

**CAPITAL PROJECTS ADVISORY REVIEW
BOARD**

**Life Cycle Cost Analysis and
Energy Efficiency**

Report to the Washington State Legislature

December 2013

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I. Introduction and Recommendations

In accordance with Substitute House Bill (SHB) 1466 (Chapter 222, Laws of 2013), the Capital Projects Advisory Review Board (CPARB) is pleased to submit this report. As directed by the Legislature, CPARB reviewed current statutes regarding Life Cycle Cost Analysis (LCCA) and Energy Efficiency as related to the design-build procurement method (Chapter [39.10](#) RCW). On September 12, 2013, CPARB established a Life Cycle Cost Committee consisting of fourteen individuals who volunteered their time to represent the diverse perspectives of the design and construction industry and project owners. The committee met several times during autumn 2013 to study and debate the issues. Current practices including case studies in LCCA, barriers and opportunities to LCCA, and recommendations were discussed and included in the draft report. The committee presented their draft report and recommendations to CPARB on December 12, 2013, of which CPARB unanimously approved.

CPARB makes the following recommendation for consideration by the Legislature:

Revise RCW 39.10.330(4)(a) to read:

A detailed description of the project including programmatic, performance, and technical requirement and specifications; functional and operational elements; building energy performance goals and validation requirements; minimum and maximum net and gross areas of any building; and, at the discretion of the public body, preliminary engineering and architectural drawings; and...

This change in statute clarifies that a public body is required to state the minimum building energy performance goals in the request for proposal to the design build team finalists. The final proposals would include an evaluation of each team's proposed approach to meeting the stated performance goals.

While it is beyond the scope of this report to develop a recommendation for a fully updated and unified statute on energy conservation and life cycle cost analysis (Chapter [39.35](#) RCW), CPARB recommends a team be established with public owners and industry stakeholders to prepare a recommendation to the Legislature for a unified policy.

II. Executive Summary

The 2013 Legislature passed Substitute House Bill (SHB) 1466 (Chapter 222, Laws of 2013) directing the CPARB to deliver a report to the appropriate committees of the legislature by December 31, 2013. The following table provides a brief summary of this report's response:

SHB 1466 Directive Summary

Directive	Response
CPARB is directed to review current statutes regarding life-cycle cost analysis and energy efficiency as related to the design-build procurement method performed under Chapter 39.10 RCW.	RCW 39.10.330(4) should be amended to require public body to issue building energy performance and validation requirements in request for proposal.
Report to the legislature by 12/31/13.	CPARB approved report on 12/12/2013; report complete and submitted by 12/31/2013.
With recommendations for statutory changes that promote energy efficiency and reduce the total cost to construct, operate and maintain public buildings.	Chapters 39.35 , 39.35A , 39.35B , 39.35C , and 39.35D RCW were reviewed with the recommendation that they be revised to a fully updated and unified statute on energy conservation and life cycle cost analysis.
Recommendation must include provisions for post occupancy validation of estimated energy efficiency measures, and operating and maintenance cost estimates.	Post occupancy enhanced commissioning is critical to achieve the long-term desired performance outcomes and a building that operates optimally. It is recommended that the performance guarantee period commence after the building transitions to occupancy and proceed for 18-36 months from that point.
Life-cycle estimates of energy use must include estimates of energy consumptions for materials used in construction.	Life cycle assessment technical databases needed to implement this emergent embodied energy analysis are not yet developed to a useable level at this time. As new versions of the LEED rating system incorporate LCA requirements, the databases are anticipated to improve based on future market demand.

CPARB established a committee representing a variety of stakeholders to address the requirement and prepare this report that was unanimously approved by the full board. The materials used by the committee for preparing this report represent a worthwhile resource library that the legislature and committees may use for future work. The directive from SHB 1466 is for life cycle cost analysis and energy efficiency related to the design build

procurement process in Chapter [39.10](#) RCW. Life cycle cost analysis and energy efficiency apply to the design construction and operation from any procurement or delivery process. Many of the issues in this report are applicable to other delivery processes.

It is important to note that various definitions exist within the industry and existing statutes for life cycle cost analysis. For the purposes of this report, life LCCA is defined as follows:

The evaluation of a building system's Total Cost of Ownership (TCO). TCO is the financial cost of purchasing, installing, constructing, operating, maintaining, repairing and/or replacing, and disposing of a system over a specified amount of time. LCCA elements include analysis of energy efficiency.

Responding to the legislative directive, CPARB identified four deliverables that are provided in the following sections of the report:

- Current practices in Life Cycle Cost Analysis (Section IV)
- Barriers and opportunities regarding Life Cycle Cost Analysis (Section V)
- Recommendations to the Legislature for statutory changes (Section VI)
- Recommendations for further review (Section VII)

The following is a brief summary of each section:

Section IV: Current Practices in Life Cycle Cost Analysis

- There are two main types of life-cycle cost analysis tools that are common in the industry; "Black box" software and spreadsheet software such as Microsoft Excel. Both types of software require inputs generated through the use of energy modeling and published guidelines of maintenance, operations, and replacement costs and schedules for building components.
- There is consensus that the best practice is to perform LCCA during the early phases of a project, starting in the feasibility and pre-design phases, and to verify the LCCA results during the later phases. In this bookended scenario, it is more likely that the LCCA results would be implemented early in the design process in order to provide the best value outcome for the owner.
- There are two fundamental types of case studies researched and documented: 'process' and 'project.' Process case studies reflect the tasks and workflow through which an agency, organization, or entity conducts LCCA. Project case studies reflect the implementation of this process on an individual project.
- The Maier Hall project case study illustrates current LCCA practices of Washington State public projects, as it underwent the mandated Energy Life Cycle Cost Analysis (ELCCA) process. Though this project was recognized as an *Architecture 2030* and U.S. Department of Energy (DOE) case study and achieved LEED Gold certification, its success could have been enhanced by a process that informs decision making earlier in the overall project timeline. The lowest life cycle cost option was not chosen. High performance building standards and reduction of greenhouse gas emissions were

paramount to lowest life cycle cost. The owner's preference was to look beyond the 30 year evaluation period and select a mechanical system and renewable energy systems that use less annual energy, requires less maintenance, and reduces more air and water pollutants as compared with the lowest life-cycle cost option.

- The Federal Center South case study illustrates a project that has received numerous awards and recognition for its innovative contracting, design, and post occupancy process. However, LCCA was not formally conducted during the design process. The U.S. General Services Administration (GSA) requested that the design team conduct a cost, benefit, and simple payback analysis to evaluate features that could affect building performance ("betterments").
- A priority shift to sustainable and high performance buildings that strive to meet progressive energy codes and Leadership in Energy & Environmental Design (LEED) certifications often drives the design decision making more than the lowest total cost of ownership. As the priority and standards increase for sustainable design and high performance buildings, LCCA can be used as an analysis tool to debate design choices against a preferred outcome, such as stated performance goals (Energy Use Index (EUI) or LEED targets, etc.).
- The LCCA results greatly depend on the qualifications and experience of the one performing the modeling. There are many inputs and sensitivity analyses to be considered and discussed with the decision makers. Ultimately, selecting a LCCA analyst and energy modeler is critical to an effective outcome.
- Life cycle Cost Assessment (LCA) is a compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle expressed as embodied energy. While a noble concept, technical databases needed to implement this emergent analysis are not yet developed to a useable level at this time. As new versions of the LEED rating system incorporate LCA requirements, the databases are anticipated to improve based on this market demand.

Section V: Barriers and Opportunities Regarding Life Cycle Cost Analysis

Barriers

- Owner Project Requirements (OPR's) are not consistently completed prior to the selection of a Design Build (D/B) team. This often leads to unclear expectations for all parties.
- Performance goals for a building or campus are rarely identified early enough to weigh a firm's ability to meet/exceed post occupancy goals, during the selection of the D/B team.
- In traditional D/B projects, most of the design occurs in the competition phase. This is not the collaborative and integrated process owner's prefer and the D/B intends to encourage.
- LCCA is often done too late in the processes, and is used widely as a design confirmation tool rather than a financial analysis tool.
- There are rarely overarching performance goals such as EUI targets, LEED targets, etc. where LCCA is the analysis tool used to debate design choices against a preferred outcome.
- Performance of a building and the systems within are rarely operational and fully understood (with a full year of heating and cooling seasons) prior to the D/B team's contract closeout.
- Buildings rarely operate in complete alignment with design assumptions; they take time to attune to the programming and occupant needs.
- Buildings are growing ever-more complicated to operate and maintain, and there is not ample training to keep pace with this trend for on-site staff.

Opportunities

- The owner ultimately needs to determine the approach based on their needs, so performance requirements can be established and communicated to the D/B team that will deliver the project. The results of this effort should focus on *project outcomes*, not the building systems.
- The owner should imbed the performance language and verification requirements that will be used to evaluate and select the D/B team. The performance outcomes and guarantees from the planning process should be clearly stated in the Request for Qualifications/Request for Proposal (RFQ/RFP) documents.
- The guarantee of performance post occupancy should be defined in the RFQ/RFP and the contract with the selected D/B team. It is recommended that the performance

guarantee period commence after the building has been transitioned to occupancy and proceed for 18-36 months from that point.

- The construction phase of a project should focus on building the facility in a manner such that as-designed performance for the whole building can be achieved. Execution is important to achieve the desired outcome. The right design by itself will not deliver success.
- A longer post occupancy phase, commonly referred to as enhanced commissioning, is critical to achieve the long-term desired performance outcomes and optimal building operation.
- The specific requirements of the enhanced commissioning period should be defined and communicated during the procurement phase, to allow accurate scoping and costing of the project to be developed by the D/B team.
- It is highly likely that the function of a building will change over time. This may have an impact on long term building performance. Considering the guarantee period against the overall life of the building, it is likely that any functional changes will happen after all contractual requirements have been fulfilled.
- The current more progressive D/B procurement path allows an owner and a D/B team to work in an iterative and integrated fashion to provide predictable outcomes and an optimally performing building.

Section VI: Recommendation to Legislature for Statutory Changes

- In accordance with SHB 1466, the focus of this report is energy LCCA requirements related to the D/B procurement delivery procedure included in Chapter [39.10](#) RCW. It should be noted that existing statutes (Chapters [39.35](#), [39.35A](#), [39.35B](#), [39.35C](#), and [39.35D](#) RCW) cover more than just energy LCCA and are not tied to a particular procurement method but instead are applicable to all projects and types of work defined within the statutes.
- The areas of energy conservation, environmental stewardship and sustainability continue to quickly evolve with new technology and innovation. Observations made during the review of existing statutes confirm that the Legislature has placed a high importance on continuing this innovation through policy and leadership actions.
- With each release of updated building and energy codes, the minimum code requirements for building performance are increased. A steady convergence of high performance building standards, LEED certification, and minimum building code requirements is happening across the industry regardless of the procurement method utilized. Statutory requirements should provide policy guidance and not prescriptive in nature to allow flexibility to implement current and future industry best practices.

- While nothing in existing statute precludes a public owner from using or requiring the use of a life cycle cost analysis tool in D/B procurement, it is beneficial to include building performance criteria and validation requirements in the request for proposals to D/B team finalists. The following language addition is recommended:

RCW 39.10.330(4)(a) is revised to read as follows:

A detailed description of the project including programmatic, performance, and technical requirement and specifications; functional and operational elements; building energy performance goals and validation requirements; minimum and maximum net and gross areas of any building; and, at the discretion of the public body, preliminary engineering and architectural drawings; and

This change in statute clarifies that a public body is required to state the minimum building energy performance goals in the request for proposal to the D/B team finalists. The final proposals would include an evaluation of each team's proposed approach to meeting the stated performance goals.

While it is beyond the scope of this report to develop a recommendation for a fully updated and unified statute on energy conservation and life cycle cost analysis (Chapter 39.35 RCW), we recommend a team be established with public owners and industry stakeholders to prepare a recommendation to the Legislature for a unified statute.

Section VII: Recommendations from the Life Cycle Cost Committee to CPARB for Further Review

The research conducted during the process indicates that LCCA is an evolving process. The following items have been identified by the committee as recommendations to CPARB for continued work to benefit the public and the legislature in development of policy and best practices reflective of state of the art life cycle cost analysis.

- Establish a committee to develop guidelines for post occupancy verification and how the process best fits into procurement and project delivery.
- Establish a committee to explore how life cycle cost analysis can be enhanced for the design bid build and extended to General Contractor Construction Manager (GCCM) procurement methods.
- Establish training programs or workshops for planning and delivery of projects using LCCA.
- Monitor and track the success of the innovative delivery of the DES 1063 Block Replacement project and "Washington State University (WSU) North Puget Sound at Everett" project for performance and lessons learned.

Conclusion

Significant progress has been made in the development of life cycle cost analysis tools for informed decision making. There is the potential to expand the use of these tools throughout the project implementation process. An example flow chart that describes the role of LCCA throughout each phase in the planning, design, construction, and operations of building is provided in Appendix F to this report.

Preparation of this report would not have been possible without the extensive efforts of industry stakeholders and public bodies actively involved in life cycle cost analysis and alternative public works procurement. The knowledge and experience was invaluable in understanding the current state of the art, barriers and opportunities and future trends in high performance buildings. CPARB's sincere appreciation goes out to everyone that has participated and contributed to this process.

III. Substitute House Bill 1466 Section 3

CPARB is directed to deliver a report as directed in Substitute House Bill 1466 passed in the 2013 Legislature. The applicable section of bill that applies to this report is provided below:

SHB 1466 Section 3 (Chapter 222, Laws of 2013)

RCW 39.10.230 (5)

The capital projects advisory review board is directed to review current statutes regarding life-cycle cost analysis and energy efficiency as related to the design-build procurement method performed under chapter [39.10](#) RCW. Capital projects advisory review board shall report to the appropriate committees of the legislature by December 31, 2013, with recommendations for statutory changes that promote energy efficiency and reduce the total cost to construct, operate and maintain public buildings. Recommendation must include provisions for post occupancy validation of estimated energy efficiency measures, and operating and maintenance cost estimates. Life-cycle estimates of energy use must include estimates of energy consumptions for materials used in construction.

IV. Current Practices in Life Cycle Cost Analysis

This section's purpose is to illuminate the current practices of LCCA primarily in the western region of the United States, with a focus on Washington State. From research and round table discussions with professionals in the architectural, engineering, and contracting industry, the following definitions, tools, and case studies were identified as important elements in defining current LCCA practices.

Definitions

There are numerous variations of the following definitions, thus the descriptions below represent a broadly-applicable standard based on the research conducted for this report. Washington State established its own specific definitions of LCCA and related terms in Chapters [39.35](#), [39.35A](#), [39.35B](#), [39.35C](#), and [39.35D](#) RCW and Executive Order [13-03](#), located in Appendices I and J of this report. The sections of the RCW that relate to the following definitions are enumerated in Section VI of this report.

Life Cycle Cost Analysis (LCCA)

The evaluation of a building system's Total Cost of Ownership (TCO). TCO is the financial cost of purchasing, installing, constructing, operating, maintaining, repairing and/or replacing, and disposing of a system over a specified amount of time.^{1 2}

GSA definition: Life Cycle Costing (LCC) is an important economic analysis used in the selection of alternatives that impact both pending and future costs. It compares initial investment options and identifies the least cost alternatives for a twenty year period. LCC is expected to support selection of all building systems that impact energy use: thermal envelope, passive solar features, fenestration, heating, ventilation, and air conditioning, domestic hot water, building automation and lighting. However, LCC can also be applied to building features or involve costs related to occupant productivity, system maintenance, environmental impact and any other issue that impacts costs over time.

Enhanced Life Cycle Cost Analysis (Enhanced LCCA)

A systematic and iterative approach to LCCA, in which the process may be used for decision making throughout planning, design, construction, and occupancy phases to optimize performance relative to stated goals and optimize the total cost of ownership of the facility for the owner.

Energy Life Cycle Cost Analysis (ELCCA)

An evaluation of the financial costs associated with the ownership and operation of energy-related systems within a building over a specified amount of time. Energy-related

¹ Fuller, Sieglinde K, "Guidance on Life-Cycle Cost Analysis Required by Executive Order 13123," Department of Energy, Federal Energy Management Program (April 2005).

² Fuller, Sieglinde K. and Stephen R. Petersen, "Life-Cycle Costing Manual for the Federal Energy Management Program," (Feb. 1996).

systems may include heating, cooling, lighting, building envelope, and domestic hot water systems.³

Life Cycle Assessment (LCA)

International Standard ISO 14040:19979(E) definition; LCA is a compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle.

- Metrics that are measured by environmental impact include, but are not limited to, the following: raw material use, water use, energy use, global warming potential, fossil fuel depletion, ozone depletion, smog creation, pollution of water bodies, acidification, and eutrophication, and toxic releases to air, water, and land.

Embodied Energy is the sum of all the energy required to produce any goods or services, considered as if that energy was incorporated or 'embodied' in the product itself. Embodied energy is an accounting method which aims to find the sum total of the energy necessary for an entire product life-cycle. Determining what constitutes this life-cycle includes assessing the relevance and extent of energy into raw material extraction, transport, manufacture, assembly, installation, dis-assembly, deconstruction and/or decomposition as well as human and secondary resources.

LCA is a complex analysis process that relies highly on the quality of the database that supports it. As of this writing, the quality of the LCA databases do not allow for an accurate and consistent study of a building's total environmental impact.⁴ However, as new versions of the LEED rating system incorporate LCA requirements, the databases are anticipated to improve based on this market demand.

Tools for Life Cycle Cost Analysis

There are two main types of life-cycle cost analysis tools that were discussed in the Life Cycle Cost Committee's research and round-table discussions that are common in the industry; "Black box" software such as the GSA's Federal Energy Management Program's (FEMP) Building Life Cycle Cost (BLCC) software and spreadsheet software such as Microsoft Excel. Both of these types of software require inputs that are typically generated through the use of energy modeling and published guidelines of maintenance, operations, and replacement costs and schedules for building components.

- Spreadsheet software (e.g., Microsoft Excel) is a type of life cycle cost analysis tool that allows the analyst to customize all characteristics of the analysis including but not limited to inputs, outputs, and scope. This customization provides the analyst with a clear understanding of the relationship between analysis inputs and outputs in a transparent fashion.
- "Black box" software (e.g. FEMP's BLCC) is a type of life cycle cost analysis tools that prescribes the characteristics of the analysis being conducted. This prescriptive

³ Energy Life-Cycle Cost Analysis Guidelines for Public Agencies in Washington State (Nov. 2005).

⁴ Haselbach, Liv and Kathrina Simonen, "LCA for WA: Life Cycle Assessment (LCA) and Buildings Research for WA State," ES-4 (Aug. 31, 2012).

nature of the tool may work very well for federal or other agency projects in which the criteria for inputs has been created specifically for the particular values and criteria. However, according to a resource that specializes in conducting LCCAs, the usefulness of this software is limited based on the lack of transparency of the analysis.

When compared with a customizable spreadsheet tool, it is more difficult to understand or be aware of the numerous factors affecting the outputs of the “black box” software. A customized spreadsheet for each project requires one to consider the unique characteristics of each project, which can provide more transparency and value to the process by targeting the specific goals and objectives of the project.

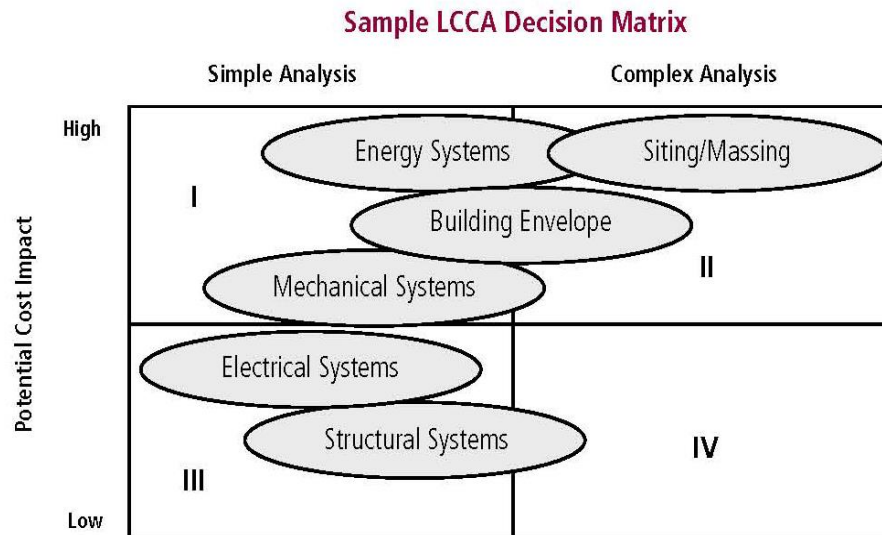
Case Studies – Summary of Findings

Discussing specific projects in the Life Cycle Cost Committee’s meetings and round-table discussions with the Architecture Engineering and Construction (AEC) industry was a natural way of framing the discussion to define LCCA current practices. The projects that were discussed most frequently are included as case studies. There are two fundamental types of case studies researched and documented: ‘process’ and ‘project’. Process case studies reflect the process through which an agency, organization, or entity conducts LCCA. Project case studies reflect the implementation of this process on an individual project. One process case study and three project case studies are highlighted below for immediate reference, and more case studies are available in Appendix D of this report.

