

State of Washington  
Joint Legislative Audit & Review Committee (JLARC)



# **High Performance Public Buildings: Impact on Energy Use is Mixed**

**Report 11-7**

June 23, 2011

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## **Joint Legislative Audit and Review Committee**

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JLARC's non-partisan staff auditors, under the direction of the Legislative Auditor, conduct performance audits, program evaluations, sunset reviews, and other analyses assigned by the Legislature and the Committee.

The statutory authority for JLARC, established in Chapter 44.28 RCW, requires the Legislative Auditor to ensure that JLARC studies are conducted in accordance with Generally Accepted Government Auditing Standards, as applicable to the scope of the audit. This study was conducted in accordance with those applicable standards. Those standards require auditors to plan and perform audits to obtain sufficient, appropriate evidence to provide a reasonable basis for findings and conclusions based on the audit objectives. The evidence obtained for this JLARC report provides a reasonable basis for the enclosed findings and conclusions, and any exceptions to the application of audit standards have been explicitly disclosed in the body of this report.

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### **Committee Approval**

On June 23, 2011, this report was approved for distribution by the Joint Legislative Audit and Review Committee.

### **Acknowledgements**

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**High Performance  
Public Buildings:  
Impact on Energy  
Use is Mixed  
Report 11-7**

**June 23, 2011**



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## REPORT SUMMARY

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### **In 2005, the Legislature Established High Performance Public Building Requirements**

The 2005 Legislature passed ESSB 5509, which established high performance building requirements for public buildings. High performance buildings, also known as “green buildings,” must be designed and constructed to standards intended to promote environmental conservation. The bill required that state agencies, higher education institutions, school districts receiving state funding for new construction or major renovations, and certain recipients of capital funds through the Department of Commerce follow high performance building standards. The bill also required state entities and school districts to document and report the added costs and operational savings of their projects.

### **Agencies and School Districts Report That High Performance Building Requirements Have Increased Public Building Costs by 1 to 3 Percent**

Construction and renovation costs have increased for most building projects completed under the requirements of the 2005 legislation. JLARC estimates that incorporating high performance features added \$2.5 million, or about 1 percent, to the costs of 17 projects completed by state agencies and higher education institutions. JLARC estimates that the new requirements added \$9.5 million, or about 3 percent, to the cost of 14 new schools completed under the program. However, the University of Washington reported that following high performance requirements reduced construction costs for two projects.

### **Four Metrics Show That High Performance Buildings Have Mixed Results in Reducing Energy Use**

JLARC measured energy performance in four ways. Because energy data was not available for all buildings using any single measurement approach, the four approaches provide the Legislature with the most possible information, given data limitations.

As shown on the following table, three of the four metrics show that while some high performance buildings meet expectations for energy efficiency and savings, others do not. The final metric shows that performance improves over time. These results are based on limited experience and suggest that a definitive conclusion about the benefits of Washington’s high performance building program may be premature at this time.

Actual Energy Use Compared With:	Results for High Performance Buildings Reviewed:
Estimated energy use	Energy use exceeded design estimates in five of six K-12 projects. Energy use met design estimates for the one state agency/higher education project for which data was available.
Similar buildings owned by organization	Actual energy use in five of nine K-12 high performance school buildings is lower than the average energy use among comparable buildings within their respective districts. Actual energy use at a high performance correctional facility is between 24 and 29 percent less than comparable facility.
National benchmark	Five of 13 K-12 school buildings qualify for an Energy Star designation.
Change over time	Actual energy use declined in eight of nine K-12 school buildings reporting more than 22 months of operations data.

In addition, school districts implementing resource conservation management programs have reported significant reductions in utility use and cost in old as well as new buildings

### **JLARC’s Ability to Assess Performance of All High Performance Public Buildings Is Limited Because State Agencies Are Not Reporting Information as Required by Law**

The reporting system envisioned by the 2005 legislation is incomplete. The Department of General Administration (GA) and the Office of Superintendent of Public Instruction (OSPI) established procedures and formats for state entities and school districts to submit required data. However, state agencies and institutions have not submitted reports on a timely basis. Both GA and OSPI report that the staff available for monitoring high performance public buildings and analyzing data has been reduced in recent years due to budget reductions. The Department of Commerce has not yet reported on affordable housing projects and does not believe reports are required for community development projects.

In addition, JLARC was unable to assess other anticipated benefits of high performance buildings, such as recycling and use of regional materials because of limited data. Lack of clear linkage between building design and building occupant performance prevented JLARC from measuring the impact of high performance buildings on worker productivity and student performance.

### **Conclusion**

Washington’s high performance public building program has been in existence for five years. Only a relatively few buildings have been completed and in operation for more than one year. Because of this, JLARC concludes it is too early to make any overall judgments about the long-term effectiveness of the program. However, in order for the Legislature to make informed decisions about the program, it will be necessary for GA, OSPI, and Commerce to improve energy use and cost data and reporting.

### **Recommendation**

- 1. The Department of General Administration, Office of Superintendent of Public Instruction, and Department of Commerce should develop plans to ensure that they receive complete and accurate data on high performance buildings and they should analyze program results.**
- 2. If the Legislature wishes to obtain information on operating savings for high performance projects supported by community development grants from the Department of Commerce, it should consider revising the reporting requirements of Chapter 39.35D RCW to specifically require the Department of Commerce to obtain that information from grant recipients.**

# PART ONE – HIGH PERFORMANCE PUBLIC BUILDINGS IN WASHINGTON

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In 2005, the Legislature established high performance building requirements for state agencies, state higher education institutions, public school districts, and other recipients of state capital funds. Before explaining the Legislature’s action in more detail, this first part of the report begins with more general information about high performance buildings.

## **What Are High Performance Buildings?**

The U.S. Environmental Protection Agency describes high performance buildings as buildings designed using processes that are environmentally responsible and resource-efficient throughout a building’s life cycle, from siting, to design, construction, operation, maintenance, renovation, and deconstruction. High performance buildings are sometimes referred to as “green buildings.” These buildings are designed with the intent to reduce the overall impact of the built environment on human health and the natural environment by aiming to:

- Use energy, water, and other resources efficiently;
- Protect occupant health and improving employee productivity; and
- Reduce waste, pollution, and environmental degradation.

## ***High Performance Buildings Must Meet Certain Standards***

In order to qualify as a high performance building under Washington law, the building must meet specific standards. There are, however, more than one set of standards available for a public or private developer to consider. Standards used in Washington for different types of high performance buildings include Leadership in Energy and Environmental Design (LEED) standards, the Washington Sustainable Schools Protocol (WSSP), and the Evergreen Sustainable Development Standard (ESDS).

Although the standards differ in some details, the approach for determining how a building qualifies as high performance is similar. Each set of standards identifies specific categories, such as energy, water, and indoor environmental quality. Each category includes design or operational elements, some of which are required and some of which are optional. For example, in the energy category for the LEED standards, a certain minimum energy performance is required, while use of on-site renewable energy is an option. When a building includes these optional elements, the building receives “points.” In addition to the required elements, the building must acquire a certain threshold of optional points to qualify as high performance.

The optional points are available in each of the categories, and each building’s owner and designer chooses which optional measures to incorporate. This means that two buildings could qualify as high performance under the same set of standards, with one building putting more emphasis on the energy elements and the second emphasizing elements that address indoor environmental quality. These options create the potential for some trade-off among the categories. For example, an owner who chooses to emphasize indoor environmental quality may receive points for enhanced air

circulation and greater window space to allow more daylight; however, those choices could reduce a building’s potential energy efficiency.

## **Legislation in 2005 Established High Performance Public Building Requirements in Washington**

In 2005, the Legislature passed a bill requiring certain public entities and certain recipients of state capital funds to meet high performance building standards when constructing or renovating their buildings (ESSB 5509; Chapter 39.35D RCW).

The requirement applies to “major facility projects,” which the legislation defined as:

- A construction project larger than 5,000 gross square feet of occupied or conditioned space as defined in the Washington State Energy Code; or
- A building renovation project when the cost is greater than 50 percent of the assessed value and the project is larger than 5,000 gross square feet of occupied or conditioned space as defined in the Washington State Energy Code.

The legislation also identifies a number of different projects that do *not* qualify as major facility projects, such as transmitter buildings, pumping stations, hospitals or projects where high performance design is determined to be not practical.

The high performance building requirements apply to state agencies, state institutions of higher education, and public school districts receiving state construction assistance. The requirements also apply to recipients of state capital funds in the form of community development grants or via the Housing Trust Fund. The latter two funding mechanisms are administered by the state Department of Commerce.

### ***High Performance Requirements Were Phased In***

The Legislature staggered the effective dates for meeting the new high performance building requirements, as shown in Exhibit 1.

**Exhibit 1 – The Legislature Staggered the Effective Dates for Compliance with High Performance Building Requirements**

<b>Project Type</b>	<b>Effective Date</b>
State Agencies & Higher Education Institutions	July 25, 2005
Volunteer School Districts	July 1, 2006
Class One School Districts	July 1, 2007
Class Two School Districts	July 1, 2008
Housing Trust Fund Recipients	July 1, 2008

Source: ESSB 5509, Sections 3, 4, and 12.



**Different Standards Apply to Different Types of Projects**

As noted earlier, there are different high performance building standards. The 2005 legislation identified which standard to use for different circumstances. The legislation specifies use of the Leadership in Energy and Environmental Design (LEED Silver or better) standard for some entities and allows school districts to choose between use of the LEED standard or the Washington Sustainable Schools Protocol (WSSP).

For affordable housing projects, the Legislature directed the Department of Community, Trade and Economic Development (now the Department of Commerce) to work with stakeholders to adopt an existing sustainable building standard or criteria appropriate for affordable housing. The agency adopted the Evergreen Sustainable Development Standard (ESDS) modeled after the Enterprise Green Communities’ national green building standard for affordable housing.

Exhibit 2 provides a summary about the bill’s requirements and the three different high performance building standards. Appendix 3 has additional detail on the three sets of standards.

