



City of Seattle Code Review: Final Gap Analysis Report

Prepared for

**U.S. Department of Energy
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Acronyms and Abbreviations

ASHRAE	American Society of Heating, Refrigeration & Air Conditioning Engineers
BDS	Bureau of Development Services
BMP	Best Management Practice
BPS	Bureau of Planning and Sustainability
DOE	U.S. Department of Energy
DPD	Department of Planning and Development
ECA	Environmentally Critical Areas
EIS	Environmental Impact Statement
ICC	International Code Council
IESNA	Illuminating Engineering Society of North America
MOA	Memorandum of Agreement
NREL	National Renewable Energy Laboratory
PV	photovoltaic
SEPA	State Environmental Policy Act
SHW	solar hot water
SMC	Seattle Municipal Code
WAC	Washington Administrative Code

Executive Summary

Purpose

The purpose of this report is to summarize Seattle Municipal Code (SMC) provisions as they relate to identified Best Management Practices (BMPs) for increased solar energy use. In addition, the report presents broader approaches and policies that could affect the successful implementation of new or updated solar energy use policy. The information in this report is intended for Seattle Department of Planning and Development (DPD) and Seattle City Light staff to use in improving policies and codes related to increased solar energy use.

Overview

The City of Seattle, Washington, was designated a Department of Energy Solar America City in 2008. Solar America Cities is a partnership between the U.S. Department of Energy (DOE) and 25 cities across the country that have committed to accelerating the adoption of solar energy technologies at the local level. As part of the program, the National Renewable Energy Laboratory (NREL) has provided assistance in identifying how current policies, practices, codes, and standards in Seattle related to solar energy installations compare with recognized best practices across the country.

DOE, NREL, and their partners have recently developed studies and guidelines for increased solar energy use, particularly as part of the Solar America Cities Program. BMPs and case studies related to increased solar energy use are summarized in most of the studies. Many of the BMPs focus on interconnection issues, financial incentives, and outreach. These areas, especially the absence of effective financial incentives, have been identified as the major barriers to increased solar energy use.

The literature also addresses the need to update and enforce local rules and regulations. While the literature encourages cities to address barriers in the codes, evaluation of specific code for solar energy use is only recently re-emerging since the 1970s and 1980s. Therefore, this analysis includes a review of specific codes to evaluate how solar energy use is addressed using the BMPs and available examples and case studies as guidelines. Policies and programs such as net metering, interconnection, and financial incentive programs that are managed at the utility, state, or federal level are not directly analyzed in this work.

Gap Analysis Summary

The City of Seattle addressed solar energy use in its code as early as 1980. The Seattle DPD and Seattle City Light (SCL), the City's publicly-owned electric power utility, have a supportive approach to renewable energy, sustainability, and solar energy installations. The City has technical resources including Green Building staff, an Innovation Advisory Committee, client assistance memos (CAMs), a Green Building library, and a "Green Q" and Priority Green Permitting that result in opportunities for

expedited review of green development projects, and flexibility within the code to accommodate current common solar installations.

Overall, the SMC does not present barriers to solar installations. For areas of the code such as tree preservation, shoreline management, and historic preservation where conflicts could occur, no reports were found of code-related issues that prevented solar installations. As solar energy use increases, it will be important to track and monitor not only installations, but lessons learned from working within current policies and code.

Although the SMC does not present significant barriers to increased solar energy use, improvements in the City's approach to permitting and planning could provide benefits. The detailed gap analyses in Appendices A and B offer options for improving areas of the SMC, permitting processes, and policies, and the lists below summarize the main areas of the SMC and City policies where gaps may be minimized or removed. The BMP recommendations that are listed come from reports recently developed through the Solar America Cities Program. Reports such as *Solar Powering Your Community: A Guide for Local Governments* (Muller and Truitt 2009) and *City of Austin, Texas Benchmarking of Solar Energy Programs* (Jackson 2008) and related references provided the basis for BMP recommendations (see Appendix E, Best Management Practice Review).

Appendices A and B provide the detailed gap analysis tables that include the main areas below as well as other codes and policies that were reviewed.

Gaps that can be addressed in the Seattle Municipal Code

The following list summarizes selected gaps, recommendations, and examples from the detailed tables in Appendices A and B.

1. Increase/Improve Building Energy Standards

- ✓ Require a percentage of solar energy technology for public improvements.
 - The State of Oregon (House Bill 2620) requires that public entities spend 1.5% of the total contract price of public improvement contract for new construction or renovation of a public building on solar technology. Public entities include state agencies, universities, community colleges, school districts, and local government.

2. Require Solar Ready Construction

- ✓ Require developers to build solar-ready residential and commercial buildings.
 - The City of Tucson has an ordinance that requires all new homes to either have solar photovoltaic (PV) and solar hot water (SHW) heating systems installed or to have all of the necessary hardware installed so that a system can be easily installed at a later date. (See Appendix A for additional detail on solar-ready requirements).

- The City of Seattle should lead by example and require solar installations and/or solar-ready construction on new construction and major renovation of municipal buildings.
- A solar ready definition should include a recorded, structurally sound roof and a pre-engineered chase. Other considerations include orientation, wiring, and plumbing.

3. Add Flexibility to Height Limits and Roof Coverage Limits

- ✓ Issues with the current residential height restrictions of 4 feet have not been reported as barriers to solar installations to date. However, height restrictions may present a barrier to some solar hot water technologies which may need up to 7 feet for some current models. The City of Portland has proposed an amendment to waive an additional 5 feet of height for solar panels.
- ✓ The City of Seattle DPD should confirm a change in height in further coordination and tracking with contractors and “lessons learned” and/or with an interagency task force so that changes made to the code are sustainable over the long-term.
- ✓ While it is typical for engineers to assume a 60% coverage of rooftop when designing a solar PV system, the 20-25% limit in the SMC has not so far been reported as a barrier. A typical 60% solar PV coverage assumption allows space for rooftop-shading obstructions such as stairwells, walls, parapet walls, access walkways (for maintenance and fire access), and rooftop heating, ventilation, and air conditioning (HVAC) equipment. Seattle DPD should investigate the origin of the rooftop coverage limits and either eliminate or expand if possible.
- ✓ California Fire Code requires plan review if a system to be installed will occupy more than 50% of the roof area of a residential building.

4. Develop or Refine Definitions

- ✓ Update the Table of Uses to further ensure that solar energy projects are not unnecessarily prohibited.
 - In the municipal codes and plans, if a use is not included, it can be considered specifically prohibited. Be sure to distinguish small-scale facilities from power plants. Differentiate among types of energy based on sources, scale, technology, and neighborhood impact. The closest facility name found in the SMC is “power plant,” which is specifically or conditionally permitted in most industrial zones. It is specifically prohibited in commercial zones, shoreline districts, and multi-family zones.
 - The suggested definition of “Energy Generation Facility” from *A Local Official’s Guide to Zoning and Land Use for Renewable Energy* (Pioneer Valley Planning Commission n.d.) is “a generator unit that may use a variety of sources and/or products for the production of power:

- a. For use on-site [and/or by non-commercial users], or
 - b. For sale to the grid, accessory to on-site use of power, or
 - c. For sale to the grid as a primary use.”
- ✓ The City of Portland included Green Energy and Use in its Regulatory Improvement Workplan (May 2009). The City of Portland has proposed a green code amendment that will prevent certain types of basic utility uses from requiring a conditional use permit.
 - ✓ Monitor definition of solar collector.
 - No issues reported or found with the current SMC definition of “solar collector”. This should be monitored as technology evolves, along with a full monitoring or “lessons learned” tracking program.
5. Implement a Solar Access Ordinance
- ✓ Develop a solar access ordinance.
 - ✓ An ordinance may be a long-term action item. In the meantime, provide clear guidance and tested examples for solar easements for owners to use in their own easements. Seattle DPD can create solar easement legal forms for residents and business to use and assist with solar easement negotiations.
6. Increase Focus on Commercial and Industrial Land Use/Development
- ✓ The City of Seattle DPD should work with Seattle City Light to address a 100-kW system size limit for net metering. A typical commercial PV system can be at least 200 – 300 kW. Coordination of planning, incentives, solar access, and codes can encourage increased solar energy use in commercial and industrial uses.
 - ✓ As part of developing a solar access ordinance or as part of developing solar access materials for voluntary use, include information helpful to commercial, industrial, and downtown development. The information may have ranges of payback on investment, planning information to help determine if and when solar access may be threatened, and solutions for preventing and resolving solar access issues.

Gaps that can be Addressed by Policies, Permitting, and Review Processes

1. Develop an Interagency and Stakeholder Task Force
- ✓ Standing Task Forces can provide a useful forum for the ongoing monitoring of solar energy policies and programs and implementation of policies and strategies for increasing solar energy

use. A larger task force can be broken up to address various issues like solar access, permitting, and certification.

- ✓ Create a renewable energy task force where solar energy can be further addressed. The City of Seattle has several Green Building programs and policies. An interagency task force could include a representative from each of those programs along with representatives for contractors, training programs and professional solar associations, communities interested in energy efficiency and solar energy, and surrounding jurisdictions.
- ✓ Include the fire department early and often.

2. Require Green Power

- ✓ Improve leadership-by-example by requiring purchase of green power and use of solar technologies on new municipal buildings or major renovations.

3. Expand Training for Contractors, Inspectors, Plan Reviewers, and Other City Departments

- ✓ Increase City-sponsored training. Enough training should occur so that contractors and inspectors can receive training in an open format in the same classroom as other stakeholders and reviewers.
- ✓ Partner with existing organizations that provide training and/or can further develop training like solarwashington.org, community colleges, universities, and technical colleges. These organizations should also have representation on the interagency task force mentioned above.
- ✓ Establish solar training centers or include them as another part of community centers.

Case Study Excerpt from Solar Powering Your Community: Milwaukee, Wisconsin

In 2008, the City of Milwaukee created Milwaukee Shines, a citywide program designed to advance solar energy using the city's Solar America Cities grant. The city is working with a number of partner agencies that have a stake in Milwaukee becoming a sustainable solar city:

- We Energies (local utility);
- Focus on Energy (state public-benefit energy fund);
- Johnson Controls (Milwaukee-based corporate and technology leader); and
- Midwest Renewable Energy Association (site assessor and installer training agency).

Other participants include the **Milwaukee Area Technical College**, which offers courses in renewable energy and hosts a large annual renewable energy summit, and the **University of Wisconsin–Milwaukee's Center for Economic Development**.

The Milwaukee Shines Advisory Committee has created **subcommittees in the areas of finance, marketing and outreach, manufacturing, and training**. Subcommittee members are volunteers. The Milwaukee team has found voluntary participation to be important because it ensures that tasks are approached with interest, enthusiasm, and buy-in.

4. Address Competing Code Requirements through Planning Process

- ✓ Renewable energy, including solar energy, should be considered as part of the planning process on equal ground with tree preservation, shoreline protection, and historic and landmark preservation.
 - While the SMC has no documented barriers or cases where solar installations were denied because of tree preservation and landmark and historic district requirements, it is likely these conflicts will become more prevalent as solar energy use increases. It is recommended that these issues be discussed as part of neighborhood planning, design guideline development, and other community planning processes.
 - If policy evolves to require solar energy use or solar readiness, develop those requirements to address the scale of the project: infill development, block or multi-block development, and neighborhood-wide.
 - Subdivision and short plat codes are currently silent and can be updated to include, or at least consider, right-of-way for renewable energy sources (no code examples found to date).

5. Develop and Implement a Solar Mapping and Tracking Program tied to the Permitting Process

- ✓ Create a solar mapping and tracking program that identifies solar PV and hot water heaters installations by location, type, land use/zoning, and ownership (public, private, institutional, etc.). As a central information resources, the tracking system can inform the enforcement of access laws, assist in assessing the impacts of neighboring development or where solar installations might gain the most overall value, and inform
- ✓ Solar mapping can also be beneficial in informing the local fire officials about types and locations of installations.
- ✓ Include King County in the solar mapping and tracking program since solar hot water permits come from King County and should also be tracked.
- ✓ Use the Los Angeles County and San Francisco examples to further encourage solar energy use through a one-stop Web site that can estimate solar potential and provide additional resources and information. The on-line tool can also be a component in recognizing solar access easements. Part of the catalogue could link to solar easements (which ideally were previously linked to the permitting process) so that examples could be available to planners and citizens. In addition, solar potential can be estimated by entering an address.

6. Allow or Streamline Negotiation for Downtown Interconnection

- ✓ As the downtown grid requires higher reliability than in surrounding areas, interconnection is not currently allowed. However, the more generation capacity in the downtown area the better, from a planning viewpoint, because this increases the likelihood that critical downtown electric loads will be met in the event of transmission and power plant outages. The potential for interconnection should be carefully evaluated, and such a process should address perceived and real issues with potential overload back to the grid, fire hazards, and other concerns.
- ✓ City of Seattle DPD, other departments, their stakeholders, and partners like Northwest Seed should provide resources to further investigate this issue and provide solutions in choosing the most feasible areas for solar energy use in downtown. For example, SCL is implementing a community solar project in Pike Place Market, and customers in the downtown network will want to take advantage of the community solar-related incentives.

Summary Remarks and Next Steps

The City of Seattle green building policies, Seattle DPD regulations and permitting, and Seattle City Light policies are supportive of solar energy use. The SMC addresses solar installations throughout the code, especially in Title 23 Land Use Code. However, to be more proactive in a renewable energy future and encourage increased solar energy use, current codes and processes can be updated, and programs that monitor and track progress can be instituted to ensure effectiveness and incremental improvement.

Embracing the City of Seattle as a Solar America City through internal and external education, outreach, and goal setting would provide a framework for a holistic approach to increasing solar energy use. A solar mapping and tracking program could help the City and contractors market the use of solar PV and solar hot water systems as well as assist in estimating solar potential. A solar tracking and mapping system could also assist in planning efforts for solar overlay zones or neighborhood level energy planning including the balance needed for other issues like view corridors and tree preservation. As economic, cultural, and national policies trend toward an increase in renewable energy, solar energy, along with wind power and other technologies, could be considered as a “line item” part of project and neighborhood planning.

Seattle DPD can use the information and recommendations in this report to refine, add, and implement code updates. The recommendations in this report could be accomplished through several first steps:

1. Begin coordination internally and with other City departments for education and outreach that communicates and refines goals for increased solar energy use.
2. Prioritize code updates, changes, and additions in a way that Seattle DPD can create an action plan to implement the changes in a successful manner with other tasks in the Solar America Cities Program and other relevant programs administered at the City (Green Building, for example).

