

# CODE AND REGULATORY BARRIERS TO THE LIVING BUILDING CHALLENGE FOR SUSTAINABLE, AFFORDABLE, RESIDENTIAL DEVELOPMENT

## REPORT #2: STRATEGIES & RECOMMENDATIONS

PREPARED FOR:  
CITY OF VANCOUVER, WA  
CLARK COUNTY, WA

PREPARED BY:  
CASCADIA REGION  
GREEN BUILDING COUNCIL





# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>3</b>
<b>INTRODUCTION .....</b>	<b>5</b>
<b>PROCESS &amp; FINDINGS.....</b>	<b>7</b>
<b>RECOMMENDATIONS .....</b>	<b>9</b>
<b>NEXT STEPS.....</b>	<b>21</b>
<b>APPENDIX A: FULL LIST OF SUGGESTED STRATEGIES FOR REMOVING CODE &amp; REGULATORY BARRIERS .....</b>	<b>22</b>
<b>APPENDIX B: EXTERNAL STAKEHOLDER GROUP PRIORITIES .....</b>	<b>37</b>
<b>APPENDIX C: RECOMMENDATIONS FOR REGIONAL COLLABORATION EFFORT IN CLARK COUNTY.....</b>	<b>43</b>
<b>APPENDIX D: PROJECT PARTICIPANTS &amp; STAKEHOLDERS.....</b>	<b>44</b>



## EXECUTIVE SUMMARY

This report provides strategies and recommendations for removing barriers to sustainable, affordable, residential development (SARD) in Clark County and the City of Vancouver. Building, development, and land use codes were evaluated to identify barriers, and input was solicited from both the private sector building community as well as internal staff to arrive at possible solutions for removing obstacles. The following is a summarized list of prioritized recommendations for the City and County to consider in removing barriers. They are categorized by barrier type and listed as either a strategy that can be easily implemented in the short term or one that will require additional research and resources and therefore represents a longer term strategy. These prioritized recommendations are explained in further detail within the body of this report, along with references to specific examples where other jurisdictions have implemented similar approaches to removing barriers. Additionally, a full list of suggested strategies for all land use, development and building code barriers identified through this project is found in *Appendix A*.

Barrier	Short-Term Recommendations	Long-Term Recommendations
<b>I. INSTITUTIONAL/            PROCESS BARRIERS</b>	<ol style="list-style-type: none"> <li>1. Establish an Expedited or Priority Permit Processing Program for Green Building Projects that Commit to Achieving a High Level of Green Performance (e.g. LEED®-Gold Certification).</li> <li>2. Develop In-House Mandatory Trainings Targeted to Planners, Plans Examiners, Building Officials, and Inspectors.               <ul style="list-style-type: none"> <li>• Combined trainings with monthly or quarterly meetings between building officials, plans examiners, and inspectors to learn about new technologies and coordinate communication on green building projects.</li> <li>• Bring in experts from the private sector and utilize in-house experts to teach trainings, and include field trips to see sustainable development strategies in-place.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>3. Establish Mandatory Green “Pre-Application” Meetings to Involve Building Officials and Reviewers Early on in the Design Process.               <ul style="list-style-type: none"> <li>• Provide early design meetings with building officials and reviewers free-of-charge to applicants as an incentive to encourage more sustainable development projects.</li> <li>• Assign the green project an ombudsman or “green champion” within the department who is responsible for ensuring a facilitated review process, helping to address any code obstacles that do arise, and communicating with project teams on possible solutions.</li> </ul> </li> <li>4. Create a Green Building Technical Assistance Program.               <ul style="list-style-type: none"> <li>• Provide education and outreach internally to City and County staff as well as to the private development community.</li> <li>• Develop a cross-jurisdictional technical assistance program between Vancouver and Clark County and possibly including other cities/towns within the County to help improve consistency and stretch limited resources.</li> <li>• Leverage existing conservation programs funded through local utilities (such as solid waste, drinking water, stormwater, wastewater, or energy).</li> </ul> </li> </ol>
<b>II. BARRIERS TO            ENERGY EFFICIENCY</b>	<ol style="list-style-type: none"> <li>1. Define Requirements and Develop Guidelines for Permitting Renewable Energy and Passive Heating/Cooling Systems.               <ul style="list-style-type: none"> <li>• Define standards for urban and rural small scale wind energy systems, photovoltaic and solar thermal installations, passive solar design, and natural ventilation.</li> </ul> </li> <li>2. Consider Density Bonuses for Energy Efficiency Measures.               <ul style="list-style-type: none"> <li>• Increase floor area ratios (FAR) for high performance projects.</li> <li>• Increase density for cottage housing developments.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>3. Amend SEPA to Include Evaluation and Mitigation of Greenhouse Gas Emissions from New Construction Projects Including Embodied Energy of Materials, Construction Activities, and Ongoing Operating Energy.</li> <li>4. Require and Enforce Performance Testing to Demonstrate Residential Energy Code Compliance.               <ul style="list-style-type: none"> <li>• Develop a process for requiring blower door testing on new construction residential projects.</li> <li>• Develop a job training program around blower door testing to help support local economic development.</li> </ul> </li> <li>5. Develop a District Energy Demonstration Project Ordinance.               <ul style="list-style-type: none"> <li>• Address land use planning issues associated with crossing property boundaries, utility connection requirements, and ongoing maintenance and management for district systems.</li> <li>• Allow for greater flexibility within the current codes for pilot projects and require reporting to inform future code amendments.</li> </ul> </li> </ol>

17 April 2009

Barrier	Short-Term Recommendations	Long-Term Recommendations
<b>III. BARRIERS FOR NON-CONVENTIONAL GREEN BUILDING STRUCTURES</b>	<ol style="list-style-type: none"> <li>1. Allow Flexibility within the building codes for "Incubator" Pilot Projects to Test Alternative Green Materials.</li> <li>2. Develop Code Guidance for Strawbale Structures. <ul style="list-style-type: none"> <li>• Utilize code guidance language from other jurisdictions.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>3. Develop an Advisory Committee of Green Building Experts for Alternative Technologies. <ul style="list-style-type: none"> <li>• Assemble a group of third-party experts charged with reviewing data supplied by the applicant and making recommendations to building officials.</li> <li>• Participate on the City of Portland's Alternative Technologies Committee, or develop a similar committee specific to City and County projects.</li> </ul> </li> </ol>
<b>IV. DRIVEWAY &amp; FIRE ACCESS ROAD WIDTHS</b>	<ol style="list-style-type: none"> <li>1. Develop Code Guidance on Acceptable and Best Practices for Low Impact Development. <ul style="list-style-type: none"> <li>• Provide education and guidance to developers on code-acceptable LID practices.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>2. Update Standards for Streets, Fire Access Roads and Private Driveways. <ul style="list-style-type: none"> <li>• Require LID approaches that reduce impervious surfaces through the design of narrower roads and the use of pervious pavements.</li> </ul> </li> <li>3. Consider Stormwater Management Utility Fee Reductions. <ul style="list-style-type: none"> <li>• Offer fee reductions for LID approaches that manage stormwater onsite.</li> <li>• Tier fee reductions to promote more aggressive LID approaches that include comprehensive natural drainage strategies.</li> </ul> </li> </ol>
<b>V. MINIMUM PARKING REQUIREMENTS</b>	<ol style="list-style-type: none"> <li>1. Consider New Policies to Reduce Minimum Parking Requirements as Part of an Overall Strategy to Increase Alternative Transportation in the Next City/County Comprehensive Plan Update. <ul style="list-style-type: none"> <li>• Allow for a reduction in required onsite parking in exchange for dedicated car-share vehicle spaces.</li> <li>• Reduced or eliminated parking requirements for developments located in mixed-use districts.</li> <li>• Define requirements for bicycle storage facilities.</li> <li>• Develop pedestrian-oriented street standards.</li> <li>• Require pedestrian connections between housing developments and nearby community services.</li> <li>• Allowing greater flexibility for affordable housing projects to reduce onsite parking provided based on need.</li> </ul> </li> </ol>	
<b>VI. SETBACKS &amp; SEPARATION FOR RAINWATER HARVESTING CISTERNS</b>	<ol style="list-style-type: none"> <li>1. Provide Guidance on Designing, Permitting, Installing, and Maintaining Rainwater Harvesting Cisterns into New Construction and Retrofit Applications.</li> <li>2. Revise Code Requirements for Setbacks and Building Separation for Above-Ground Rainwater Cisterns. <ul style="list-style-type: none"> <li>• Eliminate setback and separation requirements for above ground cisterns.</li> </ul> </li> </ol>	
<b>VII. CLUSTER DEVELOPMENTS/ COTTAGE HOUSING</b>		<ol style="list-style-type: none"> <li>1. Develop New City and County Cottage Housing Codes.</li> </ol>
<b>VIII. WATER-RELATED BARRIERS</b>	<ol style="list-style-type: none"> <li>1. Provide Guidance on Designing, Permitting, Installing, and Maintaining Rainwater Harvesting Cisterns. <ul style="list-style-type: none"> <li>• See recommendation above.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>2. Collaborate in a Neighborhood-Scale Net Zero Water Pilot Project. <ul style="list-style-type: none"> <li>• Develop a demonstration ordinance that allows for flexibility within the current codes for a neighborhood-scale development with net zero water goals</li> <li>• Require monitoring and reporting of water use and wastewater reduction, and utilize data to support future code updates.</li> </ul> </li> </ol>

The next step in the SARD project will be to evaluate the cost and benefits of the recommended list above to both the City and County as well as the private development community. A final report will be published in June 2009

# INTRODUCTION

## BACKGROUND

The City of Vancouver, Washington, in partnership with Clark County, has contracted with the Cascadia Region Green Building Council (Cascadia) to evaluate City and County codes and regulations that pose barriers to sustainable, affordable, residential development (SARD). Cascadia’s Living Building Challenge has been used as the benchmark performance standard for the code study because it currently represents the most stringent standard established for green building projects across the country.

The following codes were analyzed as part of this project:

Code	
Zoning	VMC Title 20, CCC Title 40
Land Divisions	VMC 20.320, CCC 40.540
Planned Unit Development	VMC 20.260, CCC 40.520
Site Plan	VMC 20.270, CCC 40.520
Grading	VMC 17.12, CCC 14.07
Erosion Control	VMC 14.24, CCC 40.380
Stormwater Management	VMC 14.25, CCC 40.380
Parking Standards	VMC 20.945, CCC 40.340
Street Standards	VMC Title 11, CCC 40.350
International Building Code – 2006 Edition	Standards and Amendments WAC 51-50
International Mechanical Code – 2006 Edition	Standards and Amendments WAC 51-52
International Fire Code – 2006 Edition	Standards and Amendments WAC 51-54
Uniform Plumbing Code – 2006 Edition	Standards and Amendments, WAC 51-56, 51-57
Washington State Energy Code – 2006 Edition	WAC 51-11
Washington State Ventilation and Indoor Air Quality Code – 2006 Edition	WAC 51-13
Onsite Sewage Systems	CCC 24.17
Group A Public Drinking Water Systems	WAC 246-290
Group B Public Drinking Water Systems	WAC 246-291
Large On-Site Sewage Systems	WAC 246-272B
Wastewater Treatment Facilities	WAC 173-240
Evidence of Adequate Drinking Water Supply	RCW 19.27.097

In November 2008, Cascadia published *Report #1: Findings* identifying more than 80 obstacles that currently exist within Vancouver and Clark County codes and regulations which project teams may encounter when seeking approval for a Living Building project. Roughly 30 of these code barriers were found in the land use and development codes and another 50 within the building, plumbing and energy codes. Some of the barriers were directly related to City and County regulations while others extended beyond the authority of the local jurisdictions to the state level. A full list of building, development, and land use code barriers identified in *Report #1: Findings* can be found online at: [www.cityofvancouver.us/envplan](http://www.cityofvancouver.us/envplan).

## GOALS

The purpose of *Report #2: Strategies & Recommendations* is to:

- summarize the process for developing a comprehensive list of strategies to address the barriers identified in Report #1,
- present the list of strategies in an organized and easy-to-reference format, and
- provide both short-term and long-term recommendations on a prioritized list of key barriers in order to assist the City and County with addressing and removing barriers to sustainable affordable residential development.

The SARD project is funded through the Washington State Department of Community, Trade and Economic Development.

## PROCESS & FINDINGS

The process of developing strategies and recommendations for addressing code and regulatory obstacles to the Living Building Challenge involved a series of facilitated meetings with both internal and external stakeholder groups between January 2009 and March 2009. The purpose of the meetings was to solicit feedback from key participants and to brainstorm solutions that were both creative and feasible for implementation.

### EXTERNAL STAKEHOLDER MEETINGS

The City and County invited over 150 local stakeholders from the private sector (including developers, architects, engineers, home builders, affordable housing developers and green building advocates) to participate in a series of three workshops.