**Exhibit 2 – The 2005 Legislation Authorizes Different High Performance Building Standards for Different Types of Projects**

	<b>LEED</b>	<b>WSSP*</b>	<b>ESDS</b>
Who Applies?	<ul style="list-style-type: none"> <li>• State agencies</li> <li>• State institutions</li> <li>• Community development grant recipients</li> <li>• School districts**</li> </ul>	<ul style="list-style-type: none"> <li>• School districts**</li> </ul>	<ul style="list-style-type: none"> <li>• Housing Trust Fund recipients</li> </ul>
Who Administers?	<ul style="list-style-type: none"> <li>• Green Building Certification Institute</li> <li>• WA Department of General Administration</li> </ul>	<ul style="list-style-type: none"> <li>• Office of Superintendent of Public Instruction</li> </ul>	<ul style="list-style-type: none"> <li>• WA Department of Commerce</li> </ul>
Requires Third Party Validation?	Yes	No	Yes
Levels of Achievement Recognized	<ul style="list-style-type: none"> <li>• Certified (40-49 points)</li> <li>• Silver (50-59 points)</li> <li>• Gold (60-79 points)</li> <li>• Platinum (over 80 points)</li> </ul> <p>(max points: 110)</p>	<ul style="list-style-type: none"> <li>• Compliance at 40 points</li> </ul> <p>(max points: 96)</p>	<ul style="list-style-type: none"> <li>• New construction compliance at 50 points (max points: 220)</li> <li>• Renovation compliance at 40 points (max points: 187)</li> </ul>

\* 2006 WSSP edition. OSPI released a revised WSSP edition in November 2010.

\*\*Chapter 39.35D allows school districts options for which standard to follow.

Source: U.S Green Building Council, Department of General Administration, Office of Superintendent of Public Instruction, and Department of Commerce.

### ***Monitoring and Reporting Requirements***

The Legislature created a set of monitoring and reporting requirements and expressed its intent that public agencies and public school districts document the costs and savings associated with implementing the legislation. For those public agencies, the legislation specifically directs them to (a) monitor and document ongoing operating savings resulting from major facility projects designed, constructed, and certified as high performance buildings (LEED Silver or better); and (b) report this information annually to the Department of General Administration (GA).

The legislation requires public school districts to (a) monitor and document for a minimum of five years the appropriate operating benefits and savings resulting from major facility projects designed and constructed as high performance buildings; and (b) report this information annually to the Superintendent of Public Instruction (OSPI).

In order for the Legislature and others to learn about the costs and savings associated with the high performance public building requirements, the bill directed GA and OSPI to consolidate the information they receive, and report to the Legislature and the Governor each even-numbered year until 2016.

Affordable housing projects supported by the Department of Commerce Housing Trust Fund are exempt from the monitoring requirements under RCW 39.35D.030(3)(a) that are applicable to public agencies. However, RCW 39.35D.080 assigns the Department of Commerce the responsibility for reporting operating savings. According to Department staff, the Housing Trust Fund will meet this requirement by reporting the results of energy modeling for projects completed under ESDS.

Statutory reporting requirements are less clear for projects funded by community development grants, which are administered by the Department of Commerce. The Department believes that it is not required to monitor or report operating savings for these projects.

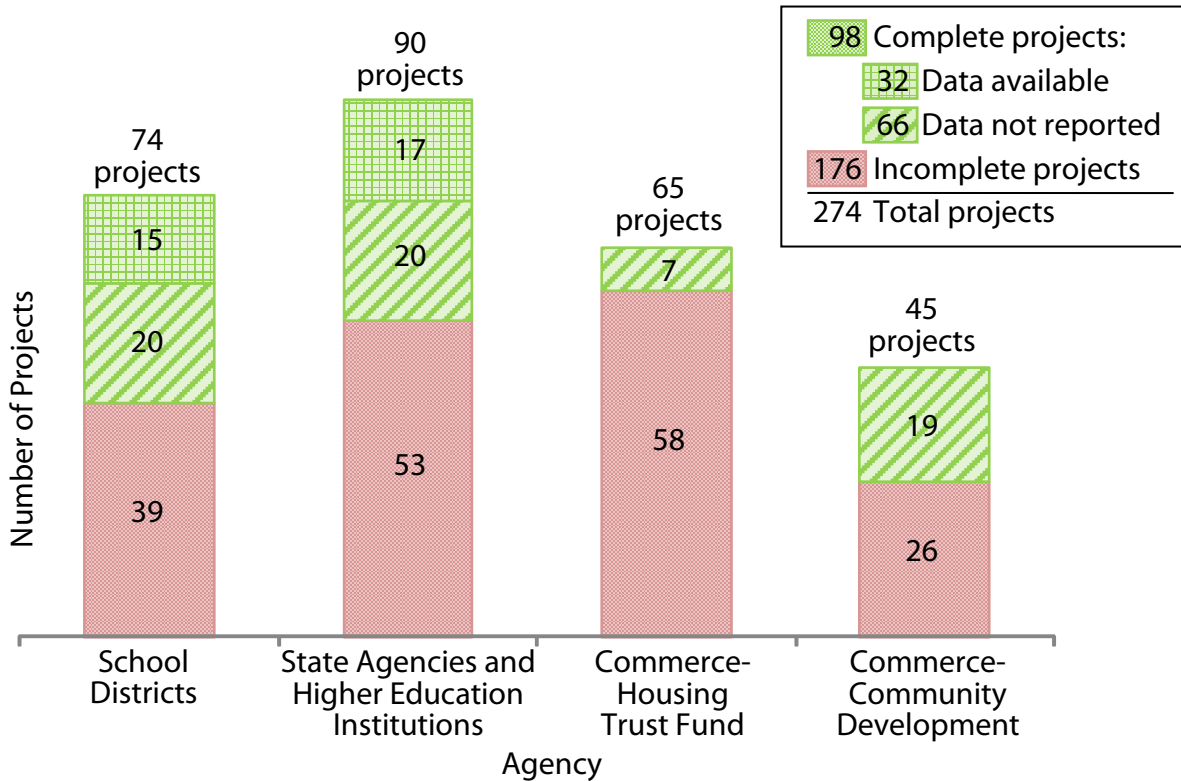
### ***Performance Review by JLARC***

The 2005 legislation included direction to the Joint Legislative Audit and Review Committee (JLARC) to conduct a performance review of the high performance public buildings program. The Legislature specifically asked that the review include information on the costs of implementing the high performance public building standards and on operating savings attributable to implementing the standards. The Legislature also asked about the identification of any impacts of high performance building standards on worker productivity and student performance and about the effectiveness of high performance building standards.

### **Identifying Buildings to Include in JLARC's Review**

As of June 30, 2010, Washington State agencies, higher education institutions, school districts, and certain grant recipients had initiated 274 projects that fall under high performance building requirements. (See Exhibit 3.)

**Exhibit 3 – Washington State Initiated 274 High Performance Public Building Projects as of June 30, 2010**



Source: JLARC analysis of information provided by the Department of General Administration, Office of Superintendent of Public Instruction, and Department of Commerce.

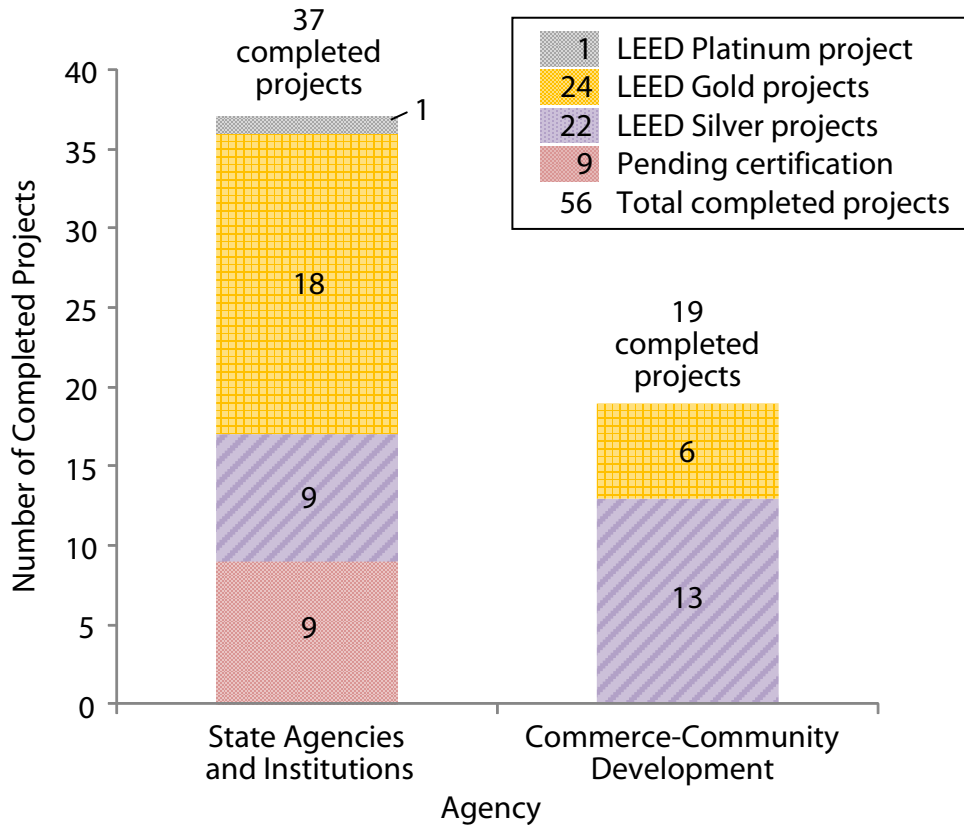
A total of 98 projects were completed by June 30, 2010. However, data was not available for all completed projects. As noted previously, the Department of Commerce has not reported project cost or operating data for Housing Trust Fund and community development projects. School districts are not required to begin reporting until after the project is formally accepted by the governing board, and many state agencies and higher education institutions have not reported data for completed projects. As a result, project data was available for 15 school district and 17 state agency and higher education projects constructed under the requirements of the 2005 legislation. These projects are included in the JLARC review. JLARC’s review does not address the performance of seven completed Housing Trust Fund projects and 19 completed community development projects funded through the Department of Commerce.

In addition to the buildings shown in Exhibit 3, JLARC identified a number of high performance buildings that were constructed prior to enactment of the 2005 legislation. These include five school buildings constructed as pilot projects for the WSSP, five Department of Corrections buildings, nine University of Washington buildings and the Seminar II building at The Evergreen State College. Data from three of the pilot school projects and the Seminar II building is included in JLARC’s analysis of energy use in buildings with longer operating histories. Individual building energy data for other pre-2005 buildings was not available for that analysis.