3. Once internal coordination is underway, establish an interagency task force that can work with Seattle DPD to address issues like code updates and permitting as well as consistency among other local jurisdictions and solar access.
4. Coordinate with Seattle City Light to establish a solar mapping and tracking program that links to the permitting process.
5. Use pilot projects (like a pilot solar overlay zone) and an iterative process to align Seattle DPD tasks with overall City goals for renewable energy, specifically solar energy use, while implementing code changes, and while folding in training programs and updated planning processes to include renewable energy as part of goal setting.

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1.0 Purpose

The purpose of this report is to summarize Seattle Municipal Code (SMC) as it relates to Best Management Practices (BMPs) for increased solar energy use. This report compares Seattle's codes and practices to nationally-recognized BMPs and lists notes and options that could reduce or remove barriers. The information in this report is intended for Seattle Department of Planning and Development (DPD) and Seattle City Light (SCL) staff to use in improving policies and codes related to increased solar energy use.

2.0 Background and Approach

The City of Seattle, Washington, was designated a Department of Energy Solar America City in 2008. Solar America Cities is a partnership between the U.S. Department of Energy (DOE) and 25 cities across the country that have committed to accelerating the adoption of solar energy technologies at the local level. These 25 cities have teamed with municipal, county, and state agencies, non-profit organizations, universities, utilities, developers, and solar companies to accelerate the adoption of solar energy. The experience and lessons learned from these cities will provide guidelines and recommendations for other cities to use.

As part of its participation in the Solar America Cities Program, Seattle has signed a Memorandum of Agreement (MOA) with DOE and the National Renewable Energy Laboratory (NREL) for the promotion of increased use of solar-powered technologies throughout the City. As part of the MOA, NREL provides assistance in identifying how the current policies, practices, codes, and standards in Seattle relate to solar energy installations compared with recognized best practices across the country.

To develop this report, recent BMP documents provided by NREL were reviewed and summarized (see Appendix E, Best Management Practice Review). Next, the City of Seattle's Municipal Code was reviewed. The team also consulted with Seattle DPD staff, SCL staff, and solar installers to clarify some code issues. The information gathered was evaluated for gaps between current codes and BMPs and summarized in this Gap Analysis Report. The BMP resources did not include many specific references to municipal code (except to remove barriers). To include the broader BMPs and to review specific SMCs, this report is organized by review of the BMP or by the municipal code.

3.0 Report Organization

This report is organized into eight sections and five appendices:

- The Executive Summary provides the gap analysis overview and main areas where near-term solutions can be implemented to minimize gaps in increased solar energy use.
- Section 1 above states the purpose of this report.
- Section 2 above describes the background of the project including the City's participation in the Solar America Cities Program.
- Section 3 lists the sections of the report.
- Section 4 is a brief overview of BMPs and municipal code reviews.
- Section 5 summarizes the municipal codes that were found to be most relevant to solar installations and the BMP review.
- Section 6 provides a description of solar access, example ordinances, and a summary of options that could be adapted or implemented by Seattle DPD to further encourage solar energy use.
- Section 7 provides a description of solar mapping and tracking, example projects, and a summary of steps that could be initiated by SCL and Seattle DPD to implement a solar mapping program.
- Section 8 includes a summary of remarks, next steps, and preliminary recommendations.
- Section 9 lists the references used to develop this report.
- Appendices A and B include detailed gap analysis tables.
 - Appendix A contains the BMP Gap Analysis with related code and options. Some of the BMPs were more general or did not directly relate to code, but are included for consideration as policies, process, and code evolve. This appendix lists the BMP, the related code, and options to minimize gaps, if needed.
 - Appendix B is the Municipal Code Gap Analysis. Appendix B begins with a summary of the most relevant codes, then discusses gaps and options. There is overlap between the tables in these appendices; this offers a way for staff to reference the discussion in different ways.

- Appendix C includes a reference section for use in evaluating solar access BMPs, easements, and policy options.
- Appendix D includes graphic references for the solar tracking examples discussed in Section 7.
- Appendix E includes the two previous deliverables from this task: Draft BMP Review and Code Review Meeting Notes.

4.0 Overview of Gap Analysis

The City of Seattle addressed solar energy use in its code as early as 1980. The Seattle DPD and SCL, the City's publicly-owned electric power utility, have a supportive approach to renewable energy, sustainability, and solar energy installations. The Planning and Utilities Departments have developed clear outreach information for residents and business owners to assist with permitting, code compliance, design review, and solar installations. The Seattle DPD has technical resources, a Green Building library, a Green Q that results in opportunities for expedited review of green development projects, and flexibility within the code to accommodate current common solar installations.

Overall, there are not many barriers to solar installations in the SMC. For areas of the code such as tree preservation, shoreline management, and historic preservation where conflicts could occur, no reports were found of issues that have prevented solar installations. As solar energy use increases, it will be important to track and monitor not only installations, but lessons learned from working within current policies and code.

Solar energy systems require direct access to sunlight to operate efficiently. "Solar easements" refers to the ability of one property to continue to receive sunlight across property lines without obstruction from another's property (buildings, foliage, or other impediment). The SMC does not explicitly acknowledge solar easements, but it does not prohibit them. Section 6 discusses solar easements in more detail, and Appendix C includes several related reports and example ordinances from other cities that will be further evaluated and narrowed down as options that might best work in Seattle.

Most BMPs and policies are developed or are most effective for new development. There are also only a few areas or resources that focus on redevelopment. In the SMC, the landmark district and historic preservation code provide a good starting point for policy and process in reviewing redevelopment projects. It may be appropriate to develop requirements based on the scale of the project. For example, it may be possible to require an infill development with three or four townhouses to either install solar PV and solar hot water (SHW) or at least make the development solar-ready. However, it may not be advisable to require a homeowner making a garage renovation to also install solar PV.

On the other hand, the SMC is currently silent in the short plat and subdivision sections for solar energy use. It is possible to include specific language for considering renewable energy as part of the review process for new subdivision development.

Appendix A provides a detailed gap analysis table of the BMPs identified through the BMP review along with case studies and examples.

Appendix B provides a summary gap analysis of the main areas of the SMC that can address increased solar energy use. As mentioned above, the SMC does address solar energy installations in most cases; therefore, the Appendix B gap analysis did not result in many gaps. Areas for improvement for future consideration include more flexible height restrictions, rooftop coverage limits, and further permitting coordination.

5.0 Seattle Municipal Code Review Summary

The following sections summarize Titles and Sections of the Seattle Municipal Code (SMC) that were reviewed and found to be the most relevant codes related to increasing solar energy use and solar installations for residential, commercial, and industrial properties. Each section provides a brief description of the code, the City's current policy, and a summary of BMPs or options that may be considered for removing or minimizing gaps, if any. Appendix A and Appendix B supplement these sections, provide additional detail, and can be referenced by code or by BMP.

5.1 Seattle Energy Code

5.1.1 Description

The 2006 Seattle Energy Code (2006 Washington State Energy Code plus Seattle amendments) is subdivided into a Residential Energy Code (single-family, multi-family, hotel and motel guest rooms) and a Nonresidential Energy Code (all other occupancies).

The purpose the Seattle Energy Code is to provide minimum standards for new or altered buildings and structures or portions thereof to achieve efficient use and conservation of energy (City of Seattle, retrieved December 2009c). The provisions are intended to provide flexibility to permit the use of innovative approaches and techniques to achieve efficient use and conservation of energy.

The Residential Energy Code is structured to permit compliance by one of three compliance paths: (1) systems analysis approach for the entire building and its energy-using sub-systems that may use renewable energy sources; (2) a component performance approach for various building elements and mechanical systems components; and (3) a prescriptive requirements approach.

5.1.2 Best Management Practices

The BMP review listed several best practices including exceeding national standards for energy efficiency, developing green design standards, and requiring a specific capacity or investment level for solar technologies for new construction and major renovation (see Appendix A, Table 1).

5.1.3 Gap Analysis and Options or Goals

The Seattle DPD and SCL have implemented most of the BMPs. The Seattle Energy Code exceeds the national American Society of Heating, Refrigeration & Air Conditioning Engineers (ASHRAE) 90.1 2006 standard by 20%. In the 2006 update, along with improvements and updates in the ASHRAE standard, the Seattle DPD updated its code amendment to continue to achieve 20% enhanced energy efficiency (it may have been only around 10% compared with the new ASHRAE standards). The same exercise is expected to occur in the 2009 update, which will take effect in 2010.

The following areas may be expanded or improved to better focus on increasing solar energy use:

- Specify solar energy use goals as part of green power goals for SCL and for municipal buildings.
- Develop standard Request for Proposal process or template information to guide solar municipal projects that may be adapted as a guide for residents and businesses.

In the State of Oregon, HB 2620 requires that public entities spend 1.5% of the total contract price of a public improvement contract for new construction or major renovation of a public building on solar energy technology. Public entities include, but are not limited to, state agencies, universities, community colleges, school districts and education services districts, and local government (State of Oregon, 2010).

5.2 Title 21 Utility Code

5.2.1 Description

Title 21 Utilities covers the municipal code for water, sewer, solid waste, lighting and power, cable communications, private utilities, street utility, and a few miscellaneous provisions. Title 21.49 relates to SCL Department and Title 21.52 relates to conservation measures. The conservation measures are mainly related to providing energy to low-income residents and finding funding sources to encourage or provide for energy conservation for low-income customers for installation of conservation measures when available and when criteria are met.

5.2.2 Current Policy

Title 21.49 addresses the Net Metering Program, the voluntary Green Power and the Green Up Programs. The code enables SCL to enter into net metering interconnection agreements, and it lists guidelines and limits.

The voluntary Green Power Program has payment levels that customers of various sizes can voluntarily pay each month. Those voluntary payments go into solar or fuel cell projects on public or not-for-profit facilities within SCL's territory, or to regional renewable power projects that generate electricity from small-scale projects that would be in addition to other policy directives or resource commitments for renewable energy. Among the qualifying types of power resources, strong preference is given to solar energy projects.

Resolution 30280 directs DPD and Seattle City Light to "propose to City Council...amendments to the Seattle Energy Code...to achieve up to 20% enhanced energy efficiency beyond the current ASHRAE/IESNA Standard 90.1".

Green Up is SCL's voluntary green power program for residential and business customers. By enrolling in Green Up, customers purchase green power for a portion of their electricity use and demonstrate their support for wind power and other new renewable energy projects in the Northwest (City of Seattle, December 2009d).

5.2.3 Best Management Practices

The following list summarizes BMPs identified during the BMP review that relate to the City's utility code:

- Purchase green power for all municipal buildings.
- For new construction or major renovation of municipal buildings, require a specific capacity or investment level for solar technologies.
- Encourage or require developers to build solar-ready residential and commercial buildings.

5.2.4 Gap Analysis and Options

The code does not require purchase of green power for all municipal buildings, although as discussed in other areas of this report, the Seattle DPD does have a Green Building policy for municipal buildings over 5,000 square feet to be certified as Leadership in Energy & Environmental Design (LEED) silver. The City's Green Building policies, however, do not require a specific capacity or investment level for solar technologies. The City of Seattle and SCL encourage developers to build solar-ready residential and commercial buildings through outreach materials like the "do-it-

yourself home energy audit” and the “green home buyers guide”; however, increased solar energy use is only a small part of most of those materials and not currently a specific focus.

Specific guidelines to solar installations are listed throughout the City’s code. However, the focus is primarily on residential development. There should be a more specific focus on commercial and industrial land uses through solar access materials (once developed) and current outreach materials. In addition, Seattle DPD should work with SCL to address a 100-kW system size limit for net metering, which is typically too small for commercial use.

5.3 Title 22 Building Construction

Title 22 covers health, safety, and welfare of the general public by requiring that buildings and structures comply with accepted standards of the building, mechanical, fire, electrical, and plumbing codes. There are national and international standards, and with some amendments, the City of Seattle requires that buildings comply with the following:

- National Electrical Code
- International Mechanical Code published by the International Code Council (ICC)
- Uniform Plumbing Code
- Uniform Mechanical Code
- International Fuel Gas Code published by the ICC
- Seattle Fire Code (International Fire Code with exceptions and amendments)
- Seattle Boiler and Pressure Vessel Code
- The 2006 Washington State Energy Code (WAC 51-11)

Fire Department Coordination Case Study:

The solar PV industry has been presented with certain limitations in roof installations due to firefighting suppression techniques. The California Department of Forestry and Fire Protection – Office of the State Fire Marshal (CAL FIRE-OSM), local fire departments, and the solar PV industry have developed a Solar PV Installation Guideline.

The intent of this guideline is to provide the solar photovoltaic industry with information that will aid in the designing, building, and installation of solar photovoltaic systems in a manner that should meet the objectives of both the solar photovoltaic industry and the Fire Service (CAL FIRE – OSM 2008).

5.3.1 Best Management Practices and Current Policy

In general, there are national committees working to coordinate improvements to national and international codes to address some limitations to solar PV installations, so a detailed review of these codes is not included as part of this report. Two items worth noting here include Seattle’s history of working to exceed national energy standards and recent developments in coordination with fire departments. California worked to develop an installation guide that would address fire

protection concerns and solar PV rooftop installations (see case study reference in sidebar on the previous page).

As early as 1981, the City of Seattle began analyzing impediments within its regulations to solar installations and energy efficiency (City of Seattle Energy Office 1981). Since about that time frame, the City Council has had a resolution in place to exceed national standards for energy efficiency (currently ASHRAE 90.1 2006). The current policy, Resolution 30280, directs DPD and SCL to “...achieve up to 20% enhanced energy efficiency beyond the current version of ASHRAE/IESNA Standard 90.1” (City of Seattle Energy Code Web site, December 2009c).

5.3.2 Gap Analysis and Options

This analysis does not focus on the national and international codes, but more on the codes where DPD may be able to have an effect. The ICC and other code councils are in the process of reviewing the national and international codes as they relate to clean energy or renewable energy sources.

To specifically focus on increased solar energy use, the City could select appropriate staff to monitor the ICC and other codes and standards groups to take part in review of those standards and to actively report back to Solar America Cities, Sustainable Code, inspectors, and other relevant staff who may be on a “green” task force or committee.

