation or Bids			
8. Review costs and savings with customer and Seattle City Light to select modifications for final analysis.			
9. Interactive analysis (for computer modeling)			
10. Prepare performance specifications			
11. Conduct contractor/bidder site visits (optional)			
12. Review bids & make final recommendations (optional)			
13. Prepare Final Report			
14. Presentation of final report to customer			
Total			

THE ENERGY ANALYSIS REPORT

The purpose of the Energy Analysis Report is to calculate the reduction in electrical energy consumption that will result from each of the proposed Energy Conservation Measures, and to document the proposed measures in sufficient detail that the analysis can be reviewed and the project can proceed smoothly to a Custom Incentive funding contract.

The Energy Analysis Report should include the following sections:

- Title page
- Table of Contents
- Description of the project and Energy Conservation Measure recommendations
- Summary table showing energy savings, costs, and estimated Seattle City Light funding

At a minimum, the description of each Energy Conservation Measure should include:

- A generic description and explanation of how it saves energy
- Manufacturer name, model, quantity, etc. of any new equipment or hardware
- Sequence of operations for any new electrical equipment, and a description of the controls to be used
- Estimated costs

- Specifications, and, where appropriate, clarifying sketches or floor plans for the proposed Energy Conservation Measures. Specifications should address critical efficiency ratings and controls sequences assumed in the calculations. They should also show any significant capacity ratings and specification of any parameters the Energy Management Analyst considers critical to achieving the calculated savings
- Analysis methodology and calculations

Other elements such as contractor's bids or copies of manufacturers' literature may be required for some projects.

The introduction to the Energy Analysis Report must include the following statement: "Estimates of Seattle City Light funding presented in this study do not guarantee funding. The funding available will be finalized by Seattle City Light in a contract with the customer, and the amount offered may differ from the amount stated here."

See the Section 2D—*Custom Incentives*, for the minimum level of documentation required for energy savings calculations.

INSTALLATION

Once the Energy Analysis Report has been approved, the selected measures are incorporated into the final design documents and a Seattle City Light Financial Incentives for ECM Installation contract is offered to the customer.

1. For New Construction Projects

The customer confirms that the design consultants have incorporated all of the selected Energy Conservation Measures into the final design documents and checks that the design documents are consistent with Seattle City Light installation contract specifications.

2. For Retrofit of Existing Facility Projects

The owner may choose to hire a design consultant to produce a full set of scaled drawings and a complete set of specifications if it is necessary to define the project scope for competitive bids, or if the selected Energy Conservation Measures affect critical systems.

Design costs (up to 10% of the total measure cost) associated directly with an Energy Conservation Measure may be added to the material and labor costs in calculating the Cost Cap for Financial Incentives.

See Section 2 of this Program Manual for information about how to obtain funding for the measures covered by an Energy Analysis Report. A contract for Financial Incentives must be executed before equipment is ordered.

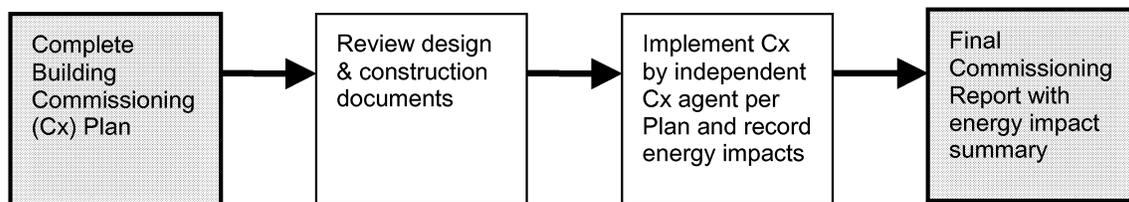
Building Commissioning Assistance

BUILDING COMMISSIONING ASSISTANCE OVERVIEW

Building commissioning is a systematic process for ensuring that the energy systems within a facility perform in accordance with the facility’s design intent, equipment requirements, and the owner’s operational needs. Seattle City Light provides financial and technical support for the building commissioning process in new construction and major remodel projects with construction budgets over \$5 million. Consideration may also be given to campuses or other multiple building facilities that meet the construction cost threshold if considered collectively. There are currently no retro-commissioning or re-commissioning services for existing facilities available.

City Light funds support: (1) development of a commissioning plan early in the building development process and (2) assessment of energy impacts from commissioning activities. City Light does **not** pay the cost of actually performing commissioning work such as the functional performance testing that would otherwise be part of start-up procedures.

In the diagram below, steps in the commissioning process supported by City Light are shaded.



While the Seattle Energy Code requires some commissioning, Seattle City Light’s Building Commissioning Assistance goes beyond Energy Code requirements in an effort to promote greater rigor and standardization in commissioning practices. For example, City Light funding requires the use of independent commissioning agents, best practice commissioning protocols, and an energy impact estimate.

Developers considering a sustainable building project following Leadership in Energy and Environmental Design (LEED™) guidelines may find Commissioning Assistance a good complement to their project. LEED™ credits for best practice commissioning may be earned by using a third party commissioning agent as specified in Seattle City Light’s Building Commissioning Assistance.

FUNDING

Projects with total construction budgets between \$5 million and \$10 million are eligible for up to \$5,000 in funding. Projects with construction budgets over \$10 million are eligible for funding up to \$10,000.

PROGRAM REQUIREMENTS

For City Light funding, commissioning activities must meet the following specific criteria:

- Owner has a separate budget for building commissioning
- Owner contracts with City Light **prior** to the start of commissioning activities
- Owner hires an independent commissioning agent who is a member of the Building Commissioning Association (see detail below)
- Commissioning activities follow established Building Commissioning Association guidelines
- Commissioning activities include functional performance testing for all HVAC systems and controls and automated lighting controls
- City Light receives a Building Commissioning Plan and a Final Commissioning Report, including an Energy Impact Summary (see below)

1. Independent Commissioning Agent

The independent commissioning agent should be employed early in the process, prior to completion of design documents. This ensures that they will become familiar with the design intent and have an opportunity to provide peer review before final design. The commissioning agent should have a direct line of communication with the building owner or owner's representative throughout the construction process and into the period of building occupancy.

2. Building Commissioning Plan

Building commissioning planning should begin early in the design stage of a project. An effective commissioning plan includes:

- Roles, responsibilities and lines of communication for all commissioning activities
- Scope of work, schedule and budget
- Review of design documents
- Commissioning requirements in specification language for incorporation into design and construction documents
- Installation checklists, functional performance test procedures and forms
- Review of training and documentation plans for building occupancy

3. Final Commissioning Report

The Final Commissioning Report includes: (1) completed functional performance test reports with deficiencies and resolutions identified and (2) an Energy Impacts Summary describing significant energy use changes based on commissioning procedures. Seattle City Light requires documentation of the energy impacts from commissioning activities because energy efficiency is the justification for offering building commissioning incentives.