## LEED Certified Projects in Washington State

Among state agencies, institutions and grant recipients required to meet LEED requirements under the provisions of Chapter 39.35D RCW, 47 projects have received certification by the U.S. Green Building Council. Exhibit 4 shows the certification levels achieved.

**Exhibit 4 – Washington State Has 47 LEED-Certified Public Buildings as of June 30, 2010**



Source: Department of General Administration 2010 Report to the Legislature; information provided by the Department of Commerce.

School districts and affordable housing projects are not required to meet LEED requirements. School districts meeting WSSP standards certify their compliance to OSPI. Affordable housing project compliance is verified by a third-party contractor reporting to the Housing Trust Fund.

# PART TWO – IMPACT OF HIGH PERFORMANCE BUILDING REQUIREMENTS

## Agencies and School Districts Report That Meeting the State’s High Performance Building Requirements Has Added 1 to 3 Percent to the Cost of Constructing Public Buildings

Available data shows that constructing buildings under high performance requirements typically increases costs between 1 and 3 percent. As shown in Exhibit 5, incorporating high performance features added \$2.5 million, or slightly less than 1 percent, to constructing 17 state agency and higher institution facilities. However, state entities did not report cost information on 20 projects. Data provided by OSPI and school districts shows that meeting high performance standards added \$9.5 million (2.6 percent) to 14 school construction costs. Appendix 4 provides complete cost data for each project.

**Exhibit 5 – Agencies Report High Performance Features Added Between 1 and 3 Percent to Building Costs**

		State Agencies & Higher Education Institutions	School Districts
Number of projects		17*	14**
Total added costs		\$3,507,796	\$10,019,890
Net added costs after incentives and avoided costs		\$2,499,726	\$9,538,020
Average net added cost per square foot		\$3.25	\$8.52
Net added cost percent	Average	0.9%	2.6%
	Min	-1.4%	0.7%
	Max	3.8%	7.2%

\*Cost reports not available for 20 of 37 projects substantially complete as of June 30, 2010.

\*\*Total cost not available for one project still being closed out.

Source: JLARC analysis of information provided by the Department of General Administration and Office of Superintendent of Public Instruction.

OSPI and General Administration use different formats and guidance for identifying added high performance costs. As a result, the added costs reported for high performance features may not be directly comparable between K-12 projects and projects at state agencies and higher education institutions.

The added cost of high performance features was reduced in a number of projects by rebates and incentives from utility providers. Utility companies offer these incentives and rebates for projects that install equipment that reduces their energy requirements. Two state agency and higher education institution projects reported rebates and incentives totaling over \$400,000. Four school district projects reported \$482,000 in rebates. In addition to rebates, the University of Washington reported that following high performance requirements eliminated the need for certain equipment on two projects, thereby avoiding almost \$600,000 in costs.

The 14 school districts shown in Exhibit 5 all volunteered to meet WSSP standards before the mandatory compliance date established by the 2005 legislation. These districts received OSPI grants totaling \$4.1 million. The grants amounted to 43 percent of the \$9.5 million net added costs for these projects.

The added costs for the 17 state agency and higher education projects shown in Exhibit 5 include LEED registration and LEED consultant fees. LEED registration fees totaled \$65,909 for the 17 projects that have submitted cost reports. In addition, these projects incurred approximately \$1.4 million in LEED consultant fees. Reports for the remaining projects have not been submitted, although required by statute. The Department of Commerce does not require grant recipients to report project costs. Therefore, the actual cost for LEED registration and consultants will likely exceed the amounts reported above.

In some cases, reports show that constructing high performance buildings may cost less than constructing conventional buildings. The University of Washington reported that two of its projects, both renovations of existing facilities, were actually less costly than conventional projects because design features eliminated the need to install air conditioning equipment. Those avoided costs allowed the university to report that these projects cost less than a conventional renovation design.

Prior to the 2005 legislation, OSPI estimated that the added cost of constructing high performance school buildings would be approximately 2 percent. Using that estimate as a criterion, the added costs for 12 of 17 (71 percent) of high performance buildings at state agency and higher education institutions met that early estimate. Five of the 14 school projects (36 percent) met that early estimate.

## **JLARC Focused on Actual Energy Use to Measure the Benefits of High Performance Public Buildings**

The 2005 legislation clearly states the Legislature's intent to reduce energy and utility costs by constructing high performance buildings. State agencies and school districts spent approximately \$423 million for all utilities in 2009-10, and information presented to the Legislature in support of the bill reported that energy savings are the largest component (89 percent) of the estimated utility savings from switching to high performance buildings. Reducing energy use could result in substantial savings for state agencies and local schools. In addition, unlike some other attributes of high performance buildings, energy use is readily measurable. Therefore, the focus of JLARC's analysis of benefits is on actual energy use.

### ***JLARC Uses Four Metrics to Evaluate Actual Energy Use***

JLARC measured energy performance in four ways. Because energy data was not available for all buildings using any single measurement approach, the four metrics provide the Legislature with the most possible information, given data limitations. The four approaches are:

- Metric 1: Actual energy use compared to energy use estimates developed during project design;
- Metric 2: Actual energy use compared to similar non-high performance buildings;
- Metric 3: Actual energy use compared to a national benchmark, the Energy Star program; and
- Metric 4: Changes in actual energy use over time in the high performance buildings that have been operating more than two years.

The primary measure of energy performance is the amount of energy used per square foot of building space, also known as energy use intensity (EUI). The EUI translates all building energy sources into thousands of British thermal units (kBtu's) per square foot per year, which provides a standard unit of measurement for comparing energy performance. A lower EUI indicates greater energy efficiency. A related indicator is the Energy Star designation available through the U.S. Department of Energy's Portfolio manager. In contrast to EUI, a higher Energy Star designation indicates greater energy efficiency. Information on energy *costs* would have provided a designation measure of energy performance. However, OSPI does not collect energy cost data and GA has obtained little actual cost data from state agencies.

### **The Four Metrics Show Mixed Performance for Washington's High Performance Public Buildings**

The results of the four metrics are based on limited experience and show mixed performance. They suggest that definitively assessing the benefits of Washington's high performance building program may be premature at this time. The following sections provide more detail of JLARC's energy use analysis using the four metrics.

#### ***Metric 1: Actual Energy Savings in Five of Seven Projects Did Not Reach Design Estimates***

Early in project development, designers conduct an energy life cycle cost analysis to evaluate design and equipment options. The cost analysis estimates energy use and cost for each available design option and is a tool for determining building configuration and equipment. Although GA requires agencies to submit this information prior to construction and to report actual energy usage at the end of a building's first years of operation, many agencies have not done so. GA has information about estimated and actual energy usage for only one of 18 projects that were completed prior to June 30, 2009, and had a full year of operating experience by June 30, 2010. OSPI does not routinely collect information on estimated energy use and cost. However, this information is available for six school buildings: four current projects and two pilot projects.

The results of this analysis show that seven buildings used more energy than estimated during design.

**Exhibit 6 – Energy Use For Five of Seven High Performance Buildings Did Not Meet Design Estimates**

	Building	Annual Energy Use (000 Btu per sf)			Design Estimate Met?
		Estimate	Actual	% Difference	
<b>State/ Higher Ed, First 12 Months</b>	UW Playhouse Renovation	84	72	-14%	Yes
<b>School Buildings, Most Recent 12 Months</b>	Sherwood Forest ES	30	46	+53%	No
	Grove ES	22	55	+150%	No
	Gray MS	39	57	+46%	No
	Willapa Valley Jr./Sr. HS	33	12	-64%	Yes
<b>Pilot Schools, Most Recent 12 Months</b>	Lincoln Heights ES	40	47	+18%	No
	Washington MS	26	38	+46%	No

Source: JLARC analysis of information provided by the Department of General Administration, University of Washington, Office of Superintendent of Public Instruction, Olympia School District, and Spokane Public Schools.

The data indicate that energy use estimates often overestimate the savings that buildings are likely to achieve in their first years of operation. Project and building managers identified a variety of possible reasons for this pattern, including: 1) changes in design after initial estimates, 2) installation of equipment other than as specified in the design, including plugged in loads, 3) improper installation of equipment during construction, 4) the difficulty of learning to operate a building with new and complex energy technology, 5) greater after-hours use in the newest buildings, and 6) actions by building occupants that minimize the effectiveness of high performance features (e.g., blocking air flow by placing items on vent surfaces).

**Metric 2: Mixed Results When Comparing School Buildings Within a District and State Buildings With Similar Functions**

A second approach to measuring energy performance compares high performance buildings to similar non-high performance buildings within a school district or serving the same state function. JLARC did this for K-12 school buildings and among selected state agencies and higher education institutions where possible.