5.4 Title 23 Land Use

5.4.1 Description

Title 23 covers the municipal code for development of subdivisions, short plats, and nonconforming solar collectors; residential, commercial, industrial, and overlay districts; downtown zoning; and transportation concurrency. The land use code covers land use maps and zoning and specifies the requirements for design, setbacks, signs, master plans, implementation, and other land use issues.

5.4.2 Current Policy

Title 23 includes building height, setback restrictions for buildings, lots, and rooftop features for different land use types. The code currently addresses solar collectors in detail for each type of land use as well as non-conforming solar collectors. The code waives the height restrictions for solar collectors from 4 to 15 feet above existing restrictions depending on the land use and/or district.

5.4.3 Best Management Practices

The BMPs for most of the policies or guidelines identified in the BMP review have some overlap with the land use code (see Appendix E, Best Management Practice Review). For additional detail, see Appendix A, which lists the BMPs from the BMP review and lists the codes that may be related to

those mostly broader BMPs along with gaps and options. Appendix B details each of the most relevant codes, like land use code, and details notes, potential options, and/or recommendations for consideration. These tables and Section 6 also contain more detail about solar access laws and practices that directly relate to most of the land use code.

5.4.4 Gap Analysis and Options including Additional BMP Research

As mentioned under Current Policy, most of the land use code not only addresses solar collector installations, but encourages it in most places. Gaps that may be further minimized in the land use code are mainly related to solar access regulations, definitions, and height limitations, although they are not prohibitive.

The land use code is also silent on solar collectors for short plats and subdivisions. While the code is primarily in place to ensure that enough right-of-way is available for infrastructure, traffic, and open space, the City could decide to specifically encourage renewable energy, including solar installations for short plat and subdivision development. San Luis Obispo, CA, has a section under subdivisions for energy conservation. It includes, but does not limit such opportunities to siting of structures for passive heating and cooling, solar orientation, and optimum access. Appendix C includes a full copy of the ordinance.

Research through the American Planning Association yielded additional best management practice information summarized in Table 1 below.

According to the American Planning Association Planning Advisory Service (*A Local Official's Guide to Zoning and Land Use for Renewable Energy*; see Appendix C), communities may adopt and implement a range of planning and development policies to promote use of solar energy. As defined in the report, such actions may include changes in zoning and subdivision regulations and the inclusion of renewable energy policies and strategies as mainstream considerations in comprehensive planning, as well as neighborhood and project planning. Because Seattle is developed, BMPs addressing solar energy in infill development, neighborhood and district revitalization, and various scales of redevelopment have been identified as a potentially effective approach.

Table 1 below highlights BMPs or policies from the Planning Advisory Service report that may be especially helpful in future updates. Appendices A and B include additional gap analyses from the initial BMP review that are relevant to the land use code.

Table 1. BMPs or Policies for Consideration in Future Land Use Code Updates

BMP	Gap	Recommendations/Options <small>(In some cases no gap was listed, but additional options or research notes included for informational purposes.)</small>
<p>1. In the municipal codes and plans, after explicit statements regarding discouraged uses, the Seattle DPD can add “such provision should not be read to discourage the development and use of renewable energy facilities where such facilities meet criteria below or in other code.”</p>	<p>Yes.</p>	<p>Include suggested statement with tables of permitted and prohibited uses. Use #2, #3, #4 in this table to develop definitions of facilities and develop criteria that will allow small-scale facilities where appropriate, including residential multi-family and commercial land use zones.</p> <p>Review process should match scale and complexity of facility. Levels types include:</p> <ul style="list-style-type: none"> • By Right (still includes building permit and environmental review) • Administrative Review • Special Permit • Variance
<p>2. In the municipal codes and plans, if it is not included, it can be considered specifically prohibited. Be sure to distinguish small-scale facilities from power plants. Differentiate among types of energy based on sources, scale, technology, and neighborhood impact.</p>	<p>Yes.</p>	<p>Use suggested definition in #3 for “energy generation facility” based on fuel source, scale, technology, and neighborhood impact. Example definitions are referenced in <i>A Local Official’s Guide to Zoning and Land Use for Renewable Energy</i>.</p>
<p>3. Suggested definition of Energy Generation Facility from <i>A Local Official’s Guide to Zoning and Land Use for Renewable Energy</i>: “Energy Generation Facility” means a generator unit that may use a variety of sources and/or products for the production of power:</p> <ol style="list-style-type: none"> a. For use on-site [and/or by non-commercial users], or b. For sale to the grid, accessory to on-site use of power, or c. For sale to the grid as a primary use. 	<p>Yes.</p>	<p>“Energy generation facility” or similar was not found in the SMC. Closest facility name found in SMC is “power plant,” which is specifically or conditionally permitted in most industrial zones, specifically prohibited in commercial zones, shoreline districts, and multi-family zones.</p>

BMP	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes included for informational purposes.)
4. Adopt “use variance” that would allow individual applicants to seek approval of renewable energy projects that the table of uses would otherwise not allow.	No.	N/A. Use variance in place. May reduce variance request to implement #1, #2, #3, #5 in this table.
5. Overlay districts/Incentives to encourage renewable energy resources.	Yes.	Review successful programs for things like art, open space, and affordable housing. Use successful approaches to renewable energy/solar energy use.
6. Density bonus. Mainly works well in a mixed use, public utility district, or new development setting.	No.	Seattle Municipal Code and policies currently encourage density. In a developed City, this may not be as useful, but could work on a project basis, and this is possible under current code.
7. Expedited review process.	No. Several expedited review paths available.	Set up a “lessons learned” tracking system and ability to address quickly as projects come into review processes. It may be more effective to refine tracking method in the expedited review processes and use for other review and variance processes.
8. Solar access: separate vegetation and buildings when addressing shading.	Yes.	Section 6 discusses solar access in detail. Ashland, OR, code includes a separate section on protection from vegetation.

5.5 Title 25 Environmental Protection and Historic Preservation

Title 25 mainly covers commute trip reduction, State Environmental Policy Act (SEPA) and environmental impact statements (EISs), tree protection, environmentally critical areas and shoreline protection, and landmark and historical districts. The areas that are relevant to improving solar energy use and solar access are tree protection, environmentally critical areas, shoreline protection, and the landmark and historic districts.

5.5.1 Current Policy

Tree Protection

Tree protection regulations vary based on location and fall into three categories: Undeveloped Land, Developed Land, and Environmentally Critical Areas (ECAs). CAM #242 provides a detailed summary of the regulations. The Seattle DPD has regulations that limit the removal of all trees in ECAs and exceptional trees in most zones with limited exceptions for hazardous trees and tree removal during development. The interim regulations that are currently in place specifically do not allow removal of an exceptional tree for solar access. There is some flexibility if the tree is hazardous or if it reduces the development potential of the parcel. However, tree protection is further encouraged by allowing departures from height and setback regulations for development if it will protect the tree.

If the new regulations had more flexibility for solar access, there is the risk of needing to allow tree removal for other purposes. In addition, City staff members are concerned about developers showing solar panels or other solar fixtures on plans to gain additional departures when enforcement is not in place to ensure that the solar installation was built and operational.

Environmentally Critical Areas (ECAs) and Shorelines

The state Growth Management Act requires local jurisdictions to protect their ECAs through an ordinance that must be reviewed and approved by state agencies. ECA protection is a top priority in the state for quality of life, water quality, wildlife protection, and safety. The ECA code will treat solar installations like any other development in a critical area. The current code allows City staff and the Director to make exceptions on a case-by-case basis, and usually requires the owner to show no reasonable alternative. The current ECA codes, including the shoreline management regulations, present barriers to solar installations similar to those restrictions on other types of development in order to protect the critical areas.

City staff may be more willing to specifically allow a solar installation in a critical area if the installation has minimal or no impact. There is no overwhelming amount of current research that shows that a solar installation would have less impact to an ECA like a wetland or riparian area than any other development type or that the benefits outweigh protection of environmentally critical areas. A brief Internet survey of research found one study, *Potential Health and Environmental Impacts Associated with the Manufacture and Use of Photovoltaic Cells*, that discusses this issue. One finding in this study was that the release of trace elements from PV modules installed on sites is unlikely except in the event of fire or explosion (PIER and California Energy Commission, November 2003).

Landmark and Historic Preservation Districts

Title 25 preserves historic, landmark, and neighborhood character by establishing design guidelines. Redevelopment or renovation of buildings in these areas must be approved by a review board. The code is in place to protect what is visible from the public right-of-way (not private views). The codes treat solar installations like any other rooftop installation. The code encourages installations to go toward the middle of the roof. The staff and review boards work to get through all issues to approve renovations and other requests. Out of approximately 300 permits per year, only around a dozen have been denied. Denials are usually related to work that was done without approval and therefore did not work through any issues for the renovation.

Although there have been preliminary inquiries, there are no known solar installations in the historic or landmark districts. The historic preservation staff members frequently coordinate with SCL, Seattle DPD, and the Office of Sustainability to remain aware of programs and maintain a “pro sustainability” attitude toward development.

Incidentally, schools, hospitals, and major institutions work with the Neighborhoods Department to address their master planning. These institutions have historically been proactive in using Green Building technology, and it is not likely necessary to update code as a way to further encourage solar energy use.

5.5.2 Best Management Practices

The BMPs related to this part of the land use code are general and state that codes should not prohibit solar installations based on aesthetics (see Appendix E, Best Management Practice Review). For additional detail, see Appendix B which summarizes this part of the land use code with recommendations and/or options for consideration.

5.5.3 Gap Analysis and Options

Title 25 regulations related to environmental protection and landmark and historic districts do not contain barriers to solar installations. Although the code is in place to protect aesthetics along with character, the review boards prioritize sustainability and work with building owners to resolve issues. As technology and policies evolve to further encourage solar energy use, more conflicts may begin to arise and should be reported. Two options that should be considered in further encouraging solar energy use are as follows:

- Develop a policy to discuss and evaluate renewable energy sources, including solar energy, as a “line item” in neighborhood, master, and district planning. These issues would be on equal footing with key issues like tree preservation, historic and landmark district preservation, and view corridors.
- Develop separate solar installation policies for new construction and for renovation.

The City of Seattle encourages sustainability planning through many policies and programs like the Green Building Task Force and the Seattle Climate Change Partnership. These policies have not yet been incorporated into the planning processes for the comprehensive plan, neighborhoods, and site planning as a specific or “line item” issue. In many cases, it happens organically. However, competing issues like tree preservation and rooftop solar installations are likely to arise more often following current energy efficiency trends. Allowing the communities to provide input on what is important and how those issues may be balanced on different levels (site, infill, and neighborhood) can be addressed through the planning processes.

Seattle DPD staff also suggested developing separate solar installation policies for new construction versus renovation. The National Trust for Historic Preservation does have guidelines that could be adapted specifically for solar installations. The Preservation Green Lab and Sustainability Initiative are good places to use to develop separate policies (National Trust for Historic Preservation, 2010). Clackamas County has developed a solar access ordinance with separate sections for new development and infill development, which is a start to solar installation assistance for different types of development or renovation.

6.0 Solar Access

6.1 Description and Background

Solar energy systems require direct access to sunlight to operate efficiently. The installation of a solar energy system on a new or existing building requires exterior modifications that are subject to building codes and private regulation. The solar access issue is generally thought to involve the potential shading of solar collectors by neighboring structures or vegetation (Kettles 2008).

In the Colleen McCann Kettles report, the solar access issue is separated into two distinct areas: solar easements and solar rights. “Solar easements” refers to the ability of one property to continue to receive sunlight across property lines without obstruction from another’s property (buildings, foliage, or other impediment). “Solar rights” refers to the ability to install solar energy systems on residential and commercial property that is subject to private restrictions, i.e., covenants, conditions, restrictions, bylaws, and condominium declarations, as well as local government ordinances and building codes.

The United States has held that there is no common-law right to sunlight. This has required that specific statutory authority be established to protect the rights of solar users in terms of both their ability to install a solar energy system on their property, and after that system is installed, to protect their access to sunlight so that the system remains operational. Solar access laws have traditionally been enacted at the state and local level. Many states passed solar access laws in the 1970s;

Clackamas County Solar Access Ordinance:

Clackamas County’s solar access ordinance is divided into several sections including sections for new and infill development. Further research using this ordinance may provide an outline for developing separate guidelines for solar installations in new development, infill development, and renovations. Section 6 below and Appendix C have additional detail on this ordinance.

currently there are 34 states (including Washington) that have some form of solar access law (Muller 2009). Washington statutes authorize private easements for solar access and enable local governments to draft even stronger protections (Rappe 2009). The law does not create an automatic right to sunlight. Rather, the law allows parties to voluntarily enter into solar easement contracts for the purpose of ensuring adequate exposure of a solar-energy system (DOE, retrieved December 2010).

In April 2009, Washington enacted S.B. 5136, restricting homeowner's associations from prohibiting the installation of solar energy panels. A homeowner's association may issue guidelines related to visibility and aesthetic aspects of solar panel placement, but it may not prohibit a resident or owner from installing solar panels, provided that the solar panels meet certain criteria (U.S. Department of Energy, 2010).

Several communities in the United States have developed solar access planning guidelines and/or ordinances. Necessary steps in the process include data gathering, policy determination and development, and integrating new and/or existing statutes with solar access. Zoning is a common mechanism used to protect solar access (Kettles 2008).

6.2 Best Management Practices

The following are BMPs for solar access identified through the literature review:

- Explicitly recognize solar easements.
- Ensure that City or County land offices record solar easements and ensure that the easements are transferred with the property title.
- Ensure solar access provisions are available to all property types.
- Provide suggested guidelines for homeowners associations based on state solar rights law to help avoid litigation.
- Utilize standard easement forms and procedures to assist property owners in establishing solar easements.
- Establish additional solar access policy: solar access permits or solar zoning with or without the option for Transfer of Development Rights.

Case Study:

Ashland, Oregon passed one of the first solar access protection ordinances (1981). The ordinance contains solar setback provisions designed to ensure that shadows at the north property line don't exceed a certain height, depending on the zone in which the property is located. The ordinance allows for a 16-foot shadow at the northern property line of commercial properties and a 6-foot shadow along the same property line of residential properties. Property owners can also apply for a permit for protection of shading by vegetation.

- Adopt solar access regulations for infill development, large-scale redevelopment, and new area development and construction (public utility district and subdivisions).
- Create procedures to balance solar access with tree canopy protection and growth.
- As an alternative to granting solar easements, consider providing a registration process that would allow owners to put adjacent properties on notice that a solar system is in place.
- Establish renewable energy overlay zones that would result in the pre-approval of solar siting in designated areas.