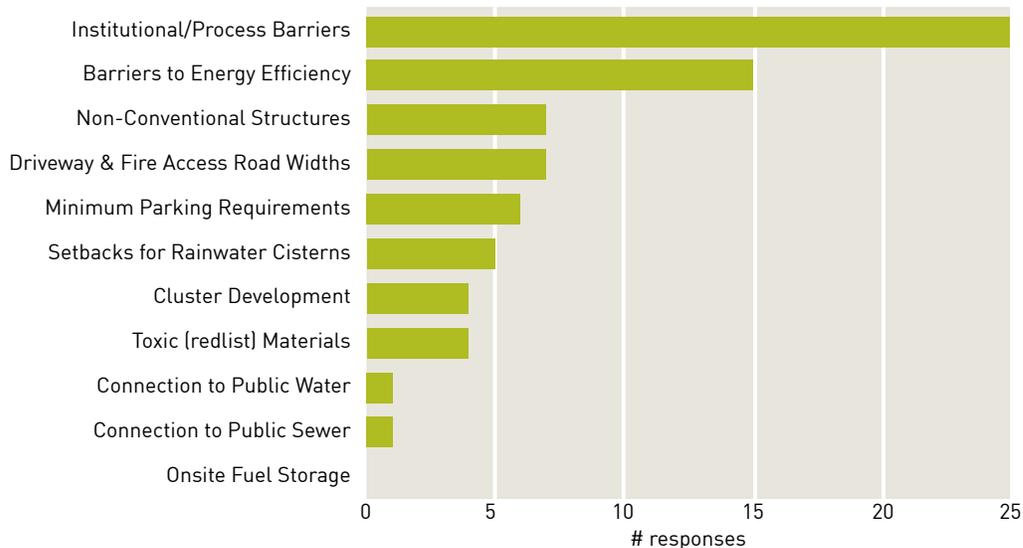
**Workshop #1:** Cascadia presented key findings from the code analysis process and requested feedback on additional code and regulatory obstacles from the perspective of the development community.

**Workshop #2:** Working with a summarized list of key findings, participants were divided into small groups to discuss the barriers and brainstorm on possible solutions for how the City and County could address them. A total of 90 possible strategies were recorded (see *Appendix B*).

**Workshop #3:** Cascadia organized the list of possible strategies into three categories: Education, Incentives, and Code Language/Regulatory Process Change. Participants were then asked to select the top four types of barriers that they would like to see the City and County prioritize as part of the SARD project, and to select the most important strategies within those categories for addressing the barriers.

Table 1 shows the results from the prioritization exercise, demonstrating a clear direction from the private stakeholders that the need for addressing institutional and process barriers within the regulatory system is the highest priority. Barriers to energy efficiency goals, approvals for non-conventional structures such as strawbale construction, and impervious surface coverage for driveway and fire access roads were the next highest priorities, respectively.

**Table 1: External Stakeholder Priorities**



In addition to the three private stakeholder meetings, Cascadia also presented the SARD project at the Vancouver Planning Commission's First Tuesday event in March 2009 and attended a public open house, also in March 2009, to further communicate the project's goals and findings.

## INTERNAL STAKEHOLDER MEETINGS

A meeting with the City and County building officials was held to review the building code barriers matrix and brainstorm on strategies for removing obstacles within the International Building, Mechanical and Fire Codes and within the Washington State Energy Codes.

Due to the inter-agency nature of the barriers arising around projects seeking net zero water goals, a separate meeting was held specifically to discuss the draft water barriers diagram. This diagram, included in *Report #1*, illustrates the myriad approvals, variances, and waivers required for a project seeking to source its water supply solely from harvested rainwater and reclaimed greywater, and to treat its wastewater onsite through composting toilets, membrane bioreactors and/or living machine technologies. The meeting was attended by representatives from the City and County building departments, Clark County Public Health, Clark Public Utilities, Clark Regional Wastewater District, the Plumbers & Steamfitters Union UA290, and the Washington State Departments of Health and Ecology, and was facilitated by Cascadia and SERA Architects.

A complete list of suggested strategies and resources for each barrier, organized by code type, is found in *Appendix A*.

Lastly, the external stakeholders' prioritized list of strategies was presented to the SARD Steering Committee (comprised of City and County department heads, managers, and key staff) who provided feedback on the feasibility and applicability of the stakeholders' input, and made additional suggestions that were taken into consideration. The outcome of this process is a list of prioritized recommendations presented in the next section.

A list of external and internal stakeholders who participated in this process can be found in *Appendix D*.

## RECOMMENDATIONS

The following is a list of priority recommendations for the City and County in removing barriers to sustainable, affordable, residential development. The recommendations were developed by analyzing the priorities identified by the external stakeholder group, suggestions and feedback from City and County staff, and extensive research on strategies for increased local government support of sustainable development. In particular, the Rocky Mountain Land Use Institute's *Draft Sustainable Community Development Code* and the *Code Barriers to the Living Building Challenge Report* by the Development Center for Appropriate Technology and Sustainable Alternatives Consulting, Inc. were two resources used in developing recommendations for the SARD project. Both short term and long term recommendations are provided in an attempt to further prioritize the removal of barriers by identifying those that can be easily and quickly adopted versus those that will require additional analysis, research, or processes prior to implementation. A full list of suggested strategies for all land use, development and building code barriers identified in *Report #1* is found in *Appendix A*.

---

### I. INSTITUTIONAL/PROCESS BARRIERS

#### Background

Throughout the external stakeholder workshops, a resounding theme from participants was the desire for a more collaborative, consistent, and open process for seeking regulatory approval for sustainable, affordable, residential development projects. Green projects typically have to justify design approaches over again for each project because there is a lack of consistency or communication among reviewers and inspectors on approved alternatives, requiring a sometimes lengthy and expensive permitting process for applicants.

A shift amongst building and planning departments from business-as-usual approaches to fully embracing and supporting more integrated, sustainable development practices is already underway around the country. The City of Vancouver and Clark County are not alone in their efforts to address institutional barriers within their agencies, and there is much to learn from other local municipalities who have found innovative ways to leverage limited resources for developing policies, programs, and incentives that promote sustainable development. At the same time, the responsibility of regulatory agencies to ensure that buildings are designed and constructed to safeguard public welfare must not be undermined. Instead, a shift in focus is needed from upholding minimum standards towards a more comprehensive approach for removing obstacles and encouraging projects that have lower impact, higher energy and water efficiency, and healthier indoor environments for building occupants.

#### Short Term Recommendations

1. Establish an Expedited or Priority Permit Processing Program for Green Projects.

Because green building projects, especially those that are proposing new technologies or alternative materials or methods from those prescribed in codes, can require longer time for review and approvals, guaranteeing a shorter review schedule or placing these projects at the front of the review line is one way to help facilitate a smoother process for applicants. While the external stakeholder group recommended the development of a process for qualifying an "A-list" of designers, builders, etc. to help streamline approvals, this approach is not recommended for a variety of reasons—primarily because building officials are responsible for ensuring that each project meets public health and safety standards. Instead, providing expedited or priority review for projects (rather than individuals) demonstrating a commitment

to reaching a high level of green building design (e.g. LEED-Gold certification) would ensure the integrity of such a program. Additionally, many building departments have instituted a priority or expedited permitting program for green projects that is integrated within their existing review process and therefore does not require extensive staffing or resources to manage.

### Examples

- Issaquah, WA: [www.ci.issaquah.wa.us](http://www.ci.issaquah.wa.us)
  - Chandler City, AZ: [www.chandleraz.gov/Content/20080626\\_15.pdf](http://www.chandleraz.gov/Content/20080626_15.pdf)
  - Northbrook Village/Town, IL: [www.northbrook.il.us/Government/BoardsCommissions/Passouts/2008/051308RBM/documents/NB\\_GreenBuildingInitiativeOrdinance.pdf](http://www.northbrook.il.us/Government/BoardsCommissions/Passouts/2008/051308RBM/documents/NB_GreenBuildingInitiativeOrdinance.pdf)
2. Develop In-House Mandatory Trainings Targeted to Planners, Plans Examiners, Building Officials, and Inspectors.

As new green building technologies and systems are introduced into the market, the importance of ongoing training for planning and building department staff is especially critical to help address institutional and process barriers. The external stakeholder group indicated that consistency amongst reviewers or inspectors who are charged with approvals throughout the life of the project is lacking. Feedback from the City and County building departments indicated that while a single plans reviewer or inspector throughout the project's approval process is ideal, this is not always feasible based on resource or staffing issues. Trainings combined with monthly or quarterly meetings between building officials, plans examiners, and inspectors to learn about new technologies and coordinate communication on green building projects is one way to help address this obstacle. Bringing in experts from the private sector and utilizing in-house experts to teach trainings, as well as taking field trips to see sustainable development strategies in-place are all effective ways to host trainings on a limited budget.

### Example

- King County DDES Training Series: <http://your.kingcounty.gov/solidwaste/greenbuilding/toolkit/governments/permit-training.pdf>

### Long Term Recommendations

3. Establish Mandatory Green "Pre-Application" Meetings to Involve Building Officials and Reviewers Early on in the Design Process.

A key component to a successful green project, and particularly important for projects seeking to meet the Living Building Challenge, is the utilization of the integrated design process amongst project teams. As described in *Report #1*, the traditionally linear nature of the approvals process can create barriers for integrated design projects, which inherently rely on an iterative information cycle. One high priority for the external stakeholder group was to replace the "turn in, get feedback, turn in again, get feedback" review approach with more collaborative face-to-face opportunities. This allows project teams to meet with those who will be responsible for reviewing and approving their plans and have constructive dialogues around opportunities and challenges while the project is still in the early stages of design. Early design meetings with building officials and reviewers may be free-of-charge to applicants as an incentive to encourage more sustainable development projects, or they may be an added cost to the project team. If the latter is implemented, education and communication around involving building and public health officials early on to help create a smoother and quicker overall review process will be important so that the perception of increased fees does not discourage green projects. Assigning the green project an ombudsman or "green champion"

within the department who is responsible for ensuring a facilitated review process, helping to address any code obstacles that do arise, and communicating with project teams on possible solutions can further assist the City and County with establishing a more integrated approach for permitting.

4. Create a Green Building Technical Assistance Program.

A green building technical assistance program would serve two purposes: first to support education and outreach internally as well as increase the collaboration between different departments; and second to provide the private development community with an established starting point for tackling code obstacles for green projects. The external stakeholder group expressed a desire to shift the mindset of the jurisdictions to be more positive and open to new ideas. Knowing that they have a point of contact for bringing forward new and innovative sustainable development design strategies is one way to address this shift in mindset.

To leverage resources, a cross-jurisdictional technical assistance program between Vancouver and Clark County and possibly including other cities/towns within the County could be established. Many jurisdictions have found resources to establish green building technical assistance programs that dovetail with already established conservation programs funded by local utilities, for example, through solid waste, drinking water, stormwater, wastewater, or energy utility conservation fees.

**Examples**

- City of Portland, OR: [www.portlandonline.com/osd/index.cfm?c=41481](http://www.portlandonline.com/osd/index.cfm?c=41481)
- City of Kirkland, WA: [www.ci.kirkland.wa.us/Community/Kirkland\\_Green/Green\\_Building.htm](http://www.ci.kirkland.wa.us/Community/Kirkland_Green/Green_Building.htm)
- Sarasota County, FL: [www.scgov.net/sustainability](http://www.scgov.net/sustainability)

---

## II. BARRIERS TO ENERGY EFFICIENCY

### Background

The City and County are required to enforce the Washington State Energy Code (WSEC) and are not permitted to amend the residential requirements of the code. However, few code provisions exist within the WSEC that prevent green building projects from moving beyond minimum code requirements toward net zero energy, a prerequisite of the Living Building Challenge. Instead, the SARD project findings point toward a lack of education, information, incentives, and enforcement that creates obstacles for design teams seeking to increase energy efficiency and use viable renewable energy sources for their projects.

Both the City and County have sustainability policies that extend beyond building and development departments. New incentives, education, and programs around energy efficiency and renewable energy should be coordinated with existing sustainability policies.

While the short term recommendations outlined below provide suggestions on how to provide permit guidance and incentives, the long term recommendations take a step beyond removal of existing obstacles into the realm of increased regulatory oversight with the intent of evening the playing field for projects seeking net zero energy goals.

### Short Term Recommendations

1. Define Requirements and Develop Guidelines for Permitting Renewable Energy and Passive Heating/Cooling Systems.

The obstacles around renewable energy systems and passive heating/cooling design strategies currently acceptable by codes stem from either the absence of defined standards, or from the real or perceived obstacles that project teams may encounter during the regulatory process. The development of code guidelines addresses both the issues.

Looking to wind ordinances developed by other jurisdictions, it is recommended that Vancouver and Clark County define standards for permitting both urban and rural small scale wind energy systems including setback, height and noise requirements, as well as structural requirements for building-mounted installations. Similar code guidance for photovoltaic and solar thermal installations should be developed. Lastly, guidelines for project teams wanting to utilize passive heating/cooling design strategies will help communicate what is allowed by code. Guidelines should specifically address optimizing solar orientation, balanced with the importance of shade and tree retention onsite. A review of Clark County's former solar ordinance could serve as a launching point for new policy development.

