



High Performance Public Buildings: Impact on Energy Use is Mixed

Preliminary Report

Joint Legislative Audit & Review Committee

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JLARC Review Mandated by 2005 Legislation



- ESSB 5509 requires major public facilities to be designed using high performance standards
- Directs JLARC to review the impact of high performance requirements on:
 - Design and construction costs
 - Operating savings
 - Worker productivity and student performance

Presentation Overview



- Part 1: High performance public buildings in Washington
- Part 2: Impact of high performance requirements on public building design and construction costs
- Part 3: How high performance buildings actually perform
- Part 4: Lack of data and methodology issues that limit evaluation



Wade King Elementary

Part 1: High performance public buildings in Washington

2005 Legislation Requires High Performance Standards



- High performance standards are intended to:
 - Promote efficient use of energy and other resources, and
 - Create productive learning and working environments for occupants
- Buildings meeting these standards are commonly known as “green buildings”

High Performance Requirements Apply to Major Facilities



Major facilities are new construction and renovation projects larger than 5,000 sf

- State agencies and higher education institutions
- School districts receiving state construction assistance
- Recipients of state capital funds through the Department of Commerce
 - Housing Trust Fund
 - Community development projects

Different Design Standards Apply to Different Building Types



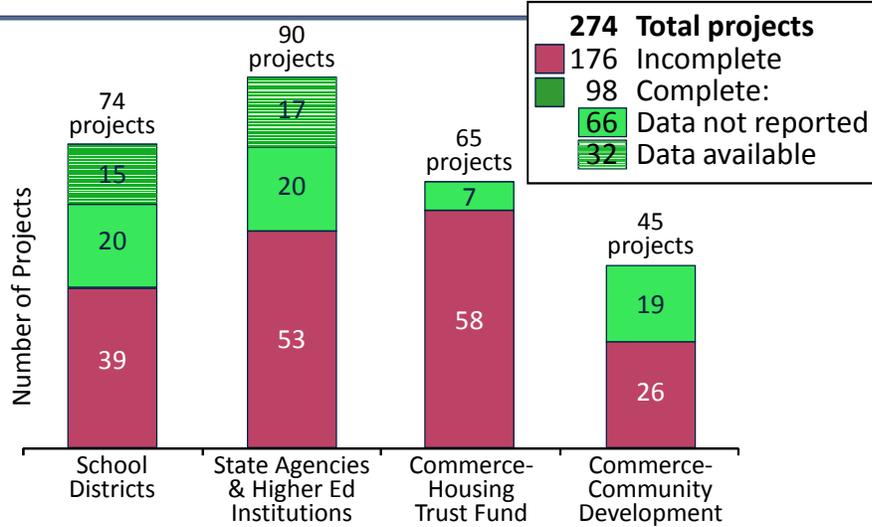
State agencies	Leadership in Energy and Environmental Design (LEED) Silver Standard
Higher ed institutions	
Community development projects	
Public Schools	Washington Sustainable Schools Protocol (WSSP) or LEED Silver
Affordable housing	Evergreen Sustainable Design Standards (ESDS)

2005 Legislation Established Monitoring and Reporting Requirements



- State agencies, higher education institutions, and school districts must:
 - Monitor and document ongoing savings, and
 - Report annually to Department of General Administration or OSPI
- General Administration and OSPI must report to Legislature in September of even-numbered years
- Legislature intended to monitor results

274 Projects as of June 2010



Source: JLARC analysis of information provided by GA, OSPI, and Department of Commerce.

What JLARC Reviewed



- 32 buildings constructed under the requirements of the 2005 legislation
- The number of completed projects with more than one year's operational history or complete information is limited
- In some cases, JLARC reviewed high performance buildings that pre-date law in order to examine longer term performance



The Evergreen State College
Seminar II building

Part 2: Impact of high performance requirements on public building design and construction costs

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Added Cost of Meeting High Performance Requirements Ranges from 1% to 3%



- Estimate presented to Legislature in 2005
 - High performance requirements would add about 2% to design and construction costs
- Actual percentage of added cost:

