

Testimony to the Little Hoover Commission
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Use of Economic Analysis in the Regulation Development Process

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Energy Commission's Cost Effectiveness Analysis Pursuant to the Warren-Alquist Act

The Warren-Alquist Act, the Energy Commission's enabling statute [in particular Public Resources Code Sections 25000.1(a) and (c) and 25402(b)(3) and (c)(1)], calls for the Commission to evaluate the cost effectiveness of proposed standards amortized over the life of the structure (or appliance). The goal is to minimize the cost to society and achieve cost effectiveness for the consumer. The cost effectiveness analysis is to include a valuation for benefits to the environment, including air quality.

When the Energy Commission was first formed, the Commission had a centralized Office of Economic Analysis. At the outset, this had the advantage of enabling the Commission to recruit economists as a core area of the Commission's expertise, and these economists were a key to establishing sound economics practices among the Commission's nascent programs. In the late 1970s, however, the Commission concluded that it would be better to spread the economists around rather than to continue the centralized office. In so doing the Commission was able to better integrate economics into the normal business of each program and have economics considered at every stage of program development and delivery of products. The Energy Commission early on established economics as a desirable educational and experience qualification for its personnel classifications, and the Commission has benefitted by having a strong contingent of staff with economics background throughout its history.

The Energy Commission has been adopting and putting into effect building and appliance energy efficiency standards that it has demonstrated to be cost effective, including periodic updates as required by statute, since 1977. The standards have provided major benefits to Californians. The Standards have resulted in an estimated statewide, cumulative savings of \$65 Billion in Californian's energy bills.

Dubbed the “Rosenfeld Effect”¹ California’s per capita electricity use has been almost flat over this time period, whereas use in the U.S. as a whole has gone up by 50%. A study by the Rand Corporation found that the public benefits of energy efficiency in California between 1977 and 2000 included a benefit to the state economy ranging from \$875 to \$1300 per capita (\$1998), approximately 40 percent lower air pollution emissions from stationary sources, and a reduced burden on low-income households.² The standards have been estimated to have resulted in about half of the energy savings that has occurred through California’s aggressive energy efficiency efforts.

The Energy Commission conducts a life cycle cost analysis for measures under consideration for inclusion in its building and appliance standards. The Commission uses state-of-the-art building energy simulation models to determine the energy savings benefits of alternative measures. The Commission has placed priority on the accuracy of these building simulation models, sponsoring research regarding the hourly weather patterns in climate regions around the State and making improvements to the simulation of building physical features, their thermodynamic properties and the operational patterns of energy use associated with building energy systems, components and controls. The Commission has upgraded the building simulation models as building science has improved. These building simulation models are designed to simulate the highly interactive effects on the building’s energy use of these features and systems, and determine the energy benefits of incorporating additional measures. The Commission also conducts surveys to determine the costs of measures that are considered for incorporation into the standards.

The Commission has always had a goal of lowest lifecycle costs for determining these measures. When standards were originally developed, the Energy Commission did an extensive analysis of all feasible measures that would reduce building energy use. The Commission conducted the following process to determine the lowest life cycle costs. The feasible measures first were added one at a time to the simulation of prototype buildings to determine the energy savings resulting individually from each measure, and determine the benefit/cost for each measure in lifecycle terms. Then, starting over with the basecase building simulation, the measures were added sequentially in rank order based on each measure’s benefit/cost ratio to determine the cumulative lifecycle cost considering interactive effects. Measures continued to be added until the combination of measures was at or near the minimum lifecycle cost point. In subsequent updates of

¹ named after former Commissioner, Arthur H. Rosenfeld, Ph. D. who has been a pioneer of California energy efficiency efforts

² Berstein, Mark, et. al. 2000. *The Public Benefit of California’s Investments in Energy Efficiency*. MR-1212.0-CEC. Santa Monica, California: The Rand Corporation

the standards, additional measures that were considered for incorporation were evaluated relative to the minimum lifecycle cost set of measures for the previous update, with cost effectiveness evaluated based on the interactive effects of the newly considered measures in combination with the measures from the previous update.

The cost effectiveness analysis for each update of the standards is done early in the process prior to the start of any rulemaking proceeding. The analysis is thoroughly vetted in public workshops that review the building simulation of the energy savings and the surveys of measure costs. As a result of that public vetting, building simulations are modified or costs are revised if determined necessary by comments from technical reviewers, affected parties and other stakeholders. That work is completed before a formal rulemaking proceeding is initiated.

Beginning with the standards update that was adopted in 2003, the building energy efficiency standards moved from only addressing energy implications and cost savings on an total annual energy basis to a more sophisticated analysis that addresses the time of use of the energy. The costs of using electricity and the air quality impacts are dependent on the time of day and season of the year of that electricity use. The cost of using natural gas and propane is dependent on the season of the year of that energy use. The Energy Commission has examined in-depth the implications on electricity generation, transmission and distribution of the time of use and the implications on natural gas and propane supply and distribution costs of the season of use of those fuels, to enable the energy cost savings accomplished by alternative measures to properly account for time of use. The Commission also has determined the reduction in air pollution and greenhouse gas emissions resulting from reduced energy use in the buildings covered by the standards, accounting for time of use.

