ENERGY

AFFECTED ENVIRONMENT

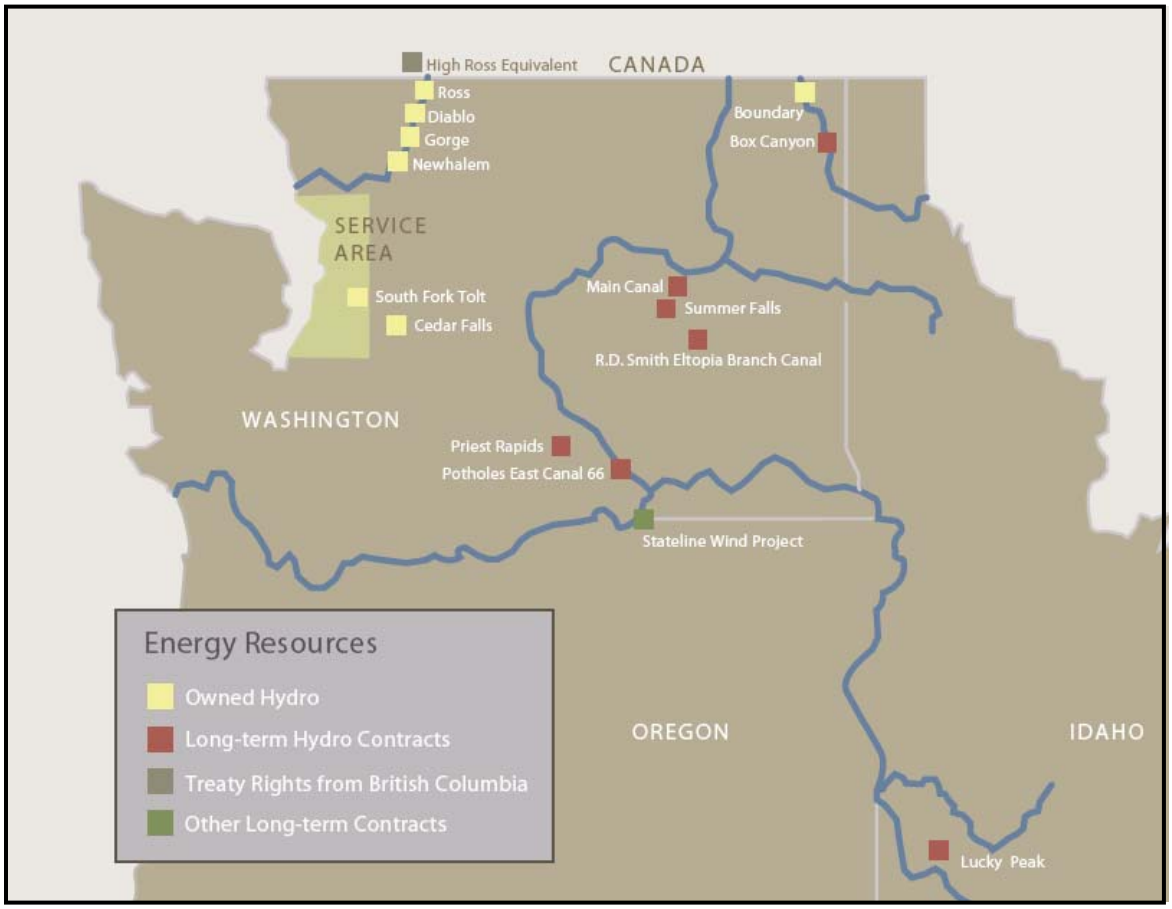
INTRODUCTION

Seattle City Light (SCL) is the municipal electric utility for Greater Seattle, serving approximately 350,000 customers, with a history dating back to 1902. SCL's service area is 131 square miles, an area with a total population of roughly 740,000 people.