Detailed engineering analysis is not necessary to calculate energy impacts; however, engineering estimates of significant energy use reductions or increases are required. Realizing that some discrepancies discovered in commissioning will result in increased energy use instead of savings, the summary should report both impacts in the final report. The summary should include: a list of equipment affected; the power requirements of the equipment; the estimated hours of operation that was saved or lost; and the calculated impact in annualized kWh. The summary should be broken into the following three categories:

- 1) Discrepancies attributed to the commissioning process that were resolved with some action taken prior to the final commissioning report
- 2) Discrepancies currently being acted on that were not resolved prior to the final commissioning report
- 3) Discrepancies that were resolved with no action currently being taken but that have an opportunity for action at some future date.

To keep this requirement manageable and cost-effective to customers, Seattle City Light strongly recommends that the commissioning agent track all discrepancies that have a significant energy impact **during actual commissioning** so they can be easily reported at the end of the commissioning process.

Free commissioning information, sample forms and procedures for HVAC and lighting controls are available from City Light's Web site: www.EnergySmartServices.com. The site also has links to the Building Commissioning Association (www.bcxa.org) and the Seattle Department of Design, Construction and Land Use (www.cityofseattle.net/dclu/energy). For additional information, contact the Energy Smart Services Program line at (206) 684-3254.

The Lighting Design Lab

The Lighting Design Lab offers training and technical support for designers of lighting systems in commercial and industrial buildings through its consultation services, lighting mock-up facilities, and classroom training opportunities. The Lighting Design Lab works to transform the Northwest lighting market by promoting quality design and energy efficient technologies.

Seattle City Light was instrumental in setting up the Lighting Design Lab, and still supports it to provide a source of reliable and unbiased information and education on the use of energy-efficient lighting practices. Based in Seattle, the Lab's services are offered across the region either for free or at a minimal cost to the user.

INFORMATION AND DISPLAYS

The Lab has a large number of interactive displays on site, allowing visitors to see first-hand the effect lighting design can have on a space. The Lab also operates a Library containing a large number of catalogs, reference materials, instructional videos, periodicals, and manufacturers' literature. The Library and most displays are available without appointment during regular business hours, 8 a.m. to 5 p.m. Monday through Friday. The Lab also offers tours of new lighting technologies and can assist the specifier in developing strategies to meet lighting code requirements. Customers should call ahead if they are interested in a tour of the Lab.

CLASSES AND WORKSHOPS

The Lab provides technical assistance, training and education to commercial customers and lighting designers seeking information on high quality, energy efficient lighting technologies. Examples of subjects offered include Daylighting, New Lighting Products, Lighting Design Considerations, Luminaires, and Controls. The Lighting Design Lab also offers training and technical assistance opportunities throughout Washington, Idaho, Oregon, Montana and British Columbia. Current class offerings, locations and fees can be viewed on the Lighting Design Lab Web site, www.lightingdesignlab.org. Customers can be added to the Lab mailing list by calling (206) 325-9711.

The Lab also hosts professional meetings where architects, lighting specifiers and designers can discuss advances in lighting equipment and electric and daylighting designs. The Lab periodically invites manufacturers and industry associations to share their organization's latest product and technical information.

CONSULTATIONS

Consultations are available for commercial, industrial and daylighting projects. Lighting Specialists will review plans and recommend efficient lighting and control strategies and products. Any interior or exterior project will be handled, and the consultation can be in person, over the phone or fax, or even by e-mail. In-person consultations are typically held at the Lighting Design Lab, but field visits may be possible with advance notice. Lighting consultations usually result in two or three energy efficient design options. A typical interior project consultation requires floor plans showing furniture placement, reflected ceiling plans, and

sections showing ceiling heights. Exterior projects should have a site plan showing building height, light fixtures (including existing street lighting) and landscaping.

The Lighting Design Lab does not specify final designs or manage projects. The Lighting Design Lab may access a national directory of lighting professionals, but does not endorse the work of any specific lighting professionals or manufacturers.

FULL SCALE DESIGN MOCK-UPS

A 1,200 square foot mock-up facility is available where life-sized models can be created to see how a proposed lighting design would look. This allows the design team to view and make necessary changes before actual construction begins. Actual light fixtures, fixture placement, ceiling height, room dimensions, surface finishes and furniture layout can all be evaluated in a mock-up. Lab staff handles all fixture installation, room construction, and painting. The client is responsible for providing fixtures, paint and any props needed for the mock-up. Simple mock-ups can be done free of charge. More complex mock-ups, and those that require extended viewing times, will incur charges.

DAYLIGHTING LAB

Customers can bring a model of a building and meet with a daylighting specialist to simulate the effects of two artificial skies, sunny and overcast. Daylight modeling on the sun simulator table and in the artificial sky room can accurately predict the daylighting effects of siting and architectural features, and predict savings from various control strategies.

FOR MORE INFORMATION

The Lighting Design Lab is in Seattle's Capitol Hill neighborhood. It is open to the public weekdays from 8:00 a.m. to 5:00 p.m. The Lab operates its own Web site offering a virtual tour of the facility, case studies, lighting design information, and other links and resources.

Address: 400 E. Pine St. Suite 100, Seattle, WA 98122

Phone: (206) 325-9711 or (800) 354-3864

Web: www.lightingdesignlab.org

Assistance with LEED™ Certification for Sustainable New Buildings

SUSTAINABLE BUILDING

Sustainable building is a holistic approach to building design and construction that helps minimize the adverse impacts the design, construction and maintenance of structures can have on people and the environment, and instead create healthful and responsible buildings. Seattle City Light values environmental stewardship and energy efficiency, and is partnering with other City departments, local businesses and institutions committed to sustainable new construction and the resulting long-term benefits to the community.

Sustainable building goes beyond energy and water conservation to include environmentally sensitive site planning, resource efficient building materials, and indoor environmental quality. Some of the key benefits are:

- Reduced electric and water utility costs
- Environmentally effective use of building materials
- Enhanced occupant health and productivity
- Economic life cycle efficiency

SUSTAINABLE BUILDING SUPPORT FROM SEATTLE CITY LIGHT

Seattle City Light encourages building owners and developers to set meaningful sustainable building goals early in building programming and design. City Light has adopted the United States Green Building Council's LEED™ (Leadership in Energy and Environmental Design) scoring system because it offers an excellent framework for designing and constructing buildings with superior environmental performance. Further, the LEED™ system provides a rating structure that allows developers and owners to “brand” and market their superior buildings.