6.3 Existing Ordinance Review

The following sections highlight some examples of existing solar access ordinances and codes. Appendix C includes the full ordinances for these examples plus examples from Eugene, OR, and San Luis Obispo, CA. It is unlikely that one example would directly address the City of Seattle’s needs. However, Seattle DPD could work with SCL, other departments, and stakeholders to implement examples that would help increase solar energy use.

Ashland, OR

The ordinance contains solar setback provisions designed to ensure that shadows at the north property line do not exceed a certain height, depending on the zone in which the property is located. The ordinance allows for a 16-foot shadow at the northern property line of commercial properties and a 6-foot shadow along the same property line of residential properties.

Property owners can also apply for a permit for protection of shading by vegetation. Exempt vegetation is all vegetation over 15 feet in height at the time the solar access permit is applied for. The code also includes solar access limits including time limits for installation and discontinued use. A definition for a solar energy system is included:

Solar Energy System. Any device or combination of devices or elements which rely upon direct sunlight as an energy source, including but not limited to any substance or device which collects sunlight for use in the heating or cooling of a structure or building, the heating or pumping of water, or the generation of electricity. A solar energy system may be used for purposes in addition to the collection of solar energy. Theses uses include, but are not limited to, serving as a structural member of part of the roof of a building or structure and serving as a window or wall.

Boulder, CO

The City of Boulder, CO takes an overlay approach to solar access. The code has siting requirements to encourage installation where investments can be more successful. Boulder includes protection for vegetation that is existing at the time of the permit application. Boulder also specifically mentions city-owned property as part of purpose of solar access requirement.

The degree of solar access protection is defined by either a 12 foot or 25 foot hypothetical "solar fence" on the property lines of the protected buildings. The ordinance is designed to protect access for a four hour period on December 21st. Under most circumstances, new structures will not be allowed to shade adjacent lots to a greater extent than the applicable solar fence. There are three Solar Access Areas in the City of Boulder. Following is a list of zoning districts and which solar access area they fall into:

Solar Access Area I: Lots are protected by a 12 foot "solar fence" as mentioned above. These lots are in RR-1, RR-2, RE, RL-1 and MH zoning districts.

Solar Access Area II: Lots are protected by a 25 foot "solar fence". These lots are in RL-2, RM, MU-1, MU-3, RMX, RH, and I zoning districts.

Solar Access Area III: All other zoning districts are in Solar Access Area III and are protected through the solar permit process.

A solar access permit is available to those who have installed or who plan to install a solar energy system and need more protection than is provided automatically in Solar Access Areas I and II.

Clackamas County, OR

Clackamas County developed a solar access ordinance that with separate sections for different purposes. Section 1017 is an ordinance for new development. The purposes of Section 1017 are to ensure that land is divided so that structures can be oriented to maximize solar access and to minimize shading on adjoining properties from structures and trees.

Section 1018 addresses a solar balance point and infill development. The purposes of Section 1018 are to promote the use of solar energy, to minimize the shading of structures and accessory structures, and where applicable, to minimize the shading of structures by trees.

Section 1019 addresses the solar access permit. The purpose is to authorize the owners of certain properties to apply for a County permit that prohibits shade caused by certain vegetation on neighboring properties from being cast on a solar feature(s) on the property of the permittee. Clackamas County is currently proposing to eliminate this ordinance since no one has ever used it, and they are likely adopting a policy that favors tree preservation rather than removal (Hugh, 2010).

6.4 Current City of Seattle DPD Policy, Practice, or Process

The City of Seattle currently does not have any policy to address solar access easements. A homeowner can request a covenant on his/her property to protect solar access; however, this is not widely practiced.

6.5 Gap Analysis and Options

The City does not explicitly recognize solar easements. Additionally, no solar access regulations for new area development and construction currently exist. There is currently no registration process to allow owners to put adjacent properties on notice that a solar system is in place. Solar mapping and installation tracking is one tool that could assist with implementing solar access regulations. Section 7 discusses solar mapping and tracking.

Finally, there are no renewable energy overlay zones for the pre-approval of solar siting in designated areas. All of these result in a gap with the BMPs for solar easements. Table 3 below summarizes options that may be adapted or combined to implement additional solar access protection.

Table 2 . Options Related To Solar Access and Solar Easements

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1. **Recognize solar easements as part of a broader inclusion of a solar and renewable energy component of the City’s comprehensive plan.**
 2. **Determine whether a solar easement ordinance should be created. If increased solar energy use is prioritized as part of City of Seattle policy, an ordinance should be created.**
 3. **Create solar access regulations for new area development and construction.**
 4. **Create incentives for new area development and construction that is willing to include solar access regulations. (This may overlap with an option to further encourage renewable energy sources/solar installations in the land use code for short plats and subdivisions.)**
 5. **Create a formal policy that considers solar access along with potentially conflicting policies like the tree preservation ordinance. In Seattle, it is not likely that solar access would or should be considered a priority over tree preservation or historic preservation, but should be addressed as a clear part of the planning process.**
 6. **Instead of creating a solar easement ordinance, create a registration process to allow owners to put adjacent properties on notice that a solar system is in place. Provide necessary forms, examples, assistance with negotiations, and easy access to the information for voluntary registration and voluntary easements.**
 7. **Establish renewable energy overlay zones for the pre-approval of solar siting in designated areas.**
-

7.0 Tracking Solar Installations

7.1 Description

In this context, tracking solar installations means creating a listing or map that shows where solar PV and/or SHW heaters have been permitted and installed in the City of Seattle. Creating this tracking system will offer the opportunity to identify where solar PV and hot water heaters have been installed, learn about the permitting process, and set targets for incentives and municipal participation. It can also inform and expedite the enforcement of access laws, and can assist planners and contractors in considering impacts of neighboring development or where solar installations might gain the most overall value.

7.2 Best Management Practices

The following are BMPs identified through the literature review.

- Conduct an installation baseline survey (Muller and Truitt, 2009).
- Create a solar system registry.

7.3 Current Policy, Practice, or Process

The City of Seattle currently does not have any policy or procedure to track solar installations. SCL can locate information from its net metered accounts, but the information is not widely available.

7.4 Gap Analysis and Options

The City of Seattle does not currently track solar installations. Aside from a summary of net metered accounts from SCL, the Solar America Cities Team has anecdotal information that solar installations do exist, but there is no detail available to track location, efficiency, or lessons learned for permitting process and code review.

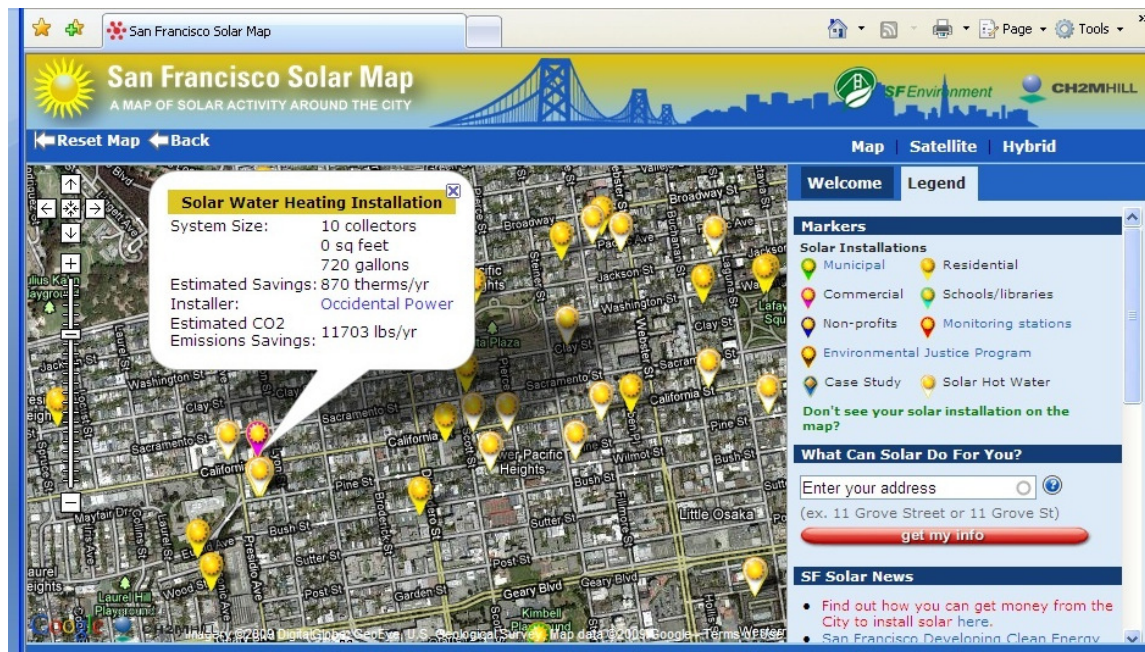
To track solar installations, it is recommended that the City conduct a baseline survey. This can be accomplished by interviewing SCL, local installers, and the State's and/or City's solar rebate program administrators. Use the baseline survey to develop a catalog and a map of solar installations. Use the Los Angeles County and San Francisco examples to further encourage solar energy use through a one-stop Web site that can estimate solar potential and provide additional resources and information. The on-line tool can also be a component in recognizing solar access easements. Part of the catalogue could link to solar easements (which ideally were previously linked to the permitting process) so that examples could be available to planners and citizens.

Examples

Los Angeles County and San Francisco both have a solar map that shows some or all of the following information:

- Location
- Land use
- Type of installation
- Cost of installation
- Cost savings
- CO₂ emissions reduced
- Name of installer

Screenshot of San Francisco's Solar Map



In addition, solar potential can be estimated by entering an address. For Los Angeles County, the estimate uses a 2006 solar radiation model that calculates and ranks solar radiation every 25 square feet in the County. It assumes a system size and calculates potential annual output, cost savings, and emissions savings. Both Web sites also have tips, incentives, and other resources and information to encourage solar energy use. Appendix D includes graphics from the Los Angeles County and San Francisco examples.

Tracking and monitoring solar installations could provide data for the City's overall Sustainable Seattle and Indicators Program (if still active) or a similar benchmarking program.

8.0 Summary Remarks and Next Steps

The City of Seattle green building policies, Seattle DPD regulations and permitting, and SCL policies are supportive of solar energy use. The SMC addresses solar installations throughout the code, especially in Title 23 Land Use Code. However, to be more proactive in a renewable energy future and to incentivize and encourage increased solar energy use, there are codes and processes that could use updates, improvements, and monitoring for “lessons learned”.

Embracing the City of Seattle as a Solar America City through internal and external education, outreach, and goal setting would provide a framework for a holistic approach to increasing solar energy use. A solar mapping and tracking program could help the City and contractors market the use of solar PV and solar hot water systems as well as assist in estimating solar potential. A solar mapping system could also assist in planning efforts for solar overlay zones or neighborhood level energy planning including the balance needed for other issues like view corridors and tree preservation. As economic, cultural, and national policies trend toward an increase in renewable energy, solar energy, along with wind power and other technologies, could be considered as a “line item” part of project and neighborhood planning.

In general, the City of Seattle has been fortunate in that developers and neighborhoods bring “deep green” or “enlightened” ideas to the City’s planners, and these ideas are led by the community. Issues arise with competing values like tree preservation and view corridors, but may be resolved through solar mapping and tracking, neighborhood planning, project/site planning, and similar coordination.

Seattle DPD can use the information and recommendations in this report to refine, add, and implement code updates. The recommendations in this report could be accomplished through several first steps:

1. Begin coordination internally and with other City departments for education and outreach that communicates and refines goals for increased solar energy use.
2. Prioritize code updates, changes, and additions in a way that Seattle DPD can create an action plan to implement the changes in a successful manner with other tasks in the Solar America Cities Program and other relevant programs administered at the City (Green Building, for example).
3. Once internal coordination is underway, establish an interagency task force that can work with Seattle DPD to address issues like code updates and permitting as well as consistency among other local jurisdictions and solar access.
4. Coordinate with SCL to establish a solar mapping and tracking program that links to the permitting process.

5. Use pilot projects (like a pilot solar overlay zone) and an iterative process to align Seattle DPD tasks with overall City goals for renewable energy, specifically solar energy use, while implementing code changes, and while folding in training programs and updated planning processes to include renewable energy as part of goal setting.

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Appendix A: Best Management Practices Gap Analysis

Best Management Practices Gap Analysis

Appendix A includes several tables that compile the best management practices (BMPs) identified during the first task of the analysis to review of materials provided by the National Renewable Energy Laboratory (NREL) as well as some additional research. The tables list the BMP, the Seattle Municipal Code (SMC) that might be related, current policy, and notes and options to be evaluated for removing or reducing the gap, if applicable. After each of the tables, case studies and examples from other cities are summarized.

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Table 1. Building Energy Standards that Mandate Solar Use

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Purchase green power for all municipal buildings. 	<ul style="list-style-type: none"> No current City requirement; Green power is available through the green up program. Green up is a voluntary green power program for residential and business customers. By enrolling in Green Up, customers purchase green power for a portion of their electricity use and demonstrate their support for wind power and other new renewable energy projects in the Northwest. 	<p>No code for purchase of green power.</p> <p>Net metering code under Utility code 21.49.</p>	<p>Yes.</p> <p>Currently voluntary.</p>	<ul style="list-style-type: none"> Require certain percentage of power for municipal buildings be purchased through the green up program. Require purchase of green power for all municipal buildings.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Develop solar and green building design standards. 	<ul style="list-style-type: none"> This BMP is tangentially addressed in the Green Building Policy. It states that all City capital improvement projects over 5,000 square feet fall under the City's Green Building Policy, which sets Silver LEED certification as the goal. Seattle Energy Code exceeds national standards by 20%. 	<p>Title 22, Building and Construction Code.</p> <p>Title 23, each land use code discusses height and setback for land use, which allows for solar access.</p> <p>Resolution 30121, resolution endorsing the City of Seattle Environmental Management Program's Sustainable Building Policy.</p>	<p>No.</p> <p>Green design is encouraged and specific guidelines and assistance is available through Codes, CAMs, Seattle DPD Green library, SCL outreach materials, and staff technical resources.</p>	<ul style="list-style-type: none"> Include solar energy installations in neighborhood design guidelines or other planning documents. Recognize competing factors as part of the clean or renewable energy step in neighborhood planning: <ul style="list-style-type: none"> Tree Preservation Renewable energy with goals for solar energy. Historic and Landmark District/Building Preservation
<ul style="list-style-type: none"> For new construction or major renovation of municipal buildings, require a specific capacity or investment level for solar technologies. 	<ul style="list-style-type: none"> Partly addressed by Green Building Policy, but solar not required. 	<p>Resolution 30121, a resolution endorsing the City of Seattle Environmental Management Program's Sustainable Building Policy.</p>	<p>Yes.</p>	<ul style="list-style-type: none"> LEED silver may cover GHG goals, should City target solar within that goal that does not prohibit further innovation. <ul style="list-style-type: none"> Example: 50% of Municipal LEED buildings will include solar. Avoid new code that would cause more exceptions.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Standard solicitation process for municipal solar installations (RFP/RFQ Process). 	<ul style="list-style-type: none"> No standard RFP process. 	N/A.	Yes.	<ul style="list-style-type: none"> Implement a formal RFP/RFQ process for solar installations. Provide template information to assist municipal departments and private residents and commercial building owners to use in contracting for solar installations.
<ul style="list-style-type: none"> Encourage or require developers to build solar ready residential and commercial buildings. 	<ul style="list-style-type: none"> This practice is encouraged in outreach materials, but not required. 	Title 21, Utilities, maybe. Title 22, Building and Construction Code, maybe. Title 23, Land Use.	Yes.	<ul style="list-style-type: none"> Develop ordinance that requires solar installation or solar ready on new development and major renovation. Be more specific about solar orientation and access for solar energy systems, not just access to streets and parks in design guidelines. Evaluate incentives. Cost is still most prohibitive factor.