#### Examples

- American Wind Energy Association. *In the Public Interest: How and Why to Permit for Small Wind Systems: A Guide for State and Local Governments*. [www.awea.org/smallwind/pdf/InThePublicInterest.pdf](http://www.awea.org/smallwind/pdf/InThePublicInterest.pdf)
- National Renewable Energy Laboratory. *An Overview of Existing Wind Energy Ordinances*. [www.windpoweringamerica.gov/pdfs/policy/2008/ordinances\\_overview.pdf](http://www.windpoweringamerica.gov/pdfs/policy/2008/ordinances_overview.pdf)
- Lincoln City, OR, Draft Ordinance No. 2009-06 for Small Wind Systems and Small Solar Energy Systems.
- City of Seattle's Client Assistance Memo #420: Solar Electric Systems. [www.seattle.gov/DPD/Publications/CAM/cam420.pdf](http://www.seattle.gov/DPD/Publications/CAM/cam420.pdf)
- City of Fort Collins, Colorado, Land Use Code: Solar Access, Orientation, and Shading: [www.colocode.com/ftcollins/landuse/article3.htm#sec3d2d3](http://www.colocode.com/ftcollins/landuse/article3.htm#sec3d2d3)
- Multnomah County, Oregon, Solar Access Provisions for New Development: [www2.co.multnomah.or.us/Community\\_Services/LUT-Planning/urban/zonordin/solar/solar\\_index.html](http://www2.co.multnomah.or.us/Community_Services/LUT-Planning/urban/zonordin/solar/solar_index.html)

2. Consider Density Bonuses for Energy Efficiency Measures.

While Clark Public Utilities does offer rebates for energy conservation measures, additional incentives within the authority of City and County building and planning departments may help offset the added costs for incorporating aggressive efficiency measures and renewables, especially for affordable housing projects. Offering density bonuses in strategic zoning areas such as downtown or neighborhood business districts in exchange for high performance energy efficient buildings is one suggestion. Utilizing increases in floor area ratios (FAR), instead of straight height restrictions, allows for flexibility in the building design. Where density bonuses already exist for affordable housing, combining bonuses assists affordable housing projects by offsetting the initial costs of design or construction for efficiency measures or renewables with additional financing or revenue from added housing units.

In less dense suburban and rural areas of the City and County, developing provisions for cottage housing can help encourage smaller, more energy efficient homes. See *recommendations under Cluster Development/Cottage Housing*.

### Examples

- Arlington County, VA: [www.arlingtonva.us/departments/EnvironmentalServices/epo/EnvironmentalServicesEpoIncentiveProgram.aspx](http://www.arlingtonva.us/departments/EnvironmentalServices/epo/EnvironmentalServicesEpoIncentiveProgram.aspx)
- City of Seattle, WA: [www.seattle.gov/dpd/greenbuilding](http://www.seattle.gov/dpd/greenbuilding)

### Long Term Recommendations

3. Amend SEPA to Include Evaluation and Mitigation of Greenhouse Gas Emissions from New Construction Projects Including Embodied Energy of Materials, Construction Activities, and Ongoing Operating Energy.

In 2007, King County adopted requirements for evaluation of greenhouse gas emissions for projects requiring review under the State Environmental Policy Act (SEPA), followed by a similar ordinance adopted by the City of Seattle. While no mitigation efforts are required at this time by either jurisdiction, a climate change impacts worksheet was developed to assist project teams in assessing and reporting the quantity of greenhouse gas emissions generated over the life span of a building. This includes emissions associated with obtaining construction materials, fuel used during construction, energy consumed during the building's operation, and transportation impacts of the building's occupants. Vancouver and Clark County should consider ordinances from other municipalities to develop greenhouse gas emissions reporting requirements and work collaboratively with other jurisdictions to define mitigation options for development projects.

### Examples

- King County, WA: [www.kingcounty.gov/property/permits/info/SiteSpecific/ClimateChange.aspx](http://www.kingcounty.gov/property/permits/info/SiteSpecific/ClimateChange.aspx)
- City of Seattle: [www.seattle.gov/dpd/Planning/GreenhouseGas/Overview](http://www.seattle.gov/dpd/Planning/GreenhouseGas/Overview)

4. Require and Enforce Performance Testing to Demonstrate Residential Energy Code Compliance.

While the Washington State Energy Code prescribes 0.35 air changes per hour (ACH) as the target value for home air leakage, currently there is no requirement for local building inspectors to verify compliance with this code provision. A blower door test can be utilized to confirm that the proposed air leakage rate is achieved during the inspection process. The City and County should develop a process for requiring blower door testing on new construction residential projects. This could be done in-house which would require building inspectors to perform testing, or this service could be contracted out to independent third-parties to perform the testing and certify results. While independent blower door testing can cost \$200-\$300 per home, research on increased energy efficiency and reduced utility bills help justify this cost, especially for affordable housing developers with long term operating budgets in mind. Furthermore, developing job training around blower door testing can help support economic development opportunities through increased green collar jobs within the community.

5. Develop a District Energy Demonstration Project Ordinance.

For many Living Building projects, meeting net zero energy and net zero water goals may make more sense by taking advantage of resources at the neighborhood or community levels rather the building site level. District energy systems centralize the production of heating or cooling for a neighborhood or community. Current building codes and regulations make district-level systems challenging based on the site-specific nature of the codes. Developing a demonstration project ordinance for district energy systems can help identify potential pilot projects and provide valuable input on performances and benefits of these systems,

helping to inform future code amendments. A district energy demonstration project ordinance should address land use planning issues associated with crossing property boundaries, utility connection requirements, and ongoing maintenance and management for the system, allowing for greater flexibility within the current codes for pilot projects.

#### Examples

- BC Climate Action Toolkit: [www.toolkit.bc.ca/tool/district-energy-systems](http://www.toolkit.bc.ca/tool/district-energy-systems)
- Sunnyside Neighborhood Energy, Portland, OR <http://sunnysideneighborhoodenergy.wikispaces.com/Welcome>

---

### III. NON-CONVENTIONAL GREEN BUILDING STRUCTURES

#### Background

With growing awareness of the resource-intensity of conventional buildings and the desire to lower a building's environmental footprint, designers and builders are increasingly interested in the use of lower-energy, locally-produced, and minimally-processed materials used for building structures such as strawbale, rammed earth or other non-conventional materials. The SARD study specifically looked at barriers to strawbale which is a highly-insulated, low-cost wall material. Testing for structural strength and fire protection for strawbale and other nonconventional materials can make them cost-prohibitive, especially for an affordable housing developer. Many of the recommendations for addressing obstacles to nonconventional materials are similar to those described above in institutional/process barriers category. Education on both sides of the counter, incentives such as expedited permitting, and technical assistance can all help improve consistency in designing, reviewing and approving strawbale and similar structures.

#### Short Term Recommendations

1. Allow Flexibility for "Incubator" Pilot Projects to Test Alternative Green Materials.

Collaborate with pilot projects to test alternative green materials, specifically those becoming more and more common like strawbale that are still required to utilize the alternative code compliance paths, in order to establish standards and guidelines for future code changes. It is important to disseminate findings from pilot projects both internally within the building department as well as to the development community so that they become resources for future projects. The Development Center for Appropriate Technology ([www.dcat.net](http://www.dcat.net)) has an established Code Compliance information package for alternative materials, systems and designs that could be used as a template for standardizing the procedure for pilot project applicants.

2. Develop Code Guidance for Strawbale Structures.

Many jurisdictions have developed strawbale codes including Tucson/Pima County, AZ; Boulder, CO; Easton, PA; Austin, TX; Grand County, UT; and the states of California and Oregon where strawbale structures are included in the Oregon State Residential Code. In Washington State, strawbale has been approved in multiple cities and counties by local jurisdictions through alternative code process, including one application within Clark County. The City and County should develop formal code guidance for strawbale structures that can be used as a resource for developers.

### Examples

- State of Oregon: [www.strawbale.com/pdf/oregon\\_building\\_code.pdf](http://www.strawbale.com/pdf/oregon_building_code.pdf)
- Tucson/Pima County, AZ: [www.grisb.org/publications/pub19.htm](http://www.grisb.org/publications/pub19.htm)

### Long Term Recommendations

3. Develop an Advisory Committee of Green Building Experts for Alternative Technologies.

The City of Portland has recently launched a new process for developers who want to use innovative new green products or building methods that may encounter difficulty in getting approved through the standard building code review process. The creation of an "Alternative Technology Advisory Committee" consisting of outside experts allows for third-party experts to review case studies and data supplied by the applicant supporting the technology. The committee then makes recommendations to the building officials as part of a standard building code appeal. The intent of this new process is to empower the building department to approve new green technologies on a more conditional basis, and to give applicants a faster turn-around on approvals. Due to the proximity to Portland, Vancouver and Clark County could explore opportunities to participate with the Portland Alternative Technologies Committee, or to develop their own similar committee specific to City and County projects. In the latter case, the City and County should solicit participation on the committee from other cities/towns within Clark County or within the larger SW Washington region.

### Example

- City of Portland, OR: [www.portlandonline.com/bds/index.cfm?c=48661](http://www.portlandonline.com/bds/index.cfm?c=48661)

---

## IV. DRIVEWAY & FIRE ACCESS ROAD WIDTHS

### Background

During the case study review process, it was determined that required hardscapes for driveways and fire access road widths can pose barriers to Living Building projects by reducing the amount of area available onsite to manage stormwater runoff. Looking for opportunities to decrease impervious surfaces not only helps meet Living Building Challenge goals but also aligns with the City and County's new stormwater codes, expected to be in effect Spring/Summer 2009, that support low impact development (LID) practices. However, any recommendations to address impervious surfaces must not undermine fire safety concerns such as access for fire apparatuses. Instead, the recommendations below propose solutions that meet both LID goals as well as maintaining access for emergency response. Coordination between the development and revisions of road/street standards by Transportation departments and fire safety requirements is critical.

### Short Term Recommendation

1. Develop Code Guidance on Acceptable and Best Practices for Low Impact Development.

With the updates to the City and County stormwater codes in 2009, low impact development practices will soon be supported by codes rather than discouraged. LID pilot projects in other municipalities have demonstrated cost savings to developers by reducing stormwater infrastructure such as large pipes, detention/retention facilities, and the associated excavation necessary for these facilities. These cost savings help offset higher upfront costs for design, landscaping materials, soil amendments, and alternative pavements. Education and guidance on code-acceptable LID practices is necessary to assist developers in choosing these methods.

### Examples

- City of Cyprus LID Guide for Developers: [www.ci.cypress.ca.us/online\\_forms/community\\_develpmnt\\_forms/low\\_impact\\_dvlpmt\\_guide.pdf](http://www.ci.cypress.ca.us/online_forms/community_develpmnt_forms/low_impact_dvlpmt_guide.pdf)
- LID Technical Manual for Puget Sound: [www.psp.wa.gov/downloads/LID/LID\\_manual2005.pdf](http://www.psp.wa.gov/downloads/LID/LID_manual2005.pdf)
- City of Seattle Client Assistance Memo #515: Green Parking Lots [www.seattle.gov/DPD/Publications/CAM/CAM515.pdf](http://www.seattle.gov/DPD/Publications/CAM/CAM515.pdf)

### Long Term Recommendations

2. Update Standards for Streets, Fire Access Roads and Private Driveways.

Revising current road, street and driveway standards to require LID approaches should be a long term goal for the City and County. Options include reducing driveway widths from 12' to 10' or requiring pervious pavements; working with fire departments to reduce road widths in neighborhoods with low-rise buildings that do not require fire apparatus stabilizer jacks; and working with transportation departments to define standards for pervious pavements on public right-of-ways and fire access roads. The City of Washougal is in the process of implementing a variety of LID strategies as part of the Downtown Washougal Improvement project which could serve as a model for making updates within Vancouver and Clark County codes.

#### Example

- City of Washougal: [www.washougal.biz/cow/planning/downtown%20Washougal%20Improvements%20Narrative.pdf](http://www.washougal.biz/cow/planning/downtown%20Washougal%20Improvements%20Narrative.pdf)
- EPA Green Street Initiatives Around the US: [www.epa.gov/owow/podcasts/greenstreetsusa.html](http://www.epa.gov/owow/podcasts/greenstreetsusa.html)

3. Consider Stormwater Management Utility Fee Reductions.

Private properties that implement stormwater design solutions that reduce runoff (and therefore the associated pollutants that runoff can contain) rather than directing that runoff into municipal storm drains are lessening the burden on public stormwater infrastructure. As public stormwater utility fees increase, offering fee reductions for LID approaches can help encourage more onsite stormwater quantity and quality control in addition to helping recharge local aquifers and protect water bodies from pollutant contamination. Fee reductions could be tiered to promote more aggressive strategies, from rebates for square feet of reduced impervious surfaces, to larger grants for more comprehensive natural drainage strategies.

#### Example

- King County, WA, Surface Water Management Fee Discounts and Cost-Sharing Program: [www.kingcounty.gov/environment/wlr/surface-water-mgt-fee/discount.aspx](http://www.kingcounty.gov/environment/wlr/surface-water-mgt-fee/discount.aspx)

---

## V. MINIMUM PARKING REQUIREMENTS

### Background

In urban areas, close to public transportation, exemptions from minimum number of parking spaces can help reduce impervious surfaces and allow for larger areas for onsite systems such as stormwater management best management practices (rain gardens, infiltration swales), rainwater cisterns, and onsite wastewater treatment. Current standards for multifamily developments with 4 units or greater require 1.5 parking spaces per dwelling unit whereas 1-, 2-, and 3-unit developments require 2 spaces per dwelling unit.

Any changes or updates to minimum parking requirements must not adversely affect fire safety access through increased on-street parking. Instead, looking to comprehensive solutions for increasing alternative modes of transportation such as walking, bicycling, and public transportation within the community will help offset the need for developers to provide for vehicle parking.

### Short Term Recommendations

1. Consider New Policies to Reduce Minimum Parking Requirements as Part of an Overall Strategy to Increase Alternative Transportation in the Next City/County Comprehensive Plan Update.

Incorporating goals for reducing parking as part of the comprehensive plan update process will lay the foundation for future code revisions. Suggestions include: allowing for a reduction in the required number of parking spaces in exchange for dedicated car-share vehicle spaces; reduced or eliminated parking requirements for developments located in mixed-use districts; requirements for bicycle storage facilities; development of pedestrian-oriented street standards (wider sidewalks, reduced setbacks, lighting, landscaping, etc.) that encourage walking; requirements for pedestrian connections between housing developments and nearby community services such as schools, grocery stores, churches, libraries, banks, etc; and placing maximum requirements on number of parking spaces in certain zones to discourage unnecessary impervious surface coverage. Allowing greater flexibility for affordable housing projects to reduce minimum parking based on need can help reduce construction costs associated with parking structures.