Featured Process Case Study: Stanford University⁵

- In 2005, Stanford University assembled a team of individuals from the Land and Buildings staff and consultants from the design and construction industry in order to develop a set of life cycle cost analysis guidelines that would “instruct Project Teams to consider not only the ‘first costs’ of a building (design and construction expenses) but also long-term costs, including utilities, operations, and maintenance.” The following questions and answers describe the core issues to understanding and developing an effective LCCA methodology.
- Within Stanford University’s Guidelines for Life Cycle Cost Analysis, what is being evaluated?
- Stanford’s guidelines focus on analysis of the following building systems: energy, mechanical, electrical, building envelope, building orientation and massing, and structural. According to their guidelines, “[...] creating an exhaustive life cycle cost estimate for every potential design element of a building would not be practical, [thus] the guidelines for LCCA focus on features and systems most likely to impact long-term costs.”

⁵ Coony, Regina, Allan Daly, Megan Davis, and Scott Gould, “*Guidelines for Life Cycle Cost Analysis*,” Stanford University, Land and Buildings (Oct. 2005).



- Who sets the parameters of the LCCA and ultimately makes decisions?

According to Stanford University's guidelines, the Capital Planning Office, the Project Manager, and the Facilities Operations Representative take a leadership role in various phases of the LCCA scope. For the majority of the project, the specific Project Manager at Stanford University is the primary decision maker.

Process Phase	LCCA Goals	Leader
Scoping	Assign O&M cost benchmark	Capital Planning
Feasibility/Programming	- Develop O&M cost benchmark in addition to project benchmark (if not done at Scoping) - Hold LCCA work session - Develop LCCA Decision Matrix	Project Manager
Schematic Design (SD)	- Review LCCA Decision Matrix - Determine which LCCA studies to perform - Select cost-effective alternatives based on LCCA studies - Report results of LCCA	Project Manager
Design Development (DD)	Review LCCA studies to confirm/verify results given project development	Project Manager
Construction Documents (CD)/Permitting	Confirm value engineering decisions from earlier design phases with LCCA results	Project Manager
Construction	- Outline LCCA elements to contractor - Discuss commissioning and testing requirements	Project Manager
Closeout	Conduct training program; perform eleventh-month evaluation	Project Manager
Ownership	Validate LCCA study outcomes and assumptions	Facilities Operation Representative

- When is the analysis conducted during the timeline of the project?

The Stanford guidelines indicate that the majority of the LCCA process must occur as early as possible in order to be most effective in aiding decision making. Thus, the substantial tasks of an LCCA are completed by the end of the schematic design phase.

Subsequent phases are utilized to confirm and verify alignment of LCCA with project development and alignment of LCCA results with previously-made decisions.

- How is the analysis conducted? What tools are used?

As is the case for many life cycle cost analyses, the tools used are a combination of energy modeling and spreadsheet software. Stanford's guidelines include the following cost components: project costs (initial costs), utility costs (energy costs, energy modeling, non-energy utility costs), maintenance costs (preventative, reactive, planned, deferred), and end-of-life costs (residual value, demolition). Other cost components could include service costs and remodeling costs. These components are incorporated into the LCCA depending on the focus of the study. In conducting an LCCA it is also important to consider discount rates, escalation rates, and sensitivity analysis.

Featured Project Case Studies⁶

The featured case studies represent a diverse cross section of current LCCA practices in projects with varying funding sources, procurement methods, project delivery methods, construction types, and location of built projects. Three case studies are highlighted below for immediate reference, and more case studies are available in Appendix D.

⁶ At the time of this writing, two performance-based design-build contract projects were underway for the State of Washington; the 1063 Block Replacement Project and the Washington State University North Puget Sound at Everett. Please refer to Appendices G and H for more information on the current status of these projects.

US Army Corps of Engineers – Federal Center South



Location	Seattle, WA
Program Type	Office Building
Funding	Public - Federal - ARRA
Project Delivery Method	Design-Build with Performance Guarantees
Construction Type	New Construction
Year Completed	2012
Size	209,000 SF
Cost	\$70 Million
Energy Use Intensity (EUI)	20.3
LCCA - Who?	Owner (GSA)
LCCA - What?	Features to improve building performance
LCCA - When?	Late in Design
LCCA - How?	Energy Modeling + Excel

Merit: Federal Center South has received numerous awards and recognition for its innovative contracting, design, and post occupancy process. However, LCCA was not formally conducted during the design process. An extra sum of funding became available during the design process and the GSA requested that the design team conduct a cost, benefit, and simple payback analysis to evaluate features that could affect building performance (“betterments”).)

Stanford University – Environment and Energy Building



Location	Stanford, CA
Program Type	Higher Ed (Classrooms and Labs)
Funding	Private
Project Delivery Method	Negotiated
Retrofit/New Construction	New Construction
Year Completed	2011
Size	166,000 SF
Cost	\$118 Million
Energy Use Intensity (EUI)	Not Available
LCCA - Who?	Stanford University
LCCA - What?	Comprehensive energy approach: Load reduction, passive systems, active systems, energy recovery, on-site generation, green power
LCCA - When?	SD - DD
LCCA - How?	Energy Modeling + Excel

Merit: Due to Stanford University's comprehensive life cycle cost analysis guidelines, it is important to include a case study that reflects their unique, whole-building energy system-focused life cycle analysis approach. Based on this report's research, no other case study was found that conducted a comprehensive whole building energy life cycle cost analysis that included passive and active strategies.

Peninsula College - Maier Hall



Location	Port Angeles, WA
Program Type	Higher Ed (Classrooms, Arts, Music)
Funding	Public - WA State
Project Delivery Method	Design-Bid-Build
Retrofit/New Construction	New Construction
Year Completed	2011
Size	62,950 SF
Cost	\$20.8 Million
EUI	45 (Design)
LCCA - Who?	College and Enterprise Services Input
LCCA - What?	Energy systems, including building envelope
LCCA - When?	SD – DD
LCCA - How?	Energy Modeling + Enterprise Services ELCCA Forms

Merit: Maier Hall illustrates the current LCCA practices of Washington State public projects, as it underwent the currently mandated ELCCA process. Though this project was recognized as an Architecture 2030 and U.S. DOE case study and achieved LEED Gold certification, its success could have been enhanced by a process that informs decision making earlier in the overall project timeline. The lowest life cycle cost option was not chosen. High performance building standards and reduction of greenhouse gas emissions were paramount to lowest life cycle cost. The owner's preference was to look beyond the 30 year evaluation period and select a mechanical system and renewable energy systems that use less annual energy, requires less maintenance, and reduces more air and water pollutants as compared with the lowest life-cycle cost option.

Lessons Learned

- What is being evaluated in LCCA's?
 - The projects evaluated did not conduct comprehensive “whole building” life cycle cost analysis. The closest example is Stanford’s Environment and Energy Building which performed whole building *energy* LCCA, by which passive as well as active energy systems were evaluated. All case studies had a slightly different focus but they were always directly related to the utility (energy and water) systems of the building. As demonstrated by Stanford’s LCCA Decision Matrix, systems related to energy and water consumption are considered to have the highest potential cost impact and require relatively simple analysis for evaluation.
 - The total cost of ownership of building materials such as exterior cladding materials or structural systems are simple to analyze, but no examples of this analysis was found likely due to their having lower potential cost impact in the TCO of the building. In this case, LCCA could be used to predict the maintenance costs of one material use over another to aid the owner and design team’s decision making.
 - Although evaluating the optimal building orientation and massing has high potential cost impact, only one of the case studies (Stanford’s Environment and Energy Building) used LCCA in this fashion, likely due to the complex analysis that is required.
- Progressive Codes and High Performance Building Standards
 - In a conversation with Laura Goldstein, the Director of Project Management at Stanford University, she expressed that over time their practice of LCCA had diverged from the guidelines that they established for two reasons. First, after going through the LCCA process a few times on whole buildings, a body of knowledge and understanding was developed among the team that allowed them to be more selective about where and when to perform LCCA. Second, a priority shift to sustainable and high performance buildings that strive to meet progressive energy codes and LEED certifications drove design making more than the lowest total cost of ownership did.
 - As the priority and standards increase for sustainable design and high performance buildings, LCCA can be used as an analysis tool to debate design choices against a preferred outcome, such as stated performance goals (EUI or LEED targets, etc.).

- Bookends (LCCA Timing)
 - A reoccurring theme throughout the round table discussions with the Architecture, Engineering and Construction industry (AEC) is that LCCA should be performed earlier in the process in order that results inform decision making rather than being a design-confirmation tool.
 - Throughout the Life Cycle Cost Committee's research, discussions, and case studies that were studied for this report, there is consensus that the best practice is to perform LCCA during the early phases of the project, starting as early as the feasibility and pre-design phases, and verify the LCCA results during the later phases. In this bookended scenario, it is more likely that the LCCA results are implemented early in the design process in order to provide the best value outcome for the owner. Also, if the LCCA results are evaluated during occupancy, the assessment can inform future LCCA studies conducted by the owner and AEC team. Stanford University's Environment and Energy building utilized this practice and the project was recently awarded a LEED Platinum rating for Maintenance & Operations (M&O).
- Junk-In, Junk-Out
 - LCCA can be "gamed" to confirm decisions already made or biases that the decision-makers may already have. Timing the analysis with the work flow of decision-making may reduce the tendency to merely confirm decisions, and instead use the tool to inform decisions. Incentivizing the use of LCCA to predict performance relative to stated goals or to reduce total cost of ownership will provide the most value to the owner.
 - The LCCA results greatly depend on the qualifications and experience of the one performing the modeling. There are many inputs and sensitivity analyses to consider and discuss with the decision makers. Ultimately, selecting a LCCA analyst and energy modeler is critical to an effective outcome.

V. Barriers and Opportunities Regarding Life Cycle Cost Analysis

This report provides a high level approach to addressing barriers and the subsequent opportunities found in typical design/build projects. This section of the report is written from the perspective of what an Owner should consider and expect over the course of the construction life cycle into ongoing operations. Some remedies or best practices an owner could consider when addressing barriers are imbedded in the section as well. This section is organized around the following phases of a project:

1. *Pre-Design*
2. *RFQ/RFP*
3. *Design*
4. *Construction*
5. *Commissioning*
6. *Ongoing Operations*

PHASE	BARRIERS
Predesign	• Owner Project Requirements (OPR's) are not consistently done prior to a D/B team's selection. This often leads to unclear expectations for all parties. • Performance goals for a building or campus are rarely identified early enough to weigh D/B team's capabilities to meet/exceed goals post occupancy. • Limited experience in the public sector managing D/B project teams and processes.
RFQ/RFP	• Many public owners need to enlist a third party consultant/owner's representative with experience in running a D/B process to effectively bring a team on board. • A public owner's desire to have a stronger role in the design process than traditional D/B competitions allow. • A costly competition process for D/B teams. • Post occupancy goals are rarely defined early enough for the D/B team to accurately determine activities/costs.
Design	• In traditional D/B projects most of the design occurs is in the competition phase. This is not the collaborative and integrated process owners like and D/B intends to encourage. • LCCA is often done too late in the processes, and is used widely as a design confirmation tool, rather than a financial analysis tool. • There are rarely overarching performance goals (EUI targets, LEED targets, etc.) where LCCA is the analysis tool used to debate design choices against a preferred outcome.

Construction	• Due to the nature of traditional D/B competitions, key subcontracting teams are often brought in too late in the process to truly capture the benefit of D/B relative to the total cost to own and operate a building. • Disaggregation of key subcontracting disciplines; mechanical, electrical, and plumbing, is often a missed opportunity for savings in materials, labor, and time. • Performance of a building and the systems within are rarely operational and fully understood (with a full year of heating and cooling seasons) prior to the D/B team's closeout.
Commissioning	• Commissioning teams are too often seen as the subcontractor that ensures components are designed, installed, tested, operated, and maintained according to the operational requirements of the owner. • This is typically a team that checks the box at completion of the project, not an active and collaborative partner that helps transition the owner into a building over some amount of time to ensure optimal performance and the onsite team's full understand of how to operate the building and systems. • It is difficult to retain enhanced commissioning services (after substantial completion) without retention of construction billings.
Ongoing Operations	• Buildings rarely operate as designed; they take time to attune to the programming and occupant needs. Closeout of a project is too often confusing and frustrating for an owner and on-site staff. • Buildings are growing ever-more complicated to operate and maintain and there is not ample training to keep pace with this trend for on-site staff. • When systems in buildings do not work as designed or are adjusted to address an immediate occupant need, they may drift away from optimal operations. This leads to a complicated set of fixes and workarounds that further compounds the problem of a building or campus performing optimally over time.

Pre-Design: The pre-design phase needs to define the performance criteria of the building. An owner should carefully consider their desired performance criteria, as there are various options to consider. The owner ultimately needs to determine the approach based on their needs, so performance requirements can be established and communicated to the D/B team that will deliver the project. Specific to building performance, the results of this effort need to focus on *project outcomes*, and not the building systems.

Traditionally, the pre-design effort has established desired project outcomes for first cost, schedule, and space programming, among others. These aspects are important and need to remain at the forefront of any planning process. Other performance outcomes that should be considered as part of the pre-design phase of the project include the following:

Energy: This would focus on establishing a performance outcome for energy use in the building. This could either be accomplished through a targeted EUI for the facility or by defining energy performance standards as a percent improvement over existing energy codes.

Operational: Similar to energy, this would also focus on establishing a performance outcome for the operational costs of the building after construction and include all of the

non-energy costs of operating the building after it has been transitioned into a mode of sustainable occupancy.

Sustainability: This category focuses on achieving any sustainability benchmarks as part of the performance outcomes for the building. As an example, LEED is a common sustainability barometer applied to buildings today.

Enhanced Life Cycle Analysis: An owner may wish to utilize a LCCA model for their building. Due to the complexity and variability of different modeling tools and techniques, it may be difficult to define specific performance outcomes during the pre-design. However, an owner could, during the course of the planning process, define the financial modeling technique and/or tool that will be used throughout the project to evaluate design options.

An owner has several options to define the performance-based outcomes of the planning process. An owner could rely on their internal resources for this information. Also, peer networks could be tapped for best practices and information which could support, or even supplant internal information. Lastly, a third-party consultant could determine, in conjunction with the owner, the performance requirements of the building.

Request for Qualifications/Request for Proposals (RFQ/RFP): After the planning phase, the project will move into the RFQ/RFP phase. The owner should focus on imbedding the performance language and information that will be used to select the D/B team through Chapter [39.10](#) RCW. The successful team should be willing to take responsibility for the holistic, overall performance of the building while understanding that the day-to-day operation of the facility will reside with the owner. The RFQ/RFP should include or request the following information related to the performance of the building:

- 1. The performance outcomes from the planning process. This information should also be used to establish the guarantees the owner wishes to incorporate into the project.*
- 2. The guarantee for performance period post occupancy could be defined. It is recommended that the performance guarantee period commence after the building has been transitioned to occupancy and proceed for 18-36 months from that point.*
- 3. A definition of the penalties for a failure to meet the performance guarantees.*
- 4. Expectations and requirements for utilizing a life cycle financial modeling tool. There is a possibility that the owner may have already utilized modeling in the Pre-Design phase and the RFQ/RFP should detail what efforts have been completed to date and the requirements going forward.*
- 5. The abilities (tools, techniques, skill, knowledge, experience, etc.) of the respondents to model the energy and operational performance of the building and how they will engage the owner in this process throughout the duration of the project.*
- 6. The ability of the respondents to identify, support, and secure all financial incentives at the local, state, and federal level and how those incentives will be applied towards the project.*

7. *Enhanced commissioning requirements should be defined so the D/B team and owner can accurately determine the activities and costs associated with this project post occupancy.*

Design: During the design phase, it is the expectation that the D/B team provide regular updates on the project at key milestones against the defined project outcomes, with the intent that the desired outcomes for the building will help guide the D/B and owner's decisions. This would include information for first cost, utility use, operational costs, sustainability goals, and other outcome-based criteria as needed. The ability of the building's design to attain the desired performance outcomes will depend on the following factors:

Modeling Tools: The various modeling tools, which capture inputs and drive outputs (i.e. building performance), are critical to identify and develop at the beginning of the design process. The owner should discuss the modeling tools/approach with the D/B team and ultimately approve of the plan. Two examples of models are a whole building energy model and a LCCA model.

Modeling Development: Specifically, this refers to the skills, experience, and knowledge that the D/B team applies to successfully model building systems and the holistic overall building performance. The owner should engage with the design team to understand the information input into the models, as well as be comfortable in debating the merits and validity of suggested inputs from the D/B team.

Operational Capabilities: After the transition period, the owner will operate the building. Any models should accurately reflect the building operational capabilities, practices, and processes of the owner. The owner needs to share this information with the D/B throughout the course of the design.

Construction: The construction phase of the project should focus on building the facility in a manner such that whole building as-designed performance can be achieved. Execution is important to achieve the desired outcome - the right design by itself will not deliver success. An owner's obligations during the construction phase relative to meeting the desired outcomes are the following:

Financial: The owner may be required to submit documentation to secure financial and/or utility incentives identified by the D/B team. This would likely occur after the design has been completed and project specifics are understood, although this could vary depending on the incentives being pursued.

Sustainability: Construction information and practices to document sustainable practices will occur during the construction phase. The primary responsibilities will be the responsibility of the D/B team, but it will likely be necessary for the owner to have visibility and input into the various activities under this category.

Commissioning: One of the tasks after the construction phase of work is commissioning. Commissioning is the process of assuring that all systems and components of a building are designed, installed, tested, operated, and maintained according to the operational requirements of the owner. The D/B team will need to deliver a draft commissioning plan to the owner for their review and approval during the construction phase.

Commissioning: Commissioning provides an opportunity to bring the constructed building into a mode of sustainable occupancy. Currently this takes place over a period of one to three months and rarely includes much more than a punch list.

However an elongated version of this post occupancy phase, most commonly referred to as Enhanced Commissioning (ECx), is critical to achieve the long-term desired performance outcomes and a building that operates optimally. The concept is a soft-handoff – the D/B team will work with the owner over the established appropriate time period to deliver enhanced commissioning, create operating procedures, resolve design issues and warranty items, train the owner's facilities staff, establish logistics for capturing building performance data, and archive relevant building information.

The specific requirements of the enhanced commissioning period should be defined and communicated during the RFP/RFQ phase, so that it can be accurately scoped and built into the cost of the project by the D/B team. During the post occupancy period, the D/B team will then execute a program in conjunction with facility services staff on site. The owner should focus on the following:

Review and approval of appropriate documentation, such as commissioning reports, operating procedures, M&O manuals, etc.

Make available for training the facilities staff that will have the responsibility of operating the building.

Work with the D/B through the resolution of design, warranty, and other issues.

Operational Performance: The operational performance phase of the building begins after the ECx phase. This phase represents the long term day-to-day function and performance of the building. A premise of this phase is that the owner's facility personnel will be responsible for the operation of the building. Ensuring that the owner's operations staff has the necessary knowledge, skills, and abilities to operate and maintain the building to the desired performance outcomes is an important best practice. The success of building and system specific training during the enhanced commissioning stage will be improved to the extent that operations staff have foundational understanding of key "building as a system" and high performance design and technology features. The Building Operator Certification program (www.TheBOC.info), developed in Washington State, and is an example of this type of training and credentialing for operations staff.

This phase also represents the time period in which the verification of the building performance outcomes will be conducted, with the D/B team responsible for meeting the guarantees previously agreed upon with the owner. Considering this context, the owner should anticipate participating in the following:

Performance Verification: The D/B team will be responsible to demonstrate the building meets the previously agreed upon guarantees. The D/B team can be expected to capture building data, analyze this information, then present knowledge back to the owner on performance. While there is certainly a very discreet action to prove the guarantees and performance standards for the building have been achieved, this activity should also be viewed as a collaborative discussion between the D/B team and the owner to optimize the performance of the building to the greatest extent.

Building Operation: As mentioned above, the owner will be responsible for the day-to-day operation of the facility. The D/B team will train the building operators during the TSO period and it will be important that they have a clear understanding of the performance outcomes and how their operation of the building impacts those outcomes. It is quite likely that as part of the performance verification, the D/B team will employ monitoring capabilities that would notify the D/B team and owner in real-time when the building is operating outside of established performance guidelines. This will create an opportunity for consistent dialogue between the D/B team and owner with the intent of optimizing building performance under the operating constraints of the facility.