GENERATION AND SUPPLY

The total capability of City Light hydroelectric plants is 1,920 megawatts (MW). The highest recent peak usage of 1,716 MW occurred in December 2005. City Light owns and operates hydro generating facilities at (1) Cedar Falls, (2) Boundary, (3) Gorge, (4) Newhalem, (5) Diablo, (6) Ross and (7) South Fork Tolt (see Figure 3-39). In addition, SCL acquires generation from Priest Rapids, Stateline wind project, Lucky Peak, products of Bonneville Power Administration consisting of "Slice" and "Block" purchases from the Mid-Columbia system and irrigation-based hydroelectric generation from the Grand Coulee Project Hydroelectric Authority.

Figure 3-39
Seattle City Light Energy Resources



HIGH-VOLTAGE TRANSMISSION SYSTEM

Electrical transmission lines connect to generation resources, bringing bulk power to receiving substations at high voltage. The SCL transmission system consists of approximately 657 circuit miles of 230 kilovolt (kV) and 115 kV lines. City Light's facilities have multiple interconnections with Bonneville Power

Administration, Puget Sound Energy, Snohomish County Public Utility District and Avista Corporation systems.

DISTRIBUTION SYSTEM

City Light has nearly 2,500 circuit miles of distribution lines at three power levels, and the lines are served from thirteen receiving substations. Three of these substations (Broad Street-Annex, Union Street and Massachusetts Street) serve an underground 13.8 kV Downtown network. Another two of these substations (East Pine and University) serve an underground 26.4 kV network in the First Hill area and University District area. The rest of Seattle gets power from a 26.4 kV looped radial distribution system. The looped radial substations are as follows: Broad (26 kV), Canal, Creston Nelson, Delridge, Duwamish, East Pine, North, Shoreline, South, University and Viewland Hoffman. South Substation also serves a dedicated 34.5 kV service to Nucor Steel.

For the South Downtown study area, there are two distribution systems: (1) the underground 13.8 kV network system and (2) the looped radial 26.4 kV system which is a combination of underground and overhead distribution. Both systems are designed to provide a highly reliable power supply to customers including Downtown commercial and residential uses, the Port of Seattle and industrial uses.

Downtown Network - Massachusetts Substation (13.8 Kv)

The Downtown network is broken up into 12 sub-networks, five identified with the Broad substation, four identified with the Union substation, and three identified with the Massachusetts substation. Of these, the "Mass South" sub-network serves primarily Pioneer Square but also a segment of Chinatown/I.D., bounded by approximately Yesler Way, Alaskan Way, I-5, S. King Street in Pioneer Square, and as far east as Maynard Avenue S./S. Jackson Street. Other parts of the study area are served by the South substation near S. Spokane Street (described below).

The "Mass South" sub-network is an underground network operating at 13.8 kV. The load for the approximately 1,500 metered customers in this area is 15.2 MVA, a little more than one-third of the load served by this substation. During high-demand periods in 2005-06, the coincidental loads for the Downtown-oriented Broad, Union and Massachusetts Substations added up to a total of 241 MW or 14.0% of the entire City Light demand of 1,716 MW. On July 24, 2006, the summer peak load for the Downtown-oriented Broad, Union and Massachusetts Substations added up to a total of 261 MW or 18.3% of the entire City Light summer peak demand of 1,427 MW. Warm weather and air conditioning needs led to the summer peak demands being higher than winter peak demands.

Electrical system improvement plans for the Pioneer Square-oriented service area include replacing old cables with new cables for four feeders emanating from Massachusetts Substation. In addition, new duct banks and new manholes will be installed. This is planned to occur over the next 15 years. Also, as part of SR99 improvements, five feeders will likely be rerouted.

South Substation (26.4 kV)

Service from the South Substation occurs through a combination of underground and overhead distribution feeders. Seven feeders from the South Substation serve the South Downtown and Duwamish vicinity, including one (known as "2638") that serves the majority of the Chinatown/I.D. neighborhood and into First Hill. The other feeders provide service to various portions of the Duwamish industrial area, including the Stadium Area and vicinity of 4th Avenue S.

The non-coincidental feeder load for the main feeder serving Chinatown/I.D. ranges from about 10.0 MVA (220 amps) in summer to 11.4 MVA (250 amps) in winter. City Light has identified potential re-conductoring projects for this area, but these projects are not currently budgeted. Unless there are specific new large loads coming on-line within the next couple years, or there is a need to transfer load from one feeder to another, City Light does not plan on new feeder enhancements.