Building Energy Standards that Mandate Solar Use: Case Studies and Examples from BMP Review

- In the State of Oregon, House Bill 2620, which requires that public entities spend 1.5 percent of the total contract price of a public improvement contract for new construction or major renovation of a public building on solar energy technology, took effect January 1, 2008. Public entities include, but are not limited to, state agencies, universities, community colleges, school districts and education services districts, and local government (State of Oregon, 2010).

- Tucson, AZ City Ordinance No. 10549. The Mayor and City Council approved an ordinance in June of 2008 that requires all new single-family homes and duplexes in Tucson to be solar ready. The ordinance was developed by a stakeholder group which included Technicians for Sustainability, the Tucson Association of Realtors, the Sierra Club, the Southern Arizona Homebuilders Association, architectural professionals, solar energy companies and elements of the city government. The ordinance requires all new homes to either have a photovoltaic (PV) and solar water heating system installed or to have all the necessary hardware installed so that a system can easily be installed at a later date.

The city of Tucson is still developing rules for PV solar readiness, but the rules for solar water heating readiness have been developed and are being enforced as of March 1, 2009. To comply with the solar water heater readiness requirements, new homes must either have a complete solar water heating system installed or comply with one of two solar stub out options. Option one requires the installation of two insulated pipes and a suitably sized conduit (for two pairs of monitoring and control wires) that run from the water heater area through the roof and are capped. Option two does not require the installation of pipes, but it does require the installation of a sleeve or conduit of sufficient size to hold the two insulated pipes and wires. To comply with option two there must be a straight line from the water heater area to the roof. Both options will greatly cut down on the cost of installing a system at a later date. These requirements may be waived if it can be demonstrated to the building official that compliance is not practical due to shading, building orientation, construction constraints, or the configuration of the parcel of land.

- On August 4, 2008, Mayor Newsom signed San Francisco's groundbreaking green building ordinance that imposes strict new green building requirements on newly constructed residential and commercial buildings, and renovations to existing buildings. The ordinance specifically requires newly constructed commercial buildings over 5,000 sq ft, all new residential buildings, and renovations to areas over 25,000 sq ft in existing buildings that are undergoing major structural upgrades and mechanical, electrical or plumbing upgrades to be subject to an unprecedented level of green building requirements. (http://www.sfdbi.org/ftp/uploadedfiles/dbi/downloads/AB_093.pdf)

Table 2. Improve Permitting Requirements and Processes

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Parallel, consistent, clear and rapid Solar PV and SHW permitting procedures. 	<ul style="list-style-type: none"> If permit needed, must go to Seattle DPD for solar PV and King County Health Department for solar hot water (shw). Solar installations currently permitted based on complexity (weight, structural complexity, commercial and industrial applications). Permitting programs (Green Q and PriorityGreen) in place that incentivize green building techniques, although not exclusive to solar installations. 	Title 23. Land Use King County Plumbing Permit.	Yes. Programs relatively new and untested; should be monitored. Installer interview noted that staff error on the conservative side of decisions when they do not understand solar installation issues. Also noted that electrical inspection led to two changes in meters, eventually back to the original meter base which was costly and time-consuming (this was the Pemtec Project). In the follow up interview, contractor stated that since SCL made a pamphlet available about the process, there were absolutely no issues with the next project (Samaki).	<ul style="list-style-type: none"> Implement a “lessons learned” procedure among staff and departments to improve Green Q and other expedited and traditional permitting procedures in a timely manner with the goal of efficiency and clarity. Work with other local governments in the SCL Territory to make requirements consistent. Tracking through permitting and mapping could enable staff to more efficiently look at other examples and permits as example and to improve procedures.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Provide standard over-the-counter permits for solar energy systems that do not exceed weight threshold on buildings meeting minimum code requirements. 	<ul style="list-style-type: none"> Solar installations currently permitted based on complexity (weight, structural complexity, commercial and industrial applications). Expedited review is on case-by-case basis and determined by the complexity of structural zoning elements at the intake appointment. 	<p>Plumbing and electrical. General. In addition to the requirements of Section 302 (A), two sets of plans and specifications shall be submitted with each application for an electrical permit for an installation of the following:</p> <ul style="list-style-type: none"> (a) services or feeders of 400 amperes or over; (b) all switches or circuit breakers rated 400 amperes or over; (c) any proposed installation the scope of which covers more than 2,500 square feet; (d) any proposed installation which cannot be adequately described on the application form; and (e) installations of emergency generators. 	<p>Yes.</p> <p>Structural concerns are evaluated by the review staff and are not hindered by the building code at this time.</p>	<ul style="list-style-type: none"> There is now an over-the-counter permit for simple installations, but it is not yet widely understood. Additional outreach internally and externally and continued clarification of process is recommended. In addition to options listed in the previous row, Seattle DPD could provide focused training for staff, including inspector and contractor input, so that installations that are not considered complex can be reviewed quickly and on-line. Include wind load rating requirements in permit information. Adoption of an expedited process for solar PV using information like that developed by Brooks Engineering can offer a framework useful to reviewers and contractors (Brooks Engineering, May 2009).

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Flat fees or fee waivers for small solar installations. 	None.	Title 22. Building Code Title 23. Land Use Code.	Yes.	<ul style="list-style-type: none"> Seattle DPD should be included in a process to evaluate incentives to better cover cost, the most prohibitive factor in most cases. This would need to include SCL and likely other departments; it would require ongoing coordination since available incentives change over time. Assuming the overall City policy continues to encourage green building techniques and use of renewable energy sources, City of Seattle DPD can propose a program to implement flat fees or fee waivers for permit review to further incentives solar installations if feasible.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Exempt PV from building height limitations, building permit and design review requirements. 	<ul style="list-style-type: none"> PV installations are exempt and allowed additional height. 23.44.046 Director may permit the installation if it is non-conforming and meets certain other structural and siting conditions; although there are no departures from height restrictions or the additional height criteria based on land use. 	<p>Title 23. Land Use</p>	<p>No.</p> <p>4-foot height limit in code (low-rise zones) was likely based on other national standards for height in the 1980s, not necessarily for solar technologies.</p> <p>If a 60 degree tilt is assumed, some common solar collectors will be ok with this height limit.</p> <p>A typical rack-mounted solar hot water heater, the Heliodyne GOBI flat plate solar collector would not fit within the 4-foot height restriction.</p> <p>Most solar collectors would fit within the 7-foot height restriction (no more than 39 feet above grade), although the rooftop coverage of 20-25% may be limiting.</p>	<ul style="list-style-type: none"> 20-25% rooftop coverage is limiting. While current exemptions and limitations have not been reported to prohibit a solar installation to date, continued coordination with contractors, reviewers, fire department, and other departments should occur as renewable energy policies are implemented and codes are updated.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Standard permitting procedures among and between surrounding jurisdictions. 	<ul style="list-style-type: none"> None. Other programs have historically tried to work with the other communities. Nothing definitive found close to this purpose. 	N/A.	Yes.	<ul style="list-style-type: none"> Work with all jurisdictions in SCL territory to establish parallel permitting standards and procedures. As a first step, include representatives in a Task Force effort. Shoreline, Lake Forest Park, Lake City, Burien, SeaTac, Tukwila, Normandy Park, Renton.
<ul style="list-style-type: none"> Electrical permitting checklist based on common standards (for example UL 1741 and IEEE 1547). 	<ul style="list-style-type: none"> Yes, with some amendments. 	Title 22. Building Code	No.	<ul style="list-style-type: none"> See electrical permit on-line.
<ul style="list-style-type: none"> Permit requires minimum check of mounting system plus weight and electrical review. 	<ul style="list-style-type: none"> Yes. 	Title 22. Building Code	No.	<ul style="list-style-type: none"> See electrical permit on-line.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Codes and ordinances restricting solar not based on purely aesthetic or historical reasons. 	<ul style="list-style-type: none"> Historic/landmark districts go through certification application. There are “New Pathways” programs looking into rehabilitation in coordination with achieving LEED/green building. Need to find out process criteria 	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p>	<ul style="list-style-type: none"> Code is not a barrier. Review boards work through issues. Although code does not specifically show preference for solar installation, there have been no issues. A purpose statement encouraging solar energy use in the comprehensive plan and other planning documents would guide resolution as issues arise.

Improve Permitting Requirements and Process: Case Studies and Examples from BMP Review

- Brooks Engineering has developed a detailed guide on an expedited permitting process which could be adapted and adopted for SCL Territory, first in Seattle DPD. Brooks Engineering periodically provides training to contractors and inspectors and may be a good resource for the City of Seattle for training staff in permitting process improvements (See Brooks Engineering, May 2009).
- San Jose, CA schedules post-installation inspections by appointment with a two-hour window so the contractor does not have to wait all day.
- Portland, OR released updated solar permitting guidelines. In the past, solar installers and the permitting office were confused about the type and cost of the required permit. The new process requires building and electrical permits for a PV system, and building and plumbing permits for an SWH system. The combined permitting price for a residential system is less than \$100, which is less than a conventional building permit based on the total project cost. Solar systems can use a prescribed standard mounting technique and receive a same-day

permit. Larger systems and unique mounting techniques still require engineering review by the city. Portland allows installers to email permit application for qualified projects. The City has also trained staff to review the applications within approximately 24 hours.

- Portland, Oregon: Processing Permit Applications Electronically. The city’s Bureau of Development Services (BDS) has developed a new electronic permit submittal process for solar installers, making it easier than ever to get residential solar building permits. For qualified projects, installers can now e-mail their permit application to the city and expect a review within approximately 24 hours. The city has also trained staff at the permitting desk as solar experts and has set aside weekly times for solar contractors who need help filing their permits in person. In addition, the Bureau of Planning and Sustainability (BPS) is working with BDS to develop testing guidelines and best practices for installing solar energy systems on standing seam metal roofs and for installations with ballasted racking systems.
- Tucson, Arizona: Providing a Solar Permit Fee Credit Incentive up to \$1,000. A solar fee credit incentive will credit (or waive) a portion of or all permit fees on a new building or when retrofitting existing buildings with a qualifying solar energy system. For the installation of a qualifying solar energy system, the program will credit the amount an applicant pays for a building permit up to a maximum of \$1,000 or the actual amount of the permit fee, whichever is less.

Table 3. Technical Training

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> • Training and marketing assistance opportunities for installers. 	<ul style="list-style-type: none"> • SCL has list of contractors that have completed at least three PV installations. No SHW. • SCL does periodic training for inspectors and installers. For example, Brooks Engineering gave two training sessions in January 2010 for installers and contractors (separately). 	N/A.	No.	<ul style="list-style-type: none"> • Option to increase City-sponsored training. Enough training should occur so that contractors and inspectors can receive training in an open format in the same classroom as well as other stakeholders and reviewers.
<ul style="list-style-type: none"> • Establish accredited solar training centers and continuing education programs. 	<ul style="list-style-type: none"> • There are training opportunities from SCL, from outside sources like solarwashington.org , findsolar.com, and outreach materials. 	N/A.	Yes.	<ul style="list-style-type: none"> • Research what training is available through solarwashington.org, City of Portland, and n eastern Washington. • Could add solar to existing training centers. • Research what is available through community colleges and university. Establish partnership or regular coordination.
<ul style="list-style-type: none"> • Utilize opportunities for training and certification like those offered through North America Board of Certified Energy Practioners (NABCEP) for PV and solar thermal installers. 	None.	N/A.	Yes.	<ul style="list-style-type: none"> • City could use this as training and recommendation for installers. • City could recommend that residents and businesses check for certification like NABCEP PV Installer Certification.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Add solar PV and solar thermal education to building and electrical inspector training. 	<ul style="list-style-type: none"> SCL has list of contractors that have completed at least three PV installations. No SHW. SCL does periodic training for inspectors and installers. 	N/A.	No.	<ul style="list-style-type: none"> There are training opportunities from SCL, from outside sources like solarwashington.org and findsolar.com, and outreach materials. Option to increase City-sponsored training, like the Brooks Engineering training for contractors and inspectors. Training should eventually have the different disciplines together rather than separate for additional cross-coordination and understanding.

Technical Training: Case Studies and Examples from BMP Review

- The City of Berkeley’s action plan, now on its third update, incorporates solar energy as a means of meeting many broader goals including carbon reduction, energy independence and security, workforce development, and improved building energy standards. In November 2006, voters passed Measure G, an initiative to reduce Berkeley’s greenhouse gas (GHG) emissions by 80% from 2000 levels by 2050. To meet the requirements of Measure G, the city aims to eliminate 11,600 metric tons of carbon dioxide equivalents (MtCO2e) per year by 2020 through decentralized solar installations on residential and nonresidential buildings. Decentralized solar electric installations will decrease the vulnerability of the local electricity grid and reduce the city’s dependence on fossil fuels.