Building Changes: It is highly likely that the function of the building will change over time. This may have an impact on building performance. Considering the guarantee period against the overall life of the building, it is likely that any functional changes will happen after all contractual requirements have been fulfilled. The owner, at their option, can continue to optimize building performance through the information, models, and tools delivered from the D/B team.

Conclusion:

The barriers outlined have plagued construction projects for decades. Best practices and opportunities to positively impact every phase of a project mentioned in this section have a consistent theme running throughout. (A flow chart that describes the role of LCCA throughout each phase in the design, construction, and operations of buildings is provided in Appendix F to this report.) The D/B procurement path allows an owner and a D/B team to work in an iterative and integrated fashion to provide predictable outcomes and an optimally performing building.

VI. Recommendations to the Legislature for Statutory Changes

An initial review of existing statutes related to Life Cycle Cost Analysis, energy conservation, and high performance public buildings was conducted. The following statutes, copies of which are found in Appendix I, were found to be relevant to the subject:

Chapter [39.35](#) RCW – Energy Conservation in Design of Public Facilities, first enacted in 1975. This section sets forth the requirements for the Energy Life-Cycle Cost Analysis (ELCCA)

Chapter [39.35A](#) RCW – Performance-Based Contracts for Water Conservation, Solid Waste Reduction, and Energy Equipment, first enacted in 1985

Chapter [39.35B](#) RCW – Life-Cycle Cost Analysis of Public Facilities, first enacted in 1986. This section sets forth the requirements for the broader based Life Cycle Cost Analysis (LCCA)

Chapter [39.35C](#) RCW – Energy Conservation Projects, first enacted in 1991

Chapter [39.35D](#) RCW – High-Performance Public Buildings, first enacted in 2005

In addition to the above referenced statutes, Executive Order [13-03](#), Requiring Consideration of Life Cycle and Operating Costs in Public Works Projects, was issued by Governor Jay Inslee, on August 21, 2013.

While, in accordance with SHB 1466, the focus of this report is ELCCA requirements related to the Design/Build procurement delivery procedure included in Chapter [39.10](#)⁷ RCW, It should be noted that the above referenced statutes cover more than just ELCCA and are also not tied to a particular procurement method but instead are applicable to all projects and types of work defined within the statutes.

Existing statutes require state agencies including all political subdivisions, institutions of higher education, and public school districts to ostensibly utilize life cycle analysis on new construction and major renovation projects. Nothing in existing statute was found to discourage or prohibit the use of life cycle analysis on any public works project regardless of the procurement method used.

The review also revealed a number of inconsistencies and conflicting requirements between the various statutes. One example of inconsistency is the defined roles and responsibilities of various state agencies. In RCW 39.35.050, the Department of Enterprise Services (DES) is

⁷ The capital projects advisory review board is directed to review current statutes regarding life-cycle cost analysis and energy efficiency as related to the design-build procurement method performed under chapter 39.10 RCW. Capital projects advisory review board shall report to the appropriate committees of the legislature by December 31, 2013, with recommendations for statutory changes that promote energy efficiency and reduce the total cost to construct, operate and maintain public buildings. Recommendation must include provisions for post occupancy validation of estimated energy efficiency measures, and operating and maintenance cost estimates. Life-cycle estimates of energy use must include estimates of energy consumptions for materials used in construction.

responsible for defining procedures, methods, and guidelines for performance of life cycle cost analysis while RCW 39.35B.050, states the Office of Financial Management (OFM) shall design and implement a cost effective life-cycle cost model, establish policies and procedures regarding use of life-cycle cost analysis by state agencies. RCW 39.35D.060 states that DES and the Office of the Superintendent of Public Instruction are responsible to develop guidelines for administering the chapter and define a procedure and method for employing and verifying activities necessary for certification to at least the LEED silver standard (LEED also requires the use of LCCA). Some of the existing statutes, such as Chapter 39.35D RCW are prescriptive in nature and are in need of updating to current industry practices.

The areas of energy conservation, environmental stewardship, and sustainability continue to quickly evolve with new technology and innovation. Observations made during the review of existing statutes also indicate that the Legislature has placed a high importance on continuing this innovation through policy and leadership actions.

While it is beyond the scope of this report to develop a recommendation for a fully updated and unified statute on energy conservation and life cycle cost analysis (Chapter 39.35 RCW), CPARB recommends the creation of a team with public owners and industry stakeholders to prepare a recommendation to the Legislature for a unified policy.

The Legislature recognized the value of using a LCCA tool as a component of the decision process with the understanding that the tool is not the solution due to its constraints and limitations. RCW 39.35B.010 (6) Legislative findings states:

Life-cycle cost may not be suitable or cost-effective for all capital projects or all components of a facility, and is not an exclusive criterion for decision-making, but is nonetheless a useful framework for evaluating design and capital investment alternatives.

As noted in previous sections of this report, the most effective use of the life cycle cost analysis tools begin at the early stages of a project and continue throughout the planning design, construction and operations of a facility. Building from a foundation of performance goals with building systems and operations validation through fundamental elements of a LEED certification can support an expanded LCCA process. Chapter [39.35D](#) RCW requires all major facility projects receiving any funding in a state capital budget, or projects financed through a financing contract be designed, be constructed and certified to at least LEED silver standard. The LEED certification process is defined by the United States Green Building Council LEED green building rating standard. Since its inception, the LEED standards have been updated and revised to reflect new technology and industry standards that have resulted in more efficient and sustainable buildings. The latest update LEED version four has been released and requires significantly better building performance standards to receive silver certification.

With each release of updated building and energy codes, the minimum code requirements for building performance are being increased as well. A steady convergence of high performance building standards, LEED certification, and minimum building code requirements is happening

across the industry regardless of the procurement method utilized. It cannot be stressed enough, though, that statutory requirements should provide policy guidance rather than be prescriptive in nature to allow flexibility to implement current and future industry best practices.

As noted above, while nothing in existing statute precludes a public owner from using or requiring the use of a LCCA tool, it may be beneficial to include building performance criteria and validation requirements in the request for proposals to design build team finalists. The following language addition is recommended:

RCW 39.10.330(4)(a) is revised to read as follows:

A detailed description of the project including programmatic, performance, and technical requirement and specifications; functional and operational elements; building energy performance goals and validation requirements; minimum and maximum net and gross areas of any building; and, at the discretion of the public body, preliminary engineering and architectural drawings; and

This change in statute clarifies that a public body is required to state the minimum building energy performance goals in the request for proposal to the design build team finalists. The final proposals would include evaluation of each teams proposed approach to meeting the stated performance goals.

VII. Recommendations for Further Review

The research conducted while preparing this report indicates that LCCA is an evolving process. These action items will help the public and the Legislature follow this process and develop best practices.

- Establish a committee to develop best practices for post occupancy verification and how the process fits into procurement and project delivery.
- Establish a committee to explore how life cycle cost analysis can be enhanced for the design bid build and GCCM procurement methods.
- Establish training session or workshops for planning and delivery of projects using LCCA.
- Monitor and track the success of the innovative delivery of the DES' 1063 Block Replacement project and Washington State University North Puget Sound at Everett project for performance and lessons learned.
- Meet with other entities working on similar topics to review and coordinate lessons learned, best practices and policies (i.e. OFM).

Capital Projects Advisory Review Board (CPARB)

Life Cycle Cost Analysis and Energy Efficiency

Appendices

- A. Life Cycle Cost Committee Roster and Meeting Dates
- B. Life Cycle Cost Analysis in Public Works (PowerPoint by Schacht)
- C. Life Cycle Cost Analysis Process Notes
- D. Life Cycle Cost Analysis Case Studies
 - 1. Federal Center South
 - 2. Research Support Facility- DOE/NREL
 - 3. Maier Hall- Peninsula College
 - 4. Environment + Energy Building- Stanford U
 - 5. Thomas Foley Federal Courthouse GSA
 - 6. Cebula Hall- Saint Martin's University
 - 7. North Satellite Modernization Feasibility Study- Port of Seattle
- E. Research Methodology – Round Tables
- F. Enhanced Life Cycle Cost Analysis and Commissioning for High Performance Buildings Flow Chart
- G. Department of Enterprise Services (DES) 1063 Block Replacement Project in Olympia
- H. Washington State University (WSU) North Puget Sound Project at Everett
- I. Statutes on Life Cycle Cost Analysis: RCW 39.35, 39.35A, 39.35B, 39.35C, 39.35D
- J. Executive Order 13-03: Requiring Consideration of Life Cycle and Operating Costs in Public Works Projects

APPENDIX A

Life Cycle Cost Committee Roster and Meeting Dates

Name	Representing	Firm	Appointed to Committee by CPARB	CPARB Board Member
Ed Kommers	Specialty Contractors	MCA of Western Washington	✓	✓
Bob Maruska	Port Association	Port of Seattle	✓	✓
Olivia Yang	Higher Education	WSU	✓	✓
Walter Schacht	Engineers/Architects	Schacht Aslani Architects	✓	✓
David Myers	Labor	Washington State Building & Trades Council	✓	✓
Nancy Deakins	DES	Staff to CPARB	✓	✓
Megan Owen	Energy Contractors	McKinstry Co.	✓	
Stan Price	Non-Profit	Northwest Energy Efficiency Council	✓	
Van Collins	General Contractors	Association of General Contractors	✓	
Eric Smith	Higher Education	UW	✓	
Doug Kilpatrick	Performance Contracting	DES	✓	
JC Letourneau	Engineers/Architects	Schacht Aslani Architects		
Adam Stoeckle	Engineers/Architects	Schacht Aslani Architects		
Kristina Sing	Energy Contractors	McKinstry Co.		

Meeting Dates of Life Cycle Cost Committee

- September 26, 2013
- October 7, 2013 ○
October 21, 2013
- November 4, 2013
- November 14, 2013 – Report to CPARB
- November 18, 2013 ○
December 2, 2013
- December 9, 2013
- December 12, 2013 – Report to CPARB

APPENDIX B

Life Cycle Cost Analysis in Public Works (PowerPoint by Schacht)

life cycle cost analysis in public works

contents

Existing Definitions & Tools

Legislation & Executive Orders

Example Design Build Projects

Next Steps

contributors

Walter Schacht	Architect	Schacht Aslani Architects
JC Letourneau	Architect	Schacht Aslani Architects
Adam Stoecke	Architect	Schacht Aslani Architects
Jim Hanford	Architect	Miller Hull Partnership
Geoff Anderson	Architect	ORB Architects
Kate Simonen	Architect	University of Washington
Elizabeth Powers	Sustainability Consultant	O'Brien & Company
Tom Marseille	Mechanical Engineer	WSP
Brian Haugk	Mechanical Engineer	Hargis
Brian Boettcher	Mechanical Engineer	Hargis

existing definitions & tools

total cost of ownership

- Investment Costs
- Acquisition Costs
- Construction Costs
- Operations and Maintenance Costs
- Repair and/or Replacement Costs
- Disposal Costs
- Productivity and Health Impacts (+/-)
- Space Efficiency Impacts
- Market Value Impacts
- Future Carbon Costs
- Others (Escalation, Financing, Rebates, etc.)

environmental impact

Inputs

- Raw Material Use (Renewable/Non-Renewable)
- Energy and Water Use for Extraction, Transport, Manufacturing, Assembly, Installation, Deconstruction

Outputs

- Global Warming Potential
- Fossil Fuel Depletion (Energy use)
- Ozone Depletion
- Acidification
- Eutrophication
- Smog

LCCA

Life Cycle Cost Analysis

WHO

- OFM (recently removed from predesign checklist)

WHAT

- Evaluation of the financial cost of purchasing, installing, constructing, operating, maintaining, and repairing/replacing, a structure's materials and systems over 50 years

WHEN

- Pre-design, to confirm preferred project scope

HOW

- Cost estimates

ELCCA

Energy Life Cycle Cost Analysis

WHO

- OFM

WHAT

- Construction of cost of building envelope, mechanical and electrical systems, and energy use/cost and maintenance over 30 years
- Tends to confirm rather than evaluate design options

WHEN

- Completed during design development
- Could be a decision-making tool if iterative

HOW

- Energy modelling
- Cost estimates

LCA

Life Cycle Assessment

WHO

- planned to be added to LEED

WHAT

- Evaluation of the environmental cost and impacts associated with a product, process, or service

WHEN

- Can be completed at any phase of a project

HOW

- Information databases such as,
Athena Environmental Impact Estimator
Pharos Project database

LCC

Life Cycle Costing

WHO

- GSA

WHAT

- Evaluation of cost of purchasing, installing, constructing, operating, maintaining, and repairing/replacing, and disposing of a structure's materials and systems over its lifetime
- Expected to support selection of all building systems impact energy use, can be expanded to a broader scope of issues

WHEN

- Iterative process from predesign through design development

HOW

- Energy modelling
- Cost estimation methods

OPR

Owner's Performance (Project) Requirements

WHO

- Department of Homeland Security
- LEED recommendation (Energy and Atmosphere Prerequisite 1)

WHAT

- Tool that owners use to communicate their goals for energy, environment, sustainability, durability, operations, safety, and security to their design team

WHEN

- DHS - beginning of project design
- LEED - after A/E selection

HOW

- DHS OPR Tool
- LEED - commissioning authority assists in development of OPR

Energy Star Certification

WHO

- Federal
- LEED

WHAT

- Integrated with Architecture 2030 benchmarks
- Minimum 75th percentile of EUI for building type
- Consumer recognition

WHEN

- During design and operation of building
- Requires constant certification

HOW

- Energy Star's Target Finder
- Creating a national database

Validation

What can be validated?

- Energy use
- Material extraction, manufacturing, assembly

How is it validated?

- Metering
- Chain of Custody Documentation

Are there rewards/penalties

- State: No
- Federal: Maybe
- LEED: Certification

legislation & executive orders

SHB 1466

Reauthorizing the Alternative Public Works Laws Section 3(4)

Total Cost of Ownership



Environmental Impact?



The capital projects advisory review board is directed to review current statutes regarding life-cycle cost analysis and energy efficiency as related to the design-build procurement method performed under chapter 39.10 RCW. Capital projects advisory review board shall report to the appropriate committees of the legislature by December 31, 2013, with recommendations for statutory changes that promote energy efficiency and reduce the total cost to construct, operate and maintain public buildings. Recommendation must include provisions for postoccupancy validation of estimated energy efficiency measures, and operating and maintenance cost estimates. Life-cycle estimates of energy use must include estimates of energy consumptions for materials used in construction.

executive order 13-03

REQUIRING CONSIDERATION OF LIFE CYCLE AND OPERATING COSTS IN PUBLIC WORKS PROJECTS

ELCCA

WHEREAS, in order to reduce energy and other operating costs, consideration must be given to all costs for constructing and operating a building;

← ELCCA & LCC

Pre-Design

WHEREAS, these costs must be considered at the beginning of the planning process;

ELCCA & LCC

WHEREAS, all reasonable steps should be taken to implement measures designed to achieve more efficient building costs for both construction and operations costs, and to consider clean energy systems with life-cycle costs;

NOW THEREFORE, I, Jay Inslee, Governor of the State of Washington, by virtue of the authority vested in me do hereby direct:

All state agencies shall consider operating and life-cycle costs when planning a building as follows:

1. Definitions

a) "Life cycle costs" means the sum of present values of investment costs, capital costs, acquisition costs, installation costs, operating costs, maintenance costs, and disposal costs over the life of the building.

← LCC Economic Analysis

b) "Operating costs" means the costs required to: provide energy to the building or grounds in the form of electricity, natural gas, or other methods; maintain the building including labor and materials; replacement of building systems; wastewater disposal; and water.

- c) "Operating performance contract" means a contract that provides for the performance of services for the design, acquisition, financing, installation, testing, operation, and where appropriate, maintenance and repair, of an identified energy or water conservation measure or series of measures at one or more locations. Such contracts shall provide that the contractor guarantee the operating and maintenance costs for an agreed upon length of time.
- d) "Agency" means a state agency under the authority of the Governor, and any entity that receives funds from the capital budget.

2. Implementation

a) Life-cycle cost analysis shall determine the reasonably expected fuel costs for the economic life of the building that are required to maintain illumination, power, temperature, humidity, ventilation of such state-funded facility, and all other energy consuming equipment in a facility and the reasonably expected costs of probable facility ownership, operation, and maintenance including labor, and materials, and building operation. Life-cycle cost may be expressed as an annual cost for each year of the facility's use. Further, the life-cycle cost analysis may demonstrate for each design how the design contributes to energy efficiency, and conservation with respect to, any of the following: energy use, energy cost, clean energy use, water use, and water cost.

b) Within 180 days of this Executive Order, the director of the Office of Financial Management (OFM), in collaboration with other agency directors, shall: provide the life cycle cost model to be used for analysis; provide assistance in using the life cycle cost model; and issue guidance to clarify how agencies determine the life cycle cost for investments required by this Executive Order, including how to compare different energy and fuel options and

← All Economic Analysis

assess the current tools. The director of the OFM also shall provide direction in the Capital Budget Instructions to follow these rules.

- c) Construction shall proceed only upon the disclosure to the OFM, for the facility chosen, of the life-cycle costs as determined in this section and the capitalization of the initial construction costs of the building. The results of life-cycle cost analysis shall be a primary consideration in the selection of a building design. Such analysis shall be required only for construction of buildings with an area of 5,000 square feet or greater. An energy consumption analysis for the term of a proposed lease shall be required only for the leasing of an area of 20,000 square feet or greater.

How long will LCC be evaluated? 10 years? 20? 30?

- d) The Department of Enterprise Services shall develop sustainable design principles. The principles shall include using an energy use index or other measurements that identify energy and operating savings. Agencies shall apply such principles to the siting, design, and construction of new facilities. Agencies shall optimize life-cycle costs, pollution, and other environmental and energy costs associated with the construction, life-cycle operation, and decommissioning of the facility. Agencies shall consider using Operating Performance Contracts or utility energy-efficiency service contracts to aid them in constructing sustainably designed buildings.

How would this be implemented in a Design-Bid-Build project?

3. Architectural and Engineering Firm Selection

- a) Each cabinet agency, and any other state agency that receives funds from the capital budget, shall consider the architectural and engineering firm's experience using life cycle costs, operating costs, and energy efficiency measures when evaluating the selection of the architectural and engineering firm for projects where life cycle costs, operating costs, and energy efficiency measures are applicable.

Experience with LCC not typical for A/E firms primarily doing Design-Bid-Build

Used in ELCCA →

Similar language for GCCM and Design-Build →

b) When selecting an architectural and engineering firm, agencies shall consider the architectural and engineering firm's experience with highly efficient systems, in new construction or retrofit projects when life-cycle cost effective. Agencies shall consider

combined cooling, heat, and power when upgrading and assessing facility power needs and shall use combined cooling, heat, and power systems when life-cycle cost-effective. Agencies shall survey local natural resources to optimize use of available biomass, bioenergy, geothermal, or other naturally occurring energy sources.

c) Agencies shall consider successful implementation in areas such as Energy-Savings Performance Contracts, sustainable design, energy efficient procurement, energy efficiency, water conservation, and renewable energy projects in the evaluations of architectural and engineering firms.

Not typical for contracts with A/E firms

A/E Selection Criteria

d) If an agency determines that a waiver of this requirement is necessary, the agency may ask the OFM for a waiver of the provision. The OFM will include a list of any waivers it grants in a report to the Legislature.