PROJECTIONS OF FUTURE LOAD GROWTH

The load for the entire Downtown underground network is projected to grow at approximately 1.3% per year. Another estimate indicated that the Mass South sub-network could carry only 3% to 4% of the projected Downtown area load increase or an annual load growth "trend" of approximately 0.04% per year at 15.2 MVA base loads in 2006.

In the near term, City Light is performing work to maximize the substation and distribution feeder capacities for the Downtown network. Capacity work requires re-conductoring feeders using larger cables, balancing and transferring feeder loads between neighboring substations, and increasing some network capacities. Taken as a whole, the proposed enhancements will result in maximum utilization of network feeder and substation capacity available from substations to the Downtown network.

The projected growth for the South Substation's 26.4 kV service is 1.1% per year. No major system improvements to serve this growth are currently anticipated, although some minor feeder improvements may be needed.

PORT OF SEATTLE LOAD GROWTH

The Port of Seattle has requested comments from City Light on potentially providing shore power connections, a practice referred to as "cold ironing", to some of the Port's marine terminals. The estimated load for each freighter is approximately 7 MW. The terminals being considered for such service are at Terminals 5, 18, 25, 30, 37-46 and possibly Terminal 115. This includes potential service to cruise ships. If all of these occur, the estimated peak load "increase" would be between 50-70 MW. The study by the Port states this could occur over a 4-12 year period. This study is a recent planning activity and implementation would require approval by the Port Commissioners. As such, at this time, City Light's projections on use of the existing feeders and substation capacities do not include the maximum potential Port load increase.

INTEGRATED RESOURCE PLAN

City Light has developed and uses a long range plan, subject to bi-yearly updates, to guide the acquisition of new energy resources to meet the needs of its customers. The current 2006 Integrated Resource Plan (IRP) recommendations and EIS can be found on the web at: http://www.seattle.gov/light/news/issues/irp/. The IRP process involves looking at electricity resources (owned and long term contracts) and electrical demand forecasts over a 20 year period, to determine when new resources will be needed. Then, alternative mixes of existing and new resources are evaluated and compared based on cost, risk, reliability and environmental impacts, to select timely resource acquisitions that ensure customer obligations are met.

Environmental impacts associated with meeting electrical energy requirements anticipated under the existing forecast were assessed in the 2006 IRP EIS. A major focus of this document was air quality impacts and assessment of greenhouse gas emissions. SCL has adopted a policy of meeting load growth with conservation and renewable energy resources and fully offsetting all carbon emissions that may be a result of energy purchases needed to serve customers. This is an ongoing commitment that has been fulfilled in the past few years, beginning in 2005.

GREEN POWER & CONSERVATION

Seattle's history of renewable energy began in the early 1900's with the Cedar Falls hydroelectric plant. Later, City Light developed the Skagit and Boundary hydroelectric facilities. The Skagit facilities were recently recognized as meeting strict "low-impact hydro" certification requirements (see www.lowimpacthydro.org for additional information).

Since 1977, conservation has been Seattle's energy resource of choice. City Light's mission is to provide a full-range of cost-effective energy efficiency service to customers. In 2001, the State Legislature passed

a law allowing customers to partner with their electric utility to purchase new clean renewable energy sources. City Light responded by creating Seattle Green Power with voluntary customer payments helping to fund a wider range of new renewable energy sources, including local solar demonstration projects. Customer participation in green power programs helps to acquire additional supplies and accelerate the market for new renewable energy that does not create greenhouse gas emissions.

In 2002, City Light contracted for one of the largest wind power purchases in the country, 175 megawatts from the Stateline project in eastern Washington and Oregon.

In 2005, City Light began offering its Green Up program, offering market-based renewable energy certificates, or green tags, from wind power, to "green up" customer energy portfolios. City Light has long supported customers with a wide range of conservation products and services, including financial incentives that reduce customer electric bills and support the local economy.

EVALUATION OF EXISTING ENERGY USE IN PIONEER SQUARE NEIGHBORHOOD

A study was conducted by International Sustainable Solutions (ISS) to evaluate energy use patterns within the Pioneer Square neighborhood.