The city’s Office of Energy and Sustainable Development is implementing numerous services to encourage decentralized solar installations including innovative financing programs, personalized energy consultations, and an online solar map that estimates the solar energy potential for Berkeley homes and businesses. To meet growing demand for solar energy, the city’s action plan includes programs to increase the skilled workforce in Berkeley. The city is implementing youth development job training and placement

programs that will match local residents with high-quality green jobs. The plan also incorporates solar energy technologies in new building energy use standards by calling for all new construction to meet zero net-energy performance standards by 2020.

- **Austin, Texas: Requiring Installers to Demonstrate Qualifications.** To participate in Austin’s Solar PV Rebate Program, the municipal utility (Austin Energy) requires at least one employee of an installation firm to be eligible for NABCEP certification and to pass an exam on local codes and ordinances developed and administered by Austin Energy. To prove NABCEP eligibility, the prospective contractor must have either a letter from NABCEP stating his or her qualifications to sit for the NABCEP test or hold a certificate verifying that he or she has passed the NABCEP test. All registered solar contractors must obtain NABCEP certification within two years of being added to Austin Energy’s registered PV contractor list. All solar installers participating in Austin Energy’s Solar PV rebate program must possess a currently valid certificate of insurance proving the following coverage: \$500,000 Combined Single Limit; Bodily Injury and Property Damage/\$500,000 General Aggregate; Austin Energy must be listed as the Certificate Holder.
- **Salt Lake City, Utah: Organizing a PV/ National Electric Code Training Workshop.** In 2008, the Solar Salt Lake Leadership Team coordinated with the Utah State Energy Program, the Utah Solar Energy Association, Salt Lake Community College, and St. George Energy Services to organize and promote two Solar PV/NEC Code Trainings (hosted by national expert John Wiles) for solar installers, city/county code officials, electricians, and building inspectors. One workshop, held in Salt Lake City (in northern Utah), attracted more than 300 participants, and the other, held in St. George (in southern Utah), had nearly 100 attendees.

Table 4. Solar Access Laws and Policies

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Explicitly recognize solar easements. 	None.	23.22.052 – Subdivision Dedications 23.24.035 – Short Plats Access Land Use Code setbacks	Yes.	<ul style="list-style-type: none"> Solar easements could be recognized as part of a broader inclusion of a solar and renewable energy component of the city’s comprehensive plan. Include guidelines for solar easements in land use code.
<ul style="list-style-type: none"> City or county should record solar easements and ensure they are transferred with the title. 	None.	Title 23. Land Use Code	Yes. Recording private solar easement in property title not mandatory.	<ul style="list-style-type: none"> Pass county ordinance requiring solar easements to be recorded in land title.
<ul style="list-style-type: none"> Ensure solar access provisions are available to all property types. 	Yes, but only for existing state solar easement law.	RCW 64.04.140: Washington Solar Easement Law	Yes.	<ul style="list-style-type: none"> Consider solar access provisions for low-rise, mid-rise and high-rise multifamily and commercial zones that are different than single family requirements.
<ul style="list-style-type: none"> Develop suggested guidelines for Home Owners Association’s based on state solar rights law to help avoid litigation. 	No. State law but no local guidelines.	RCW 64.38.055	Yes.	<ul style="list-style-type: none"> Include information on RCW 64.38.055 in Seattle DPD Solar Energy Systems Client Assistance Memo (CAM). Develop easily accessible guide for potential solar collector owners on state homeowner association restrictions.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Create standard forms and procedures to assist property owners in establishing solar easements. 	No.	N/A.	Yes. No standard form for property owners.	<ul style="list-style-type: none"> Create standard solar easement forms and guidelines for solar owners.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Established additional solar access policy: solar access permits or solar zoning with or without Transfer of Devopment Rights (TDR) option. 	None.	RCW 35.63.080 and 64.040.140: Allows local jurisdictions to create their own solar access ordinance.	<p>Yes.</p> <p>Solar easements only option for protecting solar access.</p>	<p>From Section 7 of Final Report:</p> <ul style="list-style-type: none"> Recognize solar easements as part of a broader inclusion of a solar and renewable energy component of the City’s comprehensive plan. Determine whether a solar easement ordinance should be created. If increased solar energy use is prioritized as part of City of Seattle policy, an ordinance should be created. Create incentives for new area development and construction that is willing to include solar access regulations. (This may overlap with an option to further encourage renewable energy sources/solar installations in the land use code for short plats and subdivisions.) Create a formal policy that considers solar access along with potentially conflicting policies like the tree preservation ordinance. Instead of creating a solar easement ordinance, create a registration process to allow owners to put adjacent properties on notice that a solar system is in place. Provide necessary forms, examples, and easy access to the information for voluntary registration and voluntary easements. Establish renewable energy overlay zones for the pre-approval of solar siting in designated areas.
<ul style="list-style-type: none"> Solar Access regulations for new area development and construction (Planned 	None.	Title 23.22 Subdivisions Title 23.24 Short	<p>Yes.</p> <p>No criteria in existing development ordinances or an</p>	<ul style="list-style-type: none"> Establish alternatives to Planned Development code including provisions for East West streets and dedication of new park or school space as solar easements, as well as parking lots and drainage

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
Unit Development & subdivisions).		Plats Title 23.24.045 Unit lot subdivisions	alternate development ordinance including solar access requirements.	basins where feasible.
<ul style="list-style-type: none"> Procedures to balance solar access with tree canopy protection and growth. 	None.	Title 23.44.008 – Residential, Single Family Development Standards for uses permitted outright	Yes. No consideration of solar access in lot landscaping requirements.	<ul style="list-style-type: none"> Address solar access in city/utility tree planting guides – for on site and neighbors solar access. Consider changing new development landscaping requirements to encourage tree planting that does not interfere with solar access. Address competing values at neighborhood and project level. Allow flexibility to maximize goals in tree preservation, solar access, historic preservation, and critical areas.
<ul style="list-style-type: none"> Provide registration process that would allow owners to put adjacent properties on notice that a solar system is in place. 	None.	N/A.	Yes.	<ul style="list-style-type: none"> See Ashland, OR example. Notify each owner and lessee (need to inquire about adjacent properties); if it meets ordinance requirements and no objections within 30 days, then staff issues a solar access permit.
<ul style="list-style-type: none"> Establish renewable energy overlay zones that would result in the pre-approval of solar siting in designated areas. 	None.	Title 23 Land Use. Title 25. Environmental Protection and Historic Preservation.	Yes.	<ul style="list-style-type: none"> See Boulder, CO example. Would likely need to combine with mapping, tracking, and planning efforts before implementation of this type of measure. Developers and residents bring “deep green” projects to the City, and it may not be as valuable to develop designated areas without understanding of value.

Solar Access: Case Studies and Examples from BMP Review

Summarized from Section 7 of Final Report and from Appendix C:

- **Ashland, OR.** The ordinance contains solar setback provisions designed to ensure that shadows at the north property line don't exceed a certain height, depending on the zone in which the property is located. The ordinance allows for a 16-foot shadow at the northern property line of commercial properties and a 6-foot shadow along the same property line of residential properties.
- **Boulder, CO.** The City of Boulder, CO takes an overlay approach to solar access. The code has siting requirements to encourage installation where investments can be more successful. Boulder includes protection for vegetation that is existing at the time of the permit application. Boulder also specifically mentions city-owned property as part of purpose of solar access requirement. There are three Solar Access Areas in the City of Boulder. A solar access permit is available to those who have installed or who plan to install a solar energy system and need more protection than is provided automatically in Solar Access Areas I and II.
- **Clackamas County, OR.** Clackamas County developed a solar access ordinance that with separate sections for different purposes. Section 1017 is an ordinance for new development. Section 1018 addresses a solar balance point and infill development. Section 1019 addresses the solar access permit. The purpose is to authorize the owners of certain properties to apply for a County permit that prohibits shade caused by certain vegetation on neighboring properties from being cast on a solar feature(s) on the property of the permittee.

Table 5. Lead by Example

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> • Create an interagency task force or committee to focus on solar installations. 	None.	None.	Yes. No task force currently exists.	<ul style="list-style-type: none"> • Create a renewable energy task force. Task force assists with aligning City policies, SPU goals, and community and business involvement.
<ul style="list-style-type: none"> • Create green building and solar-ready standards for all new municipal buildings and renovations. 	<p>Green design is encouraged and specific guidelines and assistance is available through Codes, CAMs, Seattle DPD Green library, and staff technical resources.</p> <p>This BMP is tangentially addressed in the Green Building Policy. It states that all City capital improvement projects over 5,000 square feet fall under the City's Green Building Policy, which sets Silver LEED certification as the goal.</p> <p>The City also has several solar demonstration projects including Woodland Park Zoo and nine school projects.</p>	<p>Title 22, Building and Construction Code.</p> <p>Title 23, each land use code discusses height and setback for land use, which allows for solar access.</p> <p>Resolution 30121, resolution endorsing the City of Seattle Environmental Management Program's Sustainable Building Policy.</p>	Yes.	<ul style="list-style-type: none"> • Require solar-ready standards for municipal buildings, construction and major renovation. • Include solar energy installations in neighborhood design guidelines. It may make more sense to discuss renewable energy, in general, but currently there is a lot of existing solar installation information that could be coordinated with design guidelines to see what makes sense for that district. • Recognize competing factors as part of the clean or renewable energy step in neighborhood planning: <ul style="list-style-type: none"> ○ Tree Preservation ○ Renewable energy with goals for solar energy. ○ Design, solar access for public space. ○ Historic and Landmark District/Building Preservation • Continue developing demonstration projects.

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Install PV and/or SHW systems on suitable municipal facilities. 	None. (confirm)	N/A.	Yes.	<ul style="list-style-type: none"> Specifically include consideration of solar installations as part of “checklist” or process in Green Building Policy to see if it makes sense. Caution in “green window dressing”. Encourage integrated approach. Arrange professional site assessments, include facilities managers. Identify objectives. Consider this a hands-on training opportunity for in-house personnel and site assessors.
<ul style="list-style-type: none"> Create a Comprehensive Community Energy Plan. 	SCL has most of the basic information and outreach materials.	N/A.	Yes.	<ul style="list-style-type: none"> Use existing materials, data, and targets to begin a <u>comprehensive</u> community energy plan process. Process includes mobilizing a steering committee, creating task force to address municipal, residential, and commercial energy issues, workshops, outreach, plan development and implementation.

Appendix A
Table 5. Lead by Example

Lead by Example: Case Studies and Examples from BMP Review:

- Ann Arbor, Michigan: Using a Solar Feasibility Study as a Training Opportunity. As part of Ann Arbor’s Solar America City Project, city staffers, a representative from Sandia National Laboratories, and a representative from CH2M HILL visited five municipal buildings to evaluate the SWH and PV potential of each facility. The evaluation considered criteria including available roof area, roof age and condition, shading factors, electrical interconnection access, conduit routing, facility energy consumption, electrical meter location, potential inverter and disconnect mounting locations, structural roof issues, potential solar thermal applications, and other criteria necessary for a successful solar installation. The feasibility study and associated report serves as a framework for evaluating and reporting on the solar potential of other facilities in the City of Ann Arbor.

During the site evaluations, national laboratory and CH2M HILL experts trained a representative from Recycle Ann Arbor to conduct future scoping visits to other potential sites in the city independent of the experts. Recycle Ann Arbor is working to include solar feasibility studies in the 100 energy audits that Recycle Ann Arbor will be conducting with funding from the Michigan Public Service Commission. Through these audits, Recycle Ann Arbor is developing the Home Energy Performance Certificate. The certification process is expected to include a solar feasibility component, which may ultimately lead to a required solar feasibility study for every Ann Arbor home that goes up for sale.

Table 6. Solar Tracking

Best Management Practice	Current City Policy	Related Code	Gap	Recommendations/Options <small>(In some cases no gap was listed, but additional options or research notes includes for informational purposes.)</small>
<ul style="list-style-type: none"> Conduct an installation baseline survey 	None.	None.	Yes.	<ul style="list-style-type: none"> Create a list or map using the solar permits that shows where solar has been permitted and approved in the City. (SCL has a tracking spreadsheet that may be used as a starting point.)
<ul style="list-style-type: none"> Create a solar system registry 	None.	None.	Yes. No registry exists.	<ul style="list-style-type: none"> Allow people to self-register through an online system.
<ul style="list-style-type: none"> Develop solar tracking website (see Los Angeles County and San Francisco examples). 	None.	None.	Yes.	<ul style="list-style-type: none"> Develop a tracking website through stimulus or other funding. Conduct a solar/rooftop analysis to identify areas with most solar potential through stimulus or other funding.

Solar Tracking: Case Studies and Examples from BMP Review:

- Pittsburgh, Pennsylvania: Assessing Solar Potential through the Solar Roadmapping and Simulation Tool (RooSTer). Through a Solar America City award, the City of Pittsburgh and a team of technical experts led by Sandia National Laboratories are developing RooSTer, a computer application that will allow city planners to select a set of city properties, specify the solar technologies for application to those properties (i.e., solar water heating [SWH] or photovoltaic [PV]), and choose a funding mechanism for procuring each installation. RooSTer will then calculate the year-by-year and cumulative energy production capability of the entire set of installations and project changes in costs for conventional energy over a given period of installations. The tool will also calculate carbon offsets, total costs, and payback periods. RooSTer will allow city planners to experiment with different configurations of solar development in Pittsburgh and quantify the variables associated with that development. City planners will be able to use all of these results to demonstrate to city policy makers and donor institutions the thorough preparation and rigor behind their development plan, and to justify any loans or grants required to complete the solar projects.
- Los Angeles County and San Francisco both have a solar map that shows some or all of the following information: location, land use, type of installation, cost of installation, cost savings, emissions reduced, and name of installer. In addition, solar potential can be estimated by entering an address. For Los Angeles County, the estimate uses a 2006 solar radiation model that calculates and ranks solar radiation every 25 square feet in the County. It assumes a system size and calculates potential annual output, cost savings, and emissions savings. Both Web sites also have tips, incentives, and other resources and information to encourage solar energy use. Appendix D includes graphics from the Los Angeles County and San Francisco examples.

Appendix B: Municipal Code Gap Analysis

Municipal Code Gap Analysis

Appendix B includes several tables that compile summaries of the Seattle Municipal Code (SMC) and their related Client Assistance Memos (CAMs) identified during the second task of the gap analysis to review the SMC. The tables list the code summary, the Seattle Municipal Code (SMC) title number, current policy, and notes and options to be evaluated for removing or reducing the gap, if applicable.