### Examples

- City of Austin, Texas, Development Code, Subchapter E, Section 2.4.2: Reduction of Minimum Off-Street Parking Requirements. [www.ci.austin.tx.us/development/downloads/final.pdf](http://www.ci.austin.tx.us/development/downloads/final.pdf)
- Colorado Springs Mixed-Use Development Design Manual. [www.springsgov.com/Page.asp?NavID=4107](http://www.springsgov.com/Page.asp?NavID=4107)
- US Department of Transportation Model Policy: Integrating Bicycling and Walking into Transportation Infrastructure. [www.fhwa.dot.gov/environment/bikeped/design.htm](http://www.fhwa.dot.gov/environment/bikeped/design.htm)

---

## VI. SETBACKS & SEPARATION FOR RAINWATER HARVESTING CISTERNS

### Background

Harvesting rainwater on a site for use inside the building to offset potable water demand or outside for landscape irrigation is common on projects seeking to meet the Living Building Challenge, and in fact may be required to meet net zero water goals. During the case study review process, Clark County plans examiners noted that above ground rainwater harvesting cisterns must meet setback requirements from adjacent properties and must have a minimum of 8' separation from the building. One way to remove this barrier is to place rainwater cisterns underground; however, above ground cisterns may be preferred on certain sites for a variety of reasons. In particular, affordable housing projects may choose above ground cisterns to eliminate added costs for excavation or for upgrading to cisterns that are structurally designed to be below grade. Setback and building separation requirements are important for maintaining egress around buildings. However, current standards can undermine space available on the site for locating above ground cisterns.

### Short Term Recommendations

1. Provide Guidance on Designing, Permitting, Installing, and Maintaining Rainwater Harvesting Cisterns into New Construction and Retrofit Applications.

Many jurisdictions have development code guidance documents on how to properly design and install rainwater harvesting systems, providing permit applicants with concrete information on required drawings, specifications and details for approvals. It is recommended that the City of Vancouver and Clark County develop similar code guidance utilizing the valuable resources already available from other municipalities.

### Examples

- State of Oregon Smart Guide: [www.cbs.state.or.us/bcd/pdf/3660.pdf](http://www.cbs.state.or.us/bcd/pdf/3660.pdf)
  - Seattle Rainwater Harvesting for Beneficial Use: <http://web1.seattle.gov/DPD/CAMs/CamDetail.aspx?cn=701>
2. Revise Code Requirements for Setbacks and Building Separation for Above-Ground Rainwater Cisterns.

Update codes that discourage above ground cisterns. Suggestions include setback waivers specifically for cisterns such as those currently available for garden sheds, gazebos, and playhouses; and eliminating building setback requirements for cisterns as long as structural loading considerations are properly addressed based on the size of cistern(s) and depth of building foundations.

---

## VII. CLUSTER DEVELOPMENTS/COTTAGE HOUSING

### Background

Several of the case studies reviewed as part of the SARD project were demonstrations of smaller-footprint single family or multifamily housing units clustered around common areas. This type of development requires flexibility in land use and development codes for increased density on portions of an overall site in order to protect or increase open space and reduce overall impervious surfaces. Additional benefits can include increased amenities such as common buildings or courtyards and the sense of community connectivity. In Clark County, rural cluster developments are only allowed where designated critical areas exist. Within the City of Vancouver, clustered cottage housing can be a green option for infill development on smaller parcels. However, no provisions for cottage housing development currently exist within the City or County. While this barrier was not chosen as high priority for external stakeholder groups, development of cottage housing code provisions would address many sustainability goals including housing affordability and reduced energy use and site impacts from smaller homes. Therefore it is suggested as a longer term recommendation.

### Long Term Recommendation

1. Develop New City and County Cottage Housing Codes.

Cottage housing codes limit the size of units, typically to no more than 1,000 square feet in size, allowing developers to increase the density on a parcel. Many jurisdictions in Washington State have developed cottage codes or allowed for cottage-style demonstration projects to help establish new standards. The City and County should utilize already-established codes from other jurisdictions to develop new cottage housing provisions, allowing for demonstration projects that help define standards in the interim.

### Examples

- Municipal Research and Services Center of Washington: [www.mrsc.org/subjects/planning/cottagehousing.aspx](http://www.mrsc.org/subjects/planning/cottagehousing.aspx)
- Kirkland, WA
- Marysville, WA
- Port Townsend, WA

---

## VIII. WATER-RELATED BARRIERS

### Background

Living Building Challenge projects seek to source 100% of a building's operational water use from captured precipitation or closed-loop water systems, while also managing 100% of storm water and building water discharge onsite. The most complex code barriers encountered by Living Building Challenge projects are those that regulate water use and discharge. Obstacles span varying codes, from development codes to building codes, and require myriad permit approvals, appeals and waivers from several different jurisdictions. *Report #1: Findings* includes a graphic representation of the complexity for residential building projects within the City of Vancouver and Clark County that seek approval for net zero water design strategies. As part of the SARD project, Cascadia convened a group of stakeholders from the City and County building departments, Clark County Public Health, Clark County Public Utilities, Clark Regional Wastewater District, the Plumbers & Steamfitters Union UA290, and the Washington State Department of Health and Department Of Ecology to review and discuss the water barriers diagrams.

Although the external stakeholder group did not rate water-related barriers as a high priority for the City and County to tackle at this time, as local governments increasingly look to address the large scale environmental, economic, and social risks associated with climate change and the relationship that conventional building and development practices have on these risks it is anticipated that the water-related barriers identified in this study will become a higher priority for Vancouver and Clark County.

### Short Term Recommendation

1. Provide Guidance on Designing, Permitting, Installing, and Maintaining Rainwater Harvesting Cisterns. *(See previous recommendation under "Setbacks & Separation for Rainwater Harvesting Cisterns").*

Currently the Revised Code of Washington 90.03.250 requires a water rights permit to harvest rainwater from a building site. However, the Department of Ecology (DOE) has a backlog of over 7,000 water right applications in the permitting queue and it is not recommending that green building projects submit for a water rights permit at this time. Instead, DOE is striving to update their regulations and a bill is currently in the legislature to revise the water rights permitting requirements. While at least one municipality, the City of Seattle, has gone through the process of obtaining a general permit for all water rights within city boundaries, it was recommended by DOE that Vancouver and Clark County continue to support rainwater harvesting as a value practice for reducing a building's potable water use and helping to manage stormwater runoff. Developing guidelines for permit applicants that address design and installation as well as public health challenges regarding filtration and disinfection is recommended.

### Long Term Recommendation

2. Collaborate in a Neighborhood-Scale Net Zero Water Pilot Project.

Working with the development community, develop a demonstration ordinance that allows for flexibility within the current codes for a neighborhood-scale development with net zero water goals. Such a project would seek to source 100% of its water needs through onsite rainwater harvesting without chemical treatment and/or reuse of properly treated wastewater, and treat 100% of its wastewater onsite through sustainable design strategies such as composting toilets, greywater systems, Living Machines™ and/or small scale treatment technologies such as membrane bioreactors. The pilot project should be required to monitor and report water use and wastewater reduction, along with associated reductions in utilities fees. Communicate findings internally within City and County departments as well as to the development community, utilizing data to support future code updates.

## NEXT STEPS

Strategies for removing barriers to the Living Building Challenge within the land use, development, and building codes in Vancouver and Clark County contained within this report serves as a resource for implementing policies, programs and code or regulatory changes.

Cascadia's next steps as part of the SARD project will be to:

- Work collaboratively with the City and County to evaluate costs and benefits of the prioritized recommendations, both internally to the public agencies as well as externally to the private development community.
- Utilize the two residential project types studied under Cascadia's Financial Study for the Living Building Challenge as the starting point for the cost/benefit analysis, modifying the Portland prototype projects to reflect Vancouver and Clark County construction costs and incentives.

A final report on the cost/benefits analysis will be delivered to Vancouver and Clark County in June 2009.

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:International Building Code IMC:International Mechanical Code IFC:International Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
1	10 Net zero Water	RCW	90.03.250	Water Rights Permit	Any person, municipal corporation, firm, irrigation district, association, corporation or water users' association hereafter desiring to appropriate water for a beneficial use shall make an application to the department for a permit to make such appropriation, and shall not use or divert such waters until he has received a permit provided.	Rainwater is legally considered a water resource of the State, managed by Dept. of Ecology. Obtaining a permit to harvest rainwater for beneficial use is difficult and time consuming.	Develop guidance on permitting requirements for rainwater harvesting systems.	State of Oregon Smart Guide: <a href="http://www.cbs.state.or.us/bcd/pdf/3660.pdf">www.cbs.state.or.us/bcd/pdf/3660.pdf</a>  Seattle Rainwater Harvesting for Beneficial Use Client Assistance Memo 701: <a href="http://web1.seattle.gov/DPD/CAMs/CamDetail.aspx?cn=701">http://web1.seattle.gov/DPD/CAMs/CamDetail.aspx?cn=701</a>
2	10 Net zero Water	CCC	40.370.020 (C)(2)	Connection to Public Water	In areas located inside urban growth boundaries, where the public agency purveyor is willing and able to provide safe and reliable service, connection to public water is required as a condition of building permit issuance for all new residential uses of less than four (4) units when public water is within 750 feet of the lot.	Connection to public water system is required. Any changes to this requirement will need to be coordinated with those agencies providing water service - City of Vancouver and Clark Public Utilities.	Define conditions which would allow LBC projects to provide 100% of water needs through onsite sources, allowing for building permit issuance without a connection to the municipal water supply.	San Juan County, WA: <a href="http://www.sanjuanco.com/health/eihswater.aspx">www.sanjuanco.com/health/eihswater.aspx</a>
3	10 Net zero Water	RCW	19.27.097	Connection to Public Water	Public Health would conduct a Water Adequacy Verification Evaluation (WAVE) on the proposed water system ONLY if Community Development issued a connection to public water waiver. Washington State Department of Health requires rainwater harvesting systems to be designed with adequate storage and equipped with filtration and disinfection (UV or Chlorine). The proposed filter must meet ANSI or NSF drinking water standards for 1-micron filtration.	At this time Public Health does not have a local ordinance for wells and private drinking water systems. However; RCW 19.27.097 requires applicants for a building permit for a building necessitating drinking water to provide evidence of an adequate and safe supply for the intended use of the building. Public Health would need a waiver from Community Development before a WAVE could be reviewed and completed.	Define conditions which would allow LBC projects to provide 100% of water needs through onsite building permit issuance without a connection to the municipal water supply.	San Juan County, WA: <a href="http://www.sanjuanco.com/health/eihswater.aspx">www.sanjuanco.com/health/eihswater.aspx</a>
4	10 Net zero Water	VMC	16.04.160	Connection to Public Water- Fireflow	Water supply and hydrants (IFC 508): Private fireflow adequacy not acceptable. A public system for fire protection must be provided.	Public safety codes are not made to trust private maintenance and fluctuating water supply variables.	Where feasible, allow for rainwater cisterns to meet fireflow needs. Suggest revisions to LBC to exclude fireflow from net zero water prerequisite.	N/A

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
5	10 Net zero Water	WAC	246-290 and 246-291	Treatment of Harvested Rainwater	Public water systems definition: Group A Public Water system serves 15 or more residential connections or 25 or more people per day for 60 or more days per year, and Group B Public Water Systems are constructed to serve less than 15 residential services or constructed to serve an average nonresidential population of less than 25 per day for 60 or more days within a calendar year; or any number of people for less than 60 days within a calendar year. Examples are a church, daycare center, small business or cluster of homes sharing the same water source.	Rainwater is considered a surface water source. The treatment, monitoring, record keeping and certification requirements for surface water systems make surface water treatment for small systems unfeasible in almost all circumstances.  The micron filter may do a good job, but there are numerous complications with the regulations (state and federal) as they stand today, including: 1. Washington State DOH does not approve point of use treatment systems 2. Surface water systems require a certified operator 3. Surface water systems must have continuous turbidity and chlorine residual monitoring 4. Chlorination is mandatory for surface water systems.	Allow for UV disinfection and sand or 1-micron cartridge filtration as proposed in the case study compendium package.	Hayward Rainwater Sand Filter Product Specification. <a href="http://www.haywardnet.com/inground/products/filters/sand.cfm">www.haywardnet.com/inground/products/filters/sand.cfm</a>
6	11 Water Discharge	VMC	14.08.035	Connection to Public Sewer	Each residential or commercial water customer either within or without the city shall connect his or her premises to a city sewer if a city sewer is available thereto, as defined in VMC 14.08.015. (Ord. M-1956 § 6, 1979).	There is currently no exemption to connection when sewer is available to the site.	Code change to allow alternatives as approved by the public works director.	N/A
7	11 Water Discharge	CCC	40.370, 010 C	Connection to Public Sewer	Inside UGAs, connection to public sewer is required as a condition of building permit issuance for any new structure unless certain exceptions apply, then a sewer waiver can be granted.	Connection to public sewer is required unless a sewer waiver can be granted. Any change to this requirement needs to be coordinated with sanitary sewer service purveyors – City of Vancouver and Clark Regional Wastewater District.	Code change to allow alternatives as approved by the public works director.	N/A