The ISS study found that:

- Many of Pioneer Square's existing buildings (not including Qwest Field), due to characteristics such as operable windows and less energy-intensive systems, actually perform well, with office, warehouse and residential buildings using in the range of about 10-15 kilowatt-hours per square foot annually, compared to a U.S. average of almost 29 kilowatt-hours per square foot during the 1990s. Pioneer Square retail uses' energy intensity was higher, in the range of 50 kilowatt-hours per square foot annually.
- Comparatively, some projects designed to meet LEED[1] standards (including Seattle's Justice Center and the "Brewery Blocks" in Portland, Oregon achieved energy levels in the low 20's of kilowatt-hours per square foot, and higher performance is possible—such as at the White Rock, British Columbia City Operations Center, which achieved energy intensity levels below 10 kilowatt-hours per square foot annually.
- Similarly, other European examples that use available energy-efficient technologies are performing in the range of 5-10 kilowatt-hours per square foot annually.
- A combination of several strategies would need to be implemented to achieve a major improvement in the neighborhood's energy efficiency. Strategic options could include: high performance energy efficiency requirements in new buildings; incorporation of local renewable energy by using technologies such as solar photovoltaic systems; local combined heat and power generation; and/or use of other sustainable energy technologies. These kinds of strategies are being implemented in various European countries.

[1] "LEED" is a trademark and an abbreviation for "Leadership in Energy and Environmental Design"

FUTURE GROWTH IMPACTS ON THE ELECTRICAL SYSTEM

All Alternatives

For EIS Alternatives 1, 2, ~~and~~ 3 and the Preferred Alternative, the growth scenario evaluates approximately 6,000 dwelling units of additional residential growth, and approximately 24,600 jobs of additional employment growth in the study area by 2030. Employment growth would be expected to occur within existing buildings as well as new buildings developed by 2030.

The projected growth would increase overall demands in the study area for electrical service and overall energy demand, and there are environmental impacts associated with development of new electric resources that could be needed to meet this demand.