Project teams making a commitment to LEED™ sustainable building may qualify for financial incentives from the City of Seattle through the LEED™ Incentive Program. In addition, Seattle City Light and members of the City's Green Building Team can bring significant technical resources to bear to help customers formulate their ideas and work through the LEED™ process.

The LEED™ framework has six categories offering points for higher levels of sustainable building commitment. The categories and some sample strategies are:

- **Sustainable Sites.** Urban redevelopment, alternative transportation, reduced site disturbance, storm water runoff control
- **Water Efficiency.** Landscaping, reduced water use, innovative wastewater technologies
- **Energy and Atmosphere.** Building commissioning, CFC reductions, energy efficiency, renewable energy

- **Materials and Resources.** Building reuse, construction waste management, use of recycled content materials, use of certified wood
- **Indoor Environmental Quality.** Increased ventilation effectiveness, low-emitting materials, increased daylight and views
- **Innovation Credits and Design/Build Process.** Opportunity for points for exceptional performance beyond LEED™ requirements

THE LEED™ INCENTIVE PROGRAM

The LEED™ Incentive Program is funded by Seattle City Light and Seattle Public Utilities, and provides financial assistance to building owners and developers who incorporate meaningful sustainable building ideas into their projects. Potential projects can be either new construction or a major remodel of an existing building. The minimum grant amount is \$15,000 for projects that commit to achieving a LEED™ “Certified” rating or \$20,000 for projects that commit to a LEED™ “Silver,” “Gold,” or “Platinum” rating. Incentive monies can be used for “soft” costs that contribute to a higher level of environmental performance, like professional services for energy, daylighting and life cycle analysis. The incentive is paid when a Letter of Agreement is signed, with the applicant agreeing to reimburse Seattle City Light should the project fail to meet LEED™ certification. Funding is limited. Projects selected for funding will be those that most aggressively comply with the criteria detailed in the *LEED™ Incentive Pre-Application* (attached).

As part of this program, the City will be an active observer, helping to identify those sustainable building services the City can most effectively offer to the private sector. Seattle City Light will offer technical assistance itself, and work with other organizations to provide support for the project. City Light can also help facilitate and direct activities and discussions relating to the project, such as the required Design Charettes (see below).

1. LEED™ Incentive Eligibility Criteria

LEED™ Incentives target projects with the following characteristics:

- Commercial building projects within the Seattle City Light service area. Commercial occupancies include, but are not limited to: offices, retail and service establishments, institutional buildings (libraries, schools, museums, churches, etc.), hotels, and residential buildings of four or more habitable stories
- New construction and major renovations involving complete structural upgrades and replacement of mechanical systems (not solely tenant improvements)
- Project owner or developer commitment
- Projects considering new LEED pilot programs going beyond LEED™ 2.0, such as LEED for Existing Buildings, LEED Commercial Interiors and/or LEED Core and Shell

2. LEED™ Incentive Program Requirements

- Identify all individuals who have input into or who will ultimately be affected by building design decisions: financing officials, architects, consultants (civil, landscape, mechanical/indoor environmental quality, electrical, structural and commissioning), tenants or tenant representatives, facility/property managers, and building operators. These are the “Building Design Decision Participants”
- Hold at least one Design Charette which involves all Building Design Decision Participants
- Enter into a LEED™ Incentive Program participation agreement within three months of submitting a *Pre-Application*
- Have funding or a funding commitment in place at time of signing the Assistance Participation Agreement
- Commit to achieving a minimum LEED™ “Certified” rating for the project

3. The LEED™ Incentive Program—Steps to Participate

The application process begins with the submittal of a *Pre-Application Form* (which follows). City Light’s Sustainable Building Coordinator and the City of Seattle’s Green Building Team review this form to identify potential candidates for incentive funding. If selected, City Light and Seattle Public Utilities will work with the building design team throughout the process to promote sustainable building principles and the involvement of all affected stakeholders in the process. Besides LEED™ Incentives, many projects may also be eligible for additional financial incentives from Seattle City Light’s Energy Smart Services Program and Seattle Public Utilities’ Water Smart Technology Program.

For more information, potential applicants can call the Seattle City Light Sustainable Building Coordinator at (206) 615-1094, or get information online at www.cityofseattle.net/light/consERVE/sustainability/.

LEED™ Incentive Pre-Application

(No items below are mandatory – Completeness will be used to select potential participants. Use additional sheets as necessary to describe any items.)

Project Information

Project name: _____

Project address: _____

Project is: new construction renovation/remodel combination

Building type: commercial type _____

institutional type _____

high rise residential type _____

mixed use type _____

Project Scale

Budget: _____

Square footage: _____

Height & number of stories: _____

Project Status

If new construction, has the site been purchased? yes no

If renovation/remodel, has the building been purchased yes no

What phase of programming and design is the project in:

programming pre-design schematic design design development

Are any building permits secured? yes no type _____

Is financing secured? yes no committed? yes no

Estimated start date: _____ estimated completion date: _____

Applicant

Owner/authorized agent name(s): _____

Company name: _____

Mailing address: _____

Phone: _____ FAX: _____ email: _____

Building Design Decision Participants

Firm	Primary Contact	Phone	email
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Financing:

Architect

Civil Engineer/Landscape Architect

Mechanical Engineer

Electrical Engineer

Tenant or tenant representative

Property/Facility Manager/Building Operator

Other (Green Building Consultant, Commissioning Consultant, Environmental Consultants, etc.)

Proposed Number of **Charettes** involving Building Decision Participants _____

I, _____, owner/authorized agent of the property at _____

Seattle, Washington, am applying to participate in the LEED™ INCENTIVE PROGRAM. I agree that, if my project is selected, I will execute a LEED™ INCENTIVE PROGRAM ASSISTANCE PARTICIPATION AGREEMENT with Seattle City Light within three months of the date of this Pre-Application and will abide by the City of Seattle's rules and the LEED™ INCENTIVE ASSISTANCE PARTICIPATION AGREEMENT.

Signature of Owner/Authorized Agent

Date



Seattle City Light

Seattle Public Utilities

Climate Wise Greenhouse Gas Reduction Assistance

The City of Seattle and Seattle City Light are committed to a goal of zero net greenhouse gas emissions from power resources. To help highlight and augment that goal, Climate Wise provides an opportunity for Seattle City Light's commercial, industrial and institutional customers to manage and improve their environmental performance and reduce greenhouse emissions. Participating businesses join the City of Seattle and regional leaders in developing effective strategies for responding to climate change.

Seattle City Light's Energy Management Services Division supports Climate Wise through existing energy efficiency services, specific Climate Wise tools, customer recognition, and referrals to other sources of assistance. Companies and organizations participating in the program identify and promote themselves as "Climate Wise Partners", demonstrating their leadership in environmental stewardship. Current Climate Wise Partners represent a diverse group of private companies and public institutions.