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:International Building Code IMC:International Mechanical Code IFC:International Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
8	5 Materials Redlist 6 Construction Carbon Footprint	IBC	509.5	Group R-2 Buildings of Type IIIA construction	The height limitation for buildings of Type IIIA construction in Group R-2 shall be increased to six stories and 75 feet where the first floor construction above the basement has a fire-resistance rating of not less than 3 hours and the floor area is subdivided by 2 hour fire resistance fire walls into areas not less than 3000 sf.	Code incentivizes steel or concrete buildings over wood due to fire resistance requirements. Wood is better choice for LBC projects based on regional availability, renewable resource, less embodied energy, and better U-value. For wood construction, this code requires the use of fire resistant plywood, some of which contains toxins on the materials redlist. Fire resistant plywood products that do not contain redlist materials are more costly.	Consider alternative materials to fire retardant plywood: - concrete block (local) - dimensional lumber roof decking that meets type IV construction and/or hour rating - an approved 3 hour fire rated system - hybrid framing systems that use heavy timber and moment connections to eliminate plywood  Note: To meet the redlist fire protection treatment may not contain: -halogens -sulphates -ammonium phosphates -added formaldehydes	Federal Green Construction Guide for Specifiers www.wbdg.org/design/greenspec.php  See multiple listings in Construction Specifications Institute (CSI) format for suggested specifications of green materials.
9	5 Materials Redlist	IBC	704.11	Fire retardant wood exceptions to required parapets	Walls that terminate at roofs of not less than 2-hour fire-resistant-rated construction for where the roof, including the deck and supporting construction, is constructed entirely of noncombustible materials.	Code requires the use of fire resistant plywood, some of which contains toxins on the materials redlist. Fire resistant plywood products that do not contain redlist materials are more costly.	Suggested Options: -add a parapet -create an alternate detail that allows for non-fire rated plywood  Alternative materials to fire retardant plywood: - dimensional lumber roof decking that meets 2 hour roof assembly - Additional layers of gypsum board at framed fire walls and roof/ceiling assemblies - hybrid framing systems that use heavy timber and moment connections to eliminate plywood.	Federal Green Construction Guide for Specifiers 06.05.73 (06070) Wood Treatment

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
10	4 Net zero Energy	IBC	1203.2	Attic Spaces - required insulation	Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof framing members shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and now. Blocking and bridging shall be arranged so as not to interfere with the movement of air. A minimum of 1 inch of airspace shall be provided between the insulation and the roof sheathing. The net free ventilating area shall not be less than 1/150 of the area of the space ventilated, with 50 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents.	Vented roof in this climate not necessary. By requiring vent, LBC projects cannot maximize insulation in rafter cavity making it more difficult to achieve net zero energy requirement. This is targeted to change in the 2009 Washington State Energy Code updates.	Suggested Option: -Eliminate eave venting but not roof venting.  Alternative Options: -Allow insulation to be full depth of joist space if dew point calculations are submitted that show condensation will not be formed.  -Provide energy analysis that shows tradeoff U-value calculations to support energy savings.	Building Science Corporation Lstiburek, Joseph, <u>Understanding Attic Ventilation</u> , BSD-102, October 2006.
11	4 Net zero Energy	IBC	1203.3.2	Under Floor Ventilation	The minimum net area of ventilation opening shall not be less than 1 square foot for each 150 sf of crawl space areas.	Grey areas in code around best practice for energy efficiency and indoor air quality which is to mechanically condition crawl space and eliminate passive venting of cold outdoor air.	Define conditions which would allow crawl space to not be ventilated. (i.e. short basement concept). Provide a radon mitigation system in conditioned crawl space that provides moisture protection.	Building Science Corporation Lstiburek, Joseph, <u>Understanding Attic Ventilation</u> , BSD-102, October 2006.
12	4 Net zero Energy 12 Civilized Environment	IBC	1205.2	Window area required for Natural Light	The minimum net glazed area shall not be less than 8 percent of the floor area of the room served.	It is not clear the reason for the 8% minimum. Some projects may be designed to use less while also ensuring adequate light and increasing energy efficiency.	Instead of a mandated percentage for window area, consider requiring that buildings provide access to light and air similar to European building codes.	BOUBEKRI, Mohamed, <u>A Overview of The Current State of Daylight Legislation</u> , Journal of the Human-Environmental System, Vol. 7, No. 2: 57-63, 2004.  Table 2: Recommended Daylight levels per degree of difficulty of visual task in the German DIN 5034-4 Standard.  Table 3: Recommended window size for daylighting in the German DIN 5034-4 Standard.
13	4 Net zero Energy	IBC	1205.3	Artificial Light - average of 10 foot-candles	Artificial light shall be provided that is adequate to provide an average illumination of 10 foot-candles over the area of the room at a height of 30 inches above the floor level.	Mandatory foot-candle requirement does not address needs of space. For instance, a bedroom might need less artificial lighting. Over-lighting spaces encourages higher energy use.	Use lowest end of the Illuminating Engineering Society guidelines as a mandated light level rather than 10 foot-candles.	Illumination Engineering Society Guidelines

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
14	4 Net zero Energy	IBC	1604.8.1	Use of Straw bale as a lateral element	Anchorage of the roof to walls and columns, and of walls and columns to foundations, shall be provided to resist the uplift and sliding forces that result from the application of the prescribed loads.	Straw bale is highly insulated, low-cost wall material. Structural strength of straw bale not known and testing is expensive.	Allow use of existing standards to define structural strength. Address water intrusion issues.	OR Res. Code Appendix R, section AR106 & AR107 define bearing walls, height limits and minimal connections.  California Health and Safety Code 1894.3 to 1983.3.4.
15	4 Net zero Energy	IBC	Table 602	Use of Straw bale where fire rating is required	Table 602 provides fire rating requirements for exterior walls.	Straw bale is highly insulated, low-cost wall material. Not cost effective if additional fire protective material is required and testing is expensive.	Allow use of straw bale when covered with plaster or stucco of at least 7/8" thickness.	OR Res. Code Appendix R, section AR106 & AR107 define bearing walls, height limits and minimal connections.  California Health and Safety Code 1894.3 to 1983.3.4.
16	5 Materials Red list  8 Appropriate Materials Radius	IBC	2303.1	Preservative -treated wood.	Lumber, timber, plywood, piles and poles supporting permanent structures required by Section 2304.11 to be preservative treated shall conform to the requirements of the applicable AWPA standard U1 and M4 for the species, product, preservative and end use. Preservatives shall be listed in Section 4 of the AWPA U1. Lumber and plywood used in wood foundations systems shall conform to Chapter 18.	Most wood preservatives approved by code are on the LBC materials redlist. Natural species within the materials radius requirements would be a better option for LBC projects. Burden of proof is on the design team to provide documentation for alternatives that meet the intent of the code.	Research local woods that have decay resistant properties and create code guides that allow these exceptions to be used if conditions are met.  Natural rot resistant species in increasing order of preference (heartwood only): -Redwood (limited availability) -Black Locust (Eastern forests) -Black Walnut -Bald Cypress (Florida) -White Oak (Burr Oak, Oregon Oak 1360)anka -Western Red Cedar (Western States 350)anka -Eastern Red Cedar (Midwest and East, 900)anka  Other products: -Wood Acetylation (pickled with vinegar) -TimberSil (glass wood Decay grade 10) Provide links to approved natural material sources.	Federal Green Construction Guide for Specifiers 06.05.73 (06070) Wood Treatment

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
17	5 Materials Red list 8 Appropriate Materials Radius	IBC	2303.4	Wood supported by Exterior Foundation	Wood framing members and furring strips attached directly to the interior of exterior masonry or concrete walls below grade shall be of approved naturally durable or preservative treated wood.	Most wood preservatives approved by code are on the LBC materials redlist. Natural species within the materials radius requirements would be a better option for LBC projects. Burden of proof is on the design team to provide documentation for alternatives that meet the intent of the code.	See recommendations above for natural rot resistant species. Alternative Option: - Separate wood from other materials by more than 6", or use natural or approved treatments where wood is not subject to water splash.	Federal Green Construction Guide for Specifiers 06.05.73 (06070) Wood Treatment
18	5 Materials Red list 8 Appropriate Materials Radius	IBC	2304.11	Wood used above ground, wood supported by exterior foundations, exterior walls below grade on inside of masonry, sleepers and sills, wood siding	Wood used above ground in the locations noted shall be naturally durable wood or preservative treated wood using water borne preservatives, in accordance with AWPA UI for above ground use.	Most wood preservatives approved by code are on the LBC materials redlist. Natural species within the materials radius requirements would be a better option for LBC projects. Burden of proof is on the design team to provide documentation for alternatives that meet the intent of the code.	See recommendations listed above under IBC 2303.4.	Federal Green Construction Guide for Specifiers 06.05.73 (06070) Wood Treatment
19	4 Net zero Energy	WSEC	201	Definition: Design Heating and Cooling Conditions	The heating or cooling outdoor design temperatures shall be selected from 0.6% column for winter, and 0.5% column for summer from the Puget Sound Chapter of ASHRAE publication "Recommended Outdoor Design Temperatures, Washington State, ASHRAE."	Is this the right temperature reference to use for Vancouver and Clark County? Allowing wider design temperatures may result in higher efficiency. Larger projects can demonstrate this through energy modeling; smaller projects and affordable housing would benefit from prescriptive approach. ASHRAE 55-2004 provides expanded comfort criteria for naturally ventilated spaces.	Consider using 99% data for heating and 1% or 2% data for cooling. Provide a prescriptive path for systems analysis.	ASHRAE 55 - 2004
20	4 Net zero Energy	WSEC	201	Definitions: Advanced Framing	Advanced Framed Walls: Studs framed on 24 inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and one stud is used to support each header. Headers consist of double 2x material with R-10 insulation between the header and exterior sheathing. Interior partition wall/exterior wall intersections are fully insulated in the exterior wall. (See Standard Framing and Section 1005.2 of this Code.) Advanced Framed Ceilings: Advanced framing assumes full and even depth of insulation extending to the outside edge of exterior walls. (See Standard Framing and Section 1007.2 of this Code.)	Other definitions of advanced framing include single top plate allowing decreased use of materials and increased energy efficiency.	Require trusses / roof framing to stack to have advanced framing. Consider adopting one of the guides currently developed such as the US Department of Energy's Advanced Wall Framing Guide.	Natural Resources Defense Council Edminster, Ann; Yassa, Sami; McDermid, Matthew, Efficient Wood Use in Residential Construction: A Practical Guide to Saving Wood, Money and Forests. Natural Resources Defense Council, New York, NY, 1998.  Toolbase Services developed by the NAHB Research Center www.toolbase.org/pdf/techinfo/06advancedframingtechniques_techspec.pdf  www.toolbase.org/technology-inventory/Whole-House-Systems/advance-framing-techniques  Journal of Light Construction Advanced Framing Book #AF002

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
21	4 Net zero Energy	WSEC	301.2	Heating & Cooling - more stringent envelope requirements	A building that is designed to be both heated and cooled shall meet the more stringent of the heating or cooling requirements as required in this code envelope differ.	This code option does not allow for energy programming, or maximizing efficiencies between areas of the building which might provide waste heat. Therefore, LBC project teams have reduced opportunities to design the most appropriate envelope to meet net zero energy goals.	Allow for easy modeling of passive heating and cooling measures. Consider developing code guidelines for prescriptive approaches to achieve cooling through alternate means.	ASHRAE 90.1-2007
22	4 Net zero Energy	WSEC	302.2.1	Indoor Design Temperature -70 F Heating 78 F Cooling	Indoor design temperature shall be 70° F for heating and 78 degrees F for cooling. Exception: Other design temperatures may be used for equipment selection if it results in a lower energy usage.	Exception doesn't address how to prove lower energy usage. This poses possible financial burden for smaller projects and affordable housing projects. ASHRAE 55-2004 provides expanded comfort criteria for naturally ventilated spaces.	Clarify what is required to "prove" lower usage (i.e. code guide that allows 68 for heating and 80 for cooling results in x-y% increase; or 65 for heating and 82 for cooling results in x-y% increase).	ASHRAE 55 - 2004
23	4 Net zero Energy	WSEC	302.1	Exterior Design Conditions	The heating or cooling outdoor design temperatures shall be selected from 0.6% column for winter, and 0.5% column for summer from the Puget Sound Chapter of ASHRAE publication "Recommended Outdoor Design Temperatures, Washington State, ASHRAE." (See also Washington State Energy Code Manual.)	May be too stringent; consider 1, 2, or 4% data with expanded interior design conditions.	Use tables in current code - but allow reference to different column.	N/A
24	4 Net zero Energy	WSEC	502.1.4.3	Insulation Clearances	Where required, insulation shall be installed with clearances according to manufacturer's specifications. Insulation shall be installed so that required clearances shall be maintained through installation of a permanent retainer.	Similar to IBC issue. In this climate, this code language does not allow LBC projects to maximize insulation in wall and roof cavities, making it more difficult to achieve net zero energy.	See recommendations under IBC 1203.2	Building Science Corporation Lstiburek, Joseph, Understanding Attic Ventilation, BSD-102, October 2006.
25	5 Materials Red List	WSEC	502.1.6.2	Floors: Vapor retarders	Floors separating conditioning space from unconditioned space shall have a vapor retarder installed. The vapor retarder shall have a one perm dry cup rating or less (i.e. four mil [0.004 inch thick] polyethylene or Kraft faced material).	Conventional materials contain toxins on the LBC materials Red List. Alternative products carry a cost premium.	Consider vapor barrier paint. Create a code guide that follows practices in Lstiburek's book.	Building Science Corporation Lstiburek, Joseph, Vapor Barriers and Wall Design, Research Report - 0410 November-2004.
26	5 Materials Red List	WSEC	502.1.6.6	Walls: Vapor retarders	Walls separating conditioned space from unconditioned space shall have a vapor retarder installed. Faced batt insulation shall be face stapled. Exception: For Climate Zone 1, wood framed walls with a minimum of nominal R-5 continuous insulated sheathing installed outside of the framing and structural sheathing. For Climate Zone 2, wood framed walls with a minimum of nominal R-7.5 continuous insulated sheathing interior cavity insulation for this exception shall be a maximum of nominal R-21.	Conventional materials contain toxins on the LBC materials Red List. Alternative products carry a cost premium.	Create a code guide that follows practices in Lstiburek's book.	www.buildingscience.com Lstiburek, Joseph, Vapor Barriers and Wall Design, Research Report - 0410, November 2004. Lstiburek, Joseph, Air Barriers vs. Vapor Barriers, Research Report - 0004, 2000.