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Table 1. Permit Requirements Summarized from CAM 420

Building Permits	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<p>Building permits may be required for solar energy systems when:</p> <ul style="list-style-type: none"> • Weight is 1,000 pounds or more (a 2 kW photovoltaic system appropriate for a small household weighs approximately 500 pounds and a typical two collector residential solar hot water system weighs approximately 300 pounds). • Installation is structurally complex (as determined by DPD). • Solar projects that require stand alone support structures, or are part of building alterations or additions, valued over \$4,000 (not including the value of the solar equipment). • Project is for a commercial or industrial application. 	<p>Title 22. Building and Construction Code.</p> <p>Title 23. Land Use</p>	<p>No.</p>	<ul style="list-style-type: none"> • Solar is addressed, and it does not require a permit for smaller systems that would likely be used for residential systems in the near future or smaller improvement.
Electrical Permits	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)

<ul style="list-style-type: none"> • Electrical permits are required for all solar electric systems. Electrical permits (no plan review) for systems up to 26kW may be obtained online, or at the Over-the-Counter (OTC) permit area of DPD's Applicant Service Center (ASC). • Electrical systems over 26kW require plan review. Permit fees will vary depending on the size and complexity of the system.. • Seattle City Light requires an Interconnection Application and Agreement, which is conditional on final approval of your electrical permit. 	<p>Title 22. Building and Construction Code.</p> <p>Title 23. Land Use</p>	<p>No.</p>	<ul style="list-style-type: none"> • Specifically addresses solar electric systems, and offers simpler reviews for simpler systems.
<p>Plumbing Permits</p>	<p>Code</p>	<p>Gap</p>	<p>Recommendations/Options</p> <p>(In some cases no gap was listed, but additional options or research notes includes for informational purposes.)</p>
<ul style="list-style-type: none"> • A plumbing permit is required when installing a solar hot water system. Plumbing permits are approved and issued by Seattle/King County Health Department Staff. 	<p>Title 22. Building and Construction Code.</p>	<p>Yes.</p>	<ul style="list-style-type: none"> ✓ Continue to evaluate and address electrical and plumbing permitting for solar installations with King County to simplify permitting where feasible.

Table 2. Land Use Requirements Summarized from CAM 420

General Excerpt from Code	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> In general, alterations and additions to existing buildings must be permitted and conform to lot coverage, height and setback (yard) requirements described in the Land Use Code. 	Title 23. Land Use.	No. Waivers in place for solar collectors.	n/a
<ul style="list-style-type: none"> Solar collectors are permitted outright as an accessory use. This means the collectors are incidental to and support the principal use of the lot, such as a home or business. 	Title 23. Land Use.	No. Specifically addresses solar collectors.	n/a
<ul style="list-style-type: none"> Solar collectors are defined as “any device used to collect direct sunlight for use in the heating or cooling of a structure, domestic hot water, or swimming pool, or the generation of electricity” (SMC 23.44.046). 	Title 23. Land Use.	No. No issues with definition found to date, but should be monitored.	n/a
General Height Requirements	Code	Gap	Comment/Options
<ul style="list-style-type: none"> In Single Family and Residential Small Lot zones, solar collectors may be mounted to extend up to 4 feet above the zone’s height limit, or extend up to 4 feet above the ridge of a pitched roof. However, the total height from existing grade to the top of the solar collectors may not extend more than 9 feet above the zone’s height limit (see CAM 220). 	Title 23. Land Use.	No.	<ul style="list-style-type: none"> Most solar collectors would fit within the 7-foot height restriction (no more than 39 feet above grade), although the rooftop coverage of 20-25% may be limiting.

<ul style="list-style-type: none"> In the Lowrise (multifamily) zone, and Commercial and Neighborhood Commercial zones with 30- or 40-foot height limits, and most shoreline-designated areas, solar collectors may not extend more than 4 feet above height limits (additional height for pitched roofs may not be counted in this measurement). 	Title 23. Land Use.	Yes.	<ul style="list-style-type: none"> If a 60 degree tilt is assumed, some common solar collectors will be ok with this height limit. A typical rack-mounted solar hot water heater, the Heliodyne GOBI flat plate solar collector would not fit within the 4-foot height restriction.
<ul style="list-style-type: none"> In most other nonresidential zones and the Midrise and Highrise zones, solar collectors may extend up to 7 feet above height limits. However, in the nonresidential zones listed below, additional flexibility is provided. 	Title 23. Land Use.	Yes.	
<p>Additional Height Flexibility for Solar Collectors in Non residential Zones</p>	Code	Gap	<p>Recommendations/Options</p> <p>(In some cases no gap was listed, but additional options or research notes includes for informational purposes.)</p>
<ul style="list-style-type: none"> Applicable zones: Industrial, Commercial, Neighborhood Commercial, Downtown, Special Review Districts, and Seattle Mixed zones; Urban Harborfront and Urban Stable shoreline-designated areas. 	Title 23. Land Use.	No.	None.
<ul style="list-style-type: none"> Because many rooftops in nonresidential zones include a variety of mechanical and architectural features, solar collectors are treated just like those features. 	Title 23. Land Use.	No. Solar collectors addressed as other rooftop features.	None.
<ul style="list-style-type: none"> Solar collectors may extend up to 15 feet above the maximum height limit, so long as the combined total coverage of the rooftop features do not exceed 25% of the roof area when typical features (such as elevator penthouses) are present. 	Title 23. Land Use.	No. Solar collectors addressed. Requirements not prohibitive.	<ul style="list-style-type: none"> Most solar collectors would fit within the height restriction although the rooftop coverage of 25% may be limiting.
<ul style="list-style-type: none"> If rooftop features exceed the 25% roof coverage, solar collectors may only extend 7 feet above maximum height limits, except in the Seattle Mixed zone. 	Title 23. Land Use. Title 25 Environmental Protection and Historic Preservation.	No. Solar collectors addressed. Requirements not prohibitive.	<ul style="list-style-type: none"> Most solar collectors would fit within the height restriction although the rooftop coverage of 25% may be limiting.

<ul style="list-style-type: none"> Additional height flexibility is available in the Seattle Mixed and Downtown zones, when screening and design considerations are met. 	<p>Title 23. Land Use.</p> <p>Title 25 Environmental Protection and Historic Preservation.</p>	<p>No.</p> <p>Solar collectors addressed. Requirements not prohibitive.</p>	<ul style="list-style-type: none"> None.
<ul style="list-style-type: none"> In the Special Review Districts such as Pioneer Square, solar collectors may extend to meet the height limit or exceed the roof height by 7, 8 or 15 feet, depending on whether various setbacks and rooftop coverage limits are met, subject to review by the District's Board. Refer to SMC 23.66.140 for details. 	<p>Title 23. Land Use.</p> <p>Title 25 Environmental Protection and Historic Preservation.</p>	<p>No.</p> <p>Solar collectors addressed.</p> <p>Requirements not prohibitive.</p> <p>Special Review Districts have staff and review boards that generally work through issues and are aware of trade-offs.</p> <p>In cases where installation may not seem the best value for energy efficiency, staff will request a building energy audit to determine more integrated approach.</p>	<p>None.</p>

Protecting Solar Access of Property to the North	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> In the Single Family and Residential Small Lot zones, a solar collector exceeding the zone height limit must be placed so that it does not shade the property to the north on January 21 at noon any more than a structure built to the maximum permitted bulk for that zone. For assistance in determining solar exposure, please see CAM 417, Sun Chart: Determination of Solar Exposure. 	Title 23 Land Use.	No. Solar collectors addressed. Requirements similar to other examples in nation, no specific "BMP" to compare.	None.
<ul style="list-style-type: none"> In most other zones, the applicant shall either locate a solar collector at least 10 feet from the north edge of the roof, or provide shadow diagrams to demonstrate the lack of additional shading on January 21 as described above. However, this is not required in Downtown or Industrial zones. 		No. Solar collectors addressed. Requirements similar to other examples in nation, no specific "BMP" to compare.	None.
Setback and Yard Requirements	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Solar collectors are not permitted in a front yard, except for greenhouses that are integrated into the principal structure. 	Title 23 Land Use.	No. Solar collectors addressed. Requirements not prohibitive.	None.

<ul style="list-style-type: none"> In Single Family zones, in a rear yard, up to 15 feet from the rear property line. When there is a dedicated alley the solar collector may up to 15 feet (10 feet in Residential Small Lot zones) from the centerline of the alley. 	Title 23 Land Use.	No. Solar collectors addressed. Requirements not prohibitive.	None.
<ul style="list-style-type: none"> In a Single Family zone, in a side yard, up to 3 feet from the side property line. 	Title 23 Land Use.	No. Solar collectors addressed. Requirements not prohibitive.	None.
<ul style="list-style-type: none"> In Multifamily zones (Lowrise, Midrise, Highrise), solar collectors must be setback 3 feet from the side property line and 5 feet from any principal or accessory structure. The solar collectors in the rear setback must be a minimum of 5 feet from any principal or accessory structure. 	Title 23 Land Use.	No. Solar collectors addressed. Requirements not prohibitive.	None.
<ul style="list-style-type: none"> In Commercial and Neighborhood Commercial zones, solar collectors must be set back 5 feet from any principal or accessory structure. Where a lot line abuts a residentially zoned lot, such as Single Family or Multifamily, the required setback is a minimum of 3 feet. 	Title 23 Land Use.	No. Solar collectors addressed. Requirements not prohibitive.	None.
<ul style="list-style-type: none"> Other zones do not have specific yard-related setback requirements for solar collectors. However, applicants having projects in Special Review Districts (including Pioneer Square and the International District) should consult with the regulations in SMC 23.66.140C and 23.66.332C for setbacks when solar collectors are rooftop features. 	Title 23 Land Use.	No. Solar collectors addressed. Requirements not prohibitive.	None.
<ul style="list-style-type: none"> For additional information about regulations pertaining to greenhouses and sunshades in Multifamily zones, please refer to SMC 23.45.146 	Title 23 Land Use.	N/A.	None.

Appendix B

Table 2. Land Use Requirements Summarized from Cam 420

Lot Coverage Requirements	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Solar collectors do not count as lot coverage if minimum standards are met, including but not limited to height and setback requirements. CAM 220, Lot Coverage, Height and Yard Standards for Homes in Single Family Zones, provides details and illustrations 	Title 23 Land Use.	No. Solar collectors addressed and encouraged.	None.
Nonconforming Residential Uses	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> A solar collector may be added to the existing principal building on a nonconforming residential lot without forcing the entire building to be brought up to current code standards (SMC 23.42.106) 	Title 23 Land Use.	No. Solar collectors addressed and encouraged.	None.

Table 3. Design and Installation Considerations

Solar Access and Performance	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> For optimal solar performance your collectors should be in a location that has clear unobstructed access to the sun (free of shading from roofs, trees and other landscape features) for most of the day and throughout the year. During a site evaluation, a solar contractor should evaluate potential collector locations using a tool like a Solar Pathfinder that illustrates annual shade impacts. 	Title 23 Land Use.	No. Solar collectors addressed and encouraged.	None.
Rooftop Structural	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> For rooftop installations, provide a stable and durable connection to the roof structure for the size and weight of the components used. Take extra care to ensure a leak-proof installation. For unusual, complicated, or heavy installations, consult an experienced building contractor or structural engineer. In some circumstances, engineering documents may be required to address issues of weight and wind sheer if the solar energy system is surface mounted on a flat roof. If you are unsure about the structural integrity of your roof, or if it is in need of repair, have it professionally inspected to verify its condition and suitability. It may be necessary to make roofing improvements prior to mounting solar modules. 	Title 22 Building and Construction. Title 23 Land Use.	No. Solar collectors addressed and encouraged.	None.

Electrical	Code	Gap	Comment/Options
<ul style="list-style-type: none"> • A safe electrical connection of solar equipment to an existing electrical service requires careful consideration and planning. Modifications to branch circuit wiring or the panel board may be necessary. A pv breaker must be connected to the breaker furthest from the main breaker. Information about all changes to the electrical system must be included in the electric permit application. Be sure to follow all manufacturer instructions. • All components of the solar electric system, such as photovoltaic modules and inverters, must be listed by a nationally recognized testing laboratory. • Article 690 of the National Electrical Code has requirements specific to Solar PV Systems. • Seattle City Light’s Interconnection Standards specify electrical requirements in greater detail. 	Title 22 Building and Construction.	No. Solar collectors addressed and encouraged and information provided.	<ul style="list-style-type: none"> • NEC 690 has clear instructions and requirements for marking, wiring, voltage, current, wiring, disconnects, batteries, inverters, grounding, safety, and safety signs. • Seattle City Light’s Interconnection Standards provide clear requirements and reference applicable national codes. • The Green Q Alternative Path permitting process requirements align closely with the proposed Washington State Energy Code. It is estimated that the Alternative Path would result in structures that are 10-15% more efficient than the 2006 energy code.
Building Interated Photovoltaics (PV)	Code	Gap	Comment/Options
<ul style="list-style-type: none"> • Solar collectors can be incorporated into building materials such as roof tiles, shingles and insulated glass frames. These materials are known as building-integrated photovoltaics (BIPV). Often, these types of materials cost more than simple solar modules, but the cost of BIPV materials can be offset by the cost of ordinary materials that would have been used, and are no longer needed. Further discussion of BIPV applications is beyond the scope of this memo. 	Title 22 Building and Construction.	No. No barriers to BIPV as long as it meets structural codes.	None.

Table 4. Tree Preservation

General	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Trees are valued in Seattle and legally protected in a variety of ways. Trees protection regulations are contained in the Tree Protection Ordinance, Seattle Municipal Code (SMC) 25.11, as well as the Environmentally Critical Area Code, SMC 25.09, which provides specific requirements for Environmentally Critical Areas (ECAs) including property adjacent to steep slopes, wetlands, streams, and shorelines. 	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>Yes.</p> <p>Most of the Tree Preservation sections are here to demonstrate how important tree protection is to Seattle’s neighborhoods, character, climate change mitigation and adaptation, and ECAs.</p>	<ul style="list-style-type: none"> Trees are highly valued in the “Emerald City”. No reported conflicts to date. While requirements that prevent tree removal may, in some cases, prevent a successful solar installation, it is not appropriate here to encourage solar energy use as a trade-off to tree protection. Solar energy use, solar installations, and codes should offer to balance based community and project development values, case by case, when tree preservation comes into conflict with a solar installation. Recommendations can be for a site that may encourage solar installations while also meeting tree preservation (and landscape) requirements. City Light has developed “The Right Tree” booklet for selecting trees for planting near power lines. There may be value in developing something similar related to solar/wind/other renewable, on-site energy to use to help balance tree and other conflicts.