...

example design build projects

federal center south

Army Corps of Engineers
Federal Way, WA



Funding

- American Recovery & Reinvestment Act (ARRA)
- ARRA projects have minimum performance criteria

RFP

MINIMUM PERFORMANCE CRITERIA

- Integrated Design
- Energy
- Water
- Indoor Environmental Quality
- Materials

LIFE CYCLE COST

- Required for solar hot water, renewable energy, cooling and heating systems
- Performed after project reward for solar hot water system and photovoltaics

national renewable energy laboratory

Department of Energy
Golden, CO



Life Cycle Cost

EVALUATED

- Used in design process to evaluate specific feasibility of:
LED lamps
Hydronic Radiant Heating/Cooling

IDENTIFIED AS COST EFFECTIVE STRATEGIES (BUT NOT EVALUATED)

- High thermal mass
- Good insulation
- Reduced lighting power density
- Right-sized HVAC
- Overhangs

next steps

continuing research

tools

- King County
- National Park Service
“Choosing by Advantage” program

example projects

- SeaTac North Sattelite
Port of Seattle
- San Ysidro Border Crossing
GSA
- City Hall
City of Sequim

APPENDIX C

Life Cycle Cost Analysis Process Notes

life cycle cost analysis process notes

LCCA process notes

WHO:

- Collaborative: DES, Energy Services, end-user (facilities directors, VP's, etc.), A/E, Contractor
- DES to provide leadership with LCCA goals and standardization:
 - send consistent message on performance goals/requirements across agencies
 - set escalation rates, discount rates, and analysis time frame for consistent application of LCCA's

LCCA process notes

WHAT:

- Category A - Development Strategy
 - Recommend performing in the funding request phase (PRR) versus the Predesign when funding is already allocated.
 - Options to explore may include: New Construction, Renovation, Lease, Do Nothing
- Category B - Building Systems
 - High Potential Cost Impact - Complex Analysis: Building massing & orientation to optimize energy performance. (currently check-box approach in ELCCA's Environmental Design Considerations check-list.) Recommend shoe-box modeling early in Predesign or Schematic Design.
 - High Potential Cost Impact - Simple Analysis: Energy (energy source, HVAC), Water Systems, Building Envelope (Currently in ELCCA)

(continued on next page)

LCCA process notes

WHAT:

- Category B - Building Systems
 - Low Potential Cost Impact - Simple Analysis: Electrical, lighting systems (Currently in ELCCA). Others that could be added include envelope materials, interior finishes, or other discretionary items that may have maintenance and operations implications.

LCCA process notes

HOW:

- Improve rigor of analysis both in terms of an integrated, iterative process, but also strive for a transparent decision making tool (vs. confirmation tool, ELCCA is done too late in the process currently)
- Integrate VE process with LCCA process (drop the E from ELCCA)
- Existing ELCCA spreadsheets are very good; ensures transparency of analysis inputs. However, there is room for improvement. Standardization for consistency needs to occur for:
 - differential escalation calculations
 - sensitivity analysis to allow testing across a range
 - removal of superfluous information from process that is not meaningful
 - ability to handle a very large number of FIMs

(continued on next page)

LCCA process notes

HOW:

- Complete LCCA prior to Value Engineering/Analysis. A/E & Owner to present LCCA results to the Value Analysis team. (D-B: Integrate with VE. It's the same thing).
- Value Analysis team can evaluate value based decisions made through the OPR and LCCA process.
- Process shall allow for immunity for strategies and/or integrated systems solutions in order that performance goals do not collapse.
- DES to provide reviewer with specific expertise in energy modeling and LCCA.

LCCA process notes

WHEN:

Phase	Tasks	Players
Funding	- Use LCCA to determine development strategy (Category A)	DES, Agency/End Users, A/E Team & Cost Estimators, Contractors (for estimating, constructability, and more FIM ideas)
Pre-Design	Collaboratively develop OPR and operations & maintenance cost benchmarks Create LCCA plan including process outline, measures to be studied roles and responsibilities of team members and decision matrix	DES, Energy Services, Agency/End Users, Cx Agent, A/E Team & Cost Estimators
Schematic Design	Conduct LCCA for building systems (Category B) Select systems based on LCCA matrix and OPR - Review strategies with OPR	DES, Energy Services, Agency/End Users, A/E Team & Cost Estimators
Value Engineering	A/E & Owner team present LCCA results to VE team. Evaluate project with OPR and LCCA as major considerations	Qualified VE Team, A/E Team and Agency/End Users

(continued on next page)

LCCA process notes

WHEN:

Phase	Tasks	Players
Design Development	Verify LCCA decisions made during Schematic Design given development of project Update design and/or OPR as necessary - Cx Agent review - Create a Measurement & Verification (M&V) Plan to help achieve efficient actual performance post-occupancy	A/E Team, Cx Agent
Construction Documents	- Verify LCCA decisions previously made - Cx Agent review	A/E Team, Cx Agent
Construction	- Communicate LCCA elements to Contractor	A/E Team, Contractor, Cx Agent
Commissioning	Optimize systems to operate as designed - Implement Training	A/E Team, Cx Agent, Contractor, Agency/ Operators & End Users
Post-Occupancy	Transfer of knowledge - Training - Monitor building operations - Validate LCCA outcomes Make adjustments/corrections if the M&V shows that the building isn't performing (Energy Performance Guarantees) If adjustments can't be made to bring the building to expected performance levels, provide compensation to the owner	A/E Team, Contractor, Facilities Staff, M&V Team, Agency/End Users

LCCA process notes

Other Process Considerations:

- Be aware of changing energy standards (LEED, ASHRAE, etc.) in order to align future processes with future standards
- DES to develop standard guidelines for OPR in order to correlate with WA State mandates/incentives
- Enhance Closeout Phase to allow A/E Team and Contractor to perform necessary post-occupancy testing & verification, training, alongside Cx Agent and Owner's team.
- A/E fee schedule needs to be aligned with shift in effort to earlier in the concept/planning phases. At minimum, flip SD and DD fee percentages (so that SD is at 20% and DD at 13%)

LCCA process notes

Possible Incentives for LCCA:

- Create pool of money in Capital Budget for high performance projects with demonstrated total of cost of ownership benefits.
- Create funding request scoring criteria based on high performance goals.
- Lengthen analysis period from 30 to 50 years to allow high performing systems to demonstrate lower TCO. 50 years aligns with building quality standards prescribed by DES.

LCCA process notes

Possible Outcomes for LCCA:

- LCCA is fundamentally a cost equation, and is a dispassionate tool. The results may give an answer someone doesn't want to hear, or that doesn't align with the OPR. How does the Owner/DES handle this situation?
- Energy codes or other performance based codes are driving the decision-making discussion more than LCCA. Often, higher cost systems are selected to achieve higher performance. LCCA results and energy performance goals may or may not align.

LEED

New release of LEED v4 will raise the bar for energy performance. LEED Silver will be more difficult to achieve.

Highlights include:

- LEED v4 public release in November 2013 (LEED 2009, or v3, remains open through June 2015)
- ASHRAE 90.1 2010 energy use baseline is about 19% lower than 2007 standard
- Focus in the Materials and Resources category on environmental life-cycle assessment (LCA)
- Credit for 'Integrated Design', a key in creating high-performance buildings in a cost-effective way
- Envelope commissioning

APPENDIX D

Life Cycle Cost Analysis Case Studies PowerPoint

life cycle cost analysis case studies

fundamental questions:

- WHO is setting the parameters of the life cycle cost analysis (LCCA) and making decisions?
- WHAT is being evaluated during LCCA?
- WHEN during the funding, design, and construction process is LCCA done? WHEN should it be done?
- HOW is LCCA done? What are the tools used?

							
Name	Federal Center South	Research Support Facility	Maier Hall	Environment and Energy Building	Thomas Foley Federal Courthouse	Cebula Hall	North Satellite Feasibility Study
Location	Seattle, WA	Golden, CO	Port Angeles, WA	Stanford, CA	Spokane, WA	Lacey, WA	SeaTac, WA
Program Type	Office Building	Office	Higher Ed (Classrooms, Arts, Music)	Higher Ed (Classrooms and Labs)	Courthouse	Higher Ed (Classrooms)	Airport Terminal
Funding	Public - Federal - ARRA	Public - Federal	Public - WA State	Private	Public - Federal	Private	Public
Project Delivery Method	Design-Build with Perf. Guar.	Design-Build	Design-Bid-Build	Negotiated	Design-Build with Perf. Guar.	Design-Build (Qualifications Based)	Design-Bid-Build
Construction Type	New Construction	New Construction	New Construction	New Construction	Retrofit	New Construction	Retrofit
Year Completed	2012	2010	2011	2011	2012	2013	2017
Size	209,000 SF	222,000 SF	62,950 SF	166,000 SF	300,000 SF	26,900 SF	183,500 SF
Cost	\$70 Million	\$64 Million	\$20.8 Million	\$118 Million	\$40 Million	\$6 Million	\$16-26 Million
Energy Use Intensity (EUI)	20.3	32 (Total) - 0 (Zero Net Energy with PV)	45 (Design)	Not Available	38 (Design) - 32.76 (Actual)	Not Available	72 - 187

Federal Center South - USACE

Location	Seattle, WA
Program Type	Office Building
Funding	Public - Federal - ARRA
Project Delivery Method	Design-Build with Performance Guarantees
Construction Type	New Construction
Year Completed	2012
Size	209,000 SF
Cost	\$70 Million
Energy Use Intensity (EUI)	20.3
LCCA - Who?	Owner (GSA)
LCCA - What?	Features to improve building performance
LCCA - When?	Late in Design
LCCA - How?	Energy Modeling + Excel
Merit of Case Study	- Contract included energy performance guarantees - Proven high performance building - Did not conduct formal LCCA, but did evaluate costs, benefits, and simple payback of “betterments”



Federal Center South has received numerous awards and recognition for its innovative contracting, design, and post occupancy process. However, LCCA was not formally conducted during the design process. An extra sum of funding became available during the design process and the GSA requested that the design team conduct a cost, benefit, and simple payback analysis to evaluate features that could affect building performance (“betterments”).

Source:

Zimmer Gunsul Frasca Architects LLP. U.S. General Services Administration Federal Center South Building 1202 U.S. Army Corps of Engineers Seattle District Headquarters. Aug. 2013.

Marseille, Tom. “RE: LCCA for Federal Center South Questions.” Message to the author. 22 Nov. 2013. E-mail.

Research Support Facility - DOE/NREL

Location	Golden, CO
Program Type	Office
Funding	Public - Federal
Project Delivery Method	Design-Build
Construction Type	New Construction
Year Completed	2010
Size	222,000 SF
Cost	\$64 Million
Energy Use Intensity (EUI)	32 (Total) - 0 (Zero Net Energy with PV)
LCCA - Who?	Owner (DOE + NREL)
LCCA - What?	Funding Strategy, LED Lamps, daylighting controls, hydronic radiant heating and cooling
LCCA - When?	Strategic Planning + SD - DD
LCCA - How?	Energy Modeling + BLCC5 + NIST Handbook 135
Merit of Case Study	- Proven high performance building - Early LCCA used for acquisition strategy (leasing vs. using appropriated funds vs. using private sector funds) - Thoroughly documented and continually studied



DOE and NREL's Research Support Facility (RSF) has been a thoroughly documented and studied building due to the tenants' focus on energy efficiency in the built environment. The design-build process of the RSF was well documented and indicated the LCCA was utilized to determine the best funding strategy for the new facility. In this analysis, different acquisition strategies were evaluated, including leasing, using appropriated funds, and using private sector funds. Also, NREL developed a report that recommends considering "Life Cycle Benefits" as a best practice to control costs in high performance office buildings. Several energy related systems were studied during the SD and DD phases, including LED lighting, daylighting controls and hydronic radiant heating and cooling.

Source:

"The Design-Build Process for the Research Support Facility." US Department of Energy, Energy Efficiency & Renewable Energy.

Pless, Shanti, and Paul Torcellini. "Controlling Capital Costs in High Performance Office Buildings: A Review of Best Practices for Overcoming Cost Barriers." ACEEE Summer Study on Energy Efficiency in Buildings. Pacific Grove, California: May 2012.

Maier Hall - Peninsula College

Location	Port Angeles, WA
Program Type	Higher Ed (Classrooms, Arts, Music)
Funding	Public - WA State
Project Delivery Method	Design-Bid-Build
Construction Type	New Construction
Year Completed	2011
Size	62,950 SF
Cost	\$20.8 Million
Energy Use Intensity (EUI)	45 (Design)
LCCA - Who?	College + WA DES Input
LCCA - What?	Energy systems, including building envelope
LCCA - When?	SD - DD
LCCA - How?	Energy Modeling + WA State DES ELCCA Forms
Merit of Case Study	- Illustrates current LCCA practices of WA state public projects - Underwent current ELCCA process but could have been enhanced by process that informs decision making earlier



For Maier Hall, the lowest life cycle cost option was not chosen. High performance building standards and reduction of greenhouse gas emissions were paramount to lowest life cycle cost. The owner's preference was to look beyond the 30 year evaluation period and select a ground source heat pump system for heating and cooling in order to follow their campus standard. Ultimately, this system uses less annual energy, requires less maintenance, and reduces air and water pollutants.

Source:

Schacht Aslani Architects

Environment + Energy Building - Stanford Univ.

Location	Stanford, CA
Program Type	Higher Ed (Classrooms and Labs)
Funding	Private
Project Delivery Method	Negotiated
Construction Type	New Construction
Year Completed	2011
Size	166,000 SF
Cost	\$118 Million
Energy Use Intensity (EUI)	Not Available
LCCA - Who?	Stanford University
LCCA - What?	Comprehensive energy approach: Load reduction, passive systems, active systems, energy recovery, on-site generation, green power
LCCA - When?	SD - DD
LCCA - How?	Energy Modeling + Excel
Merit of Case Study	- Example of whole building energy LCCA - Bulk of LCCA decision making done during SD - Analysis started with load reduction and passive strategies before analysis of active systems



Due to Stanford University's comprehensive life cycle cost analysis guidelines, it is important to include a case study that reflects their unique, whole-building, energy system-focused life cycle cost analysis approach. Based on this report's research, no other case study was found that conducted a comprehensive whole building energy life cycle cost analysis that included passive and active strategies.

Source:

Roberts, Cole. Whole Building Energy LCA, Stanford E&E [PowerPoint slides]. Retrieved from E-mail. Goldstein, Laura. "RE: LCCA Case Studies." Message to author. 24 Oct. 2013. E-mail.

Thomas S. Foley Federal Courthouse - GSA

Location	Spokane, WA
Program Type	Courthouse
Funding	Public - Federal
Project Delivery Method	Design-Build with Performance Guarantees
Construction Type	Retrofit
Year Completed	2012
Size	300,000 SF
Cost	\$40 Million
Energy Use Intensity (EUI)	38 (Design) - 32.76 (Actual)
LCCA - Who?	GSA
LCCA - What?	Lighting, HVAC, plumbing systems
LCCA - When?	Contract Writing (Consultant to GSA), SD-DD (Project Team)
LCCA - How?	Energy Modeling + Excel
Merit of Case Study	- Contract included energy performance guarantees - Contract for RFP based on energy model from GSA's consultant - Unique in that it was a retrofit done during occupancy



The Thomas S. Foley Federal Courthouse is a unique case study in the sense that it was a design/build project with performance guarantees. An additional unique quality of this project is that it was a retrofit completed during building occupancy. Though operations and maintenance considerations were not formally modeled, full life cycle cost analyses were still conducted on energy-related building systems such as lighting, HVAC, and plumbing systems.

Source:

McKinstry. "GSA - Thomas S. Foley Federal Courthouse."

Owen, Megan. "Fwd: Recommendations and Foley Building." Message to the author. 18 Oct. 2013. E-mail.

Cebula Hall - Saint Martin's University

Location	Lacey, WA
Program Type	Higher Ed (Classrooms)
Funding	Private
Project Delivery Method	Design-Build (Qualifications Based)
Construction Type	New Construction
Year Completed	2013
Size	26,900 SF
Cost	\$6 Million
Energy Use Intensity (EUI)	Not Available
LCCA - Who?	Not Available
LCCA - What?	Ground source HVAC system, PV system
LCCA - When?	Not Available
LCCA - How?	Not Available
Merit of Case Study	- High LEED rating relative to cost of project



Cebula Hall at Saint Martin's University achieved a LEED Platinum rating with a score of 97. Relative to the LEED rating, the project achieved a very low cost per square foot. One of the strategies the design team employed was a life cycle cost analysis of the ground source HVAC system and the photovoltaic system. The HVAC system has a payback as short as five years while the photovoltaic system has a longer payback period of twenty-five years.

Source:

"Green building without the 'green premium'." US Green Building Council, 15 Nov. 2013. Web. 20 Nov. 2013.

North Satellite Modernization Feasibility Study - Port of Seattle

Location	SeaTac, WA
Program Type	Airport Terminal
Funding	Public
Project Delivery Method	Design-Bid-Build
Construction Type	Retrofit
Year Completed	2017
Size	183,500 SF
Cost	\$16-26 Million
Energy Use Intensity (EUI)	72 - 187
LCCA - Who?	Port of Seattle
LCCA - What?	Five different integrated energy and water systems options evaluated including stand-alone systems and systems utilizing central utility plant
LCCA - When?	Strategic Planning
LCCA - How?	Energy Modeling + Excel
Merit of Case Study	- LCCA done during strategic planning - Large scale, unique program type



The North Satellite Modernization Feasibility Study at SeaTac Airport is an important precedent to consider based on the fact that the life cycle cost analysis was conducted during strategic planning, well before the beginning of the design process. The analysis studied five different integrated energy and water systems, including stand alone systems and systems utilizing the existing central utility plant. Upon the beginning of the design process, the A/E/C team will have the foundation of a thorough energy and water LCCA to guide their decision making.

Source:

Suehiro Architecture, Miller Hull Partnership, WSP Flack & Kurtz, Project Dimensions. North Satellite Sustainability Study, Executive Report [Adobe PDF slides]. 22 Aug. 2012. Retrieved from Jim Hanford at the Miller Hull Partnership.

APPENDIX E

Research Methodology – Round Tables

In order to gather information that is most relevant to current practices today, several round tables were held to discuss issues surrounding life cycle cost analysis and energy efficiency as they relate to design/build procurement and delivery in public works. Attendees of the round tables were diverse and included the fields of architecture, architectural research and education, engineering, energy efficiency consulting, life-cycle costing, and owner representation. Three round tables were organized in which the first two focused on the architectural and engineering community and the final round table focused on the contractor community.

Round Table Participants:

Walter Schacht (Schacht Aslani Architects)
JC Letourneau (Schacht Aslani Architects)
Adam Stoeckle (Schacht Aslani Architects)
Jim Hanford (Miller Hull Partnership)
Tom Marseille (WSP Flack + Kurtz)
Elizabeth Powers (O'Brien & Company)
Geoff Anderson (ORB Architects)
Brian Boettcher (Hargis Engineers)
Brian Haugk (Hargis Engineers)
Kate Simonen (University of Washington)
Laura Goldstein (Stanford University)
Megan Owen (McKinstry)
Stan Price (Northwest Energy Efficiency Council)
Allan Montpelier (PAE Consulting Engineers)
Ron Eliason (Hargis Engineers)
Peter Morris (AECOM)
Mark Gardener (McKinstry)
Drew Phillips (Forma Construction)
Dave Jobs (OAC Services)
Stacy Shewell (OAC Services)

09.25.13 CPARB Round Table

DATE: 9.25.13
TIME: 10:00 AM PST
LOCATION: Schacht|Aslani Architects
ATTENDEES: Walter Schacht (WS) Schacht Aslani Architects
JC Letourneau (JL) Schacht Aslani Architects
Adam Stoeckle (AS) Schacht Aslani Architects
Jim Hanford (JH) Miller Hull Partnership
Tom Marseille (TM) WSP Flack + Kurtz
Elizabeth Powers (EP) O'Brien & Company
On phone:
Geoff Anderson (GA) ORB Architects
Brian Boettcher Hargis Engineers
Brian Haugk (BH) Hargis Engineers
Kate Simonen (KS) University of Washington

WS - Total Cost of Ownership includes the following:

- Investment costs
- Acquisition costs
- Construction costs
- Operations and Maintenance Costs
- Repair and/or Replacement Costs
- Disposal Costs
- Productivity and Health Impacts (Positive and Negative)
- Space Efficiency Impacts
- Market Value Impacts
- Future Carbon Costs
- Other considerations include: Escalation, Financing, Rebates

WS - Some of the above are more applicable to privately funded projects.

TM – LCA is a big topic and not many can do it

EP – LCC is a comparison of design alternatives, not a guarantee of performance targets (ie: EUI)

TM – 1063 Block project modeled after Federal Center South project

Phone - Critical question: Politically, how can we secure funding for operations costs and increases in capital costs?

WS – Need to tie capital and operating budgets together – separate now, project could apply for extra funding from a special fund set aside for sustainability investments

WS - We must figure out how to incorporate provisions for post-occupancy evaluation/commissioning into contracts

Phone - How can we extend contract life beyond one year of post-occupancy to include several years of operations and maintenance? Example: project included three seasons of testing, project in Olympia includes five years of O&M in contract

EP - ELCCA needs to be more iterative - Iterative processes: ANSI, LEED v4 – Energy, Water, Site LCCA Credit

JH – Is it true that older systems are easier to maintain?

TM – It comes down to familiarity

WS – Old cars vs. new cars analogy

TM – Controls are a major issue

- Not great information/data to base LCCA on

BH - How accurate are the numbers that the A/E community uses? Are they out of date? Are they national or regional?

Phone – Untrained staff that attempt to work with new, sophisticated systems can do damage

WS – Is it feasible to say that staff training will catch up to the technology OR that the State can't afford to maintain their projects?

All - Unions get involved = not good

WS – How valuable are these tools?