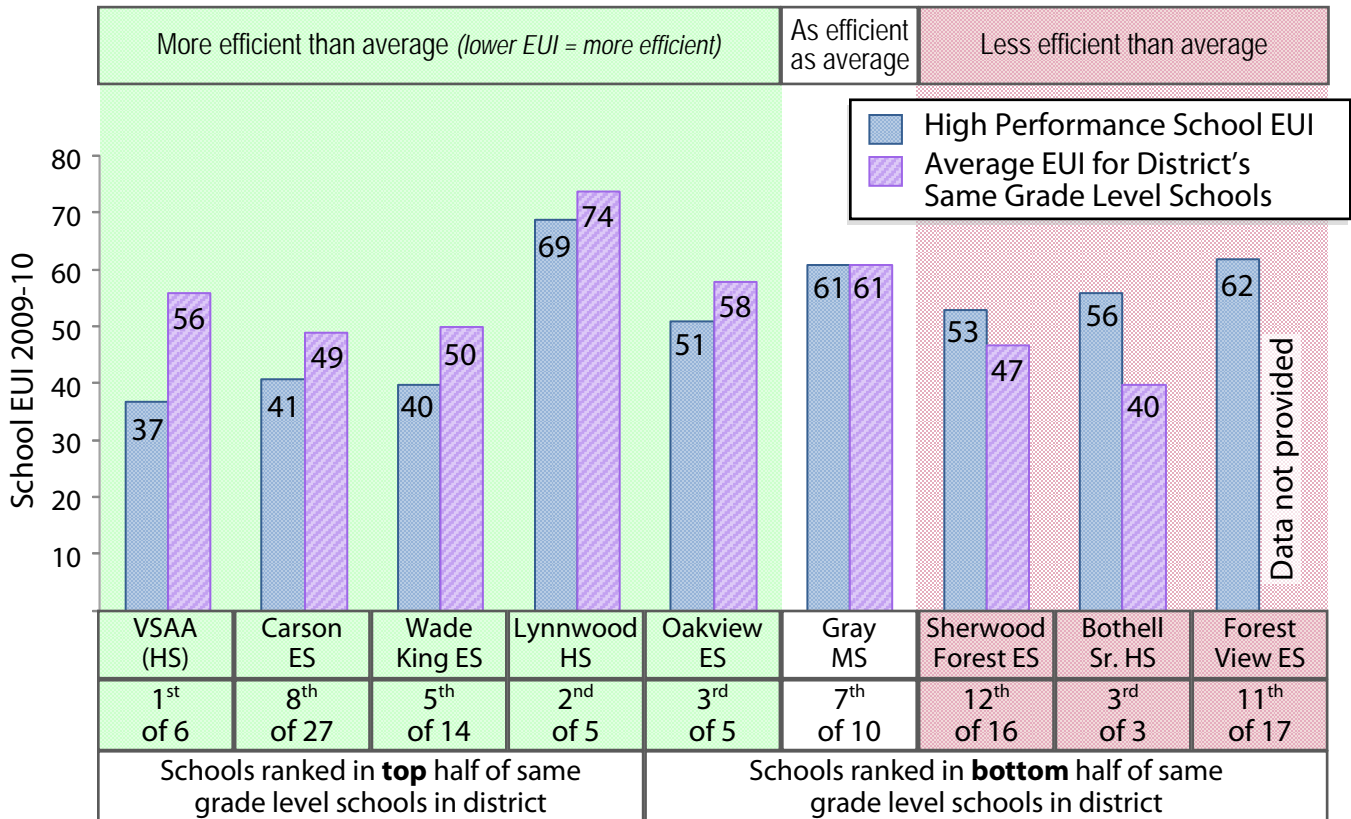


### K-12 School Comparisons

JLARC collected energy use data from school districts with completed high performance school buildings. Nine districts had at least one similar grade level school for comparison.<sup>1</sup> As shown in Exhibit 7, high performance school buildings used less energy per square foot than the average for other same grade level buildings in five of the nine districts. In addition, high performance buildings ranked among the top half of district grade level buildings in terms of energy efficiency in four of the nine districts.

While this approach provides comparison between buildings within a school district, it does not consider the impact of energy management practices among different districts. For example, in the Bellevue School District, the Sherwood Forest Elementary School ranks 12<sup>th</sup> of 16 elementary schools in energy use per square foot. However, an analysis that accounts for individual school characteristics, such as equipment and hours of operation, shows that Sherwood Forest and all but one other Bellevue elementary schools perform well compared to a national benchmark. For this reason, JLARC analyzes school performance using the Energy Star national benchmark in Metric 3.

**Exhibit 7 – High Performance School Buildings Are Sometimes, but Not Always, Among the Most Energy Efficient Buildings**



Source: JLARC analysis School Year 2009-10 energy data provided by districts.

<sup>1</sup> Although the Bethel School District has four additional junior high schools to compare with the newly constructed Liberty Junior High School, that building was used as a temporary high school during the school year 2009-10. Because the building was not used as a junior high school, the district is not included in this analysis.

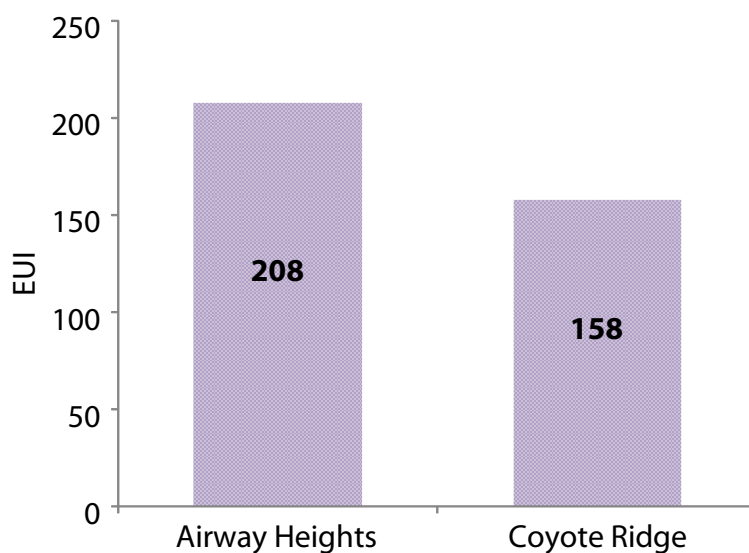
## State Agency and Higher Education Institution Comparisons

Comparable data for state agency and higher education institution buildings was not uniformly available. JLARC reviewed energy use at The Evergreen State College (TESC), University of Washington (UW), and the Department of Corrections (DOC) to assess energy use among buildings at those institutions, but found available information was limited. Only TESC monitors energy use by individual building and only since 2009-10. In contrast, the various DOC institutions and UW monitor energy use by campus and lack data on individual buildings. Within these limits, JLARC was able to make two comparisons of energy use in this subcategory using Metric 2, one for an entire state prison complex and one for campus buildings at TESC.

The first comparison shows energy use at the Coyote Ridge and Airway Heights prison complexes.<sup>2</sup> Although DOC has constructed 38 LEED certified buildings since 2005, including the 21 buildings at Coyote Ridge, the Department is unable to report on individual building energy use. All prison campuses are served by a single meter for each energy utility (e.g., electricity, natural gas). Although LEED certified buildings must be constructed with sub-meters, DOC does not record or report individual building energy use. According to DOC officials, the Department lacks the staff to do so. As a result, comparative analysis among DOC's individual high performance buildings is not possible.

However, DOC did provide campus-wide energy use data that indicates that Coyote Ridge was more energy efficient than Airway Heights during 2010 (Exhibit 8). The data shows that Coyote Ridge used 24 percent less energy per square foot than Airway Heights. Once Coyote Ridge reached full capacity in the final three months of 2010, it used 29 percent less energy per square foot than Airway Heights.

**Exhibit 8 – Coyote Ridge Used 24% Less Energy Per Square Foot Than Airway Heights In 2010**

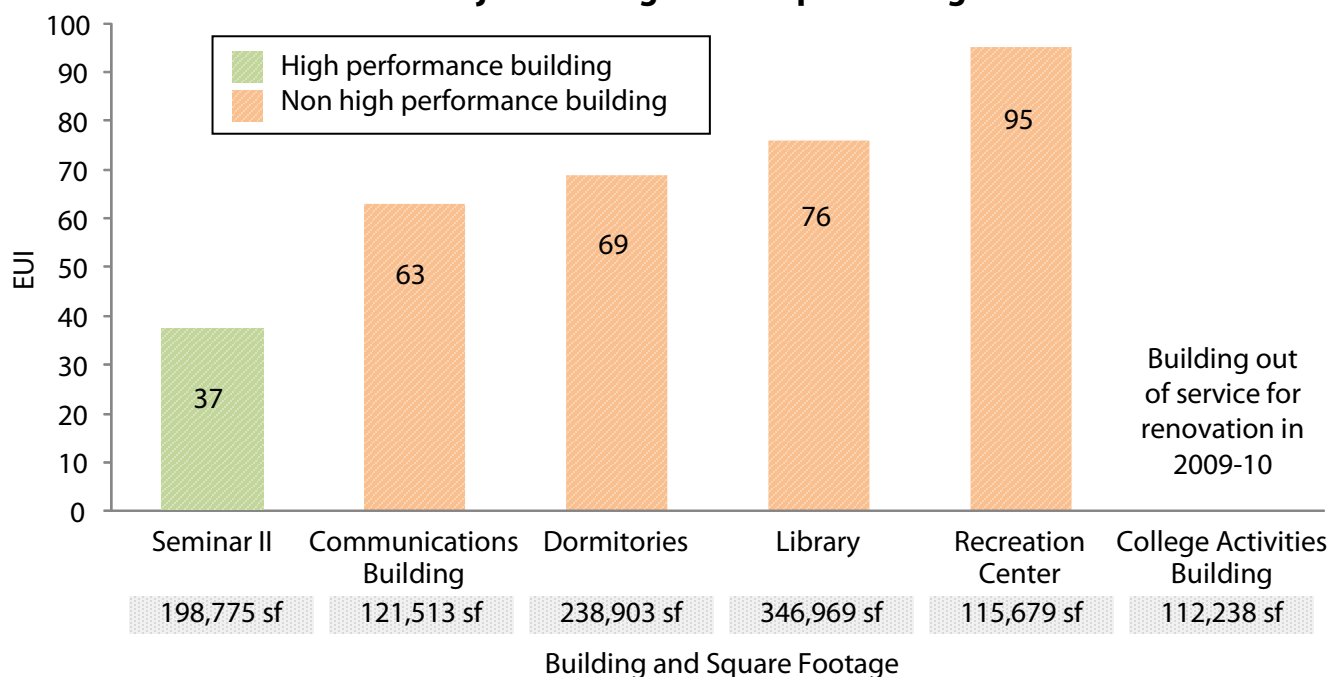


Source: JLARC analysis of data provided by DOC.

<sup>2</sup> DOC represents these two facilities as similar in population size and custody level, types of programs offered, and climate.

The second comparison compares TESC’s LEED certified Seminar II building to other campus buildings. Although Seminar II was constructed prior to the 2005 legislation, it is included in this analysis as an example of energy use in a building with six years’ operating experience. As shown in Exhibit 9, Seminar II ranks lowest among TESC’s major buildings in energy use per square foot. The second lowest energy use building, Communications, uses 70 percent more energy per square foot than Seminar II.

**Exhibit 9 – TESC’s High Performance Seminar II Building Used Less Energy Than Other Major Buildings on Campus During FY 2009-10**



Note: Major building is 100,000 square feet or more.  
 Source: JLARC analysis of information provided by The Evergreen State College.