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
27	4 Net zero Energy	WSEC	502.1.4.8	Slab on Grade insulation	Slab-on-grade insulation, installed inside the foundation wall, shall extend downward from the top of the slab for a minimum distance of 24 inches or downward and then horizontally beneath the slab for a minimum of 24 inches. Insulation installed outside the foundation shall extend downward to a minimum of 24 inches or to the frost line. Above grade insulation shall be protected. Exception: For monolithic slabs, the insulation shall extend downward from the top of the slab to the bottom of the footing.	Where insulation is located inside the foundation wall, the connection between the foundation and slab is not addressed.	Provide drawing to encourage continuous thermal break that is acceptable as an alternate means and methods.	ORRC Table 403.3 Minimum Insulation requirements for Frost Protected Footings in Heated Buildings.  ORSC Chapter 13 Section 1312.1.2.4.  Oregon Residential code does not consider slab heat loss a factor for buildings below 2,000 Air Freezing Degree-Days.
28	5 Materials Red List	WSEC	502.1.6.7 1313.5	Ground cover of black polyethylene	A ground cover of 0.006 inch thick black polyethylene or approved equal shall be laid over the ground within crawl spaces. The ground cover shall be overlapped 12 inches minimum at the joints and shall extend to the foundation wall. Exception: The ground cover may be omitted in crawl spaces if the crawl space has a concrete slab floor with a minimum thickness of 3 1/2 inches.	Conventional ground cover materials contain toxins on the LBC materials red list. Alternative products carry a cost premium.	Use concrete slab exception or design crawl space with radon mitigation strategy.	Building Science Corporation Lstiburek, Joseph, Vapor Barriers and Wall Design. Research Report - 0410 November-2004.
29	4 Net zero Energy	Indoor Air Quality	502.1.2	Ventilation	All crawl spaces shall be ventilated as specified in 1203.3 of the International Building Code.	This requirement in the IBC adds extra outside air and potential energy loss, and does not account for heated crawl spaces.	Create a code guide that follows practices in Lstiburek's book.	www.buildingscience.com Lstiburek, Joseph W., Insight New Light in Crawlspaces, BSI-009.
30	4 Net zero Energy	WSEC	505.3	Outdoor Lighting	Luminaires providing outdoor lighting and permanently mounted to a residential building or to other buildings on the same lot shall be high efficacy luminaires.	Definition does allow for new technology like LEDs unless it is put on a motion sensor- LEDs not currently conducive to a motion sensor. Code could identify maximum wattage as opposed to fixture type.	Redefine High Efficiency luminaires to include new technologies like LED.	Illumination Engineering Society Guidelines
31	11 Water Discharge	UPC	305.1	Sewers Required - every building must have a connection to a public sewer	Every building in which plumbing fixtures are installed shall have a connection to a public or private sewer except as provided in Section 305.2.	Only exception is for projects without sewer available for use.	Consider exceptions for projects which install membrane bioreactors and other onsite or neighborhood-level sewage treatment systems that address public health concerns.	OPSC 713.1, 713.2, 713.4 Exceptions are provided if a public sewer is not available.
32	5 Materials Red List	UPC	311.8	Screwed fittings do not include green materials	Screwed fittings shall be ABS, cast iron, copper alloy, malleable iron, PVC, steel, or other approved materials. Threads shall be tapped out of solid metal or molded in solid ABS or PVC.	Some newer materials are more environmentally sensitive choices (PEX). Burden of proof is on the design team to provide alternatives that are acceptable by code.	Push industry to develop new products that provide fittings in new materials or use copper / ABS.	N/A

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:International Building Code IMC:International Mechanical Code IFC:International Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
33	10 Net zero Water	UPC	405.2	Urinals that don't have a wash at each discharge are prohibited	Prohibited Urinals: Floor-type and wall-hung type trough urinals shall be prohibited. Urinals that have invisible seal or that have unventilated space or wall that is not thoroughly washed at each discharge shall be prohibited.	Exemption for waterless fixtures is not well defined.	Refer to Oregon Plumbing Code exempt language in Chapter 4.	OPSC 402.3.1 defines Nonwater Urinals which are distinct and separate from Urinals as defined in 402.3. Therefore, wash at each discharge (405.2) appears to apply to Urinals and not Nonwater Urinals. Code also includes non binding note that waterless urinals must be kept clean.
34	10 Net zero Water	UPC	402.3 409	Water supply to Urinal	Every water supply to a urinal shall be protected by an approved-type vacuum breaker or other approved backflow prevention device as described in Section 603.3.	For waterless urinals, extra cost for redundant system.	Promote installation of low water urinals instead of waterless urinals.	N/A
35	10 Net zero Water	UPC	601	Running Water Required	Except where not deemed necessary for safety or sanitation by the Authority Having Jurisdiction, each plumbing fixture shall be provided with an adequate supply of potable running water piped thereto in an approved manner, so arranged as to flush and keep it in a clean and sanitary condition without danger of backflow or cross-connection. Water closets and urinals shall be flushed by means of an approved flush tank or flushometer valve. In jurisdictions that adopt Chapter 16, water closets, urinals, and trap primers in designated non-residential buildings may be provided with reclaimed water as defined and regulated by Chapter 16 of this code. Exception: Listed fixtures that do not require water for their operation and are not connected to the water supply.	Requiring potable water supply to all fixtures undermines ability of a LBC project to use harvested rainwater or reclaimed greywater for toilet flushing to meet zero water goals. Dual piping may be necessary which provides a financial barrier for affordable housing projects.	Allow rainwater to be used as potable source with proper signage and construction as now allowed under the State of Oregon Alternate Methods ruling OPSC 08-01.  Allow grey water to be used to flush toilets with proper signage and require similar construction to currently passed using the Oregon State Alternate Methods.	OPSC 2008, Appendix M- Rainwater Harvesting Systems.  King County Rainwater Harvesting Guidelines: <a href="http://www.kingcounty.gov/healthservices/health/ehs/plumbing/-/media/health/publichealth/documents/plumbing/Rainwater_Harvesting.aspx">http://www.kingcounty.gov/healthservices/health/ehs/plumbing/-/media/health/publichealth/documents/plumbing/Rainwater_Harvesting.aspx</a>
36	10 Net zero Water	UPC	610.1	Size of Potable Water Piping	The size of each water meter and each potable water supply pipe from the meter or other source of supply to the fixture supply branches, risers, fixtures, connections, outlets, or other uses shall be based on the total demand and shall be determined according to the methods and procedures outlined in this section. Water piping systems shall be designed to ensure that the maximum velocities allowed by the code and the applicable standard are not exceeded.	Water sizing regulations based on older fixtures - resulting in water losses.	Standard sizes for pipes and fittings start at 1/2" diameter. Anything smaller is special order or not manufactured.	OPSC--Chapter 6: Review tables 6-5, 6-6

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
37	11 Water Discharge	UPC	1101.1	Storm Drainage - code requires storm drainage system	All roofs, paved areas, yards, courts, and courtyards shall be drained into a separate storm sewer system, or into a combined sewer system where a separate storm system is not available, or to some other place of disposal satisfactory to the Authority Having Jurisdiction (AHJ). In case of one- and two-family dwellings, storm water may be discharged on flat areas such as streets or lawns so long as the storm water shall flow away from the building and away from adjoining property, and shall not create a nuisance.	Standard requires AHJ to independent evaluate - rather than providing standards. LBC projects manage stormwater onsite where feasible so connection to storm sewer would require an appeal.	Provide code guidance on preferred onsite stormwater management practices.	Portland Stormwater Management Manual, Chapter 1, Section 1.3 Stormwater Management Requirements Low Impact Development Technical Guidance Manual, Puget Sound Action Team: <a href="http://www.psp.wa.gov/downloads/LID/LID_manual2005.pdf">http://www.psp.wa.gov/downloads/LID/LID_manual2005.pdf</a>
38	10 Net zero Water 11 Water Discharge	UPC	1602	Gray Water definition	Gray water is untreated household wastewater that has not come into contact with toilet waste. Gray water includes used water from bathtubs, showers, and bathroom wash basins, and water from clothes washers and laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers.	Definition doesn't include wastewater from mechanical systems or other commercial uses.	Revise definition through process involving stakeholders.  Separate definitions of condensate water and chiller process water.	Ludwig, Art, The New Create an Oasis with Greywater - Choosing, Building and Using Greywater Systems - Includes Branched Drains Revised and Expanded 5th Edition  Ludwig, Art, Building Professional's Graywater Guide, Oasis Design 5 San Marcon Trout Club Santa Barbara, CA 93105-9726. A guide to professional installation of graywater systems. <a href="http://www.oasisdesign.net/greywater/misinfo/index.htm">www.oasisdesign.net/greywater/misinfo/index.htm</a>

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:International Building Code IMC:International Mechanical Code IFC:International Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
39	10 Net zero Water 11 Water Discharge	UPC; IRC Code Section B - Grey Water Systems	1606	Procedure for Estimating Gray Water Discharge, Department of Health Water Conserving On-Site Wastewater Treatment Systems	(A) The number of occupants of each dwelling unit shall be calculated as follows: First bedroom = 2; Each additional bedroom = 1. (B) The estimated gray water flows for each occupant shall be calculated as follows: Showers, bathtubs and washbasins = 25 GPD [95LPD]; Laundry = 15 GPD [57 LPD]. (C) The total number of occupants shall be multiplied by the applicable estimated gray water discharge as provided above, and the type of fixtures connected to the gray water system. Example 1: Single-family dwelling; three bedrooms with showers, bathtubs, washbasins, and laundry facilities all connected to the gray water system: Total number of occupants = 2 + 1 + 1 = 4; Estimated gray water flow = 4 x [25 + 15] = 160 GPD, metric = 4 x [95 + 57] = 608 LPD. Example 2: Single-family dwelling; four bedrooms with only the clothes washer connected to the gray water system: Total number of occupants = 2 + 1 + 1 + 1 = 5; Estimated gray water flow = 5 x 15 = 75 GPD, metric = 5 x 57 = 285 LPD.	Overestimates gray water by a factor of 4, requiring more area required for subsurface drip irrigation systems. Calculations should use more efficient fixture performance.	Revise numbers for new projects with water conserving fixtures.	See resource above for Oasis Gray Water Manual.
40	10 Net zero Water	UPC	1614	Definitions	Reclaimed water is water that, as a result of tertiary treatment of domestic wastewater by a public agency, is suitable for a direct beneficial use or a controlled use that would not otherwise occur. The level of treatment and quality of the reclaimed water shall be approved by the public health Authority Having Jurisdiction. For the purpose of this chapter, tertiary treatment shall result in water that is adequately oxidized, clarified, coagulated, filtered, and disinfected so that at some location in the treatment process, the seven (7) day median number of total coliform bacteria in daily samples does not exceed two and two-tenths [2.2] per one hundred [100] milliliters, and the number of total coliform bacteria does not exceed twenty-three [23] per one hundred [100] milliliters in any sample. The water shall be filtered so that the daily average turbidity does not exceed two [2] turbidity units upstream from the disinfection process. Specifically excluded from this definition is gray water, which is defined in Part 1 of this chapter.	Exception does not allow gray water, which may be necessary to achieve net zero water.	Revise definition.	See resource above for Oasis Gray Water Manual.