STEPS TO PARTICIPATE

To become involved, the prospective participant signs a Climate Wise Partnership Agreement, formalizing the voluntary partnership with City Light and laying out general roles and responsibilities of each party. Next, the Climate Wise Partners work together with City Light, Seattle Public Utilities, The Business and Industry Resource Venture, and other organizations to formulate a specific plan to improve performance in areas such as:

- Energy and water efficiency
- Waste reduction and recycling
- Hazardous waste management
- Transportation efficiency
- Environmental management

In order to participate, Partners agree to:

- Establish a process to identify and implement measures that meet business needs and contribute to greenhouse gas emission reductions
- Establish a strategy through a Climate Wise Action Plan describing commitments and implementation timelines
- Track, report and inform staff and the public about Climate Wise activities

TECHNICAL ASSISTANCE AND BENEFITS OFFERED

Program staff provide technical assistance in identifying strategies appropriate to the business needs of each Climate Wise Partner. They can help write the Action Plan, assist Partners in accessing local programs, and help report greenhouse emissions. Company-wide environmental initiatives are supported through local agencies with related technical expertise.

Benefits of the Climate Wise Program:

- Offers a coordinated, multi-resource management approach to improving business environmental performance
- Provides technical assistance such as greenhouse gas emissions tracking and reporting
- Results in lower utility bills through referrals to services provided by local resource efficiency programs
- Supports opportunities for public recognition and peer exchanges with other organizations and companies

For more information, visit the Climate Wise homepage at:

www.cityofseattle.net/light/consERVE/business/climatewise/ or call City Light at (206) 684-3254.

A checklist of Climate Wise energy actions and management strategies is attached.



Turning Energy
Efficiency and Environmental
Performance Into a
Corporate Asset

Action Plan “First Tier” Checklist

Boilers

- Optimize boiler size and boiler loading
- Analyze flue gas and optimize air-to-fuel ratio
- Install over-fire draft control
- Convert to atomizing burners
- Install characterizable fuel valve
- Clean boiler tube
- Establish burner maintenance schedule
- Install stack dampers
- Recover waste heat from flue gas or blowdown to pre-heat combustion air or pre-heat feedwater
- Minimize boiler blowdown with better feedwater treatment
- Automate blowdown control
- Turn off hot water circulation pump when boilers are not in use
- Fuel-switch to less carbon-intensive fuel

Steam Systems

- Implement steam trap maintenance program
- Shut off steam traps on super-heated steam lines when not in use
- Install correctly sized steam traps
- Repair steam leaks in lines, valves and reducing stations
- Improve insulation of steam lines, condensate lines, and condensate tanks
- Recover and recompress vented steam for low-pressure applications
- Flash condensate to produce lower pressure steam
- Increase condensate return to boiler
- Install de-aerator in place of condensate tank
- Replace barometric condensers with surface condensers
- Clean steam coils in process tanks
- Close off unused steam lines
- Use minimum steam operating pressure

Furnaces, Ovens, and Kilns

- Minimize warm-up time and temperature
Use optimum temperature and minimum safe ventilation
- Automate controls
- Recover waste heat for use in other applications
- Optimize combustion and heat transfer conditions
- Improve insulation, seals, and refractories
- Implement direct firing or direct electric heating in place of indirect heating

Waste Heat Recovery and Heat Containment

- Recover waste heat for use in other applications
- Clean fouled heat-exchanger surfaces (filter contaminated streams if fouling is heavy)
- Install or improve insulation of process equipment, tanks
- Isolate hot equipment from air-conditioned areas

Cogeneration and Renewables

- Install cogeneration equipment
- Generate electricity with waste heat
- Generate electricity with renewable resources (e.g., biomass, photovoltaics, wind turbines)

Process Cooling

- Use cooling tower water instead of refrigeration or chiller
- Use outside air when possible
- Reduce refrigeration system operating pressure
- Raise cooling water temperature
- Use waste heat for absorption refrigeration
- Clean condensers and coils
- Improve insulation

Compressed Air Systems

- Use cooler air for compressor intakes
- Install, upgrade or adjust compressor controls
- Right-size compressors/optimize loading
- Reduce pressure
- Eliminate compressed air use
- Repair air leaks
- Recover waste heat
- Change dryer filters
- Clean intercoolers
- Adjust operating schedules to minimize equipment idle time
- Remove or close off unused compressed air lines

Process Controls

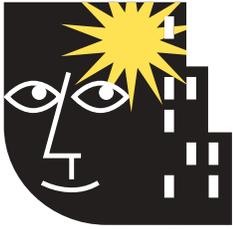
- Optimize temperature, pressure, flow, and material movement

Other Technologies

- Next generation technologies:

The Climate Wise Opportunity Assessment ‘Quick Scan’

EFFICIENCY OPPORTUNITY	IMPORTANCE FACTOR 1=Not Very 2=Somewhat 3=Very	PERFORMANCE RATING 1=High 2=Average 3=Needs Work	PRIORITY SCORE Column 1 x Column 2	ACTION ITEM? Yes, if Priority Score ≥ 4
Energy Efficiency <input type="checkbox"/> Furnaces/Boilers <input type="checkbox"/> Steam Systems <input type="checkbox"/> Process Equipment <input type="checkbox"/> Motors/Drives <input type="checkbox"/> Compressed Air Systems <input type="checkbox"/> Lighting <input type="checkbox"/> HVAC/Building Shell				
Hazardous Waste Prevention <input type="checkbox"/> Cleaning Processes <input type="checkbox"/> Operating and Production Practices <input type="checkbox"/> Inventory Control <input type="checkbox"/> Painting/Coating Operations <input type="checkbox"/> Landscaping				
Transportation Efficiency <input type="checkbox"/> Alternative Work Schedules <input type="checkbox"/> Public Transportation <input type="checkbox"/> Car Pools/Van Pools/Clean Fuel Vehicles <input type="checkbox"/> Telecommuting <input type="checkbox"/> Biking/Walking				
Water Efficiency <input type="checkbox"/> Building/Plant Maintenance <input type="checkbox"/> Sanitary Use <input type="checkbox"/> Cooling and Heating Systems <input type="checkbox"/> Process Operations <input type="checkbox"/> Landscaping				
Solid Waste Reduction (Reduce, Reuse, Recycle) <input type="checkbox"/> Production Operations <input type="checkbox"/> Packaging <input type="checkbox"/> Equipment <input type="checkbox"/> Office Paper <input type="checkbox"/> Organic Waste				
Green Product Design <input type="checkbox"/> Suppliers are environmentally sound <input type="checkbox"/> Products are designed to minimize waste and pollution <input type="checkbox"/> Products can be reused/recycled after use <input type="checkbox"/> Environmental factors are incorporated in product design				
Green Management Practices <input type="checkbox"/> Interdepartmental environmental team <input type="checkbox"/> Environmental goal setting process <input type="checkbox"/> Environmental impacts considered in investment decisions, accounting, and personnel policy <input type="checkbox"/> Adopts “best environmental practices” used in industry				