TESC’s overall EUI is 87 which is well below the average college campus EUI of 120 reported in the Commercial Building Energy Consumption Survey published by the U.S. Department of Energy. Without Seminar II, the campus EUI would be 99 or 15 percent higher.

**Metric 3: Five of 13 High Performance School Buildings Achieve Top Performance Compared to National Energy Star Benchmark**

A third approach to evaluating energy performance is to compare building energy usage to recognized benchmarks. One such benchmark is the Energy Star Portfolio Manager created by the U.S. Department of Energy for evaluating energy performance. Portfolio Manager compares a building’s energy use to a national database of similar buildings, taking into account each building’s characteristics such as size, location, number of occupants, number of personal computers, equipment, and hours of operation. The system ranks each building relative to its peers. The system produces a score from 0 to 100 that reflects each building’s energy performance relative to that of other similar buildings. A higher score represents greater energy efficiency. A building must

receive a score of 75 or more to earn an “Energy Star” designation, which places the building in the top 25 percent of all similar buildings nationwide.

JLARC entered data reported to OSPI by school districts into Portfolio Manager or used data from district Portfolio Manager accounts to determine that four of 13<sup>3</sup> high performance school buildings achieved the Energy Star designation. The results of JLARC’s Portfolio Manager analysis are presented in Exhibit 10. This exhibit shows the Energy Star scores achieved by 13 high performance school buildings during their first 12 months of operation and for the most recent 12 months. Although all but one building have more than 12 months data, only three have data for two full years or more.

**Exhibit 10 – Five of 13 High Performance School Buildings Earn Energy Star Designation**

District	School	Project Type	Energy Star Performance		
			First 12 Mo	Most Recent 12 Mo	Earns Energy Star Designation?
Willapa Valley	Willapa Valley Jr./Sr. High	Mod, Add	100	100	Yes
Vancouver	VSAA (Arts and Academics)	Mod	89	94	
Edmonds	Lynnwood High	New	82	94	
Bellevue	Sherwood Forest Elementary	New	79	91	
Lake WA	Rachel Carson Elementary	New	85	87	
Bethel	Liberty Junior High **	New	64	70	No
Northshore	Bothell High	Mod, Add	61	67	
Bellingham	Wade King Elementary	New	65	n/a*	
Everett	Forest View Elementary	New	27	58	
Marysville	Grove Elementary	New	26	50	
Tacoma	Gray Middle	New	26	48	
Steilacoom	Pioneer Middle	New	60	45	
Centralia	Oakview Elementary	Mod	41	41	

Project Type Key: Add=Addition, Mod=Modernization, New=New Construction.

\* Twelve months’ data only.

\*\* Building served as temporary high school during reporting year.

Source: JLARC Portfolio Manager analysis of WSSP annual reports submitted by school districts to OSPI and data reported directly to Portfolio Manager by three school districts.

<sup>3</sup> Bainbridge Island High School Building 200 and Tumwater New Market Skills Center Life Sciences Building are excluded from this analysis because they share utility services with other buildings and, therefore, are not eligible for an Energy Star designation.

This analysis shows that five schools qualify for an Energy Star designation based on their most recent 12 month's energy usage. These same five schools also achieved an Energy Star designation during their first year of operation. The table also shows that all but one of the schools reporting more than one year of data improved or maintained their performance over their initial 12-month performance.

No Portfolio Manager comparison was possible for state agency and higher education institution buildings because Portfolio Manager does not yet have benchmarks for college classroom and prison buildings, which are the most common state capital projects constructed under high performance requirements. Even if benchmarks were available for these project types, comparisons would be limited by the lack of actual energy use data reported to GA.

### ***Metric 4: Energy Use in Many High Performance School Buildings Declines Over Time***

Energy use over time provides a broader context for evaluating energy performance than does a single year's data. A variety of sources indicated that a building's first year of operation does not necessarily indicate its ultimate performance. However, because of the lead time required to design and construct buildings and the phased implementation schedule for school districts, few high performance school buildings reviewed by JLARC have more than one year of documented performance. None of the state agency and higher education institution high performance buildings have reported more than one year of operating data.

Metric 4 examines multi-year energy use trends among high performance schools. This analysis includes six school buildings constructed under the requirements of the 2005 legislation (current projects) that have reported 22 or more months of operating data. The analysis also includes three schools constructed as pilot projects constructed prior to 2005 (pilot projects). As shown in Exhibit 11, five of the six current projects reduced their energy use between the first and most recent 12 months of operation. Energy use declined at all three pilot school projects from 2006-07 through 2009-10.

**Exhibit 11 – Energy Use per Square Foot Declined in Eight of Nine Schools Reporting 22 or More Months of Energy Data**

	District	School	Months of Energy Data	Energy Use (000 Btu per sf)		
				First 12 Mo	Most Recent 12 Mo	Percent Change
Volunteer WSSP Schools	Tumwater	New Market Skills Center Life Sciences Building	36	143	82	-43%
	Everett	Forest View Elementary	24	86	64	-26%
	Vancouver	VSAA (Arts and Academics)	22	43	36	-16%
	Steilacoom	Pioneer Middle	22	55	64	+16%
	Bellevue	Sherwood Forest Elementary	28	64	46	-28%
	Marysville	Grove Elementary	28	68	55	-19%
Pilot Project Schools	Olympia	Washington Middle	48	45	38	-16%
	Spokane	Lincoln Heights Elementary	48	50	47	-6%
	Bethel	Thompson Elementary	48	35	33	-6%

Source: JLARC analysis of data provided by OSPI and Olympia, Spokane, and Bethel school districts.

***The Performance of High Performance Buildings Has Been Mixed***

JLARC’s review shows that while some high performance buildings meet expectations for energy efficiency and savings, others do not. This mixed performance is consistent with findings reported by the U.S. Green Building Council in 2009. A study of 121 LEED certified buildings by the New Buildings Institute found that their actual energy use varied widely. Most were still more efficient than non-LEED certified buildings, but the actual energy use was often far more than forecast, much the same result as seen in the buildings reviewed in this report.

**Paying for High Performance Investments with Utility Savings**

Due to limited data on high performance buildings, it was not possible for JLARC to determine overall cost differences to see whether operating cost savings could offset the additional cost of constructing high performance buildings. However, the experience of two pilot school projects demonstrates that it can be possible for some high performance buildings to realize cost savings. Cost data available for the Washington Middle School and Lincoln Heights Elementary School, combined with the information developed for post-occupancy evaluations at each school, provide a basis for estimating savings over a four-year period.

Unlike the preceding analyses, which focused on energy savings, this analysis focuses on all utility services (e.g., electricity, natural gas, water, sewer and sewer), and examines the impact of these savings in two ways: 1) recovering all high performance costs, and 2) recovering only the added

## Part Two – Impact of High Performance Building Requirements

costs of high performance utility features. In addition, both districts obtained incentives from utility providers and grants from OSPI which reduced their net construction costs.

Exhibit 12 shows that both schools recovered the net cost of their high performance features in their fifth year of operation. However, OSPI pilot project grants account for much of the reduction in the added costs to the districts. Without the OSPI pilot grants, which are no longer available to school districts, the recovery periods would have been 27 and 30 years, respectively.

### **Exhibit 12 – Two Schools Will Recover the Additional Costs of High Performance Features Within Five Years But the Time Is Significantly Reduced by OSPI Grant Funds**

	<b>Washington Middle School</b>	<b>Lincoln Heights Elementary</b>
Added Cost for All High Performance Features	\$523,225	\$455,826
less: Utility Incentives	-\$161,037	-\$77,575
less: OSPI Pilot Grant	-\$300,000	-\$320,000
Net Added Cost	\$62,188	\$58,251
Average Annual Utility Savings, 2006-2010	\$13,244	\$12,698
Payback Years at Average Savings Rate	4.7	4.6
Payback Years w/o OSPI Grant	27.3	29.8

Source: JLARC analysis of construction cost and utility data provided by Spokane and Olympia School Districts.

Not all high performance features are focused on utilities. If one limits the analysis only to utility-related costs and savings, the payback period is much shorter.

### **Exhibit 13 – Two Schools Recovered the Additional Costs of High Performance Utility Features Within Three Years**

	<b>Washington Middle School</b>	<b>Lincoln Heights Elementary</b>
Added Cost for High Performance Utility Features Only	\$193,485	\$81,000
less: Utility Incentives	-\$161,037	-\$77,585
Net Added Cost	\$32,488	\$3,425
Average Annual Utility Savings, 2006-2010	\$13,244	\$12,698
Payback Years at Average Savings Rate	2.5	0.3

Source: JLARC analysis of construction cost and utility data provided by Spokane and Olympia School Districts.

## **Resource Conservation Management May Help Reduce Energy Costs in High Performance and Conventional Buildings**

A variety of sources about building performance highlight the human factor in energy management, noting that building occupants often limit the effectiveness of high performance features either by how they use or do not use the features or because of operation and maintenance practices. Some school districts in Washington are addressing the ongoing performance of their buildings—high performance and conventional—through active resource conservation management (RCM) programs.

According to the Washington State University Extension Energy Program, a resource conservation program addresses both operational issues and occupant behaviors by analyzing resource use and trends, identifying efficiency opportunities, and developing action plans that focus on reducing energy use.

School districts using RCM programs have reported significant reductions in utility use and cost in old as well as new buildings. For example, the Bethel School District implemented a RCM program in 2005. By 2010, 18 of the district's 24 eligible schools achieved an Energy Star designation. Among these were buildings constructed in 1938 and 1979. The Bellevue School District, which also implemented a RCM program, reports that 14 of its 15 elementary schools achieved Energy Star designation in March 2011.

Savings reported by school district resource conservation managers can be significant. Bethel district staff estimate that the district avoided<sup>4</sup> over \$600,000 in utility costs, and reduced utility expenditures by 26 percent. The Olympia, Lake Washington, Kent, Issaquah, and Evergreen School Districts and The Evergreen State College all reported achieving savings with RCM programs.

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<sup>4</sup> Avoided costs represent expenditures that would have been made if energy use had not been reduced.