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
41	5 Materials Redlist	UPC	1617	Pipe Material - Reclaimed water pipe marked by tape fabricated with poly vinyl chloride	Reclaimed water piping and fittings shall be as required in this code for potable water piping and fittings. All reclaimed water pipe and fittings shall be continuously wrapped with purple-colored Mylar. The wrapping tape shall have a minimum nominal thickness of five tenths (0.0005) inch and a minimum width of 2 inches. Tape shall be fabricated of poly(vinyl chloride) with a synthetic rubber adhesive and a clear polypropylene protective coating or approved equal. The tape shall be purple (Pantone color #512) and shall be imprinted in nominal 1/2 inch high, black uppercase letters, with the words, "CAUTION; RECLAIMED WATER, DO NOT DRINK." The lettering shall be imprinted in two parallel lines, such that after wrapping the pipe with a 1/2 width overlap, one full line of text shall be visible. Wrapping tape is not required for buried PVC pipe manufactured with purple color integral to the plastic and marked on opposite sides to read. "CAUTION; RECLAIMED WATER, DO NOT DRINK" in intervals not to exceed three feet. All valves, except fixture supply control valves shall be equipped with a locking feature. All mechanical equipment that is appurtenant to the reclaimed water system shall be painted to match the Mylar wrapping tape.	Code definition of marking tape violates materials redlist prerequisite. Expand definition of what types of materials can be used for marking.	Use integral color pipe.  For Water: Ductile iron, HDPE, Concrete, Copper, PEX  For Sewer: Concrete, HDPE  For Drain, Waste and Vents (DWV): Cast Iron, Copper, ABS, PEX	Harvie, Jamie with Lent, Tom, PVC-Free Pipe Purchasers' Report, Healthy Building Network, draft 11/01/02.
42	11 Water Discharge	UPC	1101.5.6	Subsoil drains - must be 10' from property line	Nothing in Section 1101.5 shall prevent drains that serve either subsoil drains or areaways of a detached building from discharging to a properly graded open area, provided that: 1. They do not serve continuously flowing springs or groundwater; 2. The point of discharge is at least 10 feet from any property line; and 3. It is impracticable to discharge such drains to a storm drain, to an approved water course, to the front street curb or gutter, or to an alley.	LBC projects attempt to manage all water on site. Adequate site area required to manage all storm drainage.	Allow for variances in property line setback requirements for projects that demonstrate adequate onsite stormwater management through low impact development strategies.	N/A
43	11 Water Discharge	UPC	1601A	Gray Water allowed for single family only for underground landscape irrigation	The provisions of this chapter shall apply to the construction, alteration, and repair of gray water systems for underground landscape irrigation. Installations shall be allowed only in single-family dwellings. The system shall have no connection to any potable water system and not result in any surfacing of the gray water. Except in any surfacing of the gray water. Except otherwise provided for in this chapter, the provisions of this code shall be applicable to gray water installation.	Code does not allow greywater subsurface drip irrigation systems for multifamily buildings.	Consider allowing grey water usage in multifamily developments. Consider adopting ordinance similar to the State of Oregon Alternate means and methods.	Oregon Smart Guide: Water Conservation Systems. www.cbs.state.or.us/external/bcd/pdf/0990.pdf

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
44	10 Net zero Water	UPC	1618.0(A)	Hose Bib installation	Hose bibs shall not be allowed on reclaimed water piping systems.	Hose bibs should be allowed on the reclaimed water system to meet zero water goals.	Allow hose bibs to be used with proper signage.	N/A
45	10 Net zero Water	UPC	1618.0(B)	Installation - requires devices to allow for deactivation	The reclaimed water system and the potable water system within the building shall be provided with the required appurtenances (valves, air/vacuum relief valves, etc.) to allow for deactivation or drainage as may be required by this chapter.	Cost issues for deactivation drainage.	Consider similar Alternate Means and Methods as recently was adopted in Oregon.	Oregon Plumbing Specialty Code 08-03
46	10 Net zero Water	UPC and CCC	UPC 1618; CCC 24.17	Trenching / reclaimed water pipe	Reclaimed water pipes shall not be run or laid in the same trench as potable water pipes. A ten foot horizontal separation shall be maintained between water piping. Buried potable water pipes crossing pressurized reclaimed water pipes shall be laid a minimum of 12 inches above the reclaimed water pipes. Reclaimed water pipes laid in the same trench or crossing building sewer or drainage piping shall be installed in compliance with Sections 609.0 and 720.0 of this code. Reclaimed water pipes shall be protected similar to potable water pipes.	Requires very large lot to make reclaimed water supply systems feasible.	Allow for "common sense" when required separation can not be maintained.	N/A
47	5 Materials Red list	UPC	Appendix 16-1	Pipe Standards	UPC provides standards for PVC and CPVC only.	No standards for alternative plumbing materials not listed on materials redlist (i.e. PEX).	Revise acceptable pipe list.  For Water: Ductile iron, HDPE Concrete, Copper, PEX  For Sewer: Concrete, HDPE  For Drain, Waste and Vents (DWV): Cast Iron, Copper, ABS, PEX	Harvie, Jamie with Lent, Tom, PVC-Free Pipe Purchasers' Report, Healthy Building Network, draft 11/01/02.
48	10 Net zero Water	UPC, CCC 24.17, and WAC 246-272A	UPC Table 16-1	Location of Gray Water System	Table 16-1 provides setback requirements for greywater holding tanks and disposal fields.	Requires very large lot to handle greywater. Allowing greywater for reuse can help LBC projects meet LBC goals for net zero water.	Consider similar code guide as recently was adopted in Oregon.	Oregon Plumbing Specialty Code 08-03

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:international Building Code IMC:international Mechanical Code IFC:international Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
49	11 Water Discharge	IMC	307.2.1	Condensate Disposal	Condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an approved place of disposal. Condensate shall not discharge into a street, alley or other areas so as to cause a nuisance.	Drainage system needs to be dealt with on site for LBC projects. Consider allowing reuse of condensate.	Consider defining condensate disposal as gray water (for toilet flushing).	Environmental Building News: "Alternative Water Sources: Supply-Side Solutions for Green Buildings," May 1, 2008.
50	4 Net zero Energy	IMC	403.2	Outdoor Air Required	The minimum ventilation rate of required outdoor air shall be determined in accordance with Section 403.3.	Ventilation rates based solely on occupancy tend to supply more outside air than necessary by other methods. Allowing air quality sensors for measuring minimum ventilation can help save energy.	Consider making ASHRAE 62.1 2007 the mandatory method for Ventilation calculations	ANSI/ASHRAE Standard 62.1-2007 Ventilation for Acceptable Indoor Air Quality
51	4 Net zero Energy	IMC	403.3	Ventilation Rate	Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate determined in accordance with table 403.3 based on the occupancy of the space and the occupant load or other parameter as stated therein. The occupant load utilized for design of the ventilation system shall not be less than the number determined from the estimated maximum occupant load rate indicated in Table 403.3. Ventilation rates for occupancies not represented in Table 403.3 shall be determined by an approved engineering analysis. The ventilation system shall be designed to supply the required rate of ventilation air continuously during the period the building is occupied, except as otherwise stated in other provisions of the code. Exception: The occupant load is not required to be determined, based on the estimated maximum occupant load rate indicated in Table 403.3 where approved statistical data document the accuracy of an alternate occupant density.	Table over-predicts occupancy by basing maximum on egress levels rather than design occupancy.	Consider allowing IMC exception that allows other occupancy rates to be used (even if not documented in plans) provided use of approved statistical data to document accuracy of alternative anticipated occupant density" in addition to the current Washington exception which states: "where occupancy density is known and documented in the plans, the outside air rate may be based on the design occupant density."	International Mechanical Code 2006.
52	4 Net zero Energy	IMC	514.2	Energy Recovery Ventilation Systems - prohibited applications	Energy recovery ventilation systems shall not be used in the following systems: 1. Hazardous exhaust systems covered in Section 510. 2. Dust, stock, and refuse systems that convey explosive or flammable vapors, fumes or dust. 3. Smoke control systems covered in Section 513. 4. Commercial kitchen exhaust systems serving Type I and Type II hoods. 5. Clothes dryer exhaust systems covered in Section 504.	Per code requirements, LBC projects lose opportunities for heat reclamation.	Provide code guidance to allow exterior conductive transfer of heat from ducts or provide an alternate means and methods for air treatment and filtration systems which remove contaminants before heat recovery.	No reference standard is currently available. However, for example, products for improved grease removal/extraction from kitchen hood exhaust through UV treatment and filtration make these airstreams suitable for heat recovery. Example manufacturer: Gaylord USA product XG-UV series for kitchen hoods. www.gaylordusa.com

# APPENDIX A: Full List of Suggested Strategies for Removing Code & Regulatory Barriers (continued)

RCW: Revised Code of Washington VMC:Vancouver Municipal Code CCC:Clark County Code IBC:International Building Code IMC:International Mechanical Code IFC:International Fire Code UPC: Uniform Plumbing Code WESC:WA State Energy Code

#	LBC Prereq. Affected	Code	Code Section	Description	Code Language	Project Concern	Proposed Recommendation	Reference / Resources
53	5 Materials Red list	IMC	Chapter 12	Pipe Standards	CPVC Plastic Pipe. Joints between CPVC plastic pipe or fittings shall be solvent-cemented or threaded joints conforming to Section 1203.3. PVC Plastic Pipe. Joints between PVC plastic pipe and fittings shall be solvent-cemented or threaded joints conforming to Section 1203.3.	Pipe standards violate LBC Red List.	Revise pipe list referenced in code to include HDPE, steel, and aluminum as acceptable alternatives to PVC.	Harvie, Jamie with Lent, Tom, <u>PVC-Free Pipe Purchasers Report</u> , Healthy Building Network, draft 1/1/01/02.
54	10 Net zero Water	IMC	1005.2	Potable Water Supply (Boilers)	The water supply to all boilers shall be connected in accordance with the International Plumbing Code.	Nonpotable water supply such as reclaimed water can assist with meeting net zero water goals.	Consider use of non-potable water source.	"Guidelines for Water Reuse" U.S. Environmental Protection Agency, September 2004.
55	11 Water Discharge	IMC	1009.3	Open-type expansion tank (drainage)	Open-type expansion tanks shall be located a minimum of 4 feet above the highest heating element. The tank shall be adequately sized for the hot water system. An overflow with a minimum diameter of 1 inch shall be installed at the top of the tank. The overflow shall discharge the drainage system in accordance with the International Plumbing Code.	To meet the LBC net zero water prerequisite, drainage needs to be dealt with onsite. Consider defining overflow as greywater and allow this to be stored onsite and reused for toilet flushing.	Consider defining this as gray water (for toilet flushing).	N/A
56	11 Water Discharge	IMC	1206.2	System Drain Down	Hydronic piping systems shall be designed and installed to permit the system to be drained. Where the system drains to the plumbing drainage system, the installation shall conform to the requirements of the International Plumbing Code.	The meet the LBC net zero water prerequisite, system drain down needs to be dealt with onsite. Consider allowing system drain down to be defined as greywater and allow water to be stored onsite and reused for toilet flushing.	Consider defining this as gray water (for toilet flushing).	N/A
57	3 Habitat Exchange 11 Water Discharge	IFC	503.1.1	Fire Apparatus Access Roads	Approved fire apparatus access roads shall be provided for every facility, building, or portion of a building and shall extend to within 150' of all portions of the facility.	More land required to achieve fire access for residential development.	Consider alternatives to providing direct access for fire trucks - cisterns, fire sprinklers etc or consider allowing different types of paving that allow apparatus access.	Ferguson, Bruce K. <u>Porous Pavements</u> , CRC Press, Boca Raton, Florida, 2005.  The book discusses alternatives to porous paving. Any choice must also meet Red List requirements  -porous aggregate -porous turf -plastic geocells -open-jointed paving blocks -open-cell paving grids
58	3 Habitat Exchange 11 Water Discharge	IFC	D106.1	Fire Apparatus Access Roads	Multifamily residential projects having more than 100 dwellings units shall be equipped throughout with two separate and approved fire apparatus access roads.	More land required to achieve fire access for residential development.	Consider alternatives to providing direct access for fire trucks - cisterns, fire sprinklers etc or consider allowing different types of paving that allow water discharge.	N/A

# APPENDIX B: External Stakeholder Group Priorities

Priority #1	Priority #2	Priority #3	Priority #4
*more than one box highlighted with the same color indicates a tie			
Description	Strategies		
	Education	Incentives	Code Language or Regulatory Process Changes
1 Institutional/ Process Barriers	Provide education and training for both developers/owners and code officials.	Define a sustainability or green development ombudsperson to help applicants and reviewers work together.	Need consistency in reviewers - a project should stay with the same reviewer throughout its life.
	Set up a system for education, licensing, and certification for sustainable or green development practitioners so they have credibility when dealing with reviewers (who may have the same credentials).	Streamline approvals for qualified "A-list" builders, designers, etc. The cost for these reviews should be reduced in proportion to the amount of review needed (less review should mean lower fees).	Replace the "turn in-get feedback-turn in again-get feedback again" loop with face-to-face collaboration.
	Shift the mindset of the jurisdictions to be more positive and open to new ideas.	Create green building technical assistance program for permit applicants.	Get the jurisdiction involved early in the design process.
	Set up quarterly meetings between builders and building officials for better communication.		
	Permit agencies provide an online database of approved alternates, accessible by public, and guidance documents for using approved alternatives.		
	Provide training on green building technologies to building inspectors.		Provide a single point of contact in the field instead of multiple inspectors.
Set up quarterly meetings between builders, building officials, and building inspectors for better communication.		Involve the inspector and plans examiner early in the design process to facilitate understanding of the project goals.	