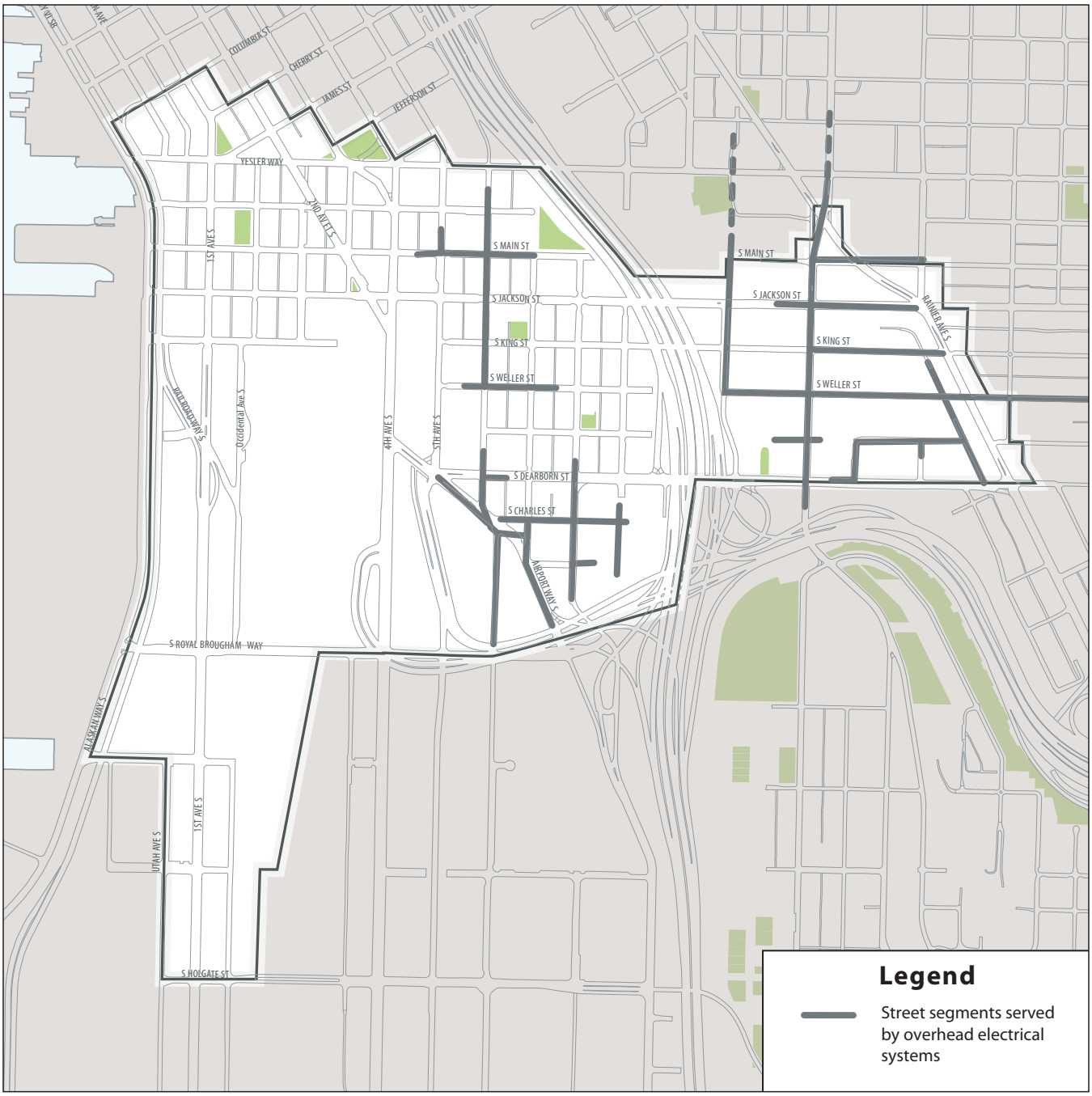
There also may be construction impacts associated with expansion or improvement of the electrical distribution system to serve new load. However, the analysis to date indicates that the City Light distribution system can accommodate load growth identified in the ~~four~~ EIS alternatives (Chung, Nierenberg, 2007), including the Preferred Alternative (DPD, 2008). To reach this preliminary conclusion, City Light staff reviewed the existing systems' characteristics, the EIS growth scenarios, prospective future load growth in the Duwamish industrial area, and City Light's ongoing planning of future system improvements. Additional analysis to verify this conclusion will be conducted by City Light.

While no specific distribution system infrastructure capacity improvements related to the projected growth are identified at this time (for example, no new feeder lines are likely to be needed to serve projected growth using standard assumptions about types of commercial and residential growth), if unusually high energy demands or customer service requirements are proposed, such as a data center or research facility, City Light would partner with the applicant to ascertain electrical demands and any specific energy delivery improvements (such as a feeder extension) that might be needed to serve such uses. It is also possible that individual developments would need localized improvements to extend service from existing lines. In such cases, City Light's policy is that developers provide and bear the cost of such improvements (Nierenberg, 2007).

City Light needs right-of-way space to build power line infrastructure to meet future building development and growth demands. Overhead electric lines are one option outside of network areas. However, developers of new buildings often want to locate the building bulk abutting the property lines at the edge of street rights-of-way. In such cases, clearances to power lines in the rights-of-way may not be sufficient to maneuver equipment and maintenance personnel, so a safety hazard may occur. In such circumstances, City Light coordinates with customers to determine how service may be achieved while maintaining required clearances. In some cases, adjustments in building design may be sufficient to provide adequate clearance. In others, more costly undergrounding of electric utilities may be needed, and if needed to accommodate specific developments, the building developer may be responsible for any cost difference. This concern about new building design could continue to be addressed on a project-by-project basis (DPD favors this approach), or additional building setback controls could be defined for zones in the affected vicinity. Figure 3-40 below shows where overhead systems are present in the study area.