# PART THREE – INFORMATION ABOUT HIGH PERFORMANCE PUBLIC BUILDINGS IS NOT COMPLETE

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## **JLARC’s Ability to Assess Performance of All High Performance Public Buildings Is Limited Because State Agencies Are Not Reporting Information as Required by Law**

A key requirement of the high performance building legislation was a reporting system to monitor the costs and operating savings from the high performance buildings. The Legislature wanted to know if the high performance requirements resulted in the expected benefits. The legislation established two data management tasks for state agencies and higher education institutions. First, agencies are directed to monitor and document ongoing operating savings resulting from construction of high performance facilities. Second, they are required to report this information annually to GA.

The statute establishes similar monitoring and reporting requirements for school districts receiving funding in a state capital budget. School districts are required to report to OSPI for a minimum of five years. The Department of Commerce is required to report energy performance for Housing Trust Fund and community development projects to GA.

Statute directs GA and OSPI to consolidate the reports from state agencies and higher education institutions and report to the Governor and Legislature in September of even-numbered years through 2016. Both GA and OSPI established procedures to govern their respective programs and to facilitate reporting. As designed, the reporting forms capture much of the data needed to monitor and evaluate building performance. In practice, however, data collection has been incomplete and analysis has been limited:

- Thirteen of 18 state agencies that completed high performance projects by June 30, 2009, did not report energy usage for fiscal year 2009-10.
- Agencies and institutions of higher education submitted cost reports for only 17 of 37 projects that were substantially complete prior to June 30, 2010.
- GA does not have an accurate inventory of completed projects. The inventory provided in its 2010 report includes projects not constructed as high performance projects and duplicate projects. The inventory does not include actual completion dates and for some projects no dates at all.
- As of September 2010, six school districts had not submitted complete construction cost and annual operating reports for projects identified as complete and operational during the 2009-10 school year.
- Neither GA nor OSPI have performed a complete review or analysis of the reports submitted. JLARC’s review of the reports identified errors and omissions.
- The Department of Commerce has not reported any operating cost savings for projects funded through its Division of Community Development.

In the absence of actual results, for its 2010 report to the Legislature, GA presented a comparison between computer model estimated energy costs of a high performance building and computer model estimated energy costs of a code building for ten projects. In the past, actual results have not been available and estimates based on models were the best information available. However, with completion of 18 buildings that had 12 months of actual operating data, GA's focus could now shift to comparing actual results with energy estimates developed during building design.

Both GA and OSPI state that they lack resources necessary to monitor, follow up, and analyze high performance building performance.

## **Potential Opportunity to Incorporate High Performance Public Building Energy Data Collection With Another Energy Reporting Requirement**

In 2009, the Legislature established an energy reporting requirement for state-owned buildings (E2SSB 5854). The legislation requires agencies to report building energy use through the Energy Star Portfolio Manager. As noted previously, Portfolio Manager is a database management system that enables managers to record, monitor, and evaluate energy usage. Portfolio Manager provides benchmarks and Energy Star designations for 15 building types, including K-12 schools. It does not provide benchmark for other types of buildings included in the state's capital construction program, such as college classrooms and prisons. It does, however, incorporate critical factors, such as location, climate, and source energy into its calculations of energy use and can serve as a basis for developing benchmarks where none are yet available.

Initial reports were due in June 2010. Fewer than half of state agencies and institutions submitted complete reports, and more than one-third submitted no report, including the Department of Corrections, one of the largest utility consumers within state government.<sup>5</sup> This reporting requirement will include the current and future state-owned high performance buildings. As indicated in its 2010 report to the Legislature, GA plans to explore the feasibility of integrating energy reporting for high performance buildings and the Portfolio Manager reporting requirements to eliminate potential duplication and to ensure complete, timely reporting. Improved reporting will provide information that will enable development of benchmarks that are now lacking for many types of state agency and higher education institution buildings.

The 2009 legislation states that schools “are strongly encouraged” but not required to follow the provisions of the legislation. Some districts have begun using Portfolio Manager, and OSPI's 2011 report to the Legislature suggests that reporting through Portfolio Manager may provide more useful results than the existing WSSP annual report format.

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<sup>5</sup> The missing reports may be due to lack of appropriations. The legislation states that the section applies “only to the extent that specific appropriations are provided to those agencies referencing this act or chapter number and this section.”

## **JLARC Did Not Assess Other Features of High Performance Buildings Because of Lacking Data and Research Limitations**

In addition to potential energy and utility savings, the 2005 legislation addressed other goals that are not evaluated in this report: use of local and regional materials, recycling construction waste, use of recycled content materials, and improvement in worker productivity and student performance.

### ***Data on Building Materials is Lacking***

Data on materials is limited to reports from ten projects submitted to GA. These reports show:

- Each of the ten projects reported recycling at least 90 percent of construction waste for a total of 12,920 tons of construction waste recycled. The average percentage was 96 percent.
- The ten projects reported using \$10.9 million of recycled content materials.
- The ten projects reported purchasing \$16.3 million in regional materials.

Analysis of WSSP strategies and costs reported by school districts shows that shows that 14 of the 15 WSSP projects achieved points and incurred costs for material-related credits. Information available does not indicate actual amounts or savings in these areas.

### ***Research on Worker Productivity and Student Performance is Limited***

The impact of high performance buildings on worker productivity is unclear. Measuring the impact of high performance buildings on worker productivity is difficult for two reasons. The first reason is that for many work activities productivity is highly subjective, especially for knowledge-based work. The second challenge is determining how a building's high performance features actually affect its occupants. JLARC found only two research studies that measured impact of features on objective measures of productivity. Both studies addressed production-oriented workplaces where output can be measured directly. The remaining studies are based on subjective information such as employee self-assessment or indirect measures such as absenteeism, turnover, and retention.

Measuring the impact of high performance school buildings on student performance is difficult because conclusive research on the impact of high performance schools on student performance is limited. In 2006, the National Academy of Sciences Committee to Review and Assess the Health and Productivity Benefits of Green Schools reported that:

...Establishing cause-and-effect relationships between an attribute of a green school or other building and its effect on people is very difficult. The effects of the built environment may appear to be small given the large number of variables and confounding factors involved...The committee did not identify any well-designed, evidence-based studies concerning the *overall* effects of green schools on human health, learning, or productivity or any evidence-based studies that analyze whether green schools are actually different from conventional schools in regard to these outcomes. (italics in original)

OSPI funded post-occupancy evaluations of two pilot projects constructed as part of WSSP development, Washington Middle School and Lincoln Heights Elementary School. These

evaluations report the results of building occupant surveys, including student responses in one evaluation. The evaluations do not address student performance or teacher productivity.

GA developed and tested a model for conducting post-occupancy evaluations of newly constructed high performance buildings. The evaluation model surveyed occupants of the buildings to solicit feedback about their experience about thermal comfort, noise levels and other building characteristics, but did not attempt to quantify changes in productivity or student achievement. GA reports that additional post-occupancy evaluations have not been conducted due to lack of funding.

# CONCLUSION AND RECOMMENDATIONS

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## Conclusion

Data available from state agencies, institutions of higher education and school districts show that high performance buildings cost an estimated 1 to 3 percent more to design and construct than conventional buildings, but their actual energy efficiency performance varies. JLARC found examples of both strong and weak performance among the high performance buildings constructed under the high performance building statute. JLARC also found energy savings among some high performance buildings constructed prior to the law's effective date. However, lack of complete data and the limited operational experience with these buildings strongly suggest that these results must be considered preliminary. At this time, it is unclear why some buildings perform well and others do not.

Lack of complete and timely reporting by state agencies and institutions as required by statute is a serious limitation on any evaluation of the high performance public buildings program. Absent more complete reporting, the Legislature will not be able to review documented costs and ongoing operating savings as intended by the 2005 legislation. As a result, the state and school districts may be missing opportunities to learn what works to reduce their more than \$400 million annual utility expenditures.

## Recommendations

1. **The Department of General Administration, Office of Superintendent of Public Instruction, and Department of Commerce should develop plans to ensure that they receive complete and accurate data on high performance buildings and they should analyze program results.**

**These efforts plans should:**

- a. **Identify criteria for measuring building performance (for example, comparing estimated and actual energy use or comparing energy use among similar buildings) and the information needed to measure those criteria;**
- b. **Establish clear deadlines for reporting required information and procedures for following up when information is not submitted, including identification of non-respondents; and**
- c. **Identify the resources needed to ensure complete and timely information is collected, analyzed, and reported to the Legislature.**

**GA, OSPI, and Commerce should submit their plans for strengthening project reporting and program analysis to JLARC, and the legislative fiscal committees by December 31, 2011. GA and OSPI should incorporate the results of the improved reporting and analysis in the biennial report to the Legislature due on September 1, 2012.**

- 2. If the Legislature wishes to obtain information on operating savings for high performance projects supported by community development grants from the Department of Commerce, it should consider revising the reporting requirements of Chapter 39.35D RCW to specifically require the Department of Commerce to obtain that information from grant recipients.**

# APPENDIX 1 – SCOPE AND OBJECTIVES

## HIGH PERFORMANCE PUBLIC BUILDINGS PROGRAM

### SCOPE AND OBJECTIVES

SEPTEMBER 22, 2010



STATE OF WASHINGTON  
JOINT LEGISLATIVE AUDIT  
AND REVIEW COMMITTEE

**STUDY TEAM**  
Mark Fleming

**PROJECT SUPERVISOR**  
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**LEGISLATIVE AUDITOR**  
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## Why a JLARC Study of Washington’s High Performance Public Buildings Program?

ESSB 5509 enacted in 2005 directs the Joint Legislative Audit and Review Committee (JLARC) to conduct an evaluation of Washington’s high performance public buildings program by June 2011. The high performance building program requires that state-funded major facilities be constructed using methods that create buildings that save money, improve school performance, and improve worker productivity.

## Public Buildings in Washington May Qualify as High Performance Under Several Standards

High performance buildings, also known as “green buildings,” attempt to provide a healthy environment for human activity while reducing the impact of that activity on the environment through increased energy efficiency, careful site selection, and innovative design. Initially promoted by the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) standards, the green building movement now encompasses a variety of standards that address the impact of buildings on building occupants and the surrounding environment. High performance public buildings in Washington can be constructed under LEED, the Washington Sustainable Schools Protocol, or the Evergreen Sustainable Design Standards.

## Three Agencies Supervise High Performance Building Projects

The Department of General Administration, the Office of Superintendent of Public Instruction, and the Department of Commerce are each responsible for ensuring that facilities constructed with state funds under their supervision follow high performance standards for design and construction. Since 2005, an estimated 276 projects have been initiated using high performance standards. The projects include university facilities, state offices, public schools, community facilities, and affordable housing.