Categories of Trees Affected	Code	Gap	Options
<ul style="list-style-type: none"> • Trees over six inches in diameter, measured four and one-half feet above the ground • Exceptional trees — trees that have significant value due to their size and species as defined in Director’s Rule (DR) 16-2008 which have unique historical, ecological or aesthetic value (see DR 6-2001) • Hazardous trees — trees that pose a high risk of damage to persons or property 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
Undeveloped Land Requirements	Code	Gap	Options
<ul style="list-style-type: none"> • No trees 6” in diameter or greater may be removed on undeveloped lots unless they are found to be hazardous (see Hazardous Tree section) or where tree removal is proposed as part of a development.. 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
Developed Land Requirements	Code	Gap	Options
<ul style="list-style-type: none"> • Tree removal on developed land is limited in all lowrise, midrise, and commercial zones and on single family lots 5,000 sq ft in area or larger as follows unless they are found to be hazardous or where tree removal is proposed as part of a development (see Tree Protections During Development section) • No exceptional trees may be removed. • No more than 3 non-exceptional trees 6” in diameter or greater may be removed on a lot in any year period. 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
<ul style="list-style-type: none"> • No permits are required for removal of trees within these limits; however, removal of hazard trees or tree removal as part of a development may require submittal of documentation as discussed in those sections. 	Title 25. Environmental Protection and Historic Preservation.	No.	None.

Appendix B
Table 4. Tree Preservation

<ul style="list-style-type: none"> On single family lots less than 5,000 sq ft, tree removal is allowed where no development is proposed, but may be limited according to the Tree Protections During Development section when development is proposed. 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
Environmentally Critical Areas (ECAs)	Code	Gap	Options
<ul style="list-style-type: none"> Tree removal in ECAs including steep slopes, creeks, wetlands and shorelines is regulated differently because trees play a critical role in preventing erosion, protecting water quality, and providing habitat. In general, removal of trees and vegetation is only allowed in limited circumstances for normal and routine maintenance, removal when part of an issued building or grading permit, restoration, or mitigation of a hazard tree. 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
Tree Protection During Development	Code	Gap	Options
<ul style="list-style-type: none"> Tree protection requirements during development exist in Single-family, Lowrise, Midrise, and Commercial zones as per SMC 25.11, Tree Protection. Development applications must identify all existing trees with a diameter of over six inches on the site plan (including location, size and species/common name). 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
<ul style="list-style-type: none"> In general, exceptional trees must be retained unless doing so would prevent a project from meeting the development potential of the zone even after available departures from development standards are considered. 	Title 25. Environmental Protection and Historic Preservation.	No.	None.

<p>Single Family and Residential Small lots:</p> <ul style="list-style-type: none"> • Exceptional trees may be removed only if protecting the tree during construction would prevent the maximum allowed lot coverage from being achieved. A single family lot's allowed lot coverage is defined as 35% of the lot area or for lots less than 5,000 sq ft, 1,000 sq ft plus 15% of the lot area. Applicants must take advantage of allowed front and/or rear yard departures if this would allow preservation of the tree. To protect the tree, homes and other structures (up to their "development potential") must be designed to avoid the tree's protection area. The tree protection area may be determined by an arborist based on the condition and location of the tree; however, it is generally considered to be the dripline. • If the development potential cannot be achieved in this manner, or if avoiding development in the tree protection area would result in a portion of the house being less than 15 feet in width, then the tree may be removed. Protection of other non-exceptional trees over two feet in diameter is optional, but encouraged. Existing front and/or rear yard departures may be utilized to retain these trees. 	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p>	<p>None.</p>
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<p>Lowrise Duplex/Triplex, Lowrise 1, Lowrise 2 and Lowrise 3 Zones:</p> <p>If there is an exceptional tree on the site, the project must go through administrative design review, even if the project is below the design review threshold for number of units, unless the applicant proposes to preserve the tree without departures.</p> <p>Exceptional tree removal is permitted only in limited circumstances where protecting the tree during construction would prevent the maximum allowed floor area from being achieved. A site's allowed floor area in these zones is the total floor area that could be achieved with the maximum permitted development coverage and the height limit of the applicable lowrise zone.</p> <p>The project (up to its "development potential") must utilize one or more of the following options if it would allow preservation of the tree:</p> <ul style="list-style-type: none"> • Development standard departures through design review including extensions into required setbacks. • Increase in permitted height of five feet if needed to accommodate additional development on an additional floor. The amount of the additional floor area is limited to the amount of floor area lost by avoiding development within the tree protection area. • Reduction in number of required parking spaces (up to a 10% reduction). <p>Protection of other non-exceptional trees over two feet in diameter is optional, but encouraged. Applicants may utilize any of the above departures to retain these trees.</p>	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p>	<p>None.</p>
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<p>Lowrise 4, Midrise, and all Commercial Zones</p> <p>If there is an exceptional tree on the site, the project must go through administrative design review, even in the project is below the design review threshold for number of units or square footage, unless the applicant proposes to preserve the tree without departures. An exceptional tree may be removed only if avoiding development in the tree protection area could not be achieved by development departures through design review and/or up to a 10% reduction in required parking spaces. Protection of other non-exceptional trees over two feet in diameter is optional, but encouraged. Applicants may utilize design review or parking space reductions to retain these trees.</p>	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p>	<p>None.</p>
<p>Other Zones</p> <ul style="list-style-type: none"> • Tree protection may be required as part of design review and/or SEPA evaluation. 	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p>	<p>None.</p>

<p>Tree replacement and site restoration</p> <p>Each exceptional tree and tree over two (2) feet in diameter that is removed in association with development in all zones shall be replaced by one or more new trees, the size and species of which shall be determined by the Director; the tree replacement required shall be designed to result, upon maturity, in a canopy cover that is at least equal to the canopy cover prior to tree removal. Preference shall be given to on-site replacement. When on-site replacement cannot be achieved, or is not appropriate as determined by the Director, preference for off-site replacement shall be on public property.</p> <p>No tree replacement is required if the (1) tree is hazardous, dead, diseased, injured or in a declining condition with no reasonable assurance of regaining vigor as determined by a tree care professional, or (2) the tree is proposed to be relocated to another suitable planting site as approved by the Director.</p>	<p>Title 25. Environmental Protection and Historic Preservation. 25.11.090</p>	<p>No.</p>	<p>None.</p>
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Table 5. Landscape Requirements/Development Standards

General	Code	Gap	Comment/Options
Trees shall be required when single-family dwelling units are constructed. The minimum number of caliper inches of tree required per lot may be met through using either the tree preservation option or tree planting option set forth below, or through a combination of preservation and planting. This requirement may be met by planting or preserving street trees in the public right-of-way.	Title 25.	No. May compete with solar in some cases, but not necessarily a gap.	None.

Table 6. Shoreline Substantial Development Exemptions CAM 209A Summary

Partial Preface Excerpt	Code	Gap	Recommendations/Options <small>(In some cases no gap was listed, but additional options or research notes includes for informational purposes.)</small>
<ul style="list-style-type: none"> State law and the SMC specifically exempt certain types of development from the requirement of obtaining an SSD permit (SMC 23.60.020). If your project qualifies for a shoreline exemption, you must obtain written approval from the DPD before a construction permit can be issued or the project can be implemented. The burden of proof that a development or use is exempt from the permit process is on the applicant. All development within the Shoreline District, even where an exemption from the requirement of an SSD permit is granted, must be consistent with the policies of the State Shoreline Management Act (SMA) and Seattle's Shoreline Master Program (SMP). The SMA also states that permitted uses in the shorelines of the state shall be designed and conducted in a manner to minimize, in so far as practical, any resultant damage to the ecology and environment of the shoreline area and any interference with the public's use of the water. 	<p>Title 25. Environmental Protection and Historic Preservation. Title 23.60.020</p>	<p>No. Shoreline management not barrier to solar installations.</p>	<ul style="list-style-type: none"> Shoreline district is 200 feet from shorelines. Shoreline setback is 25 feet like the rest of the Environmentally Critical Areas (ECA). Exemptions listed below and director's discretion allow flexibility in development of shoreline while providing protection for ECAs which are protected at the local, state, and sometimes, federal level. Exceptions and variances available case by case for reasonable minimal use. This will normally not apply to solar installations, as energy is available from other sources. Shorelines are especially sensitive view corridors.

Types of Projects that are Commonly Shoreline exempt:	Code	Gap	Recommendations/Options (In some cases no gap was listed, but additional options or research notes includes for informational purposes.)
<ul style="list-style-type: none"> Any development with a value of less than \$5,000 that does not materially interfere with normal public use of the water (SMC 23.60.020 A). 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
<ul style="list-style-type: none"> Normal maintenance and repair of existing structures or developments, including damage by accident, fire or elements (SMC 23.60.020 C1). 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
<ul style="list-style-type: none"> Interior remodeling of existing structures (SMC 23.60.020 C1). 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
<ul style="list-style-type: none"> Installation of rooftop mechanical units located behind existing parapet and not visible from the water (SMC 23.60.020 C1). 	Title 25. Environmental Protection and Historic Preservation.	Maybe.	<ul style="list-style-type: none"> Consider solar installation design and visibility before prohibiting based only on visibility.
<ul style="list-style-type: none"> Construction of normal protective bulkhead common to single family residences, including beach nourishment and bioengineered erosion control projects (SMC 23.60.020 C2). 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
<ul style="list-style-type: none"> Emergency construction necessary to protect property from damage by elements (23.60.020 C3). 	Title 25. Environmental Protection and Historic Preservation.	No.	None.

<ul style="list-style-type: none"> • Construction of a single family residence and accessory structures including landscaping by owner, • Lessee or contract purchaser, for his/her use, on dry land only (23.60.020 C6). 	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p>	<p>None.</p>
<ul style="list-style-type: none"> • Construction of a pier, designed for pleasure craft only, for a single family residence, the cost of which • Does not exceed \$2,500 in saltwater, or \$10,000 in freshwater in a single year, and which does not exceed \$12,500 inclusive of the initial investment within 5 years of the initial investment (SMC • 23.60.020 C7). 	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p>	<ul style="list-style-type: none"> • Piers may present opportunities for solar pilot projects and installations. Technology is available to encourage solar energy use on Piers where there may be less obstruction and less issue for visual quality. There is a large (245 kW) solar facility on Pier 96 in the Port of San Francisco, that is highly touted as an example of what solar can do. http://sfwater.org/detail.cfm/MC_ID/12/MSC_ID/139/C_ID/3845.
<ul style="list-style-type: none"> • Demolition of structures, not having a major impact on the shoreline character (SMC 23.60.020 C11). 	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p>	<p>None.</p>

Table 7. Historic Preservation and SEPA Review: Summary from CAM 3000

General Preface	Code	Gap	Comment/Options
<ul style="list-style-type: none"> The City of Seattle has one of the oldest and strongest historic reservation programs in the United States. Seattle is home to seven historic districts and more than 350 individually designated landmarks. All projects that involve changes to the features of historic buildings, sites or landmarks require a certificate of Approval, however, even if they are not subject to SEPA. All projects involving properties located in special review or landmark districts or City of Seattle landmarks must submit an application for a Certificate of Approval before they can submit their Master Use Permit (MUP) application or Construction Permit application. A Certificate of Approval is required prior to issuance of the MUP. 	Title 25, Sections	No.	None.
SEPA Review	Code	Gap	Comment/Options
<ul style="list-style-type: none"> If a project is subject to SEPA review, the threshold determination for SEPA must be made before the appropriate historic preservation board or commission can issue a Certificate of Approval. To determine if your project is subject to environmental review, see DPD Director’s Rule 17-2008. 	Title 25. Environmental Protection and Historic Preservation.	No.	None.
<ul style="list-style-type: none"> The SEPA ordinance indicates that if an existing building that is proposed for demolition or modifications or additions may meet criteria for landmark designation in SMC 25.12, it will have a lower set of thresholds for SEPA review. SEPA review will be required when a proposal is for more than 4 dwelling units or 4,000 square feet of non-residential uses. In most zones within Urban Centers and Station Area Overlay Districts, if the proposal does not affect a landmark, the SEPA review thresholds are higher, at 30 dwelling units and 12,000 square feet of non-residential uses. 	Title 25. Environmental Protection and Historic Preservation.	No.	None.

Historic Preservation: Incentives for Historic Properties in Seattle	Code	Gap	Comment/Options
<p>Zoning Code Relief</p> <p>For a designated landmark, the Director of the Department of Planning and Development (DPD) may authorize a use not otherwise permitted in a certain zone. This provision provides flexibility of use to encourage the preservation and use of historic buildings.</p> <p>Administrative Conditional Uses (SMC Sections 23.44.026, 23.45.124, and 23.47.004) authorize, under certain circumstances, uses in a designated landmark that are not otherwise permitted in the zone in which the landmark is located. The DPD Director may also waive or modify standards for open space, setbacks, width and depth limits for screening, and landscaping for designated landmark structures or within a landmark or special review district (SMC 23.47.027). In addition, parking exceptions for landmark structures are available on an application basis (SMC 23.54.020).</p> <p>In order to be considered for an exception, an application must be filed with DPD. Approval is subject to certain development standards that include approval by the appropriate historic preservation board or the Director of the Department of Neighborhoods.</p>	<p>SMC Sections</p> <ul style="list-style-type: none"> • 23.44.026 • 23.45.124 • 23.47.004 • 23.47.027 	<p>No.</p> <p>These incentives were intended to help with maintenance and repair of landmark properties.</p>	<p>None.</p>
<p>Building Code Relief</p> <ul style="list-style-type: none"> • The Seattle Building Code, adopted by the City Council to accompany the Uniform Building Code, allows the DPD Director to modify specific requirements of the building code for landmark buildings. The Director has the discretion to request alternate requirements that will result in a reasonable degree of safety to the public and building occupants. The building code requires that, when there is a conflict between a general requirement and a specific one, the specific requirement applies. This gives the DPD Director discretion to modify more stringent code requirements. 	<p>Title 25. Environmental Protection and Historic Preservation.</p>	<p>No.</p> <p>These incentives were intended to help with maintenance and repair of landmark properties.</p>	<p>None.</p>