ENERGY CONSERVATION AND SUSTAINABILITY

There is growing public sector, citizen and development community interest in addressing global climate change and advancing sustainable development practices. SCL's programs and approaches already address several aspects of conservation and sustainable practices, especially in how the supply of energy is provided (see summarized information in "Affected Environment" discussion above, and the referenced



0 2 4 6 8 10
Scale in 100 Feet

N

Figure 3-40

Location of Overhead Electrical Systems

Livable South Downtown

documents for more information). To address the study area's future energy demands, Livable South Downtown recommendations will include consideration of strategies that are meant to achieve higher energy efficiency and limits on carbon emissions, through conservation and sustainable development strategies. This direction is supported by current City policy including SEPA policies, smart growth planning objectives, SCL's and Citywide carbon emission reduction objectives, and other components of the city's Climate Action Plan and SCL's 2006 Integrated Resource Plan.

The preferred approach will set performance levels for energy use and conservation, will encourage or require conservation strategies to be incorporated in design of new development, and will define how carbon emissions will be addressed. A comprehensive strategy may include the following:

1. **Beat Energy Code minimum performance:** New structures should be designed to exceed Seattle Energy Code minimum performance levels by at least 15%.
2. **Coordinate early with City Light on energy conservation assistance:** Developers and their designers should coordinate with City Light staff early in the design process to take advantage of City Light energy conservation funding opportunities relating to building development.
3. **Compare building performance to recognized benchmarks such as the 2030 Challenge:** As a way of measuring and disclosing performance, define a benchmarking method such as levels associated with the "2030 Challenge" that compares performance to a goal without setting an absolute requirement.
4. **Set an "energy budget" or similar performance level at building or district scale:** Certain types of new structures in rezoned areas could be required to not exceed the total energy use expected to occur under today's zoning, thereby setting an "energy budget" or a performance level that must be achieved even though future development would be larger than previously anticipated.
5. **Consider district-based approaches:** Strategies such as district heating/cooling systems that could provide benefits to multiple parties as well as additional environmental benefits not available through conventional or site-by-site development approaches.
6. **Consider participation in larger-scale carbon emission reduction strategies or programs:** Through the Climate Action Plan, the City will continue to examine options to achieve carbon emission reductions and climate protection. Ongoing agency and interdepartmental work will likely yield approaches that are part of a big-picture approach to sustainable growth. This may, for example, describe methods for addressing transportation-related emissions as a side-effect of growth.

Further discussion will be needed to settle on the optimal approach for South Downtown. The long-term net result of such actions is likely to promote fulfillment of the City's SEPA policies, which indicate "it is the City's policy to promote energy conservation and the most efficient possible use and production of energy."

Update for the Final EIS

The recommended strategy is that new proposals gaining bonus development rights should achieve a minimum performance level of "energy cost savings" that beat Seattle Energy Code minimums by 20%. This would be approximately equivalent to achieving a LEED "Gold" performance level of 8 "EA1" credits for the energy-related portion of LEED, and approximately equivalent to beating the ASHRAE/IESNA Standard 90.1 by 30%. A majority of new structural development would likely use bonuses, but not necessarily developments involving rehabilitation of existing structures or small new structures.

Setting this performance level suggests that energy system design should be evaluated in early stages of future development project design. This would likely require an approach such as running a "whole building project simulation" modeling, for which City Light may be able to fund some of the modeling costs. This would also likely require a meeting with City Light's energy conservation staff to discuss opportunities in efficient energy design and conservation.

The Livable South Downtown planning effort also recommends considering "other possible actions" that could promote energy efficient approaches and sustainable strategies in future development:

- Ban electrical resistance space heating methods such as electric baseboards to avoid foreclosing future district energy heating and/or cooling solutions.
- Require energy efficiency that results in a 60% fossil fuel use reduction (e.g., natural gas) compared to a comparable building as described in the U.S. Dept. of Energy's "Commercial Building Energy Consumption Survey" database. This would promote achievement of the City's Climate Action Plan and related climate change mitigation initiatives.
- Encourage larger developments in particular to further explore district energy strategies, with the cooperative evaluation and possible assistance of public-sector agencies and energy providers such as the Seattle Steam Company. A district energy heating and/or cooling system may be feasible in future development, but would require further interactive assessment of a combination of regulatory, cost and policy considerations that may determine the feasibility of proceeding.