Energy Smart Services

solutions &
incentives for
business

SECTION 4

OPERATIONS & MAINTENANCE SERVICES



- Big capital improvement projects often receive priority at the expense of the ongoing maintenance of existing equipment. Stuck outside air dampers and clogged heat recovery coils are easily forgotten as more dramatic issues need attention. But deferred maintenance can have a huge effect on energy consumption, and neglected repairs can negate the effects of large capital investments in energy efficient equipment.
- Energy Smart Services encourages customers to pay careful attention to operations and maintenance in four ways:
- First, Facility Assessments identify problems in building operations, and supply specific low-cost suggestions for improvements that can be implemented quickly.
- Second, as a condition of funding an energy conservation measure, City Light may require the owner to repair, clean, or adjust broken equipment related to that measure. For example, it doesn't make sense for City Light to fund a super-efficient piece of equipment that is controlled by a dysfunctional time clock. The time clock needs to be repaired.
- Third, City Light staff help to make sure building operators understand newly installed equipment and are familiar with its operation so energy savings will be ongoing.
- And finally as a pilot project, Seattle City Light is offering limited funding to facilities that wish to pursue operation and maintenance upgrades independent of other installation incentives. Operation and maintenance measures are inexpensive and very effective. By striving not only for maintenance, but also for continuous improvement, customers can work to bring down operating costs in very inexpensive ways.

from  Seattle City Light

Section 4.

Operations and Maintenance Services

- The Relationship Between ECMs and O&Ms
- Operations and Maintenance Measure Recommendations
- Operations and Maintenance Requirements as Part of the Financial Incentives Contract
- Pilot Service: Funding for Recommended Operations and Maintenance Measures

Operations and Maintenance Services

Operations and Maintenance Measures (O&Ms) are repairs, replacements, and adjustments that offer a rapid payback on the investment due to their low cost and high energy savings. Typically, they are measures that involve the cleaning, repair or replacement of broken equipment, changes to control settings or software, or changes to operational procedures. Examples include: replacing the “dogs” on a mechanical time clock if they have all been removed; replacing a broken thermostat; cleaning a clogged heat recovery coil; reactivating night setback software that has been overridden; or repairing an outside air damper that is stuck in the full open position. Rapid payback results from the fact that often a very small adjustment or inexpensive piece of equipment has a disproportionate effect on energy consumption. Energy Smart Services offers the customer technical assistance in identifying Operations and Maintenance Measures.

THE RELATIONSHIP BETWEEN ECMS AND O&MS

The efficiency of a customer’s facility is dependent not only on the initial selection of efficient equipment, but also on effective operation and maintenance throughout the life of the equipment. For that reason, Energy Smart Services supports energy efficiency both through capital investments and operations and maintenance.

Facility investments are typically broken down into project-specific capital budgets on the one hand and annual operations and maintenance budgets on the other. Seattle City Light’s Energy Smart Services funding creates a bridge between capital investments and operations and maintenance. Through Financial Incentives for ECM Installation, Seattle City Light increases the amount of capital available during equipment selection allowing the customer to select equipment that is likely to have lower operating costs due to its higher efficiency. In addition, Energy Smart Services recommends ways that the equipment can be operated and maintained so that it can fully realize its efficiency potential.

OPERATIONS AND MAINTENANCE MEASURE RECOMMENDATIONS

In a Facility Assessment, the Energy Management Analyst outlines how the customer can improve facility efficiency through both Energy Conservation Measures and Operations and Maintenance Measures. Because O&Ms are generally low-cost, fast payback items, the customer may decide to move forward on them independent of subsequent City Light funding contracts for Energy Conservation Measures. In other cases, the availability of measure funding gives higher priority to O&Ms that the building operations staff may have already had on their list of things to do.

Some facilities have a comprehensive preventative maintenance program targeting a wide range of goals, including prolonging measure life, occupant safety, comfort, and in the case of manufacturing, increased production rates and product quality. Although Seattle City Light has high regard for such an approach to maintenance, in order to work within realistic expectations for budget and staffing, Energy Smart Services projects target a list of specific operations and maintenance actions rather than ongoing facility-wide preventative maintenance plans.

OPERATIONS AND MAINTENANCE REQUIREMENTS AS PART OF THE FINANCIAL INCENTIVES CONTRACT

When a customer signs a City Light funding contract for Energy Conservation Measures, he or she also makes a commitment to good maintenance of the systems on which the measures are being installed.

1. Operation and Maintenance of Existing Equipment

The scope of work specified under the Seattle City Light funding contract includes the Energy Conservation Measures being funded and a list of any O&Ms needed to bring the same systems into proper operation. Seattle City Light payment is issued after the measures and O&Ms have been completed per contract.

2. Operation and Maintenance of New Equipment

Building operator understanding and commitment is essential to the success of energy conservation projects. Prior to City Light payment, the Energy Management Analyst assigned to the project checks that the Energy Conservation Measure is operating properly and that the customer's operations staff is familiar with its operation. The City Light funding contract language also requires that the customer operates and maintains the equipment over the assumed measure life. The customer is asked to accept responsibility for proper operations and maintenance of equipment purchased because the Energy Conservation Measures need to be properly maintained and operated to realize the energy savings that are the basis of City Light energy conservation investments.

PILOT SERVICE: FUNDING FOR RECOMMENDED OPERATIONS AND MAINTENANCE MEASURES

Traditionally, City Light's energy conservation program offered technical support and capital funding in return for the customer's willingness to take responsibility for operations and maintenance. In February of 2003, Energy Smart Services will expand to include a pilot service for funding Operations and Maintenance Measures. Under that pilot service, O&Ms recommended by an Energy Management Analyst may receive one cent per kWh of estimated first-year savings based on simplified Custom Incentive calculations. The funding process will otherwise be the same as for Energy Conservation Measures (see *Financial Incentives for ECM Installation—Steps to Participate* in Section 2 of this manual).

The O&M pilot service operates on a limited budget, which is assigned at the utility's discretion to capture a wide range of building types, customers and building system technologies. O&Ms on systems affected by Energy Conservation Measures do not receive funding under the pilot service; they are to be completed by the customer in return for measure funding.