TM – Used LCCA model for King County projects to evaluate different project site options in terms of traffic, transportation, etc.

- KC has Green Building Initiative at 30% SD

- During the procurement and financing part of project

EP – For KC, one can add 2% to LEED Gold projects

JH – Did LCC for sustainable systems with GSA in Pre-Design for border crossing – quick and dirty study

TM – Sustainable Master Planning

- Choosing by Advantage (CBA) system – National Park Service

o Consensus based decision making based on weighted priorities that consider costs

o Lionsgate Water Treatment Center in Vancouver

▪ Used as a decision making tool

TM – LCCA for Federal Center South completed during design – extra funding became available and evaluation completed to understand how to spend it

WS – More sustainability requirements result in more architectural freedom and better quality architecture

- How would all of this inform Design-Build?

JH – Sequim Project – get documentation, little things can be plucked out for LCCA, results not satisfying

TM – Need performance targets AND operations and maintenance targets
- JL – fits with best value

TM – Integrated Project Delivery (IPD) has more promise than Design-Build because owner is at the table for conversations instead of being simply presented to at a few benchmarks along the way

by: Adam Stoeckle

11.07.13 CPARB Round Table

DATE: 11.07.13

TIME: 8:00 AM PST

LOCATION: Schacht|Aslani Architects

ATTENDEES: Walter Schacht (WS)	Schacht Aslani Architects
JC Letourneau (JL)	Schacht Aslani Architects
Adam Stoeckle (AS)	Schacht Aslani Architects
Megan Owen (MO)	McKinstry
Mark Gardener (MG)	McKinstry
Drew Phillips (DP)	Forma Construction
Dave Jobs (DJ)	OAC Services
Stacy Shewell (SS)	OAC Services

- WS - A major issue with Design/Build is the cost it requires to compete in the RFP phase and the resulting inability of small businesses to take on the financial risk of competing. **Criteria need to be mandated in order to allow any size business to compete for Design/Build work.**
- DJ - Owners, facility directors, and building engineers have not been formally engaged during round tables. **Are their interests and opinions being adequately represented?**
- WS - Mandating LCCA or any associated process methods for achieving high-performing buildings is counterproductive due to multiple reasons; amongst them would be the resulting limited flexibility of the owner. Instead of institutionalizing mandates, provide a “How-To” manual of best practices that allows owners to determine how energy efficiency, life cycle cost, and other scoring criteria are weighted based on their priorities.
- MO - Focusing LCCA efforts on the bookends of a project are critical to its success.
- Bookend (Beginning): Early in the project, the owner and project team must establish a rigorous OPR that identifies priorities between quantitative and qualitative factors. Then, LCCA can be conducted based on the OPR. In order to establish a better LCCA process, it is important to define what is evaluated and what is assumed about the analysis so that the operating assumptions match the owner’s expectations. **In order to preserve the relevancy of the LCCA, guidelines should be established to adjust the LCCA as the OPR evolves.** In the case of Design/Build, LCCA is already being done during the RFP phase in order to meet performance requirements while achieving the best value cost.
 - o Associated Challenges:
 - DJ - The more prescriptive the OPR and other bridging documents, the less creativity is allowed by the project team

- **WS - Changes in the OPR could potentially be detrimental to the LCCA that is done early in a project – eg. Changing an EUI target from 25 to 50**
 - **WS - In Design/Build, the relationship with the owner during the RFP phase is limited to a handful of meetings. However, in the early phases of a project it is critical for the design team conducting the LCCA to understand the owner and other stakeholders as much as possible.**
 - **MO - Quality control of LCCA – eg. garbage in, garbage out**
- **SS - Stakeholders (owners, facility directors, building engineers, occupants) need to be informed, educated, and sophisticated. If knowledge of the Design/Build process is a problem, the State needs to provide resources through which stakeholders become educated.**
 - **WS/MO - The State's Project Review Committee needs to be more responsible for owners that are not capable of carrying out a Design/Build project on their own. This responsibility may include directly providing training, education, or advice throughout the procurement process. This responsibility may also include providing sufficient financial resources to have a third party such as an owner's representative provide these services.** Depending on the sophistication of the owner, the bridging documents distributed by the owner need to be reviewed by a third party consultant, agency, or other entity.
 - **Bookend (End): Moving forward for any project delivery method, owner and project team (including architect, consultants, contractor, and subcontractors) need to be tied together for at least one year following the move-in date. During this time, a monthly meeting with the stakeholders and project team needs to be held in order to communicate what is going wrong, what is going right, and what needs to be done to take care of any issues.**
 - **Associated Challenges:**
 - **WS - During occupancy, there is a tendency for stakeholders to act in a manner that is inconsistent with the OPR. In this situation, stakeholders' energy use expectations need to be adjusted accordingly.**
 - **MG - Energy assumptions regarding operations are often affected by stakeholders post-occupancy. The project team must clearly communicate to the appropriate stakeholders how their actions will affect the performance of the building.**

APPENDIX F

Enhanced Life Cycle Cost Analysis (ELCCA) and Commissioning for High Performance Buildings Flow Chart

The following flowchart illustrates a set of draft recommendations (green) for how the existing ELCCA process (grey) in Washington can be adapted to become a more effective decision-making tool for owners and their design teams. Both design-bid-build and design-build procurement and delivery methods are included in the flowchart to demonstrate the potential flexibility of the recommendations. The content of the chart has been assembled based on the research of this report and thus represents lessons learned and best practices from recent industry experience.

	←————— ENHANCED LCCA and COMMISSIONING for HIGH PERFORMANCE BUILDINGS —————→																	
							←————— DES ELCCA CURRENT PRACTICES —————→											
	High Level Goal Setting						Develop Performance Plan, M&V Plan						Systems/Equipment Install & Testing			M&V & Optimize Performance		
D-B-B ¹ / GCCM	Feasibility/ Funding		Pre-Design		Schematic Design		VE	Design Development			Construction Documents		Construction & Commissioning			Occupancy		
D-B ² (Public)			Pre-Design	RFO		RFP		Design										
Owner ³	Determine project development options for LCCA	-Review LCCA results -Determine strategy for dev't	-Choose CxA and co-create OPR -Review LCCA guidelines	Finalize OPR for Pre-Design Report or RFP solicitation		Provide feedback on building strategies development	Review LCCA report	Consider LCCA options & VE team suggestions	Communicate decision(s) to design team, DES	-Update OPR if required -Contribute to M&V Plan	Review OPR & BOD and provide comments to AEC		Final review of CDs prior to bidding & construction	Participate in Cx Meetings	Participate in training & systems start-up	Participate in systems start up & training prior to subst. compl.	On-going training, M&V Plan, Retro-Cx, & Reporting	-Attend monthly O&M meetings -Validate LCCA through M&V
					Determine whether LCCA is required	Participate in Green Bldg Option development	Participate in Work Plan development			Review ELCCA report		Verify implementation letter of justification if lowest life cycle cost is not implemented						
A/E/C Team			-Choose CxA -OPR workshop -Review LCCA Guidelines	-Contribute to LCCA Guidelines -Develop BOD	-Develop LCCA passive strategies options that meet OPR -Develop LCCA active strategies options that meet OPR		-Evaluate results & recommend -Review LCCA report	Present design & LCCA to VE team	Incorporate Owner's decisions into Basis-of-Design (BOD)	M&V Planning: Model Energy & Operational Performance	Design KPI Data Collection System & develop perform. evaluation plan	Verify LCCA & VE elements are in BOD documentation	Incorporate Cx requirements into Construction Documents	-Participate in Cx Meetings -Communicate perform. criteria	Construct to specifications & sequence of operations	Complete start-up testing of systems & training Owner	Lead monthly O&M meetings with Owner	-Validate LCCA through M&V -10 month review
					Determine whether LCCA is required	Participate in Green Bldg Option development, submit forms	Participate in Work Plan development			Review final LCCA report		Verify to Owner that decisions will be incorporated	Incorporate Owner's decisions					
Cx Agent ⁴ (CxA)			Facilitate OPR development with Owner & AEC Team	-Review LCCA Guidelines -Finalize OPR			Review OPR & BOD and provide comments to Owner & AEC	Participate in VE meeting(s)*	Develop commissioning plan	-Contribute to M&V Plan* -Update OPR w/ Owner if req'd	Review OPR & BOD and provide comments to Owner & AEC*	Conduct Cx design review prior to 50% CD completion	Provide Cx requirements for Construction Documents	-Facilitate Cx Meetings* -Review systems' submittals	-Install KPI Data Collection System -Communicate Cx Test Req'ts	-Verify training completion -Develop Systems Manual	-Attend monthly O&M meetings* -Ongoing-Cx as req'd by contract*	Review operation within 10 months of subst. completion
														-Evaluate Change Order Impacts on OPR	-Verify Cx systems installation & test performance	-Summary Cx Report	-Monitor Key Performance Indicators (KPI)	-Verify Operations Performance, and Optimize Systems Performance
LCCA Analyst	Conduct development options LCCA: DES consultant	Prepare LCCA Report			Prepare LCCA Work Plan to meet OPR	Perform LCCA on options approved by Owner & LCCA Reviewer	-Evaluate results & recommend -Prepare LCCA Report	Present LCCA results to Owner	Address comments & Owner's decision into report	Submit addendum to report								-Report M&V results to LCCA Reviewer -10 month review
							Prepare ELCCA Work Plan		Prepare ELCCA Report	Submit ELCCA to Owner & Reviewer	Address comments & make corrections to report.	Prepare & submit addendum with Owner's decision						
LCCA Reviewer			Participate in OPR workshop	Review & approve Work Plan for SD or RFP phases		Provide feedback on building strategies development	Review report & provide comments	Participate in VE meeting(s)		-Review addendum -Recommend LCCA to Owner								Review M&V results/LCCA validation information
						Receive Green Bldg options	Review & approve Work Plan			Review report & provide comments		Review addendum	Recommend LCCA to Owner					
VE Team								Consider LCCA in VE report & recommendation										
								Currently ELCCA is not considered as it is not finished until DD										
Utilities			Participate in OPR workshop	Provide support to LCCA Reviewer	Participate in OPR workshop & Work Plan development	Consider Utilities incentives in LCCA evaluation	Provide support to LCCA Reviewer	Participate in VE meeting(s)										
							Participate in Work Plan development											

FOOTNOTES

¹Or Qualifications Based “Progressive” D-B, GCCM
²Assumes public procurement design-build via a two-step RFQ/RFP (Qualifications & Cost) process
³Owner (DES Project Manager & End User)
⁴Commissioning Agent - *Recommended Best Practices (tasks exceed LEED Enhanced Cx requirements)

ABBREVIATIONS AND DEFINITIONS:

OPR - Owner’s Project Requirements - The owner’s project requirements should detail the functional requirements of a projects and let the expectations of the building’s use and operation as they relate to the systems to be commissioned. The owner’s project requirements should address the following issues, as applicable to the project: owner and user requirements, environmental and sustainability goals, energy efficiency goals, indoor environmental quality requirements, equipment and system expectations, and building occupant and O&M personnel requirements.

BOD - Basis of Design - The Basis of Design is a document that records the concepts, calculations, decisions, and product selections used to meet the Owner’s Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. It describes the systems to be commissioned and outlines any design assumptions that are not otherwise included in the design documents. This document should be updated with each subsequent design submission, with increasing specificity as applicable. The Basis of Design should include the following, as applicable: primary design assumptions, standards, and narrative descriptions.

- LCCA - Life Cycle Cost Analysis
- ELCCA - Energy Life Cycle Cost Analysis
- DES - Department of Enterprise Services
- A/E/C Team - Architect/Engineer/Contractor Team
- RFQ - Request for Qualifications
- RFP - Request for Proposals
- Cx - Commissioning
- CxA - Commissioning Authority, or Agent
- VE - Value Engineering
- M&V - Measurement & Verification
- O&M - Operations and Maintenance
- KPI - Key Performance Indicators

Source:
Owner’s Project Requirements Template. July 2012.
LEED Reference Guide for Green Building Design and Construction 2009 Edition. Washington D.C.: U.S. Green Building Council, 2009. Print.

APPENDIX G

1063 Block Replacement Project in Olympia

Background

The 2013 Legislature initiated the 1063 block replacement project through an appropriation to the Department of Enterprise Services in the capital budget for the 2013-15 biennium (Sections 1109 and 7014, Chapter 19, Laws of 2013, 2013 2nd Special Session). The project's purpose is:

- Develop a state-owned facility as a model of high-performance and energy efficiency.
- Establish an efficient office building in Olympia for executive and legislative agencies.
- Improve the gateway to the state's Capitol Campus.
- Replace an existing state-owned building at 1063 Capitol Way South in Olympia, which is more than 80 years old and near the end of its useful life.

Status as of December 31, 2013

In 2013, Enterprise Services completed the following activities for the project:

- Launched the 1063 block replacement project in July 2013.
- Selected pre-design consultants for the project in July 2013.
- Conducted a competitive procurement and selected three design-build team finalists in October 2013 for a two-stage competition for the project.
- Began initial programming of tenant groups. (The budget proviso identified the Washington State Patrol as a tenant. The proviso also directed the Office of Financial Management to determine additional tenants, which are now multiple legislative agencies and parts of the Office of Financial Management.)
- Hosted a public open house to share information about the project in November 2013.
- Issued a Request for Proposals to the three design-build finalists in November 2013.

Next Steps

Enterprise Services plans the following activities for the project:

- Conduct proprietary meetings with design-build team finalists.
- Work with the Office of Financial Management as it prepares an interim report on cost estimates for the 2014 legislative session.
- Work with the City of Olympia to complete a State Environmental Policy Act (SEPA) review in early spring 2014.
- Host a second public open house in March 2014.
- Select a winning design-build team in late spring 2014.
- If approved to proceed, award a contract in early summer 2014.
- If approved to proceed, expect substantial completion of the facility by fall 2016.

Additional Background

The [legislation](#) (Sections 1109 and 7014, Chapter 19, Laws of 2013, 2013 2nd Special Session) includes:

- Approval of a \$13 million appropriation that is solely for predesign, design, competition honoraria, project management, demolition and other planning activities, including permits.
- The Office of Financial Management must review cost estimates and submit a report to the Legislature indicating the budget increase that would be required 60 days prior to executing any construction contracts for the building.

If construction proceeds after a review, the budget proviso includes:

- Approval for the state to enter into a financing contract for up to \$69 million to construct a new office building. (The financing mechanism is a certificate of participation.)
- The new building must be built using the design build project delivery system, as defined in [RCW 39.10](#), with a guarantee for energy, operations, and maintenance performance.
- The scope of the building shall be between 200,000 and 225,000 square feet of office space, with Washington State Patrol identified as one of the tenants.
- Tenant lease costs must not exceed \$26 per gross square foot.
- This is phase one of a two-phase process that includes future demolition of the current General Administration Building.

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APPENDIX H

Washington State University (WSU) North Puget Sound at Everett

Project Update:

The proposed WSU North Puget Sound at Everett facility is currently in the programming phase of the design-build process. A programming architect will be selected by December 2013 to develop basis of design documents for the project. Programming exercises will begin in early January 2014. The basis of design documents are scheduled for completion in early May 2014, and will include: the architectural program, minimum building performance standards, including life cycle cost requirements, and other necessary information for Design-Build teams to develop schematic design documents and determine project cost. The Request for Qualifications (RFQ) and the Request for Proposal (RFP) for the Design Builders are in development. Target issue date for the RFQ is March 4, 2014 with responses due back March 18, 2014. WSU will narrow to the three most qualified teams and issue the Request for Proposals on April 7, 2014.

Schedule:

- | | |
|--|-------------------------|
| 1. Award Programming Consultant Contract | January 3, 2014 |
| 2. Issue Request for Qualifications (RFQ) Design-Build Team | March 4, 2014 |
| 3. Design-Build Statements of Qualifications due | March 18, 2014, 3:00 pm |
| 4. Selection of Pre-Finalists to be interviewed (if necessary) | March 25, 2014 |
| 5. Complete basis of design documents, programming, and RFP | April 1, 2014 |
| 6. Pre-Finalist Interviews (if necessary) | April 2-3, 2014 |
| 7. Selection of Finalist Teams/Issue Request for Proposals | April 7, 2014 |
| a. Proprietary meeting #1 | Week of April 28, 2014 |
| b. Proprietary meeting #2 | Week of May 19, 2014 |
| c. Proprietary meeting #3 | Week of June 16, 2014 |
| 8. Design-Build RFP Submittal deadline | July 8, 2014, 3:00 pm |
| 9. Finalist Presentations, Technical Review, Financial Review | July 9-July 30, 2014 |
| 10. Design Build Contract Award (no later than) | August 1, 2014 |
| 11. Construction Complete | December 2016 |

APPENDIX I

Statutes on Life Cycle Cost Analysis: RCW 39.35, 39.35A, 39.35B, 39.35C, 39.35D

RCW 39.35: Energy Conservation in Design of Public Facilities

RCW 39.35A: Performance Based Contracts for Water Conservation, Solid Waste Reduction, and Energy Equipment

RCW 39.35B: Life Cycle Cost Analysis of Public Facilities

RCW 39.35C: Energy Conservation Projects

RCW 39.35D: High Performance Public Buildings

Chapter 39.35 RCW

ENERGY CONSERVATION IN DESIGN OF PUBLIC FACILITIES

RCW Sections

- 39.35.010 Legislative finding.
- 39.35.020 Legislative declaration.
- 39.35.030 Definitions.
- 39.35.040 Facility design to include life-cycle cost analysis.
- 39.35.050 Life-cycle cost analysis -- Guidelines.
- 39.35.060 Life-cycle cost analysis -- Review fees.
- 39.35.900 Severability -- 1975 1st ex.s. c 177.

39.35.010

Legislative finding.

The legislature hereby finds:

- (1) That major publicly owned or leased facilities have a significant impact on our state's consumption of energy;
- (2) That energy conservation practices including energy management systems and renewable energy systems adopted for the design, construction, and utilization of such facilities will have a beneficial effect on our overall supply of energy;
- (3) That the cost of the energy consumed by such facilities over the life of the facilities shall be considered in addition to the initial cost of constructing such facilities;
- (4) That the cost of energy is significant and major facility designs shall be based on the total life-cycle cost, including the initial construction cost, and the cost, over the economic life of a major facility, of the energy consumed, and of the operation and maintenance of a major facility as they affect energy consumption; and
- (5) That the use of energy systems in these facilities which utilize renewable resources such as solar energy, wood or wood waste, or other nonconventional fuels, and which incorporate energy management systems, shall be considered in the design of all publicly owned or leased facilities.

[2001 c 214 § 15; 1982 c 159 § 1; 1975 1st ex.s. c 177 § 1.]

Notes:

Findings -- 2001 c 214: "(1) The legislature hereby finds that:

- (a) The economy of the state and the health, safety, and welfare of its citizens are threatened by the current energy supply and price instabilities;
- (b) Many energy efficiency programs for public buildings launched during the 1970s and 1980s were not maintained during the subsequent sustained period of low energy costs and abundant supply; and

(c) Conservation programs originally established in the 1970s and 1980s can be improved or updated. New programs drawing on recently developed technologies, including demand-side energy management systems, can materially increase the efficiency of energy use by the public sector.

(2) It is the policy of the state of Washington that:

(a) State government is committed to achieving significant gains in energy efficiency. Conventional conservation programs will be reviewed and updated in light of experience gained since their commencement;

(b) State government must play a leading role in demonstrating updated and new energy efficiency technologies. New programs or measures made possible by technological advances, such as demand-side response measures and energy management systems, shall be treated in the same manner as conventional conservation programs and will be integrated into the state's energy efficiency programs." [2001 c 214 § 14.]

Severability -- Effective date -- 2001 c 214: See notes following RCW 80.50.010.

Applicability -- 1982 c 159: "This act does not apply to a major facility construction or renovation on which a life-cycle cost analysis is commenced under chapter 39.35 RCW before June 10, 1982." [1982 c 159 § 5.]

39.35.020

Legislative declaration.

The legislature declares that it is the public policy of this state to insure that energy conservation practices and renewable energy systems are employed in the design of major publicly owned or leased facilities and that the use of at least one renewable energy system is considered. To this end the legislature authorizes and directs that public agencies analyze the cost of energy consumption of each major facility to be planned and constructed or renovated after September 8, 1975.

[1982 c 159 § 2; 1975 1st ex.s. c 177 § 2.]

Notes:

Applicability -- 1982 c 159: See notes following RCW 39.35.010.

39.35.030

Definitions.

For the purposes of this chapter the following words and phrases shall have the following meanings unless the context clearly requires otherwise:

(1) "Cogeneration" means the sequential generation of two or more forms of energy from a common fuel or energy source. Where these forms are electricity and thermal energy, then the operating and efficiency standards established by 18 C.F.R. Sec. 292.205 and the definitions established by 18 C.F.R. 292.202 (c) through (m) as of July 28, 1991, shall apply.