17 State agency/higher education projects	0.9%
14 K-12 school projects	2.6%



Rachel Carson Elementary
Library Media Center

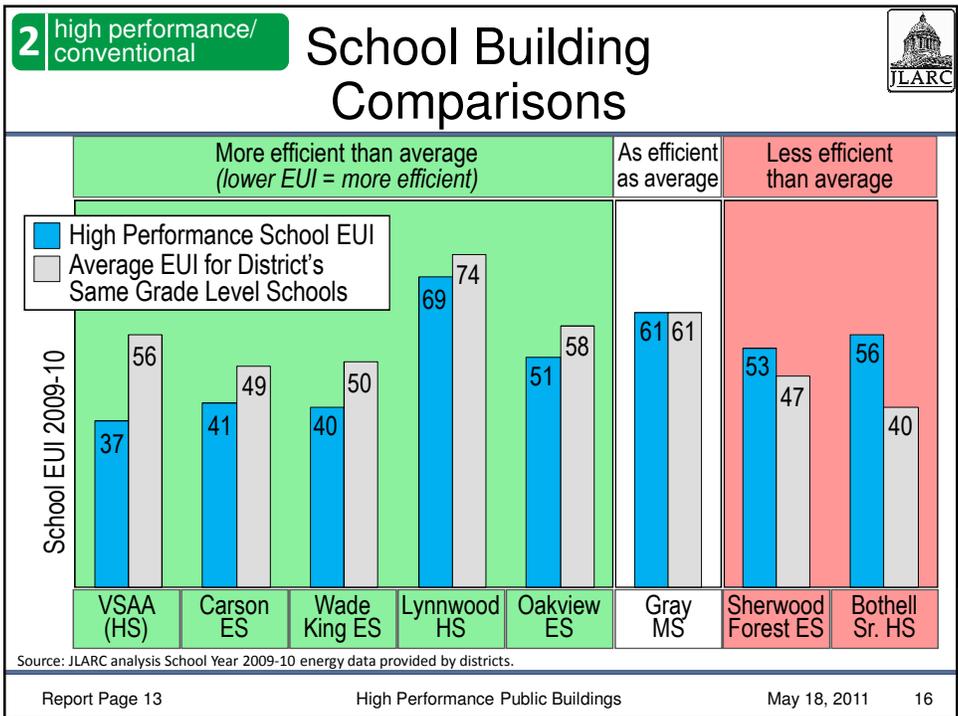
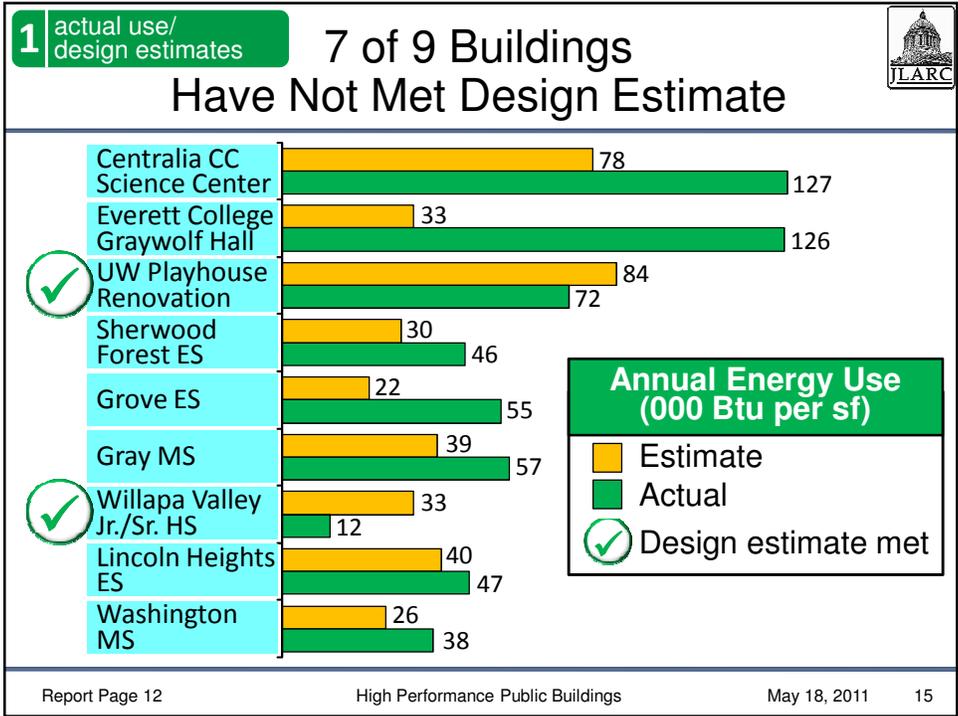
Part 3: How high performance buildings actually perform

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JLARC Review Focuses on Energy Performance



- Analyze energy performance in four ways:
 - 1** Compare actual use to design estimates
 - 2** Compare high performance buildings to similar conventional buildings
 - 3** Measure energy use against a national energy benchmark, and
 - 4** Track change in energy use over time
- Primary measure is actual energy use per square foot: energy use index (EUI)