If the O&M pilot service demonstrates the effectiveness of O&M funding, the service may become a standard part of the Energy Smart Services program. It must be kept in mind, however, that the funding required throughout the city to attain energy efficient operations and maintenance far exceeds the utility's total annual energy conservation budget. So it is hoped that O&Ms funded or required by the utility may encourage customers to increase their own

investments in O&Ms as way to lower overall operations costs. The intent of Energy Smart Services funding is to “jump start” existing building owners to achieve superior performance, not to support ongoing Operations and Maintenance. In selecting projects for funding, Energy Management Analysts will seek out customers who show a commitment to sustaining the funded improvements.



Energy Smart Services

solutions &
incentives for
business

SECTION 5

PLUG LOAD SERVICES



- **Plug loads**, those items that are not hard wired to the building but plugged into electrical outlets, have been the fastest growing end use in the commercial sector, and their growth has caught the attention of energy management professionals.
- The computers, printers, copiers and other pieces of equipment in an office frequently have features allowing them to be shut down or put to sleep, but for a variety of reasons these are not often enabled. Products without these features can often be fitted with software or external devices to do the same thing, but these are even less common.
- Seattle City Light encourages those who purchase or lease equipment to pay attention to the energy efficiency of that equipment, and enable sleep and shut-down modes whenever possible. Overcoming technical and performance issues, and providing education on the value of these features will be required for their wider adoption and use.
- In conjunction with the Bonneville Power Administration, City Light provides free external devices that shut down compressors in cold drink vending machines during times of little use. This section provides more detail on this particular device and other strategies customers can use to bring plug load energy consumption under control.
- By monitoring the effectiveness of these technologies, Seattle City Light hopes to be able to provide more support for this important and growing sector.

from  Seattle City Light

Section 5. Plug Load Services

- What are Plug Loads?
- Plug Load Management Recommendations

Plug Load Services

WHAT ARE PLUG LOADS?

Plug loads include those devices in a building that are not hard-wired to the electrical system. The most common plug loads in business settings include computers, monitors, printers, copy machines, fax machines, and task lights. Other plug loads frequently encountered are food and drink vending machines, office refrigerators, microwave ovens, coffee makers, etc. Not surprisingly, plug loads have been the largest growing end-use in the commercial sector in the last 20 years and can represent as much as a quarter of the total electricity use in office buildings.

The goal of City Light's plug load initiative under Energy Smart Services is to promote the efficient use of office equipment both through purchasing and management strategies, control devices, and behavioral changes.

PLUG LOAD MANAGEMENT RECOMMENDATIONS

1. Turn It Off When Not Needed

Too often office equipment is left on at night, during weekends, holidays and vacations when users are away. Turning equipment off at these times can save over 80% of the energy use. However, since human behavior is rarely consistent, there are a number of "automated" options to achieve similar results described below.

2. Buy and Use Energy Star™ Equipment

All offices should have a purchasing policy that specifies Energy Star™ equipment. Energy Star™ devices meet Environmental Protection Agency energy efficiency requirements. Energy Star™ office equipment saves energy by powering down and "going to sleep" after a significant lapse in usage, making it easy for businesses to save money with little impact on worker productivity. According to the EPA, the typical American business with 100 computers, 10 laser printers, and 3 copiers spends more than \$4,700 each year to power its equipment. If the equipment were Energy Star™ labeled with the power-down features enabled, energy use would be cut in half. The EPA Energy Star™ Web site, at www.energystar.gov, provides additional information on the savings for specific types of office equipment and a list of Energy Star™ equipment by manufacturer and model. Summaries of some office equipment savings are provided below.

Personal Computers. A standard desktop personal computer (PC) with a central processing unit and monitor draws approximately 120 watts at rest, with the CRT monitor using the majority of the power at 90 watts. Contrary to popular belief, screen savers do not save any power. Besides turning the monitor off, the only way to reduce energy use by a monitor is to engage the "sleep" mode on Energy Star™ computers. The monitor uses approximately 10 watts in sleep mode, versus 90 watts in standby. The monitors can also be programmed to turn off completely after a specified time delay. According to the the Environmental Protection Agency, a typically

equipped 30 story building can save about \$12,000 per year if the automatic sleep mode is enabled for all computer monitors.

The Energy Star™ features of many computers are disabled upon delivery so the user must check their “desktop” to ensure that they are turned back on. The user can program the length of the time delays before sleeping.

Printers. Printer electricity use can be substantial, even in standby mode. Impact (dot matrix) and inkjet printers are relatively energy efficient, using less than 20 watts in standby mode. However, laser printers typically use over 100 watts in standby. Purchasing Energy Star™ labeled printers can cut electricity use by over 65%. Turning printers off at night and on weekends provides significant savings.

Once again, there are Energy Star™ printers available that can power down to 15–45 watts after a specified period of inactivity. The program feature must be activated, and printer supplier or IT support may be able to help with this feature. There are also off-the-shelf devices that can automatically turn off printers after a period of inactivity.

Copiers. Copiers are the most energy-intensive piece of office equipment, and vary in their energy use in standby mode. Smaller tabletop copiers use close to 60 watts in standby, and 250 watts peak during copying activity. The floor model copiers can use close to 200 watts in standby mode since they must maintain the toner at a near-ready temperature for fusing. Night time and weekend shutoff provides significant energy savings.

Energy Star™ models are available which turn the copiers to low-power mode after 15 minutes of inactivity, and to an off-mode of 5–20 watts after 120 minutes of inactivity. This helps to maximize energy savings during evenings and weekend. Energy Star™ copiers can reduce annual energy cost by over 60%. Since most copiers are leased equipment, the leasing company should be able to assist with programming the Energy Star™ features.

Consider also a high-speed copier that includes a duplexing unit set to automatically make double-sided copies. These can reduce paper costs substantially, and since it takes ten times more energy to manufacture a piece of paper than to copy an image on it, overall energy savings are realized as well.

3. Buy Controllers for Older Equipment

Energy Star™ sleep-mode features are not available on older equipment, and sometimes can't be enabled on newer computer models because of software and network incompatibilities. Alternatives in these cases are activity-based power management devices that connect to the equipment. Examples include: LaserMiser™ which turns off laser printers when not in use, MonitorMiser™ which plugs into the keyboard and turns off the monitor when not in use, and occupancy sensor power strips such as Wattstopper™ and Office Miser™.

4. Get a VendingMiser™ for Cold Drink Machines

Vending machines use electricity 24 hours a day, nights, weekends, and holidays. The VendingMiser™ controller reduces the energy consumption of cold drink vending machines by



using an occupancy sensor to power down the lights and compressor without short-cycling the compressor or letting the pop get too warm. VendingMiser™ savings average 35%–40% and this translates into a reduction of \$55 to \$130 in the annual electricity bill for each machine.