## Study Scope

JLARC will examine the extent to which the high performance public buildings program has met the legislative intent established in ESSB 5509. In that legislation, the Legislature clearly stated that it expected high performance buildings to “increase student test scores, reduce worker absenteeism and cut energy costs.” The Legislature also intended that the program offer flexibility in achieving high performance standards and

that public agencies and school districts monitor the program to ensure that economic, community, and environmental goals are achieved each year.

## Study Objectives

This performance audit will address the following questions:

- 1) What has been the cost to implement high performance standards in the design and construction of major facility projects?
- 2) What operating savings in energy, utility, and maintenance costs have been achieved through the implementation of high performance standards?
- 3) What impact has the implementation of high performance standards had on worker productivity and student performance?
- 4) Do Washington’s high performance building standards achieve the Legislative intent established by ESSB 5509?

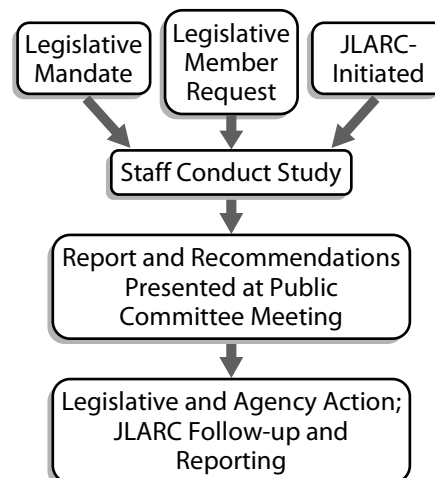
## Timeframe for the Study

Staff will present the preliminary and final reports at the JLARC meetings in May and June 2011.

## JLARC Staff Contact for the Study

Mark Fleming (360) 786-5181 [fleming.mark@leg.wa.gov](mailto:fleming.mark@leg.wa.gov)

### JLARC Study Process



### Criteria for Establishing JLARC Work Program Priorities

- Is study consistent with JLARC mission? Is it mandated?
- Is this an area of significant fiscal or program impact, a major policy issue facing the state, or otherwise of compelling public interest?
- Will there likely be substantive findings and recommendations?
- Is this the best use of JLARC resources? For example:
  - Is JLARC the most appropriate agency to perform the work?
  - Would the study be nonduplicating?
  - Would this study be cost-effective compared to other projects (e.g., larger, more substantive studies take longer and cost more, but might also yield more useful results)?
- Is funding available to carry out the project?



## APPENDIX 2 – AGENCY RESPONSES

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- Department of General Administration
- Office of Superintendent of Public Instruction
- Department of Commerce

Note: JLARC also requested a response from the Office of Financial Management (OFM). OFM responded that they did not have comments on this report.





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JLARC

State of Washington  
**Department of General Administration**  
210 11<sup>th</sup> Avenue, SW • PO Box 41000 • Olympia, WA 98504-1000  
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May 27, 2011

Keenan Konopaski, Legislative Auditor  
Joint Legislative Audit & Review Committee  
PO Box 40910  
Olympia, WA 98504

Subject: JLARC's May 18, 2011 High Performance Public Buildings: Impact on Energy Use is Mixed Preliminary Report - Comments from General Administration

Dear Mr. Konopaski:

The Department of General Administration (GA) appreciates the Joint Legislative Audit & Review Committee (JLARC) for preparing its analysis and recommendations.

This report highlights important challenges with evaluating the success of green building efforts. We appreciate that the report acknowledges the feedback from agencies and schools regarding how staff and budget reductions have affected their ability to collect and report energy usage data. We wish to share the following observations regarding the data within the report:

- Many of the projects initiated after enactment of ESSB 5509 in 2005 do not yet have operational data available. It's important to acknowledge that the timeline for taking a building from the beginning of design through one year of usage is typically 5-7 years. We expect that more complete data will be available in 2012.
- We also recognized the operating issues with the energy metering equipment noted in the report and have taken steps to address them.
- The report's primary measure of success was based on actual energy usage compared to the modeled "estimate" energy usage. Energy usage estimates typically reflect ideal conditions; they are developed during the project's design phase and do not take into account actual operating conditions. Many legitimate factors can affect actual energy usage, but these do not negate the value of the green components. Accordingly, we concur with the suggestion in the report recommendations to look at comparing the energy usage in similar buildings.

GA also recognizes the benefits of green buildings beyond energy performance. ESSB 5509 requires eligible projects to seek certification through the Leadership in Energy and Environmental Design (LEED) program, a comprehensive quality assurance tool to help design buildings that are healthy and to minimize impact to the environment. The health and

Mr. Keenan Konopaski  
May 27, 2011  
Page 2

productivity of workers and students who occupy state-funded buildings is a significant consideration. In the LEED process, public agencies and schools must address several criteria:

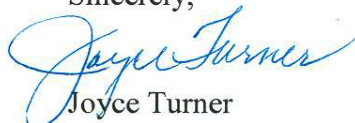
1. **Low Volatile Organic Compounds (VOC) Materials Use:** This supports occupant health.
2. **Energy Performance:** Supports state energy efficiency goals.
3. **Water Efficiency:** Important in stretching limited water resources to support growth in the state.
4. **Construction Waste Recycling:** Reduction in materials going to landfills is a statewide goal. This also helps generate recycled materials back into the local economy.
5. **Use of Recycled Content Materials:** This reduces the extraction of raw materials which protects the environment and helps create jobs in the local economy.
6. **Use of Regional Materials:** This was a specific goal listed in ESSB 5509.
7. **Access to Alternative Transportation:** Reduction in highway congestion is a state goal.
8. **Well Functioning Buildings (enhanced commissioning):** Commissioning improves building performance by helping to minimize problems during construction and makes for smoother operations in the first years of usage.
9. **Containment of Storm Water Onsite:** Treating storm water onsite, especially onsite infiltration, helps protect streams, rivers, and Puget Sound.
10. **Occupant Satisfaction:** Although subjective, people who are happier with their work space will likely be more productive and healthier.

As suggested in the report recommendations, these added dimensions of sustainability may offer additional metrics on which to more fully evaluate the performance of green building initiatives.

Finally, I am asking our Engineering and Architectural Services team to identify potential ways to ensure more consistent data collection and reporting on GA-managed capital projects, including the possibility of assigning a portion of our project management fees to this effort.

GA looks forward to submitting our plans for strengthening project reporting and program analysis to JLARC and the legislature in December 2011.

Sincerely,

  
Joyce Turner  
Director



**SUPERINTENDENT OF PUBLIC INSTRUCTION**

**RANDY I. DORN** OLD CAPITOL BUILDING • PO BOX 47200 • OLYMPIA WA 98504-7200 • <http://www.k12.wa.us>

May 25, 2011

Keenan Konopaski, Legislative Auditor  
 Joint Legislative Audit and Review Committee  
 1300 Quince Street SE  
 P.O. Box 40910  
 Olympia, WA 98504-0901

Dear Mr. Konopaski:

Thank you for the opportunity to provide a response to JLARC’s preliminary report on High-performance Public Buildings. We concur with the recommendations in the report.

RECOMMENDATION	AGENCY POSITION	COMMENTS
Recommendation #1	OSPI concurs with the recommendation.	OSPI has a start on this recommendation as we already collect cost and utility data and have already been working on improving these systems.
Recommendation #2	OSPI concurs with the recommendation	

In addition, we would like to offer the following comments on the report.

1. We appreciate the work that JLARC has done to produce this report, and we recognize how challenging it was to draw comparable conclusions on the three unique programs based on limited available data. We agree that even if more data was provided, it is too early to draw definitive conclusions about the effectiveness of the law.
2. K-12 schools provided a significant portion of the data analyzed in the report. We agree that OSPI take steps to improve our data collection and analysis. We are already working on these improvements in the following ways:
  - Our on-line school facility inventory system will be used to gather the annual reports from high-performance schools as well as Energy Star scores.
  - We have improved our cost accounting worksheet that now prompts districts to record avoided costs as well as utility incentives.
  - We are working to identify methods of improving our data collection system overall and to get timely responses from districts.

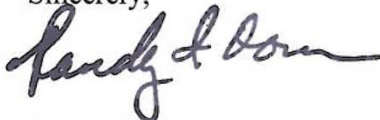


Keenan Konopaski, Legislative Auditor  
Joint Legislative Audit and Review Committee  
May 25, 2011  
Page 2

- We are working to identify methods of improving our data collection system overall and to get timely responses from districts.
3. We are pleased that the report looked at energy efficiency in K-12 buildings in a variety of metrics, because it shows that no one method can fully describe the success of energy efficiency in high-performance buildings. The report noted many of the reasons first year reporting data did not tell the whole story about energy efficiency. This supports the conclusion that it is premature to evaluate the program at this point.
  4. We believe that at this time, K-12 school buildings can only be compared with other K-12 buildings. The same is true with state agencies and higher education.

If you have questions regarding these corrections and suggested clarifications, please contact Gordon Beck, Director of School Facilities and Organization, at (360) 902-6261 or [Gordon.Beck@k12.wa.us](mailto:Gordon.Beck@k12.wa.us).

Sincerely,



Randy I. Dorn  
State Superintendent  
of Public Instruction

cc: Mark Fleming, Research Analyst, Joint Legislative Audit and Review Committee  
Gordon Beck, Director, School Facilities and Organization, OSPI  
Patricia Jatczak, Program Manager, School Facilities and Organization, OSPI



STATE OF WASHINGTON  
DEPARTMENT OF COMMERCE

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May 23, 2011

Mr. Keenan Konopaski  
Legislative Auditor  
Joint Legislative Audit and Review Committee  
P.O. Box 40910  
Olympia, WA 98504-0910

Dear Mr. Knopaski:

Enclosed is the Department of Commerce's response to recommendations raised in the Joint Legislative Audit and Review Committee report *High Performance Public Buildings: Impact on Energy Use if Mixed*.

If you have any questions on our response, please contact Dan McConnon at 360.725.2910 or [dan.mcconnon@commerce.wa.gov](mailto:dan.mcconnon@commerce.wa.gov).