(2) "Department" means the state department of enterprise services.

(3) "Design standards" means the heating, air-conditioning, ventilating, and renewable resource systems identified, analyzed, and recommended by the department as providing an efficient energy system or systems based on the economic life of the selected buildings.

(4) "Economic life" means the projected or anticipated useful life of a major facility as expressed by a term of years.

(5) "Energy management system" means a program, energy efficiency equipment, technology, device, or other measure including, but not limited to, a management, educational, or promotional program, smart appliance, meter reading system that provides energy information capability, computer software or hardware, communications equipment or hardware, thermostat or other control equipment, together with related administrative or operational programs, that allows identification and management of opportunities for improvement in the efficiency of energy use, including but not limited to a measure that allows:

(a) Energy consumers to obtain information about their energy usage and the cost of energy in connection with their usage;

(b) Interactive communication between energy consumers and their energy suppliers;

(c) Energy consumers to respond to energy price signals and to manage their purchase and use of energy; or

(d) For other kinds of dynamic, demand-side energy management.

(6) "Energy systems" means all utilities, including, but not limited to, heating, air-conditioning, ventilating, lighting, and the supplying of domestic hot water.

(7) "Energy-consumption analysis" means the evaluation of all energy systems and components by demand and type of energy including the internal energy load imposed on a major facility by its occupants, equipment, and components, and the external energy load imposed on a major facility by the climatic conditions of its location. An energy-consumption analysis of the operation of energy systems of a major facility shall include, but not be limited to, the following elements:

(a) The comparison of three or more system alternatives, at least one of which shall include renewable energy systems, and one of which shall comply at a minimum with the sustainable design guidelines of the United States green building council leadership in energy and environmental design silver standard or similar design standard as may be adopted by rule by the department;

(b) The simulation of each system over the entire range of operation of such facility for a year's operating period; and

(c) The evaluation of the energy consumption of component equipment in each system considering the operation of such components at other than full or rated outputs.

The energy-consumption analysis shall be prepared by a professional engineer or licensed architect who may use computers or such other methods as are capable of producing predictable results.

(8) "Initial cost" means the moneys required for the capital construction or renovation of a major facility.

(9) "Life-cycle cost" means the initial cost and cost of operation of a major facility over its economic life. This shall be calculated as the initial cost plus the operation, maintenance, and energy costs over its

economic life, reflecting anticipated increases in these costs discounted to present value at the current rate for borrowing public funds, as determined by the office of financial management. The energy cost projections used shall be those provided by the department. The department shall update these projections at least every two years.

(10) "Life-cycle cost analysis" includes, but is not limited to, the following elements:

- (a) The coordination and positioning of a major facility on its physical site;
- (b) The amount and type of fenestration employed in a major facility;
- (c) The amount of insulation incorporated into the design of a major facility;
- (d) The variable occupancy and operating conditions of a major facility; and
- (e) An energy-consumption analysis of a major facility.

(11) "Major facility" means any publicly owned or leased building having twenty-five thousand square feet or more of usable floor space.

(12) "Public agency" means every state office, officer, board, commission, committee, bureau, department, and all political subdivisions of the state.

(13) "Renewable energy systems" means methods of facility design and construction and types of equipment for the utilization of renewable energy sources including, but not limited to, hydroelectric power, active or passive solar space heating or cooling, domestic solar water heating, windmills, waste heat, biomass and/or refuse-derived fuels, photovoltaic devices, and geothermal energy.

(14) "Renovation" means additions, alterations, or repairs within any twelve-month period which exceed fifty percent of the value of a major facility and which will affect any energy system.

(15) "Selected buildings" means educational, office, residential care, and correctional facilities that are designed to comply with the design standards analyzed and recommended by the department.

[2011 1st sp.s. c 43 § 247; 2001 c 214 § 16; 1996 c 186 § 402; 1994 c 242 § 1; 1991 c 201 § 14; 1982 c 159 § 3; 1975 1st ex.s. c 177 § 3.]

Notes:

Reviser's note: The definitions in this section have been alphabetized pursuant to RCW 1.08.015(2)(k).

Effective date -- Purpose -- 2011 1st sp.s. c 43: See notes following RCW 43.19.003.

Severability -- Effective date -- 2001 c 214: See notes following RCW 80.50.010.

Findings -- 2001 c 214: See note following RCW 39.35.010.

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904 .

Captions not law -- Severability -- 1991 c 201: See RCW 39.35C.900 and 39.35C.901.

Applicability -- 1982 c 159: See notes following RCW 39.35.010.

39.35.040**Facility design to include life-cycle cost analysis.**

Whenever a public agency determines that any major facility is to be constructed or renovated, such agency shall cause to be included in the design phase of such construction or renovation a provision that requires a life-cycle cost analysis conforming with the guidelines developed in RCW 39.35.050 to be prepared for such facility. Such analysis shall be approved by the agency prior to the commencement of actual construction or renovation. A public agency may accept the facility design if the agency is satisfied that the life-cycle cost analysis provides for an efficient energy system or systems based on the economic life of the major facility.

Nothing in this section prohibits the construction or renovation of major facilities which utilize renewable energy systems.

[1994 c 242 § 2; 1982 c 159 § 4; 1975 1st ex.s. c 177 § 4.]

Notes:

Applicability -- 1982 c 159: See notes following RCW 39.35.010.

39.35.050**Life-cycle cost analysis-Guidelines.**

The department, in consultation with affected public agencies, shall develop and issue guidelines for administering this chapter. The purpose of the guidelines is to define a procedure and method for performance of life-cycle cost analysis to promote the selection of low-life-cycle cost alternatives. At a minimum, the guidelines must contain provisions that:

- (1) Address energy considerations during the planning phase of the project;
- (2) Identify energy components and system alternatives including energy management systems, renewable energy systems, and cogeneration applications prior to commencing the energy consumption analysis;
- (3) Identify simplified methods to assure the lowest life-cycle cost alternatives for selected buildings with between twenty-five thousand and one hundred thousand square feet of usable floor area;
- (4) Establish times during the design process for preparation, review, and approval or disapproval of the life-cycle cost analysis;
- (5) Specify the assumptions to be used for escalation and inflation rates, equipment service lives, economic building lives, and maintenance costs;
- (6) Determine life-cycle cost analysis format and submittal requirements to meet the provisions of chapter 201, Laws of 1991;
- (7) Provide for review and approval of life-cycle cost analysis.

[2001 c 214 § 17; 1996 c 186 § 403; 1994 c 242 § 3; 1991 c 201 § 15.]

Notes:

Severability -- Effective date -- 2001 c 214: See notes following RCW 80.50.010.

Findings -- 2001 c 214: See note following RCW 39.35.010.

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

Captions not law -- Severability -- 1991 c 201: See RCW 39.35C.900 and 39.35C.901.

39.35.060

Life-cycle cost analysis – Review fees.

The department may impose fees upon affected public agencies for the review of life-cycle cost analyses. The fees shall be deposited in the *general administration services account. The purpose of the fees is to recover the costs by the department for review of the analyses. The department shall set fees at a level necessary to recover all of its costs related to increasing the energy efficiency of state-supported new construction. The fees shall not exceed one-tenth of one percent of the total cost of any project or exceed two thousand dollars for any project unless mutually agreed to. The department shall provide detailed calculation ensuring that the energy savings resulting from its review of life-cycle cost analysis justify the costs of performing that review.

[2001 c 292 § 1; 1996 c 186 § 404; 1991 c 201 § 16.]

Notes:

***Reviser's note:** The "general administration services account" was renamed the "enterprise services account" by 2011 1st sp.s. c 43 § 202.

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

Captions not law -- Severability -- 1991 c 201: See RCW 39.35C.900 and 39.35C.901.

39.35.900

Severability -1975 1st ex.s. c 177.

If any provision of this act, or its application to any person or circumstance is held invalid, the remainder of the act, or the application of the provision to other persons or circumstances is not affected.

[1975 1st ex.s. c 177 § 5.]

Chapter 39.35A RCW

PERFORMANCE-BASED CONTRACTS FOR WATER CONSERVATION, SOLID WASTE REDUCTION, AND ENERGY EQUIPMENT

RCW Sections

39.35A010 Findings.

39.35A020 Definitions.

39.35A030 Performance-based contracts for water conservation services, solid waste reduction services, and energy equipment and services.

39.35A040 Application of other procurement requirements.

39.35A050 Energy service contractor registry -- Identification of performance-based contracting services.

39.35A.010

Findings.

The legislature finds that:

(1) Conserving energy and water in publicly owned buildings will have a beneficial effect on our overall supply of energy and water;

(2) Conserving energy and water in publicly owned buildings can result in cost savings for taxpayers; and

(3) Performance-based energy contracts are a means by which municipalities can achieve energy and water conservation without capital outlay.

Therefore, the legislature declares that it is the policy that a municipality may, after a competitive selection process, negotiate a performance-based energy contract with a firm that offers the best proposal.

[2007 c 39 § 1; 1985 c 169 § 1.]

39.35A.020

Definitions.

Unless the context clearly indicates otherwise, the definitions in this section shall apply throughout this chapter.

(1) "Energy equipment and services" means energy management systems and any equipment, materials, or supplies that are expected, upon installation, to reduce the energy use or energy cost of an existing building or facility, and the services associated with the equipment, materials, or supplies, including but not limited to design, engineering, financing, installation, project management, guarantees, operations, and maintenance. Reduction in energy use or energy cost may also include reductions in the use or cost of water, wastewater, or solid waste.

(2) "Energy management system" has the definition provided in RCW 39.35.030.

(3) "Municipality" has the definition provided in RCW 39.04.010.

(4) "Performance-based contract" means one or more contracts for water conservation services, solid waste reduction services, or energy equipment and services between a municipality and any other persons or entities, if the payment obligation for each year under the contract, including the year of installation, is either: (a) Set as a percentage of the annual energy cost savings, water cost savings, or solid waste cost savings attributable under the contract; or (b) guaranteed by the other persons or entities to be less than the annual energy cost savings, water cost savings, or solid waste cost savings attributable under the contract. Such guarantee shall be, at the option of the municipality, a bond or insurance policy, or some other guarantee determined sufficient by the municipality to provide a level of assurance similar to the level provided by a bond or insurance policy.

(5) "Water conservation" means reductions in the use of water or wastewater.

[2007 c 39 § 2; 2001 c 214 § 18; 1985 c 169 § 2.]

Notes:

Severability -- Effective date -- 2001 c 214: See notes following RCW 80.50.010.

Findings -- 2001 c 214: See note following RCW 39.35.010.

39.35A.030

Performance-based contracts for water conservation services, solid waste reduction services, and energy equipment and services.

(1) Each municipality shall publish in advance its requirements to procure water conservation services, solid waste reduction services, or energy equipment and services under a performance-based contract. The announcement shall state concisely the scope and nature of the equipment and services for which a performance-based contract is required, and shall encourage firms to submit proposals to meet these requirements.

(2) The municipality may negotiate a fair and reasonable performance-based contract with the firm that is identified, based on the criteria that is established by the municipality, to be the firm that submits the best proposal.

(3) If the municipality is unable to negotiate a satisfactory contract with the firm that submits the best proposal, negotiations with that firm shall be formally terminated and the municipality may select another firm in accordance with this section and continue negotiation until a performance-based contract is reached or the selection process is terminated.

[2007 c 39 § 3; 1985 c 169 § 3.]

39.35A.040

Application of other procurement requirements.

If a municipality chooses, by resolution or other appropriate mechanism, to negotiate a performance-based contract under this chapter, no otherwise applicable statutory procurement requirement applies.

[1985 c 169 §4.]

39.35A.050**Energy service contractor registry - Identification of performance-based contracting services.**

The state *department of general administration shall maintain a registry of energy service contractors and provide assistance to municipalities in identifying available performance-based contracting services.

[2001 c 214 § 19.]

Notes:

***Reviser's note:** The "department of general administration" was renamed the "department of enterprise services" by 2011 1st sp.s. c 43 § 107.

Severability -- Effective date -- 2001 c 214: See notes following RCW 80.50.010.

Findings -- 2001 c 214: See note following RCW 39.35.010.

Chapter 39.358 RCW

LIFE-CYCLE COST ANALYSIS OF PUBLIC FACILITIES

RCW Sections

39.358.010 Legislative findings.

39.358.020 Legislative declaration.

39.358.030 Intent.

39.358.040 Implementation.

39.358.50 Life-cycle cost model and analysis -- Duties of the office of financial management.

39.358.010

Legislative findings.

The legislature finds that:

- (1) Operating costs of a facility over its lifetime may greatly exceed the initial cost of the facility;
- (2) In the planning, design, and funding for new construction or major renovation of state-owned facilities it is desirable to consider not only the initial costs relating to design and construction or acquisition, but the anticipated operating costs relating to the building throughout its life;
- (3) The consideration of both initial and operating costs is known as life-cycle cost or life-cycle cost analysis;
- (4) Operating costs of a facility for purposes of this chapter include, but are not limited to, energy costs, maintenance and repair costs, and costs of the work or activity performed within the facility, including wages and salaries;
- (5) Current law, chapter 39.35 RCW, speaks to life-cycle cost analysis only in relation to energy conservation; and
- (6) Life-cycle cost may not be suitable or cost-effective for all capital projects or all components of a facility, and is not an exclusive criteria for decision-making, but is nonetheless a useful framework for evaluating design and capital investment alternatives.

[1986 c 127 § 1.]

39.358.020

Legislative declaration.

The legislature declares that:

- (1) It is the policy of the state to consider life-cycle costs in the selection of facility design alternatives, to the full extent practical, reasonable, and cost-effective;
- (2) Life-cycle cost should be considered by the state government, school districts, and state universities

and community colleges in the planning, design, and funding for new construction or major renovations;
and

(3) Use of life-cycle cost should be encouraged for cities, counties, and other governmental districts including special purpose districts.

[1986 c 127 §2.]

39.358.030

Intent.

It is the intent of the legislature to:

(1) Expand the definition and use of "life-cycle cost" and "life-cycle cost analysis" to include consideration of all operating costs, as opposed to only energy-related costs as addressed by chapter 39.35 RCW;

(2) Encourage the recognition, development, and use of life-cycle cost concepts and procedures by both the executive and legislative branches in the state's design development and capital budgeting processes;

(3) Ensure the dissemination and use of a common and realistic discount rate by all state agencies in the calculation of the present value of future costs;

(4) Allow and encourage the executive branch to develop specific techniques and procedures for the state government and its agencies, and state universities and community colleges to implement this policy; and

(5) Encourage cities, counties, and other governmental districts including special purpose districts to adopt programs and procedures to implement this policy.

[1986 c 127 §3.]

39.358.040

Implementation.

The principal executives of all state agencies are responsible for implementing the policy set forth in this chapter. The office of financial management in conjunction with the *department of general administration may establish guidelines for compliance by the state government and its agencies, and state universities and community colleges. The office of financial management shall include within its biennial capital budget instructions:

(1) A discount rate for the use of all agencies in calculating the present value of future costs, and several examples of resultant trade-offs between annual operating costs eliminated and additional capital costs thereby justified; and

(2) Types of projects and building components that are particularly appropriate for life-cycle cost analysis.

[1986 c 127 §4.]

Notes:

***Reviser's note:** The "department of general administration" was renamed the "department of enterprise services" by 2011 1st sp.s. c 43 § 107.

39.358.050

Life-cycle cost model and analysis - Duties of the office of financial management.

The office of financial management shall:

(1) Design and implement a cost-effective life-cycle cost model by October 1, 2008, based on the work completed by the joint legislative audit and review committee in January 2007 and in consultation with legislative fiscal committees;

(2) Deploy the life-cycle cost model for use by state agencies once completed and tested;

(3) Update the life-cycle cost model periodically in consultation with legislative fiscal committees;

(4) Establish clear policies, standards, and procedures regarding the use of life-cycle cost analysis by state agencies including:

(a) When state agencies must use the life-cycle cost analysis, including the types of proposed capital projects and leased facilities to which it must be applied;

(b) Procedures state agencies must use to document the results of required life-cycle cost analyses;

(c) Standards regarding the discount rate and other key model assumptions; and

(d) A process to document and justify any deviation from the standard assumptions.

[2007 c 506 § 3; (2011 1st sp.s. c 48 § 7005 expired June 30, 2013).]

Notes:

Expiration date -- 2011 1st sp.s. c 48 § 7005: "Section 7005 of this act expires June 30, 2013."
[2011 1st sp.s. c 48 § 7038.]

Effective dates -- 2011 1st sp.s. c 48: "This act is necessary for the immediate preservation of the public peace, health, or safety, or support of the state government and its existing public institutions, and takes effect immediately [June 15, 2011], except for sections 7022 through 7025 and 7027 of this act which take effect July 1, 2011." [2011 1st sp.s. c 48 § 7039.]

Findings -- Intent -- 2007 c 506: See note following RCW 43.82.035.

Chapter 39.35C RCW

ENERGY CONSERVATION PROJECTS

RCW Sections

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39.35C.010

Definitions.

Unless the context clearly requires otherwise, the definitions in this section apply throughout this chapter.

(1) "Cogeneration" means the sequential generation of two or more forms of energy from a common fuel or energy source. If these forms are electricity and thermal energy, then the operating and efficiency standards established by 18 C.F.R. Sec. 292.205 and the definitions established by 18 C.F.R. Sec. 292.202 (c) through (m) apply.

(2) "Conservation" means reduced energy consumption or energy cost, or increased efficiency in the use of energy, and activities, measures, or equipment designed to achieve such results, but does not include thermal or electric energy production from cogeneration. "Conservation" also means reductions in the use or cost of water, wastewater, or solid waste.

(3) "Cost-effective" means that the present value to a state agency or school district of the energy reasonably expected to be saved or produced by a facility, activity, measure, or piece of equipment over its useful life, including any compensation received from a utility or the Bonneville power administration, is greater than the net present value of the costs of implementing, maintaining, and operating such facility, activity, measure, or piece of equipment over its useful life, when discounted at the cost of public borrowing.

(4) "Department" means the state department of enterprise services.

(5) "Energy" means energy as defined in RCW 43.21F.025(5).

(6) "Energy audit" has the definition provided in RCW 43.19.670, and may include a determination of the water or solid waste consumption characteristics of a facility.

(7) "Energy efficiency project" means a conservation or cogeneration project.

(8) "Energy efficiency services" means assistance furnished by the department to state agencies and school districts in identifying, evaluating, and implementing energy efficiency projects.

(9) "Local utility" means the utility or utilities in whose service territory a public facility is located.

(10) "Performance-based contracting" means contracts for which payment is conditional on achieving contractually specified energy savings.

(11) "Public agency" means every state office, officer, board, commission, committee, bureau, department, and all political subdivisions of the state.

(12) "Public facility" means a building or structure, or a group of buildings or structures at a single site, owned by a state agency or school district.

(13) "State agency" means every state office or department, whether elective or appointive, state institutions of higher education, and all boards, commissions, or divisions of state government, however designated.

(14) "State facility" means a building or structure, or a group of buildings or structures at a single site, owned by a state agency.

(15) "Utility" means privately or publicly owned electric and gas utilities, electric cooperatives and mutuals, whether located within or without Washington state.

[2011 1st sp.s. c 43 §248; 2007 c 39 §4; 2001 c 214 §20; 1996 c 186 §405; 1991 c 201 §2.]

Notes:

Reviser's note: The definitions in this section have been alphabetized pursuant to RCW 1.08.015(2)(k).

Effective date -- Purpose -- 2011 1st sp.s. c 43: See notes following RCW 43.19.003.

Severability -- Effective date -- 2001 c 214: See notes following RCW 80.50.010.

Findings -- 2001 c 214: See note following RCW 39.35.010.

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

39.35C.020

State agency and school district conservation projects - Implementation - Department assistance.

(1) Each state agency and school district shall implement cost-effective conservation improvements and

maintain efficient operation of its facilities in order to minimize energy consumption and related environmental impacts and reduce operating costs. Each state agency shall undertake an energy audit and implement cost-effective conservation measures pursuant to the time schedules and requirements set forth in chapter 43.19 RCW, except that any state agency that, after December 31, 1997, has completed energy audits and implemented cost-effective conservation measures, or has contracted with an energy service company for energy audits and conservation measures, is deemed to have met the requirements of this subsection for those facilities included in the audits and conservation measures. Each school district shall undertake an energy audit and implement cost-effective conservation measures pursuant to the time schedules and requirements set forth in RCW 39.35C.025. Performance-based contracting shall be the preferred method for completing energy audits and implementing cost-effective conservation measures.