City Light offers **free** installation of VendingMisers™ for all qualifying cold drink machines. To arrange for VendingMiser™ installation on a cold drink vending machine, contact Bayview Technologies toll-free at **(866) 279-9800**. For more information on VendingMiser™, see Seattle City Light's Web site, at www.EnergySmartServices.com.

Resource Directory

ENERGY SMART SERVICES

Go to our Web site at www.EnergySmartServices.com for:

- The most up-to-date version of this Program Manual
- A sample contract between Seattle City Light and customers
- A sample Seattle City Light Energy Analysis Report
- Information on lamp and ballast disposal
- A sample Facility Assessment Report and recommendations
- A quick on-line Application for Service
- Links to other resources

SEATTLE CITY LIGHT

For information on services available from the utility, go to the Seattle City Light Web site: www.cityofseattle.net/light.

ENERGY CODES

Seattle Energy Code. The most current version of the Seattle Energy Code can be found on the Web at www.cityofseattle.net/dclu/energy. A hard copy of the Code may be purchased from the Department of Design, Construction and Land Use (DCLU), 700 5th Avenue, Suite 2000, Seattle, Washington, 98104.

Washington State Energy Code. Copies of the Washington State Energy Code may be purchased from the Washington Association of Building Officials (WABO), reached at (360) 586-6725, or www.wabo.org.

CONSERVATION PROGRAMS AT OTHER UTILITIES

Seattle Public Utilities (SPU). The Water Smart Technologies Program offers both technical and financial support for installing water saving measures in commercial, industrial, and institutional facilities. For more information on SPU programs, check the Web site: www.ci.seattle.wa.us/util/RESCONS/wst/default.htm.

Puget Sound Energy (PSE). PSE offers funding to their natural gas customers who install cost-effective natural gas energy conservation projects in new or existing facilities. PSE also provides assistance in selecting high efficiency gas equipment recommend operating changes that could save energy and money. For more information, please call the PSE Energy Hotline at (800) 562-1482, or visit www.pse.com.

GENERAL TECHNICAL SUPPORT FOR ENERGY CONSERVATION

EnergyIdeas Clearinghouse. The Clearinghouse is a technical resource that Northwest businesses and industries use to implement efficient energy technologies and practices. The Clearinghouse offers publications, analysis, engineering assistance, literature research, listservs and links to useful information. Phone: 1-800-872-3568. Email: info@energyideas.org. Web: www.EnergyIdeas.org.

Lighting Design Lab. The Lighting Design Lab is in Seattle's Capitol Hill neighborhood. It is open to the public weekdays from 8:00 a.m. to 5:00 p.m. The Lab operates its own Web site offering a virtual tour of the facility, case studies, lighting design information, and other links and resources.

Address: 400 E. Pine St. Suite 100, Seattle, WA 98122

Phone: (206) 325-9711 or (800) 354-3864

Web: www.lightingdesignlab.org

Business and Industry Resource Venture. The Business and Industry Resource Venture provides free information, assistance and referrals to help Seattle businesses improve their environmental performance. The Resource Venture, a special program of the Greater Seattle Chamber of Commerce in partnership with Seattle Public Utilities, offers assistance in recycling, water conservation, stormwater pollution prevention and sustainable building. For more information, contact Bill Anderson at (206) 389-7303 or visit the program's Web site at www.resourceventure.org.

LAMPS AND BALLAST WASTE DISPOSAL

Lighting Waste Disposal Information. For more information, contact a City Light Energy Management Analyst at (206) 684-3254, or call King County Hazardous Waste Management at (206) 263-3050.

Washington State's Universal Waste Rule. For more information, see Washington Department of Ecology publication #00-04-020, downloadable in pdf format from their Web site: www.ecy.wa.gov/pubs/0004020.pdf

Directory of Vendors. For a resource on vendors that handle various hazardous wastes including lamps, ballasts and PCBs, refer to King County Hazardous Waste's Web site: www.metrokc.gov/hazwaste/yb

Look under these categories:

- Fluorescent Lamps and Tubes (Recycling)
- Fluorescent Light Ballasts
- High Intensity Discharge Lamps
- PCBs

Lighting Waste Information Resources

<i>Resource</i>	<i>Address</i>	<i>Telephone</i>	<i>Internet Web Site</i>
Seattle City Light, Energy Smart Services	700 5 th Avenue, Suite 3300 Seattle, WA 98104-5031	(206) 684-3254	www.EnergySmartServices.com
Local Hazardous Waste Management Program in King County	130 Nickerson Street, Suite 100, Seattle, WA 98109	(206) 263-3059 (206) 263-3050	Lighting Waste Web site www.metrokc.gov/hazwaste/fluor
Washington State Department of Ecology Northwest Regional Office, Lisa Perle	3190 160th Avenue SE Bellevue, WA 98008-5452	(425) 649-7026	Ecology Homepage www.ecy.wa.gov
U.S. Environmental Protection Agency (EPA) Region 10	1200 Sixth Avenue, Seattle, WA 98101	Public and Environmental Resource Center (206) 553-1263	U.S. PCB Homepage www.epa.gov/opptintr/pcb
U. S. Toxic Substances Control Act (TSCA)		Information Hotline (202) 554-1404	

Selected Northwest PCB Commercial Storers

<i>Resource</i>	<i>Address</i>	<i>Telephone</i>
Eco Lights Northwest	Seattle, WA	(206)-343-1247
Philips Services Corporation	Renton, WA	(425) 227-0311 (800) 228-7872
General Electric Instrument and Repair Service	Portland, OR	(503) 221-5097
Chemical Waste Management	Arlington, OR	(541) 454-2643
Envirosafe Services of Idaho	Boise, ID	(800) 274-1516

Glossary

Baseline. Within Energy Smart Services, savings and costs for energy conservation are assessed as the difference between what will be done with funding (the “proposed”), and what would be done without funding (the “baseline”). For new construction, for example, the baseline is the minimum efficiency required by the Energy Code.

Climate Wise. A Seattle City Light program that helps commercial, industrial and institutional customers manage and improve their environmental performance, particularly regarding reductions in greenhouse gas emissions. Customers work with program staff to identify emissions reducing actions appropriate to their business, agree to implement the identified actions, and report on progress over time.

Cost Caps. Seattle City Light funding for installation of Energy Conservation Measures is equal to a Value of Savings, or a Cost Cap, whichever is less for a particular measure. The Cost Cap is equal to the incremental cost, up to 70% of the total cost.

Customer. The owner, mortgager, or contract vendor of a commercial facility or its authorized agent, or a lessee or other occupant of a commercial facility authorized by the owner to implement Energy Conservation Measures.