Sincerely,

Rogers Weed  
Director

Enclosure

cc: John Thomas, Internal Auditor  
Dan McConnon, Assistant Director

Appendix 2 – Agency Responses

DEPARTMENT OF COMMERCE  
 RESPONSE TO JLARC’S PRELIMINARY REPORT  
 HIGH PERFORMANCE PUBLIC BUILDINGS:  
 IMPACT ON ENERGY USE IS MIXED  
 MAY 25, 2011

RECOMMENDATION	AGENCY POSITION	COMMENTS
<p>1. The Dept of GA, OSPI, and Commerce should develop plans to ensure that they receive complete and accurate data on high performance buildings and they should analyze program results.</p> <p>These efforts plans should:                      a....                      b....                      c....</p>	Concur	<p>The Housing Trust Fund has been working with WSU Energy Extension services to develop a methodology for the collection and analysis of data to assist in analyzing project performance. The first annual report to GA will be submitted by June 30, 2011. A plan will be developed by December 31, 2011 to further refine our process for assessing and reporting on project performance in future years.</p>

RECOMMENDATION	AGENCY POSITION	COMMENTS
<p>2. If the Legislature wishes to obtain information on operating savings for high performance projects supported by community development grants from the Department of Commerce, it should consider revising the reporting requirements of Chapter 39.35D RCW to specifically require the Department of Commerce to obtain that information from grant recipients.</p>	Concur	N/A



# APPENDIX 3 – COMPARISON OF HIGH PERFORMANCE STANDARDS

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ESSB 5509 identifies three different standards for high performance public buildings: Leadership in Energy and Environmental Design (LEED) standards, the Washington Sustainable Schools Protocol (WSSP) and the Evergreen Sustainable Design Standards (ESDS). A brief description of each standard is presented below.

## **LEED Standards**

Agencies, higher education institutions, and local and nonprofit entities receiving state construction funds are required to meet the LEED Silver (or higher) standard awarded by the U.S. Green Building Council (USGBC). LEED Silver is one of four certification levels for new construction/major remodeling.

Depending on the number of points accumulated, projects may be rated in one of the four LEED categories:

- Certified 40 to 49 points
- Silver 50 to 59 points
- Gold 60 to 79 points
- Platinum 80 points and above

The certification is awarded based on the number of points achieved in seven categories. The categories are:

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation in Design
- Regional Priority

Each category includes both required and optional criteria. In order to qualify for LEED certification, the building owners must register projects with the USGBC, pay registration fees, and submit documentation of compliance with the LEED requirements along with payment for verification by USGBC. The Washington Department of General Administration administers high performance requirements for state agencies and institutions. The Department of Commerce Division of Community Development is responsible for administering program requirements for local and non-profit entities receiving state capital construction funds.

## **WSSP Standards**

Public schools receiving state construction assistance may choose to seek LEED Silver certification or meet the requirements of the Washington Sustainable Schools Protocol. The protocol, originally developed in 2006 and revised in 2010, is similar to LEED in that projects must meet requirements and achieve a minimum number of optional points in six categories. These categories include:

- Site
- Water
- Materials
- Energy
- Indoor Environmental Quality
- Extra Credit (2006 WSSP edition)
- Planning, Education & Operations (2010 WSSP edition)

Unlike LEED, WSSP does not recognize different levels of achievement—schools achieving the required points meet the protocol requirements. Each school certifies its own point totals without independent verification. WSSP is administered solely by OSPI and requires no registration or other fees to be paid by school districts.

The WSSP, modeled on the Collaborative for High Performance Public Schools standard, was developed by a stakeholder group including OSPI, school districts and school construction professionals in order to provide high performance standards for public schools receiving state construction assistance. These schools may choose to seek LEED Silver certification or meet the requirements of the Washington Sustainable Schools. ESSB 5509 allows schools in Washington to choose which standards to follow.

The revised WSSP issued in November 2010 increased the maximum number of optional points from 96 to 119 and changed compliance from 40 points for all schools to 45 for class 1 schools and 40 points for class 2 schools. All WSSP projects and references in this report are to the 2006 WSSP edition.

### ***Evergreen Sustainable Development Standards***

ESSB 5509 exempted Housing Trust Fund (HTF) projects from the requirement to meet the LEED Silver standard and directed the Department of Commerce to adopt a sustainable development standard for HTF projects. The Department adopted the Evergreen Sustainable Design Standards modeled after the Enterprise Green Communities program, the first national green building program developed for affordable housing.

The Evergreen Sustainable Development Standards address construction of affordable housing supported through the Housing Trust Fund. These standards require projects to achieve mandatory and optional points in eight categories:

- Integrated Design Process
- Site Location and Neighborhood Fabric
- Site Improvements
- Water Conservation
- Energy Efficiency
- Materials Beneficial to the Environment
- Healthy Living Environment
- Operations and Maintenance

Compliance is achieved at 50 points for new construction and 40 points for renovation projects. Commerce contracts with the Washington Community Investment Association to verify that projects comply with sustainable design requirements at each draw down request.

# APPENDIX 4 – ADDITIONAL COSTS FOR HIGH PERFORMANCE FEATURES

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**Exhibit 14 – Additional Costs for High Performance Features – State Agencies and Institutions**

Agency/Institution	Project	Square Feet	Total Project Cost	Added Cost for HP Features	Net Added Cost After Rebates and Avoided Costs	% Net Added Cost	Net Added Cost/SF
Tacoma CC	Early Learning Center	12,692	\$5,661,665	\$191,321	\$191,321	3.4%	\$15.07
CWU	IET/Hogue Technology Addition	49,280	\$14,526,587	\$556,730	\$556,730	3.8%	\$11.30
Columbia Basin CC	Business Education Building	24,000	\$7,381,612	\$171,903	\$171,903	2.3%	\$7.16
Grays Harbor College	Childcare Center/Aberdeen	6,200	\$1,988,037	\$41,508	\$41,508	2.1%	\$6.69
Cascadia CC	Global Learning & the Arts Building/Bothell	54,300	\$27,730,000	\$306,000	\$306,000	1.1%	\$5.64
Centralia College	New Science Center	69,984	\$24,190,252	\$358,268	\$358,268	1.5%	\$5.12
Military Affairs	Washington Youth Academy	18,050	\$4,057,873	\$92,400	\$92,400	2.3%	\$5.12
CWU	Dean Hall	79,553	\$24,112,093	272,268	\$272,268	1.1%	\$3.42
Skagit Valley College	Laura Angst Hall	65,230	\$25,140,200	\$477,441	\$222,871	0.9%	\$3.42
Walla Walla CC	William A. Grant Water & Environmental Center	18,500	\$3,526,391	\$56,705	\$56,705	1.6%	\$3.07
Bellevue College	Science and Technology Building	62,882	\$30,642,760	\$140,691	\$140,691	0.5%	\$2.24
Pierce College, Ft. Steilacoom	Rainier Building/Lakewood	80,645	\$26,651,581	\$276,050	\$118,550	0.4%	\$1.47
School for the Blind	Phys Ed Center	28,902	\$7,528,357	\$41,500	\$41,500	0.6%	\$1.44
Olympic College	Humanities and Student Services Building	85,012	\$24,282,598	\$104,407	\$104,407	0.4%	\$1.23
Spokane Falls CC	sn-'w'ey'-mn	70,533	\$15,321,972	\$80,339	\$80,339	0.5%	\$1.14
University of WA	Floyd & Delores Jones Playhouse Theatre	12,692	\$9,687,248	\$83,277	(\$42,723)	-0.4%	\$(3.37)
University of WA	Clark Hall	30,568	\$15,619,920	\$256,988	(\$213,012)	-1.4%	\$(6.97)
<b>Totals and Averages</b>		<b>769,023</b>	<b>268,049,146</b>	<b>3,507,796</b>	<b>2,499,726</b>	<b>0.9%</b>	<b>\$3.25</b>

Source: JLARC analysis of project cost reports provided by the Department of General Administration.

**Exhibit 15 – Additional Costs for High Performance Features – K-12 Schools**

<b>District</b>	<b>Project</b>	<b>Square Feet</b>	<b>Total Project Cost</b>	<b>Added Cost for HP Features</b>	<b>Net Added Cost After Incentives/Savings</b>	<b>% Net Added Cost</b>	<b>Net Added Cost/sq ft</b>
Tumwater	New Market Skill Center-Lab Tech Bldg	19,128	\$6,583,678	\$480,103	472,560	7.2%	\$24.71
Everett	Forest View	62,156	\$29,794,519	\$1,378,773	1,378,773	4.6%	\$22.18
Centralia	Oakview ES Mod	14,046	\$3,138,051	\$204,014	195,467	6.2%	\$13.92
Edmonds	Lynnwood HS	218,016	98,955,000	3,214,879	2,810,879	2.8%	\$12.89
Bellingham	Wade King ES	50,640	\$14,643,702	\$600,891	600,891	4.1%	\$11.87
Marysville	Grove ES	45,713	\$15,756,335	\$511,396	511,396	3.2%	\$11.19
Steilacoom	Pioneer MS	104,707	\$30,805,586	\$982,076	982,076	3.2%	\$9.38
Lake Washington	Rachel Carson ES	57,189	\$25,316,867	\$393,000	393,000	1.6%	\$6.87
Northshore	Bothell HS Phase 3	119,356	\$30,336,072	\$675,172	675,172	2.2%	\$5.66
Bainbridge Island	Bainbridge Is. HS Bldg 200	70,024	\$29,046,510	\$358,772	358,772	1.2%	\$5.12
Willapa Valley	Willapa Valley Sr. HS	63,314	\$11,594,362	\$354,152	317,457	2.7%	\$5.01
Bellevue	Sherwood Forest ES	65,773	\$22,321,174	\$320,391	320,391	1.4%	\$4.87
Tacoma	Gray MS	116,820	\$35,806,722	\$466,216	466,216	1.3%	\$3.99
Vancouver	School of Arts & Academics	112,927	\$7,563,282	\$80,054	54,969	0.7%	\$0.49
<b>Totals and Averages</b>		<b>1,119,809</b>	<b>361,661,860</b>	<b>10,019,890</b>	<b>9,538,020</b>	<b>2.6%</b>	<b>\$8.52</b>

Source: JLARC analysis of data provided by OSPI and individual school districts.