The Energy Commission is currently in the pre-rulemaking analytical and public workshop process for updated standards that are proposed for adoption by the Energy Commission in March 2012 and to become effective in January 2014. This update is responsive to the ARB AB 32 Scoping Plan recognition that improving energy efficiency in California's buildings is one of the most cost effective means of achieving 1) a return to the statewide greenhouse gas emissions levels of 1990 by 2020, and 2) an 80% reduction in greenhouse gas emissions compared to 1990 levels by 2050. A major policy goal shared by the Energy Commission, ARB and CPUC that will strongly contribute to achievement of the State's climate change mandates and goals is to achieve zero net-energy for newly constructed residential buildings by 2020 and for newly constructed nonresidential buildings by 2030.

To better address the benefits of the energy reductions needed to accomplish these policy goals, for the next update of the standards the Energy Commission is updating its time of use energy costing estimates to factor in latest estimates of the estimated market value of reducing greenhouse gas emissions, and better aligning its time of use utility costs with the weather data that the Commission uses for each of California's climate zones. This revised work will be thoroughly vetted with stakeholders over the course of several public workshops prior to the Commission initiating a formal rulemaking proceeding in late 2011.

Addressing Economic Impact as Required by the Administrative Procedure Act and Building Standards Law

The Energy Commission complies with Administrative Procedure Act rulemaking requirements related to the economic and fiscal impact of its building and appliance energy efficiency standards regulations (Govt. Code, §§ 11340 *et seq.*). For appliance efficiency standards regulations, the Office of Administrative Law (OAL) reviews the Commission's rulemaking file and process to determine APA compliance. For building efficiency standards regulations, the California Building Standards Commission (CBSC) reviews the rulemaking file and process for APA compliance, as well as for compliance with the California Building Standards Law (Health & Saf. Code, §§ 18901 *et seq.*). For the APA requirements related to economic and fiscal impact, the review by OAL and by CBSC are essentially the same. However, the CBSC must find in addition that building standards meet the criterion that "the cost to the public is reasonable, based on the overall benefit to be derived from the building standards." (Health & Saf. Code, §18930(a)(5).)

The APA requires the following questions be addressed in the documentation filed with the regulations:

- Fiscal Impact (on governmental agencies)
 - Is there any cost to any local agency or school district requiring state reimbursement?
 - Is there any cost or savings to any state agency?
 - Is there any other non-discretionary cost or savings imposed upon local agencies?
 - Is there any cost or savings in federal funding to the state?

- Economic Impacts (on the private sector)
 - Housing Costs
 - Costs that a Private Person or Business would incur
 - Adverse Economic Impact Directly Affecting Business, including Ability to Compete
 - What types of businesses are affected?
 - What are the compliance requirements that cause these affects?
 - Where recommendations for alternatives solicited from the public? What alternatives were proposed, considered, incorporated into the regulations? Example alternatives may include:
 - Establishment of different compliance or reporting requirements that take into account business resources;
 - Consolidation or simplification of compliance and reporting requirements for businesses;
 - The use of performance standards rather than prescriptive standards;
 - Exemption or partial exemption from the regulatory requirements for businesses.

In addition to being addressed in narrative in the Initial and Final Statement of Reasons, these issues must be quantitatively addressed in the Economic and Fiscal Impact Statement (Form 399) as directed by the California State Administrative Manual. The Form 399 must be prepared in conjunction with the Notice of Proposed Rulemaking/Initial Statement of Reasons, be signed by the Agency Secretary (California Resources Agency Secretary for Energy Commission regulations), be reviewed and approved by the Department of Finance, be placed in the rulemaking file and noticed to the public, and be submitted with the Final Statement of Reasons to the regulations reviewing agency.

For regulations that are building standards, the adopting agency (Energy Commission) must also submit with the Final Statement of Reasons documentation of how the “Nine Point Criteria” are met [Health and Safety Code 18930(a)]. Criteria 5 is that the “cost to the public is reasonable based on the overall benefit to be derived from the building standards.”

The Energy Commission benefits from having done a thorough cost effectiveness analysis, pursuant to the Warren-Alquist Act, early in the pre-rulemaking stages of a standards update cycle, which has been vetted through public workshops and refined as needed to address comments from technical reviewers, effected parties and other stakeholders. The savings and costs determined through that cost effectiveness

analysis are extended to the data that the Commission collects on housing starts and newly constructed nonresidential building floor space additions, to determine projections for the impacts that are to be quantified for the Form 399 and reported in narrative in the Initial and Final Statements of Reason and in the response to the building standards cost criteria. Commonly, since the cost effectiveness determination has been made prior to establishing a proposed regulation, the savings strongly exceed the costs to the sectors and parties that are to be addressed by the APA requirements. This creates a strong foundation for the reasonableness of the regulations that must be reviewed and approved by OAL or CBSC.