# APPENDIX B: External Stakeholder Group Priorities (continued)

Priority #1	Priority #2	Priority #3	Priority #4
<b>Strategies</b>			
<b>Description</b>	<b>Education</b>	<b>Incentives</b>	<b>Code Language or Regulatory Process Changes</b>
2	<p>Provide resources/education to help developers and building owners understand life cycle cost versus first cost.</p> <p>Provide permit guidance for onsite renewable energy systems (solar, wind, ground-source heat pumps).</p>	<p>Provide incentives for increased thermal performance of building envelope beyond code requirements.</p> <p>Create a utility-based incentive like the Energy Trust of Oregon.</p> <p>Identify professionals who can certify results of a design charrette before submittal so the plan resulting from the charrette can be permitted quickly.</p>	<p>Remove any requirements for minimum house size.</p> <p>Develop maximum house/unit size requirements.</p> <p>Develop ordinances for onsite renewable energy systems for solar and wind. Develop requirements for preserving solar access.</p> <p>Provide "plain English" exceptions which allow for passive heating and cooling.</p> <p>Tie energy code requirements to climate change metrics such as the 2030 Challenge.</p> <p>Mandate tracking of actual energy use for newly permitted projects.</p> <p>Include a reach code (which identifies the next code cycle energy usage requirements).</p> <p>Phase-out incandescent bulb use through more restrictive codes.</p> <p>Require greater enforcement of energy code requirements during inspections.</p> <p>Define requirements that allow for wind turbines in rural areas.</p> <p>Define requirements that allow for small urban wind energy systems such as vertical axis wind turbines on building roofs or parapets.</p> <p>Develop code requirements for light pollution reduction.</p>

\*more than one box highlighted with the same color indicates a tie

## APPENDIX B: External Stakeholder Group Priorities (continued)

Priority #1	Priority #2	Priority #3	Priority #4
*more than one box highlighted with the same color indicates a tie			
Description	Strategies		
	Education	Incentives	Code Language or Regulatory Process Changes
3	Provide guidance on approved designs that do not require independent testing.	Allow for flexible "incubator" pilot projects to test alternative materials.	If a method is prescribed by code and followed, remove requirement for an engineering stamp.
	Provide training for inspectors on unconventional technologies.	Identify professionals who can certify results of a design charrette before submittal so the plan resulting from the charrette can be permitted quickly.	Officials should use common sense and not be afraid to make a decision when a situation is not exactly within the code parameters.
4	Provide guidance on "ready to use" permeable paving solutions that are designed to meet fire truck loads in the City/County.	Offer reduced fees for projects that use pervious pavements on driveways and fire access roads that are integrated into an onsite stormwater management strategy.	Institute a stakeholder group (e.g., manufacturer's representative, code review, and manager) that can provide a quick review and decision.
	Provide design suggestions for combined pervious access road with strips of conventional structural pavement that fire vehicles can drive on.		Set up a system to take proposed code revisions to the state quickly.
	Promote the use of sprinklers instead of providing fire access roads, where feasible.		Allow the use of pervious pavement or grasscrete for fire access roads; define structural requirements.
	Work with fire departments to encourage innovative green building strategies.		Allow flexibility in development codes for eliminating sidewalks and curbs and replacing them with low impact development stormwater strategies.
			Coordinate requirements for fire access between the building department and the fire marshal. Can using smaller medical response vehicles reduce requirements?
			Lobby for narrower fire vehicles.
			Allow provisions for equivalent water sources on-site.
			Look at non-flammable building materials.

# APPENDIX B: External Stakeholder Group Priorities (continued)

Priority #1	Priority #2	Priority #3	Priority #4
Strategies			
Description	Education	Incentives	Code Language or Regulatory Process Changes
5	<p>Reduced parking can save developers money that can be used to offset first cost premiums for other green building elements. Provide education on value/benefit of alternative transportation options for market-driven parking assessments.</p>	<p>Reduce transportation SDC's for developments close to the central City.</p> <p>Cross evaluate parking requirements with new stormwater codes and provide incentives for reducing parking requirements to meet stormwater management goals.</p>	<p>Reduce parking criteria for projects that are close to public transportation.</p> <p>Eliminate requirement for on-site parking in urban areas close to public transportation.</p> <p>Allow for smaller, more compact parking spaces (micro-vehicle spaces).</p> <p>Allow for nonconventional parking lot layouts that group parking areas to reduce impervious coverage.</p>
6	<p>Provide guidance on designing, permitting, installing, and maintaining rainwater harvesting cisterns into new construction and retrofit applications.</p>		<p>Define acceptable thresholds for setbacks and building separation that promote above-ground cisterns. a) Consider cisterns like garden sheds, gazebos, or playhouses, for which there are setback waivers. b) Do not count cisterns as separate structures (i.e. garages). c) Make cisterns exempt from lot coverage restrictions. d) Allow an exception for cisterns to be closer to the building as long as any life-safety issues (such as fire access and not blocking egress) are addressed and guidance on structural considerations of loading onto building foundations is provided.</p> <p>Make code performance-driven.</p> <p>Create boilerplate solutions.</p>

\*more than one box highlighted with the same color indicates a tie

# APPENDIX B: External Stakeholder Group Priorities (continued)

Priority #1	Priority #2	Priority #3	Priority #4
*more than one box highlighted with the same color indicates a tie			
Description	Strategies		
	Education	Incentives	Code Language or Regulatory Process Changes
7 Rural Cluster Developments	Address the underlying issues with cluster developments that contribute to the perception that they don't work.	Provide incentives for small cottage housing (e.g. density bonuses) to retain rural character.	Change code so that rural cluster developments are allowed/encouraged: a) Include rural cluster developments in upcoming revisions to the Comp Plan. b) Provide for flexibility in zoning codes to allow clusters c) Allow rural clusters on land without critical areas. d) Change definition of environmentally sensitive areas to be broader to promote cluster development instead of limiting it. e) Remove critical areas by putting them in tracts in perpetuity. f) Allow multi-family in rural areas
	Define when/where rural cluster developments are beneficial even where designated environmentally critical areas do not exist.		Allow for flexible "ownership" models like associations as a way to address common areas in cluster developments.
	Provide education and guidance for onsite habitat exchange areas.		Create "green" zones with flexibility in code requirements in exchange for meeting goals for site protection, low impact, efficient development practices.
	Provide information on potential cost/benefits for cluster developments.		Tie access requirements for cluster developments to services and transportation availability
	Provide education to developers on possible lower impact rural development strategies.		Limit the documentation process necessary for products without a significant health or safety hazard - i.e. a "poor man's UL".
	8 Toxic Materials	Create a web-based resource guide of products that are environmentally friendly and approved for use by the building officials.	

# APPENDIX B: External Stakeholder Group Priorities (continued)

Priority #1	Priority #2	Priority #3	Priority #4
<b>Strategies</b>			
	<b>Education</b>	<b>Incentives</b>	<b>Code Language or Regulatory Process Changes</b>
9	Connection to Public Water Supply	Provide education about the design and use of closed-loop water systems.	Develop new code language that identifies the criteria allowing for exemptions to public water supply connections.
	Address potential loss of anticipated revenues to water purveyors.	Work with water purveyors to develop fee structure to incentivize net-zero water systems such as waived or reduced fees for projects not connected to the municipal system.	Allow use of community cisterns.
	Identify and address health issues around rainwater harvesting and greywater reuse.		Allow rainwater cisterns to be used for fire storage.
10	Connection to Public Sewer	Provide education about the design and use of closed-loop wastewater systems.	Develop new code language that identifies the criteria allowing for exemptions to public sewer connections.
	Address potential loss of anticipated revenues to sewer purveyors.	Work with water purveyors to develop fee structure to incentivize net-zero wastewater systems such as waived or reduced fees for projects not connected to the municipal system.	
	Identify and address health issues around community septic systems.		
11	Onsite Fuel Storage	Rather than onsite vehicle fuel storage, provide design and permitting guidance and education for electric-plug in vehicles.	Work with the State to develop code language that allows for onsite vehicle fuel storage.
			Defer to existing standards for heating fuel, though any underground storage would not be ideal.
			Apply guidelines from agricultural uses.

\*more than one box highlighted with the same color indicates a tie

## **APPENDIX C: RECOMMENDATIONS FOR REGIONAL COLLABORATION EFFORT IN CLARK COUNTY**

The following recommendations are for developing a regional collaboration effort to support improved consistency and collaboration for removing barriers and approving sustainable development projects within Clark County including the cities of Battle Ground, Camas, La Center, Ridgefield, Vancouver, Washougal and the town of Yacolt.

### **1. Identify key public agency and community members to sit on a regional stakeholder committee.**

Representatives from the building and planning departments, Clark County Public Health, and green building advocates from the design, engineering and building sectors should be represented on the committee. Early committee meetings should be used to establish committee goals, objectives, meeting schedules, and expected outcomes.

### **2. Develop a process for reviewing, approving, and communicating results from green building projects using alternative code compliance approaches.**

Utilize the draft resource package developed through the SARD project as a template for developing an online database to track and communicate approved alternates. To be useful to a wide range of audiences, the online resource database would need to be accessible to both public agencies as well as the private development community. The database should be easily searchable by design strategy, code reference, project type, and jurisdiction. Ongoing management of the database would be necessary to ensure information is accurate, up-to-date, and useful. Ultimately, the information from the resource database on approved alternates should be used for future updates to codes and standards to support more sustainable development practices.

### **3. Implement region-wide incentives to encourage more sustainable development projects.**

Utilizing the recommendations listed in this report, the regional stakeholder committee should assess the feasibility of adopting incentives such as priority permit processing or reduced fees across jurisdictional boundaries. Leverage resources available amongst the public agencies and seek funding from state or federal sources to implement incentives.

### **4. Host trainings to provide technical learning experiences as well as opportunities to share resources and network with peers.**

Trainings can be informal brown-bag type sessions or more elaborate workshops. The goal of the trainings is to increase understanding and knowledge of green building design strategies and emerging technologies. Trainings should be targeted both towards public agencies and the private development community.

### **5. Develop performance indicators and tracking methods for evaluating the success of the regional stakeholder committee.**

Examples include number of green buildings permitted, number of attendees at educational events, and number of potential regulatory barriers removed through the use of the online resource database, and number of codes or regulatory procedures amended to support sustainable development projects.

## APPENDIX D: PROJECT PARTICIPANTS & STAKEHOLDERS

### Consultants:

Katie Spataro, Research Director, Cascadia Region Green Building Council  
Lisa Petterson, SERA Architects

### SARD Project Leads:

Marian Lahav, Senior Planner, City of Vancouver  
Gordy Euler, Planner, Clark County

### SARD Steering Committee:

Jim Muir, Chief Building Official, Clark County  
Brian Carlson, Public Works Director, City of Vancouver  
Laura Hudson, Long Range Planning Manager, City of Vancouver  
John Gentry, Lead Deputy Fire Marshal, Vancouver Fire Department  
Jeri Newbold, Residential Plans Examiner, City of Vancouver  
Pete DuBois, Sustainability Coordinator, Clark County  
Don Skaggs, Engineering Manager, Sanitary Sewer System, City of Vancouver  
Tom Scott, Fire Inspector, Clark County Fire  
Ahmad Qayoumi, Transportation Concurrency Manager, City of Vancouver  
Annette Griffy, Surface Water Management Manager, City of Vancouver  
Chad Eiken, Planning Review Team Manager, City of Vancouver  
Chad Lawry, Deputy Fire Marshal, Vancouver Fire Department  
Charles Ray, Urban Forester, City of Vancouver  
Cindy Meyer, Building Official, City of Vancouver  
David Scott, Development Review Services Director, City of Vancouver  
Diane Stites, Vancouver Housing Authority  
Jim Crawford, Fire Marshal, Vancouver Fire Department  
Jon Dunaway, Fire Marshal, Clark County Fire Department  
Michael Butts, Community Development, Clark County  
Mike Piper, Sustainability Coordinator, City of Vancouver  
Peggy Sheehan, Community Development Block Grant Program Manager, City of Vancouver  
Sue Stepan, Engineering Services Manager, Clark County  
Tom Gonzales, Resource Protection Programs Manager, Clark County Public Health

### Water Barriers Stakeholders:

Cindy Meyer, Building Official, City of Vancouver  
Lou Malattia, Lead Plans Examiner, Clark County  
Tom Gonzales, Resource Protection Programs Manager, Clark County Public Health  
Doug Quinn, Water Department Director, Clark Public Utilities District  
John Peterson, General Manager, Clark Regional Wastewater District  
Tom Boyer, Assistant City Engineer, City of Vancouver  
Mike O'Rourke, Business Agent, Plumbers & Steamfitters Union UA290  
Ron Murray, Legislative Lobbyist, Plumbers & Steamfitters Union UA290  
Kurt Unger, Water Resources Program, WA Department of Ecology  
Ginny Stern, Environmental & Public Health Liaison, WA Department of Health

**External Stakeholders and Other Staff:**

Jeff Whitten, The Wolfe Group, LLC  
Mason Wolfe, Creation Homes, LLC  
Tom Dessert, Century 21 Cascade Pacific  
Bill Hart, Carleton Hart Architecture  
Debby Dover, YW Housing  
Mike Odren, Olson Engineering  
Cyndi Thompson, Sunrise Home Builders  
Darren Bates, Sunrise Home Builders  
David Commeree, New Tradition Homes  
Ryan Zygar, Tamarack Corp  
Jill Sughrue, Sustain-NW  
Mark Lyles, New Buildings Institute  
Jamie Clark, SGA Engineering  
Deston Dennison, Abundance Consulting  
Chuck Dougherty, Synergy Design Group  
Steve Tapio, New Tradition Homes  
Jarret Helmes, New Tradition Homes  
Henry Diaz, Mackay & Sposito  
Amy Dvorak, Maul, Foster, Alongi  
Timothy Buckley, Greenstone Architecture  
Patrick Sughrue, Structures NW  
Ed Greer  
Brian Kashas, Kashas Construction, Inc.  
Evan Dust, HDR, Inc.  
Adrienne DeDona, Jeanne Lawson Associates  
Jim Edelson, New Buildings Institute  
Chris Miner, Independent Designer  
Steve Madsen, Building Industry Association of Clark County  
Shane McGuffin, Sequoia Builders, LLC  
Pete DuBois, Sustainability Coordinator, Clark County  
Cathy Golik, Development Review Services, City of Vancouver  
Rich McConaghy, Solid Waste & Water Resources Education Center, City of Vancouver  
Nasiema Wingate-Pearse, Sustainability, Clark County  
Nick Phillips, Development Review Services, City of Vancouver