Probable improved performance of future development in controlling greenhouse gas emissions

At a programmatic level of detail, it is possible to make a few observations about probable positive effects of proposed and other possible strategies on limiting contributions to greenhouse gas emissions. These observations may not account for all economic, environmental or policy considerations that may be in play, but are worth noting as to the recommendations' relative probable benefits.

- A mandated 20% increase in energy efficiency in individual future developments would be worthwhile to pursue because it is intended to reduce total energy demands on the generation system and related environmental costs including atmospheric impacts, compared to a typical development meeting current minimum code levels. Improved efficiency is assumed to have both environmental and financial benefits.
- The inclusion of "other possible actions" creates the possibility of other possible benefits in energy efficiency that could reduce atmospheric impacts of future development. These possible actions relate to electrical space heating bans, reduced fossil fuel use, and encouraging hydronic or other district energy strategies. Each of these strategies could facilitate alternative energy choices with fewer probable atmospheric impacts. Again, improved efficiency in energy choices is assumed to have environmental and financial benefits.[2]
- Requiring and otherwise encouraging reduced vehicle trip generation through the proposed methods of reduced commuter parking capabilities and required transportation demand management programs would contribute to additional vehicle trips avoided on the regional transportation system. To the extent that workers use transit options that are readily available in most of the study area, the avoided vehicle trips of single-occupant vehicles would reduce the total amounts of greenhouse gases emitted by such vehicles.
- Meeting LEED requirements facilitates more use of local manufactured, renewably harvested, recycled content and re-used materials, which means greater efficiencies in energy consumption that is "embodied" in the materials and their production and transport.
- Implementing the "green factor" landscaping strategy, green roofs and similar sustainable strategies would help reduce environmental "heat island" effects in the immediate area, which potentially could also contribute to reduced energy demand for heating and cooling needs.
- Encouraging further consideration of hydronic or district energy strategies would maintain the secondary benefit of "leaving our options open" in how to serve future development. Otherwise, options could be foreclosed that might be more favorable in the future. For example, if it was

[2] This result does not delve into secondary possible impacts of making alternative energy choices, which conceivably could uncover economic or environmental considerations of alternative choices. However, further detailed quantification of these possible benefits or associated costs is beyond the scope of this EIS.

later determined that significant ground-source heating opportunities were available in the study area but were no longer economically favorable to pursue, that could be interpreted as a lost opportunity with an associated environmental cost.

A potential for adverse impacts in total greenhouse gas emissions that remains unconfirmed
With the increased zoned development capacity and concentration of future development that is represented by the Action Alternatives, it can be hypothesized that increased total amounts of greenhouse gas emissions could occur within the study area, compared to future development under the No Action Alternative. It can also be hypothesized that emissions associated with vehicle-miles-traveled, from a regional perspective, would be comparatively lower with future development under the Action Alternatives compared to the effects of growth patterns and commuting choices that would otherwise occur under the No Action Alternative.

However, it is beyond the scope of this programmatic EIS to quantitatively confirm whether the net effect of energy-conserving strategies included in the Preferred Alternative would result in a balancing of or net reduction in total greenhouse gas emissions, if a comparison was made to assumed development under No Action conditions. This relates to the lack of sufficient details to analyze future individual development projects, the uncertain composition of the final strategies selected, and the complexities of assessing numerous in-depth implications that may relate to economics, environmental costs, legal, operational and City policy concerns. Such efforts at assessment are better pursued through assessment at a project-specific level, and through the efforts of multiple City departments in their planning for the future. Therefore, no firm conclusions may be drawn as to whether the Action Alternatives would in the worst-case result in a net adverse impact in total greenhouse gas emissions from the study area, or not. Similarly, no conclusions may be drawn as to whether the Action Alternatives could generate significant impacts upon the maintenance of a healthy global atmosphere, which is problematic due to scientific uncertainty regarding appropriate methodologies to make such a determination. However, the lead agency may proceed even without such conclusions (SMC 25.05.080).

MITIGATION STRATEGIES

The incorporation of strategies to address conservation and sustainability objectives into the City's final recommendations will help avoid or mitigate potential impacts associated with development of new electric resources and fulfill the City's SEPA policies on energy.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

None are identified.