(2) The department shall assist state agencies and school districts in identifying, evaluating, and implementing cost-effective conservation projects at their facilities. The assistance shall include the following:

- (a) Notifying state agencies and school districts of their responsibilities under this chapter;
- (b) Apprising state agencies and school districts of opportunities to develop and finance such projects;
- (c) Providing technical and analytical support, including procurement of performance-based contracting services;
- (d) Reviewing verification procedures for energy savings; and
- (e) Assisting in the structuring and arranging of financing for cost-effective conservation projects.

(3) Conservation projects implemented under this chapter shall have appropriate levels of monitoring to verify the performance and measure the energy savings over the life of the project. The department shall solicit involvement in program planning and implementation from utilities and other energy conservation suppliers, especially those that have demonstrated experience in performance-based energy programs.

(4) The department shall comply with the requirements of chapter 39.80 RCW when contracting for architectural or engineering services.

(5) The department shall recover any costs and expenses it incurs in providing assistance pursuant to this section, including reimbursement from third parties participating in conservation projects. The department shall enter into a written agreement with the public agency for the recovery of costs.

[2001 c 214 § 21; 1996 c 186 § 406; 1991 c 201 § 3.]

Notes:

Severability -- Effective date -- 2001 c 214: See notes following RCW 80.50.010.

Findings -- 2001 c 214: See note following RCW 39.35.010.

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904 .

39.35C.025

Energy audit of school district facilities -Completion dates -Identification, implementation of

cost-effective energy conservation measures.

(1) Except as provided in subsections (2) and (3) of this section, each school district shall conduct an energy audit of its facilities. This energy audit may be conducted by contract or by other arrangement, including appropriate district staff. Performance-based contracting shall be the preferred method for implementing and completing energy audits.

(a) For each district facility, the energy consumption surveys shall be completed no later than December 31, 2001, and the walk-through surveys shall be completed no later than October 1, 2002. Upon completion of each walk-through survey, the district shall implement energy conservation maintenance and operation procedures that may be identified for any district facility. These procedures shall be implemented as soon as possible, but not later than twelve months after the walk-through survey.

(b) Except as provided in subsection (3) of this section, if a walk-through survey has identified potentially cost-effective energy conservation measures, the district shall undertake an investment grade audit of the facility. Investment grade audits shall be completed no later than June 30, 2003, and installation of cost-effective conservation measures recommended in the investment grade audit shall be completed no later than December 31, 2004.

(2) A school district that, after December 31, 1997, has completed energy audits and implemented cost-effective conservation measures, or has contracted with an energy service company for energy audits and conservation measures, is deemed to have met the requirements of this section for those facilities included in the audits and conservation measures.

(3) A school district that after reasonable efforts and consultation with the department is unable to obtain a contract with an energy service company to conduct an investment grade audit or install cost-effective conservation measures recommended in an investment grade audit, is exempt from the requirements of subsection (1)(b) of this section.

[2001 c 214 § 22.]

Notes:

Severability -- Effective date -- 2001 c 214: See notes following RCW 80.50.010.

Findings -- 2001 c 214: See note following RCW 39.35.010.

39.35C.030

Department coordination of conservation development with utilities.

(1) The department shall consult with the local utilities to develop priorities for energy conservation projects pursuant to this chapter, cooperate where possible with existing utility programs, and consult with the local utilities prior to implementing projects in their service territory.

(2) A local utility shall be offered the initial opportunity to participate in the development of conservation projects in the following manner:

(a) Before initiating projects in a local utility service territory, the department shall notify the local utility in writing, on an annual basis, of public facilities in the local utility's service territory at which the department anticipates cost-effective conservation projects will be developed.

(b) Within sixty days of receipt of this notification, the local utility may express interest in these projects by submitting to the department a written description of the role the local utility is willing to perform in developing and acquiring the conservation at these facilities. This role may include any local utility conservation programs which would be available to the public facility, any competitive bidding or solicitation process which the local utility will be undertaking in accordance with the rules of the utilities and transportation commission or the public utility district, municipal utility, cooperative, or mutual governing body for which the public facility would be eligible, or any other role the local utility may be willing to perform.

(c) Upon receipt of the written description from the local utility, the department shall, through discussions with the local utility, and with involvement from state agencies and school districts responsible for the public facilities, develop a plan for coordinated delivery of conservation services and financing or make a determination of whether to participate in the local utility's competitive bidding or solicitation process. The plan shall identify the local utility in roles that the local utility is willing to perform and that are consistent with the provisions of RCW 39.35C.040(2) (d) and (e).

[1996 c 186 §407; 1991 c 201 §4.]

Notes:

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904 .

39.35C.040

Sale of conserved energy.

(1) It is the intent of this chapter that the state, state agencies, and school districts are compensated fairly for the energy savings provided to utilities and be allowed to participate on an equal basis in any utility conservation program, bidding, or solicitation process. State agencies and school districts shall not receive preferential treatment. For the purposes of this section, any type of compensation from a utility or the Bonneville power administration intended to achieve reductions or efficiencies in energy use which are cost-effective to the utility or the Bonneville power administration shall be regarded as a sale of energy savings. Such compensation may include credits to the energy bill, low or no interest loans, rebates, or payment per unit of energy saved. The department shall, in coordination with utilities, the Bonneville power administration, state agencies, and school districts, facilitate the sale of energy savings at public facilities including participation in any competitive bidding or solicitation which has been agreed to by the state agency or school district. Energy savings may only be sold to local utilities or, under conditions specified in this section, to the Bonneville power administration. The department shall not attempt to sell energy savings occurring in one utility service territory to a different utility. Nothing in this chapter mandates that utilities purchase the energy savings.

(2) To ensure an equitable allocation of benefits to the state, state agencies, and school districts, the following conditions shall apply to transactions between utilities or the Bonneville power administration and state agencies or school districts for sales of energy savings:

(a) A transaction shall be approved by both the state agency or school district and the department.

(b) The state agency or school district and the department shall work together throughout the planning and negotiation process for such transactions unless the department determines that its participation will not further the purposes of this section.

(c) Before making a decision under (d) of this subsection, the department shall review the proposed

transaction for its technical and economic feasibility, the adequacy and reasonableness of procedures proposed for verification of project or program performance, the degree of certainty of benefits to the state, state agency, or school district, the degree of risk assumed by the state or school district, the benefits offered to the state, state agency, or school district and such other factors as the department determines to be prudent.

(d) The department shall approve a transaction unless it finds, pursuant to the review in (c) of this subsection, that the transaction would not result in an equitable allocation of costs and benefits to the state, state agency, or school district, in which case the transaction shall be disapproved.

(e) In addition to the requirements of (c) and (d) of this subsection, in areas in which the Bonneville power administration has a program for the purchase of energy savings at public facilities, the department shall approve the transaction unless the local utility cannot offer a benefit substantially equivalent to that offered by the Bonneville power administration, in which case the transaction shall be disapproved. In determining whether the local utility can offer a substantially equivalent benefit, the department shall consider the net present value of the payment for energy savings; any goods, services, or financial assistance provided by the local utility; and any risks borne by the local utility. Any direct negative financial impact on a nongrowing, local utility shall be considered.

(3) Any party to a potential transaction may, within thirty days of any decision to disapprove a transaction made pursuant to subsection (2)(c), (d), or (e) of this section, request an independent reviewer who is mutually agreeable to all parties to the transaction to review the decision. The parties shall within thirty days of selection submit to the independent reviewer documentation supporting their positions. The independent reviewer shall render advice regarding the validity of the disapproval within an additional thirty days.

[1996 c 186 §408; 1991 c 201 §5.]

Notes:

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

39.35C.050

Authority of state agencies and school districts to implement conservation.

In addition to any other authorities conferred by law:

(1) The department, with the consent of the state agency or school district responsible for a facility, a state or regional university acting independently, and any other state agency acting through the *department of general administration or as otherwise authorized by law, may:

(a) Develop and finance conservation at public facilities in accordance with express provisions of this chapter;

(b) Contract for energy services, including performance-based contracts;

(c) Contract to sell energy savings from a conservation project at public facilities to local utilities or the Bonneville power administration.

(2) A state or regional university acting independently, and any other state agency acting through the *department of general administration or as otherwise authorized by law, may undertake procurements for

third-party development of conservation at its facilities.

(3) A school district may:

(a) Develop and finance conservation at school district facilities;

(b) Contract for energy services, including performance-based contracts at school district facilities; and

(c) Contract to sell energy savings from energy conservation projects at school district facilities to local utilities or the Bonneville power administration directly or to local utilities or the Bonneville power administration through third parties.

(4) In exercising the authority granted by subsections (1), (2), and (3) of this section, a school district or state agency must comply with the provisions of RCW 39.35C.040.

[1996 c 186 §409; 1991 c 201 §6.]

Notes:

***Reviser's note:** The "department of general administration" was renamed the "department of enterprise services" by 2011 1st sp.s. c 43 § 107.

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

39.35C.060

Authority to finance conservation in school districts and state agencies.

State agencies may use financing contracts under chapter 39.94 RCW to provide all or part of the funding for conservation projects. The department shall determine the eligibility of such projects for financing contracts. The repayments of the financing contracts shall be sufficient to pay, when due, the principal and interest on the contracts.

[1996 c 186 §410; 1991 c 201 §7.]

Notes:

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

39.35C.070

Development of cogeneration projects.

(1) Consistent with the region's need to develop cost-effective, high efficiency electric energy resources, the state shall investigate and, if appropriate, pursue development of cost-effective opportunities for cogeneration in existing or new state facilities.

(2) To assist state agencies in identifying, evaluating, and developing potential cogeneration projects at

their facilities, the department shall notify state agencies of their responsibilities under this chapter; apprise them of opportunities to develop and finance such projects; and provide technical and analytical support. The department shall recover costs for such assistance through written agreements, including reimbursement from third parties participating in such projects, for any costs and expenses incurred in providing such assistance.

(3)(a) The department shall identify priorities for cogeneration projects at state facilities, and, where such projects are initially deemed desirable by the department and the appropriate state agency, the department shall notify the local utility serving the state facility of its intent to conduct a feasibility study at such facility. The department shall consult with the local utility and provide the local utility an opportunity to participate in the development of the feasibility study for the state facility it serves.

(b) If the local utility has an interest in participating in the feasibility study, it shall notify the department and the state agency whose facility or facilities it serves within sixty days of receipt of notification pursuant to (a) of this subsection as to the nature and scope of its desired participation. The department, state agency, and local utility shall negotiate the responsibilities, if any, of each in conducting the feasibility study, and these responsibilities shall be specified in a written agreement.

(c) If a local utility identifies a potential cogeneration project at a state facility for which it intends to conduct a feasibility study, it shall notify the department and the appropriate state agency. The department, state agency, and local utility shall negotiate the responsibilities, if any, of each in conducting the feasibility study, and these responsibilities shall be specified in a written agreement. Nothing in this section shall preclude a local utility from conducting an independent assessment of a potential cogeneration project at a state facility.

(d) Agreements written pursuant to (a) and (b) of this subsection shall include a provision for the recovery of costs incurred by a local utility in performing a feasibility study in the event such utility does not participate in the development of the cogeneration project. If the local utility does participate in the cogeneration project through energy purchase, project development or ownership, recovery of the utility's costs may be deferred or provided for through negotiation on agreements for energy purchase, project development or ownership.

(e) If the local utility declines participation in the feasibility study, the department and the state agency may receive and solicit proposals to conduct the feasibility study from other parties. Participation of these other parties shall also be secured and defined by a written agreement which may include the provision for reimbursement of costs incurred in the formulation of the feasibility study.

(4) The feasibility study shall include consideration of regional and local utility needs for power, the consistency of the proposed cogeneration project with the state energy strategy, the cost and certainty of fuel supplies, the value of electricity produced, the capability of the state agency to own and/or operate such facilities, the capability of utilities or third parties to own and/or operate such facilities, requirements for and costs of standby sources of power, costs associated with interconnection with the local electric utility's transmission system, the capability of the local electric utility to wheel electricity generated by the facility, costs associated with obtaining wheeling services, potential financial risks and losses to the state and/or state agency, measures to mitigate the financial risk to the state and/or state agency, and benefits to the state and to the state agency from a range of design configurations, ownership, and operation options.

(5) Based upon the findings of the feasibility study, the department and the state agency shall determine whether a cogeneration project will be cost-effective and whether development of a cogeneration project should be pursued. This determination shall be made in consultation with the local utility or, if the local utility had not participated in the development of the feasibility study, with any third party that may have participated in the development of the feasibility study.

(a) Recognizing the local utility's expertise, knowledge, and ownership and operation of the local utility systems, the department and the state agency shall have the authority to negotiate directly with the local utility for the purpose of entering into a sole source contract to develop, own, and/or operate the cogeneration facility. The contract may also include provisions for the purchase of electricity or thermal energy from the cogeneration facility, the acquisition of a fuel source, and any financial considerations which may accrue to the state from ownership and/or operation of the cogeneration facility by the local utility.

(b) The department may enter into contracts through competitive negotiation under this subsection for the development, ownership, and/or operation of a cogeneration facility. In determining an acceptable bid, the department and the state agency may consider such factors as technical knowledge, experience, management, staff, or schedule, as may be necessary to achieve economical construction or operation of the project. The selection of a developer or operator of a cogeneration facility shall be made in accordance with procedures for competitive bidding under chapter 43.19 RCW.

(c) The department shall comply with the requirements of chapter 39.80 RCW when contracting for architectural or engineering services.

(6)(a) The state may own and/or operate a cogeneration project at a state facility. However, unless the cogeneration project is determined to be cost-effective, based on the findings of the feasibility study, the department and state agency shall not pursue development of the project as a state-owned facility. If the project is found to be cost-effective, and the department and the state agency agree development of the cogeneration project should be pursued as a state-owned and/or operated facility, the department shall assist the state agency in the preparation of a finance and development plan for the cogeneration project. Any such plan shall fully account for and specify all costs to the state for developing and/or operating the cogeneration facility.

(b) It is the general intent of this chapter that cogeneration projects developed and owned by the state will be sized to the projected thermal energy load of the state facility over the useful life of the project. The principal purpose and use of such projects is to supply thermal energy to a state facility and not primarily to develop generating capacity for the sale of electricity. For state-owned projects with electricity production in excess of projected thermal requirements, the department shall seek and obtain legislative appropriation and approval for development. Nothing in chapter 201, Laws of 1991 shall be construed to authorize any state agency to sell electricity or thermal energy on a retail basis.

(7) When a cogeneration facility will be developed, owned, and/or operated by a state agency or third party other than the local serving utility, the department and the state agency shall negotiate a written agreement with the local utility. Elements of such an agreement shall include provisions to ensure system safety, provisions to ensure reliability of any interconnected operations equipment necessary for parallel operation and switching equipment capable of isolating the generation facility, the provision of and reimbursement for standby services, if required, and the provision of and reimbursement for wheeling electricity, if the provision of such has been agreed to by the local utility.

(8) The state may develop and own a thermal energy distribution system associated with a cogeneration project for the principal purpose of distributing thermal energy at the state facility. If thermal energy is to be sold outside the state facility, the state may only sell the thermal energy to a utility.

[1996 c 186 § 411; 1991 c 201 § 8.]

Notes:

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

39.35C.080**Sale of cogenerated electricity and thermal energy.**

It is the intention of chapter 201, Laws of 1991 that the state and its agencies are compensated fairly for the energy provided to utilities from cogeneration at state facilities. Such compensation may include revenues from sales of electricity or thermal energy to utilities, lease of state properties, and value of thermal energy provided to the facility. It is also the intent of chapter 201, Laws of 1991 that the state and its agencies be accorded the opportunity to compete on a fair and reasonable basis to fulfill a utility's new resource acquisition needs when selling the energy produced from cogeneration projects at state facilities through energy purchase agreements.

(1)(a) The department and state agencies may participate in any utility request for resource proposal process, as either established under the rules and regulations of the utilities and transportation commission, or by the governing board of a public utility district, municipal utility, cooperative, or mutual.

(b) If a local utility does not have a request for resource proposal pending, the energy office [department] or a state agency may negotiate an equitable and mutually beneficial energy purchase agreement with that utility.

(2) To ensure an equitable allocation of benefits to the state and its agencies, the following conditions shall apply to energy purchase agreements negotiated between utilities and state agencies:

(a) An energy purchase agreement shall be approved by both the department and the affected state agency.

(b) The department and the state agency shall work together throughout the planning and negotiation process for energy purchase agreements, unless the department determines that its participation will not further the purposes of this section.

(c) Before approving an energy purchase agreement, the department shall review the proposed agreement for its technical and economic feasibility, the degree of certainty of benefits, the degree of financial risk assumed by the state and/or the state agency, the benefits offered to the state and/or state agency, and other such factors as the department deems prudent. The department shall approve an energy purchase agreement unless it finds that such an agreement would not result in an equitable allocation of costs and benefits, in which case the transaction shall be disapproved.

(3)(a) The state or state agency shall comply with and shall be bound by applicable avoided cost schedules, electric power wheeling charges, interconnection requirements, utility tariffs, and regulatory provisions to the same extent it would be required to comply and would be bound if it were a private citizen. The state shall neither seek regulatory advantage, nor change regulations, regulatory policy, process, or decisions to its advantage as a seller of cogenerated energy. Nothing contained in chapter 201, Laws of 1991 shall be construed to mandate or require public or private utilities to wheel electric energy resources within or beyond their service territories. Nothing in chapter 201, Laws of 1991 authorizes any state agency or school district to make any sale of energy or waste heat beyond the explicit provisions of chapter 201, Laws of 1991. Nothing contained in chapter 201, Laws of 1991 requires a utility to purchase energy from the state or a state agency or enter into any agreement in connection with a cogeneration facility.

(b) The state shall neither construct, nor be party to an agreement for developing a cogeneration project at a state facility for the purpose of supplying its own electrical needs, unless it can show that such an arrangement would be in the economic interest of the state taking into account the cost of (i)

interconnection requirements, as specified by the local electric utility, (ii) standby charges, as may be required by the local electric utility, and (iii) the current price of electricity offered by the local electric utility. If the local electric utility can demonstrate that the cogeneration project may place an undue burden on the electric utility, the department or the state agency shall attempt to negotiate a mutually beneficial agreement that would minimize the burden upon the ratepayers of the local electric utility.

(4) Any party to an energy purchase agreement may, within thirty days of any decision made pursuant to subsection (2)(c) of this section to disapprove the agreement made pursuant to this section, request an independent reviewer who is mutually agreeable to all parties to review the decision. The parties shall within thirty days of selection submit to the independent reviewer documentation supporting their positions. The independent reviewer shall render advice regarding the validity of the disapproval within an additional thirty days.

(5) For the purposes of this section, "waste heat" means the thermal energy that otherwise would be released to the environment from an industrial process, electric generation, or other process.

[1996 c 186 §412; 1996 c 33 § 4; 1991 c 201 §9.]

Notes:

Reviser's note: This section was amended by 1996 c 33 § 4 and by 1996 c 186 § 412, each without reference to the other. Both amendments are incorporated in the publication of this section under RCW 1.12.025(2). For rule of construction, see RCW 1.12.025(1).

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

Findings -- 1996 c 33: See note following RCW 80.04.550.

39.35C.090

Additional authority of state agencies.

In addition to any other authorities conferred by law:

(1) The department, with the consent of the state agency responsible for a facility, a state or regional university acting independently, and any other state agency acting through the *department of general administration or as otherwise authorized by law, may:

- (a) Contract to sell electric energy generated at state facilities to a utility; and
- (b) Contract to sell thermal energy produced at state facilities to a utility.

(2) A state or regional university acting independently, and any other state agency acting through the *department of general administration or as otherwise authorized by law, may:

- (a) Acquire, install, permit, construct, own, operate, and maintain cogeneration and facility heating and cooling measures or equipment, or both, at its facilities;
- (b) Lease state property for the installation and operation of cogeneration and facility heating and cooling equipment at its facilities;

(c) Contract to purchase all or part of the electric or thermal output of cogeneration plants at its facilities;

(d) Contract to purchase or otherwise acquire fuel or other energy sources needed to operate cogeneration plants at its facilities; and

(e) Undertake procurements for third-party development of cogeneration projects at its facilities, with successful bidders to be selected based on the responsible bid, including nonprice elements listed in ****RCW 43.19.1911**, that offers the greatest net achievable benefits to the state and its agencies.

(3) After July 28, 1991, a state agency shall consult with the department prior to exercising any authority granted by this section.

(4) In exercising the authority granted by subsections (1) and (2) of this section, a state agency must comply with the provisions of RCW 39.35C.080.

[1996 c 186 §413; 1991 c 201 § 10.]

Notes:

Reviser's note: *(1) The "department of general administration" was renamed the "department of enterprise services" by 2011 1st sp.s. c 43 § 107.