Estimating Costs in Advance of Measures Required by the Regulations Becoming Mainstream Practice

One of the most debated aspects of the cost effectiveness analysis is the estimation of the costs to install energy efficiency measures in buildings or achieve the energy efficiency in appliances that are covered by the standards. This cost estimation must be done prior to the existence of the regulation, based on the costs that are seen in the marketplace at that early point. At that time the Commission is considering the incorporation of energy efficiency features that are more advanced than standard practice, which necessarily apply to a more limited marketshare. After the incorporation of the energy efficiency features in the standards, they become more common, or “mainstream.” Often, the efficiency measures under consideration for incorporation into standards are sold as “premium” measures in the pre-rulemaking marketplace. They may be commonly bundled with other amenities or features that as a package are marketed as “top of the line” features offered at premium prices. Often the pre-rulemaking profit mark-ups on these features are higher given their marketing. One of the strong advantages of incorporating these measures in regulations is that they subsequently become incorporated as standard features, to a certain extent demystifying them and making them available to building owners who previously could not afford them due to their marketing as premium features. It is not uncommon for the prices charged for these features to drop significantly after they are incorporated into standards, as a result of economies of scale, cost competition by suppliers of required measures, and unbundling them from packages of premium features.

This phenomenon of the post-regulation dropping of costs has been the subject of several studies for appliance standards. A recent study³ commissioned to support the

³ Ellis, Mark. 2007. *Experience with Energy Efficiency Regulations for Electrical Equipment*. Paris, France: International Energy Agency.

G8⁴ Plan of Action undertook a study to review existing global appliance standards and codes. The study investigated appliance standards programs conducted in many nations around the world, including the United States⁵, the European Union, Australia, and Japan, and made several conclusions related to cost effectiveness:

- Estimates of benefits and costs of mandatory standards show them to be one of the most cost-effective options to meet energy demand and reduce emissions of greenhouse gases.⁶
- The analysis of programs ... shows that all products have experienced a decline in real prices of between 10% to 45%, while energy efficiency increased by 10% to 60% ... These gains have been made without sacrificing levels of service ...
- ... in the period and countries where energy efficiency regulations have been implemented there has not been sustained increases in real prices of regulated appliances.
- [One important factor is] the ability of the design process to provide innovative solutions to overall performance targets, taking into account market conditions. Where more prescriptive requirements are used, there is a danger of impeding innovation and losing some of the cost benefits.

Consistent with the Warren-Alquist Act, the Commission has worked very hard over three decades to place a primary emphasis on performance standards in its building energy efficiency standards. The performance standards establish an energy budget for the building, in terms of energy consumption per square foot. The energy budget is based on the set of measures that the Energy Commission has determined to be cost effective. However, the performance standards provide the builder with great flexibility to choose those energy efficiency measures that it prefers due to such things as: past good experience with particular measures and suppliers; cost discount opportunities available to the builder; effective meshing of the measures with the design intent or construction practices of the builder; or increased builder success by providing measures that are desired by home purchasers, enabling the builder to differentiate its

⁴ G8, the Group of Eight, is a forum for the following governments: Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, United States (the European Union is represented but cannot host or chair) to collaborate on addressing major shared issues. The Group emerged (as the G6) following the 1973 oil crisis. Among many topics, the G8 collaborates on the resolution of Global energy issues.

⁵ The report made the following statement about the Energy Commission's standards, "... several states have pressed ahead with regulations for some equipment ... California has been particularly pro-active in this regard, and other States have tended to harmonize requirements with California."

⁶ The IEA *World Energy Outlook 2006* states, "The most effective way of encouraging investment in energy-efficiency improvements is the well-designed and well-enforced regulations on efficiency standards, coupled with appropriate energy-pricing policies."

housing product from the competition or allow the builder to market the homes more profitably.

Updates to the building standards often provide new compliance options under the performance standards, in turn adding flexibility and/or improving the quality of construction, and helping the builder avoid construction defects. Such compliance options may require independent field verification to ensure that proper installation is achieved. Commonly, these measures represent a lower cost way to comply, but under the performance standards builders can choose to use other measures. Often due to a lack of familiarity or experience with the new compliance options, some builders will choose to use other measures even though they may be more expensive. Typically, over time, builders will gain experience with the new compliance options and benefit from the lower costs they represent. This is another example where the cost of compliance for the builder is perceived to be higher at the time of the regulatory proceeding, but comes down over time after the regulations have been in effect for a period.

Thank you for the opportunity to provide this information.