2 high performance/
conventional

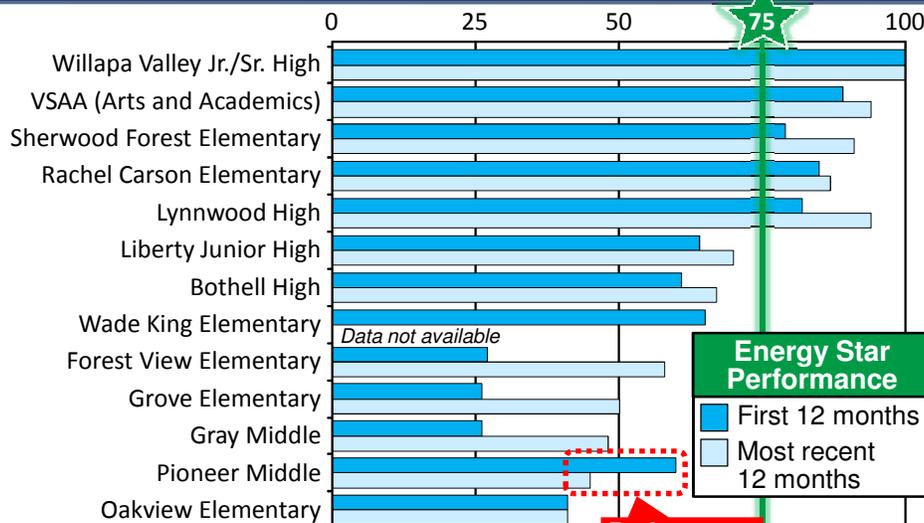
Higher Ed and Agency Comparisons



- Seminar II at TESC is by far most efficient major building on campus in 2009-10
 - Uses 40% less energy per square foot than next most efficient campus building
- DOC – Coyote Ridge and Airway Heights:
 - Coyote Ridge used 24% less energy per square foot in 2010
 - At full capacity in October-December 2010 Coyote Ridge used 29% less energy per square foot than Airway Heights

3 energy use/
national benchmark

5 of 13 Schools Earn Energy Star Designation

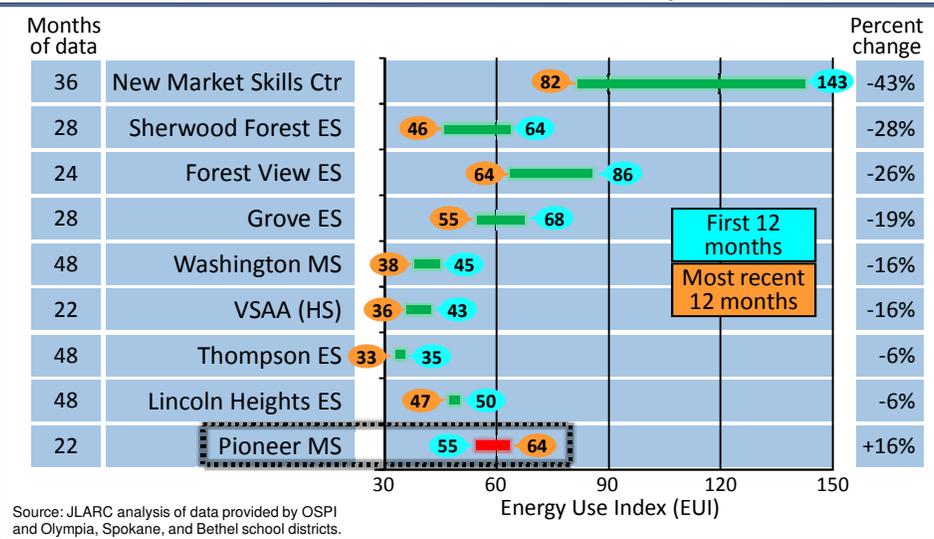


4 energy use/
change over time

Energy Use



Declines Over Time in Many Schools



Energy Performance is Mixed



- JLARC review shows that for each measure some high performance buildings demonstrate greater energy efficiency while others do not
- Definitive conclusion is premature at this time
- Consistent with results reported by:
 - U.S. Green Building Council
 - New Building Institute

Why Actual Energy Use Does Not Meet Estimates



Building managers and construction professionals told us:

- Changes in design and equipment
- Construction defects
- Extended after hours use
- Operation and maintenance practices
- How occupants use or don't use high performance features

Building Design is Only One Factor in Energy Use



- Some school districts have created positions to educate building managers and occupants in energy conservation practices
- Example: Bethel School District
 - 18 of 24 eligible schools in district earn Energy Star designation
 - District reported 26% reduction in energy costs for 2009-10



Lynnwood High School

Part 4: Lack of data and methodology issues limit evaluation

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Information About High Performance Buildings Is Not Complete



- GA and OSPI created procedures for collecting cost and operational data
 - Information for many projects is incomplete
 - Limited analysis or quality review
 - Multi-building campuses are not designed to monitor individual buildings
- Commerce has not reported on affordable housing projects
- Commerce interprets law as not requiring reports on community development projects

JLARC Was Not Able to Assess Building Impact on Workers and Students



- Most studies of worker productivity are based on subjective information, such as surveys
 - Two studies that measure productivity focus on industrial production
- National Academy of Sciences found no evidence-based studies that analyze whether green schools differ from conventional schools

Recommendation 1



- The Department of General Administration, OSPI, and Department of Commerce should develop plans to ensure that they receive complete and accurate data on high performance buildings and analyze program results.
 - Report to JLARC and legislative fiscal committees by December 2011

Recommendation 2



If the Legislature wants information on high performance projects supported by community development grants, it should clarify Chapter 39.35D RCW to specifically require the Department of Commerce to obtain that information from grant recipients.

Recently Enacted Legislation



- SSB 5300 requires LEED credit for wood products with a credible third party certification or from forests regulated under Washington's Forest Protection Act
- ESSB 5485 requires General Administration to make recommendations for streamlining statutory requirements for a variety of energy-related policies, including high performance public buildings

Next Steps & Contact Information



Proposed Final Report: June 2011

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