******(2) RCW 43.19.1911 was repealed by 2012 c 224 § 29, effective January 1, 2013.

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

39.35C.130

Adoption of rules.

The department may adopt rules to implement RCW 39.35C.020 through 39.35C.040, 39.35C.070, 39.35C.080, and 39.35.050.

[1996 c 186 §416; 1991 c 201 § 17.]

Notes:

Findings -- Intent -- Part headings not law -- Effective date -- 1996 c 186: See notes following RCW 43.330.904.

39.35C.900

Captions not law — 1991 c 201.

Captions as used in chapter 201, Laws of 1991 constitute no part of the law.

[1991 c 201 § 22.]

39.35C.901**Severability — 1991 c 201.**

If any provision of this act or its application to any person or circumstance is held invalid, the remainder of the act or the application of the provision to other persons or circumstances is not affected.

[1991 c 201 § 24.]

Chapter 39.35D RCW

HIGH-PERFORMANCE PUBLIC BUILDINGS

RCW Sections

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- 39.350.040 Public school district major facility projects -- Standards -- Annual reports -- Advisory committee.
- 39.350.050 Annual reports -- Submission to legislature.
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- 39.350.070 Liability for failure to meet standards.
- 39.350.080 Affordable housing projects -- Exemption.
- 39.350.090 Use of local building materials and products -- Intent.
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39.350.010

Finding — Intent.

(1) The legislature finds that public buildings can be built and renovated using high-performance methods that save money, improve school performance, and make workers more productive. High-performance public buildings are proven to increase student test scores, reduce worker absenteeism, and cut energy and utility costs.

(2) It is the intent of the legislature that state-owned buildings and schools be improved by adopting recognized standards for high-performance public buildings, reducing energy consumption, and allowing flexible methods and choices in how to achieve those standards and reductions. The legislature also intends that public agencies and public school districts shall document costs and savings to monitor this program and ensure that economic, community, and environmental goals are achieved each year, and that an independent performance review be conducted to evaluate this program and determine the extent to which the results intended by this chapter are being met.

(3) The legislature further finds that state agency leadership is needed in the development of preparation and adaptation actions for climate change to ensure the economic health, safety, and environmental well-being of the state and its citizens.

[2009 c 519 § 8; 2005 c 12 § 1.]

Notes:

Findings -- 2009 c 519: See RCW 43.21M.900.

Definitions.

The definitions in this section apply throughout this chapter unless the context clearly requires otherwise.

(1) "Department" means the department of enterprise services.

(2) "High-performance public buildings" means high-performance public buildings designed, constructed, and certified to a standard as identified in this chapter.

(3) "Institutions of higher education" means the state universities, the regional universities, The Evergreen State College, the community colleges, and the technical colleges.

(4) "LEED silver standard" means the United States green building council leadership in energy and environmental design green building rating standard, referred to as silver standard.

(5)(a) "Major facility project" means: (i) A construction project larger than five thousand gross square feet of occupied or conditioned space as defined in the Washington state energy code; or (ii) a building renovation project when the cost is greater than fifty percent of the assessed value and the project is larger than five thousand gross square feet of occupied or conditioned space as defined in the Washington state energy code.

(b) "Major facility project" does not include: (i) Projects for which the department, public school district, or other applicable agency and the design team determine the LEED silver standard or the Washington sustainable school design protocol to be not practicable; or (ii) transmitter buildings, pumping stations, hospitals, research facilities primarily used for sponsored laboratory experimentation, laboratory research, or laboratory training in research methods, or other similar building types as determined by the department. When the LEED silver standard is determined to be not practicable for a project, then it must be determined if any LEED standard is practicable for the project. If LEED standards or the Washington sustainable school design protocol are not followed for the project, the public school district or public agency shall report these reasons to the department.

(6) "Public agency" means every state office, officer, board, commission, committee, bureau, department, and public higher education institution.

(7) "Public school district" means a school district eligible to receive state basic education moneys pursuant to RCW 28A.150.250 and 28A.150.260.

(8) "Washington sustainable school design protocol" means the school design protocol and related information developed by the office of the superintendent of public instruction, in conjunction with school districts and the school facilities advisory board.

[2011 1st sp.s. c 43 § 249; 2006 c 263 § 330; 2005 c 12 § 2.]

Notes:

Effective date -- Purpose -- 2011 1st sp.s. c 43: See notes following RCW 43.19.003.

Findings -- Purpose -- Part headings not law -- 2006 c 263: See notes following RCW 28A.150.230.

39.350.030

Standards for major facility projects -Annual reports.

(1) All major facility projects of public agencies receiving any funding in a state capital budget, or projects financed through a financing contract as defined in RCW 39.94.020, must be designed, constructed, and certified to at least the LEED silver standard. This subsection applies to major facility projects that have not entered the design phase prior to July 24, 2005, and to the extent appropriate LEED silver standards exist for that type of building or facility.

(2) All major facility projects of any entity other than a public agency or public school district receiving any funding in a state capital budget must be designed, constructed, and certified to at least the LEED silver standard. This subsection applies to major facility projects that have not entered the grant application process prior to July 24, 2005, and to the extent appropriate LEED silver standards exist for that type of building or facility.

(3)(a) Public agencies, under this section, shall monitor and document ongoing operating savings resulting from major facility projects designed, constructed, and certified as required under this section.

(b) Public agencies, under this section, shall report annually to the department on major facility projects and operating savings.

(4) The department shall consolidate the reports required in subsection (3) of this section into one report and report to the governor and legislature by September 1st of each even-numbered year beginning in 2006 and ending in 2016. In its report, the department shall also report on the implementation of this chapter, including reasons why the LEED standard was not used as required by RCW 39.35D.020(5)(b). The department shall make recommendations regarding the ongoing implementation of this chapter, including a discussion of incentives and disincentives related to implementing this chapter.

(5) For the purposes of determining compliance with the requirement for a project to be designed, constructed, and certified to at least the LEED silver standard, the department must credit one additional point for a project that uses wood products with a credible third-party sustainable forest certification or from forests regulated under chapter 76.09 RCW, the Washington forest practices act. For projects that qualify for this additional point, and for which an additional point would have resulted in formal certification under the LEED silver standard, the project must be deemed to meet the standard under this section.

[2011 c 99 § 1; 2005 c 12 § 3.]

39.350.040

Public school district major facility projects -Standards -Annual reports -Advisory committee.

(1) All major facility projects of public school districts receiving any funding in a state capital budget must be designed and constructed to at least the LEED silver standard or the Washington sustainable school design protocol. To the extent appropriate LEED silver or Washington sustainable school design protocol standards exist for the type of building or facility, this subsection applies to major facility projects that have not received project approval from the superintendent of public instruction prior to: (a) July 1, 2006, for volunteering school districts; (b) July 1, 2007, for class one school districts; and (c) July 1, 2008, for class two school districts.

(2) Public school districts under this section shall: (a) monitor and document appropriate operating benefits and savings resulting from major facility projects designed and constructed as required under this

section for a minimum of five years following local board acceptance of a project receiving state funding; and (b) report annually to the superintendent of public instruction. The form and content of each report must be mutually developed by the office of the superintendent of public instruction in consultation with school districts.

(3) The superintendent of public instruction shall consolidate the reports required in subsection (2) of this section into one report and report to the governor and legislature by September 1st of each even-numbered year beginning in 2006 and ending in 2016. In its report, the superintendent of public instruction shall also report on the implementation of this chapter, including reasons why the LEED standard or Washington sustainable school design protocol was not used as required by RCW 39.35D.020(5)(b). The superintendent of public instruction shall make recommendations regarding the ongoing implementation of this chapter, including a discussion of incentives and disincentives related to implementing this chapter.

(4) The superintendent of public instruction shall develop and issue guidelines for administering this chapter for public school districts. The purpose of the guidelines is to define a procedure and method for employing and verifying compliance with the LEED silver standard or the Washington sustainable school design protocol.

(5) The superintendent of public instruction shall utilize the school facilities advisory board as a high-performance buildings advisory committee comprised of affected public schools, the superintendent of public instruction, the department, and others at the superintendent of public instruction's discretion to provide advice on implementing this chapter. Among other duties, the advisory committee shall make recommendations regarding an education and training process and an ongoing evaluation or feedback process to help the superintendent of public instruction implement this chapter.

(6) For projects that comply with this section by meeting the LEED silver standard, the superintendent of public instruction must credit one additional point for a project that uses wood products with a credible third-party sustainable forest certification or from forests regulated under chapter 76.09 RCW, the Washington forest practices act. For projects that qualify for this additional point, and for which an additional point would have resulted in formal certification under the LEED silver standard, the project must be deemed to meet the requirements of subsection (1) of this section.

[2011 c 99 § 2; 2006 c 263 § 331; 2005 c 12 § 4.]

Notes:

Findings -- Purpose -- Part headings not law -- 2006 c 263: See notes following RCW 28A150.230.

39.350.050

Annual reports -Submission to legislature.

On or before January 1, 2009, the department and the superintendent of public instruction shall summarize the reports submitted under RCW 39.35D.030(4) and 39.35D.040(3) and submit the individual reports to the legislative committees on capital budget and ways and means for review of the program's performance and consideration of any changes that may be needed to adapt the program to any new or modified standards for high-performance buildings that meet the intent of this chapter.

[2005 c 12 § 5.]

39.350.060**Guidelines for administration of chapter - Amendment of fee schedules - Architecture and engineering services - Building commissioning - Preproposal conferences - Advisory committee.**

(1)(a) The department, in consultation with affected public agencies, shall develop and issue guidelines for administering this chapter for public agencies. The purpose of the guidelines is to define a procedure and method for employing and verifying activities necessary for certification to at least the LEED silver standard for major facility projects.

(b) The department and the office of the superintendent of public instruction shall amend their fee schedules for architectural and engineering services to accommodate the requirements in the design of major facility projects under this chapter.

(c) The department and the office of the superintendent of public instruction shall procure architecture and engineering services consistent with chapter 39.80 RCW.

(d) Major facility projects designed to meet standards identified in this chapter must include building commissioning as a critical cost-saving part of the construction process. This process includes input from the project design and construction teams and the project ownership representatives.

(e) At, provided in the request for proposals for construction services, the operating agency shall hold a preproposal conference for prospective bidders to discuss compliance with and achievement of standards identified in this chapter for prospective respondents.

(2) The department shall create a high-performance buildings advisory committee comprised of representatives from the design and construction industry involved in public works contracting, personnel from the affected public agencies responsible for overseeing public works projects, the office of the superintendent of public instruction, and others at the department's discretion to provide advice on implementing this chapter. Among other duties, the advisory committee shall make recommendations regarding an education and training process and an ongoing evaluation or feedback process to help the department implement this chapter.

(3) The department and the office of the superintendent of public instruction shall adopt rules to implement this section.

[2006 c 263 § 332; 2005 c 12 § 6.]

Notes:

Findings -- Purpose -- Part headings not law -- 2006 c 263: See notes following RCW 28A 150.230.

39.350.070**Liability for failure to meet standards.**

A member of the design or construction teams may not be held liable for the failure of a major facility project to meet the LEED silver standard or other LEED standard established for the project as long as a good faith attempt was made to achieve the LEED standard set for the project.

[2005 c 12 § 10.]

39.350.080

Affordable housing projects-Exemption.

Except as provided in this section, affordable housing projects funded out of the state capital budget are exempt from the provisions of this chapter. On or before July 1, 2008, the *department of community, trade, and economic development shall identify, implement, and apply a sustainable building program for affordable housing projects that receive housing trust fund (under chapter 43.185 RCW) funding in a state capital budget. The *department of community, trade, and economic development shall not develop its own sustainable building standard, but shall work with stakeholders to adopt an existing sustainable building standard or criteria appropriate for affordable housing. Any application of the program to affordable housing, including any monitoring to track the performance of either sustainable features or energy standards or both, is the responsibility of the *department of community, trade, and economic development. Beginning in 2009 and ending in 2016, the *department of community, trade, and economic development shall report to the department as required under RCW 39.35D.030(3)(b).

[2005 c 12 § 12.]

Notes:

*Reviser's note: The "department of community, trade, and economic development" was renamed the "department of commerce" by 2009 c 565.

39.350.090

Use of local building materials and products -Intent.

It is the intent and an established goal of the LEED program as authored by the United States green building council to increase demand for building materials and products that are extracted and manufactured locally, thereby reducing the environmental impacts and to support the local economy. Therefore, it is the intent of the legislature to emphasize this defined goal and establish a priority to use Washington state based resources, building materials, products, industries, manufacturers, and other businesses to provide economic development to Washington state and to meet the objectives of this chapter.

[2005 c 12 § 13.]

39.350.800

Performance review-Report.

The joint legislative audit and review committee, or its successor legislative agency, shall conduct a performance review of the high-performance buildings program established under this chapter.

(1) The performance audit shall include, but not be limited to:

(a) The identification of the costs of implementation of high-performance building[s] standards in the

design and construction of major facility projects subject to this chapter;

(b) The identification of operating savings attributable to the implementation of high-performance building[s] standards, including but not limited to savings in energy, utility, and maintenance costs;

(c) The identification of any impacts of high-performance buildings standards on worker productivity and student performance; and

(d) An evaluation of the effectiveness of the high-performance building[s] standards established under this chapter, and recommendations for any changes in those standards that may be supported by the committee's findings.

(2) The committee shall make a preliminary report of its findings and recommendations on or before December 1, 2010, and a final report on or before July 1, 2011.

[2005 c 12 § 14.]

APPENDIX J

Executive Order 13-03: Requiring Consideration of Life Cycle and Operating Costs in Public Works Projects



STATE OF WASHINGTON
OFFICE OF THE GOVERNOR

P.O. Box 40002 • Olympia, Washington 98504-0002 • (360) 902-4111 • www.governor.wa.gov

EXECUTIVE ORDER 13-03

**REQUIRING CONSIDERATION OF LIFE CYCLE
AND OPERATING COSTS IN PUBLIC WORKS PROJECTS**

WHEREAS, in order to reduce energy and other operating costs, consideration must be given to all costs for constructing and operating a building;

WHEREAS, these costs must be considered at the beginning of the planning process;

WHEREAS, all reasonable steps should be taken to implement measures designed to achieve more efficient building costs for both construction and operations costs, and to consider clean energy systems with life-cycle costs;

NOW THEREFORE, I, Jay Inslee, Governor of the State of Washington, by virtue of the authority vested in me do hereby direct:

All state agencies shall consider operating and life-cycle costs when planning a building as follows:

1. Definitions

a) "Life cycle costs" means the sum of present values of investment costs, capital costs, acquisition costs, installation costs, operating costs, maintenance costs, and disposal costs over the life of the building.

b) "Operating costs" means the costs required to: provide energy to the building or grounds in the form of electricity, natural gas, or other methods; maintain the building including labor and materials; replacement of building systems; wastewater disposal; and water.

c) "Operating performance contract" means a contract that provides for the performance of services for the design, acquisition, financing, installation, testing, operation, and where appropriate, maintenance and repair, of an identified energy or water conservation measure or series of measures at one or more locations. Such contracts shall provide that the contractor guarantee the operating and maintenance costs for an agreed upon length of time.

d) "Agency" means a state agency under the authority of the Governor, and any entity that receives funds from the capital budget.

2. **Implementation**

a) Life-cycle cost analysis shall determine the reasonably expected fuel costs for the economic life of the building that are required to maintain illumination, power, temperature, humidity, ventilation of such state-funded facility, and all other energy consuming equipment in a facility and the reasonably expected costs of probable facility ownership, operation, and maintenance including labor, and materials, and building operation. Life-cycle cost may be expressed as an annual cost for each year of the facility's use. Further, the life-cycle cost analysis may demonstrate for each design how the design contributes to energy efficiency, and conservation with respect to, any of the following: energy use, energy cost, clean energy use, water use, and water cost.

b) Within 180 days of this Executive Order, the director of the Office of Financial Management (OFM), in collaboration with other agency directors, shall: provide the life cycle cost model to be used for analysis; provide assistance in using the life cycle cost model; and issue guidance to clarify how agencies determine the life cycle cost for investments required by this Executive Order, including how to compare different energy and fuel options and assess the current tools. The director of the OFM also shall provide direction in the Capital Budget Instructions to follow these rules.

c) Construction shall proceed only upon the disclosure to the OFM, for the facility chosen, of the life-cycle costs as determined in this section and the capitalization of the initial construction costs of the building. The results of life-cycle cost analysis shall be a primary consideration in the selection of a building design. Such analysis shall be required only for construction of buildings with an area of 5,000 square feet or greater. An energy consumption analysis for the term of a proposed lease shall be required only for the leasing of an area of 20,000 square feet or greater.

d) The Department of Enterprise Services shall develop sustainable design principles. The principles shall include using an energy use index or other measurements that identify energy and operating savings. Agencies shall apply such principles to the siting, design, and construction of new facilities. Agencies shall optimize life-cycle costs, pollution, and other environmental and energy costs associated with the construction, life-cycle operation, and decommissioning of the facility. Agencies shall consider using Operating Performance Contracts or utility energy-efficiency service contracts to aid them in constructing sustainably designed buildings.

3. **Architectural and Engineering Firm Selection**

a) Each cabinet agency, and any other state agency that receives funds from the capital budget, shall consider the architectural and engineering firm's experience using life cycle costs, operating costs, and energy efficiency measures when evaluating the selection of the architectural and engineering firm for projects where life cycle costs, operating costs, and energy efficiency measures are applicable.

b) When selecting an architectural and engineering firm, agencies shall consider the architectural and engineering firm's experience with highly efficient systems, in new construction or retrofit projects when life-cycle cost effective. Agencies shall consider

combined cooling, heat, and power when upgrading and assessing facility power needs and shall use combined cooling, heat, and power systems when life-cycle cost-effective. Agencies shall survey local natural resources to optimize use of available biomass, bioenergy, geothermal, or other naturally occurring energy sources.

c) Agencies shall consider successful implementation in areas such as Energy-Savings Performance Contracts, sustainable design, energy efficient procurement, energy efficiency, water conservation, and renewable energy projects in the evaluations of architectural and engineering firms.

d) If an agency determines that a waiver of this requirement is necessary, the agency may ask the OFM for a waiver of the provision. The OFM will include a list of any waivers it grants in a report to the Legislature.

4. **General Contractor/Construction Manager Selection**

a) Each cabinet agency, and any other state agency that receives funds from the capital budget, shall consider the General Contractor/Construction Manager (GCCM) firm's experience using life cycle costs, operating costs, and energy efficiency measures, when evaluating the selection of the GCCM firm for projects where life cycle costs, operating costs, and energy efficiency measures are applicable.

b) Agencies shall consider GCCM firms that have experience optimizing life-cycle costs, pollution, and other environmental and energy costs associated with the construction, life-cycle operation, and decommissioning of the facility, when evaluating GCCM experience for selection.

c) When selecting a GCCM, agencies shall consider the GCCM firm's experience with highly efficient systems in new construction or retrofit projects when life-cycle cost effective.

d) Agencies shall consider the GCCM firm's successful implementation in areas such as Energy-Savings Performance Contracts, sustainable design, energy efficient procurement, energy efficiency, water conservation, and renewable energy projects in the evaluations of architectural and engineering firms.

e) If an agency determines that a waiver of this requirement is necessary, the agency may ask the OFM for a waiver of the provision. The OFM will include a list of any waivers it grants in a report to the Legislature.

5. **Design Build Contractor Selection**

a) Each cabinet agency, and any other state agency that receives funds from the capital budget, shall consider the Design Build firm's experience using life cycle costs, operating costs, and energy efficiency measures, when evaluating the selection of the Design Build firm for projects where life cycle costs, operating costs, and energy efficiency measures are applicable.

b) Agencies shall consider Design Build firms that have experience optimizing life-cycle costs, pollution, and other environmental and energy costs associated with the construction, life-cycle operation, and decommissioning of the facility when evaluating design build firms for selection.

c) When selecting a Design Build firm, agencies shall consider the Design Build firm's experience with highly efficient systems, in new construction or retrofit projects when life-cycle cost effective.

d) Agencies shall consider the Design Build firm's successful implementation in areas such as Energy-Savings Performance Contracts, sustainable design, energy efficient procurement, energy efficiency, water conservation, and renewable energy projects in the evaluations of architectural and engineering firms.

e) If an agency determines that a waiver of this requirement is necessary, the agency may ask the OFM for a waiver of the provision. The OFM will include a list of any waivers it grants in a report to the Legislature.

This Executive Order shall take effect immediately.

Signed and sealed with the official seal of the state of Washington on this 21st day of August, 2013, at Olympia, Washington.

By:

/s/

Jay Inslee
Governor

BY THE GOVERNOR:

/s/

Secretary of State