Energy Analysis Report. The report resulting from Energy Analysis Assistance, providing in-depth analyses of proposed electrical Energy Conservation Measures not covered by Standard Incentives. Produced by a consultant, engineering expertise is applied to a full range of commercial and industrial energy conservation strategies to produce cost and savings information and to assess the eligibility for Seattle City Light incentive funding.

Energy Code. The Seattle Energy Code and, outside the city limits, the Washington State Energy Code, are often referenced in the Energy Smart Services program for development of baselines in energy savings and funding calculations. Within the city limits, the Seattle Energy Code is administered by the Department of Design, Construction and Land Use (DCLU).

ECM. See *Energy Conservation Measure*.

Energy Conservation Measure (ECM). A capital improvement that increases the electrical energy efficiency of the customer’s facility. The substitution of another fuel source, such as oil or gas, to displace electric energy use is not considered an Energy Conservation Measure.

Energy Management Analyst. A member of the Seattle City Light staff assigned to a specific customer to provide technical assistance and manage contracts for energy conservation installation. Analyzes proposed energy conservation efficiency projects, determines City Light funding levels, acts as a resource during the course of projects, and provides progress and final inspections for incentive payments.

Energy Smart Services. Technical assistance and financial incentives offered by Seattle City Light to medium and large commercial and industrial customers.

Energy Star™. An EPA program that labels products meeting specific energy-efficiency standards to guide consumers in making energy-efficient purchases. Products for both home and business are labeled, from appliances to computers to transformers.

Existing Conditions. The existing condition of a building or building system (lighting, HVAC, envelope, etc.) and/or the operation of such a building or system as it was initially designed to operate. The existing conditions may be used as the baseline if the equipment being replaced is fully functional and is not being upsized. See *Baseline*.

Fuel switching. Reduction in consumption for one type of energy, achieved by an increase in consumption for another type of energy (e.g., a reduction in electricity consumption achieved by an increase in use of natural gas).

Funding Calculation Worksheets. A series of electronic spreadsheet with pre-determined formulas designed to easily calculate energy savings of proposed efficiency upgrades. Used for Standard Incentives for lighting, HVAC, and motors.

HVAC. Heating, ventilation, and air conditioning equipment.

Incremental Cost. The difference in cost between what the customer would have done in the absence of City Light funding and the proposed Energy Conservation Measure. The difference between the total installed cost of the baseline and the proposed. See also *Baseline*. For chillers, for example, the incremental cost is the cost difference between a chiller that meets the Energy Code, and the proposed chiller. If two bids are not obtained, one for the baseline and one for the proposed, the incremental cost may be assigned the value of 50% of the material cost of the proposed chiller, or 25% of the total cost of the proposed chiller.

Incremental Energy Savings. The energy saved through City Light funding above and beyond what the customer would have done in the absence of that funding.

LEED™ (Leadership in Energy and Environmental Design). A menu-based benchmarking tool developed by the United States Green Building Council to measure and rank the sustainable performance of building projects.

Major Remodel. When an existing facility is gutted and all substantial energy systems are removed, or there is a new addition to the facility that more than doubles the floor area. Energy Smart Services treats Major Remodels and some other remodels in the same way it handles New Construction, since in both cases the Energy Code is used as baseline for savings and cost estimates.

NEMA Premium Efficiency Motor. A motor that meets the minimum efficiencies and efficiency rating method requirements established by the National Electrical Manufacturers Association for motors marketed as “NEMA Premium Efficiency.”

New Construction. A commercial facility that has not yet been constructed. Major Remodels and some other remodels are handled in the same way as New Construction, since in both cases the Energy Code is used as baseline for savings and cost estimates.

Operations and Maintenance Measures (O&Ms). Specific operations or maintenance actions to improve energy efficiency. Typically these measures have rapid payback and low cost. Examples include changing control settings, replacing broken thermostats and time clocks, or repairing outside air dampers that no longer can achieve the minimum outside air setpoint.

Payback. The estimated period of time during which a project would pay for itself on the basis of reduced energy bills. Payback, in years, is equal to the cost of the higher efficiency options divided by the annual reduction in energy costs.

Performance Contract. A performance contract offers payment based on actual performance of the installed Energy Conservation Measure. Performance is usually assessed by measuring energy consumption and other critical parameters before (if a retrofit project) and after installation.

Plug Load. Equipment that receives electrical power through a cord plugged into an outlet.

Professional Engineer (P.E.). An engineer holding a current Professional Engineering license issued by the State. Each P.E. has a stamp that may be applied to design documents and signed by the P.E.

Project Team. The architect, engineer, facility owner, tenant, Seattle City Light Energy Management Analyst, and any other individuals who are members of the team assembled to implement Energy Conservation Measures.

Standard Practice. That which is generally regarded as good engineering and economic practice. In new construction or replacement of equipment that is broken, standard practice may be considered the baseline for equipment that isn't covered directly by the Energy Code.

Sustainable Building. A “cradle to cradle” approach to building development which considers a building’s total economic, environmental and social impact and performance, from material extraction and product manufacture, through product transportation, design and construction, operations and maintenance, to eventual building reuse or disposal.

Total Cost. The total cost of installing equipment effected by an Energy Conservation Measure. The total cost includes materials, labor, design, taxes, and the design cost (up to 10% of the total cost).

Trade Ally. A contractor, manufacturer’s representative or designer who participates on projects funded by Seattle City Light, often on behalf of a customer.

Value of Savings to SCL. Energy Smart Services funding for installation of Energy Conservation Measures is equal to a Value of Savings to SCL, or a Cost Cap, whichever is less for a particular measure. The Value of Savings is equal to the estimated kWh annual savings times a funding factor that depends on the anticipated life of the measure.

Variable Air Volume (VAV). A type of HVAC air distribution system that reduces the air flow to a room when the amount of cooling required decreases. It improves efficiency by reducing the amount of heating and cooling required to satisfy a system that serves multiple thermostats.

Variable speed drive (VSD). A device that varies the speed of a motor. VSDs, variable speed drives, do so by varying the frequency of the power to the motor.

VendingMiser™. A plug load control device that powers down cold drink vending machine lights and compressors during periods of inactivity, utilizing a motion sensor to power back up when people are nearby. During long periods of inactivity, the compressors cycle on enough to maintain proper drink temperatures.

Verification. Confirmation that Energy Conservation Measures have been installed per contract, and (where required by contract) the revision of energy savings calculations to reflect actual performance.



**Energy
Smart
Services**

from



Seattle City Light

Seattle City Light
700 Fifth Avenue,
Suite 3300
Seattle, WA 98104-5031
(206) 684-3254

EnergySmartServices.com