

Attachment A to Responses to Public Comments

The California Energy Commission responds as follows to *ARMA Comments and Supporting Data on Proposed 2013 Building Energy Efficiency Standards*, Appendix B, Gnarus LLC Comments, Docket No. TN-65079, May 4, 2012.¹

The Asphalt Roof Manufacturers' Association, through Louis L. Wilde, Ph.D., Gnarus Advisors LLC, submitted twelve comments on a report prepared in support of the Building Energy Efficiency Standards, by Architectural Energy Corporation, *Non-Residential Cool Roof Cost Summary*, February 8, 2012. The Commission's response to the twelve comments are as follows:

1. Dr. Wilde states that he did not have sufficient time to compare the results and cost estimates of the September 2011 CASE report [*sic*] (the Commission understands this to refer to CASE Initiative Report, *Nonresidential Cool Roofs* (Oct. 2011)²) with Architectural Energy Corporation's Non-Residential Cool Roof Cost Summary, February 8, 2012 ("AEC Cost Summary").³ The Commission has compared both reports. The cost estimates in the reports differ because they are based on different sources of data, although both reports used data obtained directly from roofing product manufacturers, distributors and contractors throughout California.⁴ The CASE Report also used data from the RS Means Construction Cost database.⁵ Although the reports have different costs, both show that the standards are cost-effective.
2. The objective of the cost survey was to poll costs from the industry as a whole, where nonresidential construction is prevalent and from industry sources who install a range of nonresidential roofing types. Survey information throughout geographic regions of the state and cost data was solicited through a range of sources representing the entire roofing industry assuring the data was representative of construction practice. Because the objective was to obtain representative costs, the survey did not focus on the randomness of the sampling. Nonetheless, the survey sample consisted of over 70 contractors, identified from the National Roof Contractors Association online database (by specifying a metropolitan area and

¹ Available at

http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/public_comments/45-day/2012-05-04_Ashphalt_Roofing_Manufacturers_Association_Comments_TN-65079.pdf.

² CASE Initiative "Nonresidential Cool Roofs", October 2011, Docket No. TN-65228, http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/Envelope/2013_CASE_NR_Cool_Roofs_Oct_2011.pdf, which was subsequently supplemented by Revised LCC for NR Cool Roofs, Docket No. TN-65227, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/public_comments/45-day/2012-05-15_Revised_LCC_for_NR_Cool_Roofs_TN-65227.pdf

³ Docket No. TN-65228, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/public_comments/45-day/2012-02-08_Architectural_Energy_Corporation_Non_Residential_Cool_Roof_Cost_Summary_TN-65228.pdf.

⁴ Cf. Nonresidential Cool Roofs CASE Report, p. 20, with AEC Cost Summary, pp. 2-3, 5-10.

⁵ Nonresidential Cool Roofs CASE Report, p. 20, citing RS Mean Construction Cost database, Reed Construction Data (2010).

- searching for contractors within a 50-mile radius), and adding at least ten contractors from each region unless 10 were already available from that region. However, the responses received were random, in that there was variability in the response rates.⁶
3. The response rate to the efforts to obtain costs is indicative of the construction market as a whole. Not all contractors install every roofing product type or had cost data available for roofing types with different performance characteristics. Distributors are often reluctant to divulge competitive cost information, and targeted audiences often resist activities that require time taken away from their business focus. Information gathered represents regional and construction differences as well as data from a variety of sources.⁷ The comment by Gnarus, and the record before the Commission, do not establish that the response rate was insufficient or somehow renders the data inadequate or unreliable, especially where no contradictory data was placed into the record,
 4. Every effort was made to ensure an adequate response rate representing the range of roofing products and climates in California. Follow-up telephone surveys were made to geographical regions and cross-sections of the roofing industry, as noted in the AEC Cost Summary. Surveys were made of the geographical regions of San Francisco Bay area, Los Angeles, San Diego, Riverside, Sacramento, Fresno, and San Bernardino. There were responses by 12 contractors, 11 distributors, and 1 manufacturer. The comment by Gnarus, and the record before the Commission, do not establish that the survey was insufficient or somehow renders the data inadequate or unreliable, especially where no contradictory data or information regarding survey administration was placed into the record,⁸
 5. The measures are cost effective, as demonstrated by costs representative of the industry at large. Information was obtained from email and telephone surveys, industry databases, and other sources. Notably, the data was consistent across the sources that the standards are cost-effective. As stated above, the record does not establish that the data was inadequate or insufficient. Indeed, the references cited by Gnarus do not establish that a minimum number of survey responses were necessary to provide reliable data. The Engineering Statistics Handbook acknowledges that sample size depends on a variety of assumptions, and provides formulae for one and two-sided tests. But roofing costs are not a product of one or two sided questions. The Tutorials in Quantitative Methods for Psychology paper provides guidance for social science research on human behavior. No explanation is

⁶ See Transcript of the 45-Day Language Hearing, Monday, March 12, 2012, Docket No. 12-BSTD-01, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-03-12-13_hearing/2012-03-12_Transcript.pdf, pp: 115:21-116:11; CEC Response E-mail to ARMA Comments and Supporting Data on Proposed 2013 Building Standards TN-65234, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/public_comments/45-day/2012-05-15, p. 2.

⁷ See Transcript of the 45-Day Language Hearing, Monday, March 12, 2012, Docket No. 12-BSTD-01, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-03-12-13_hearing/2012-03-12_Transcript.pdf, pp: 115:21-116:11; AEC Cost Summary, pp. 2, 7.

⁸ See Transcript of the 45-Day Language Hearing, Monday, March 12, 2012, Docket No. 12-BSTD-01, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-03-12-13_hearing/2012-03-12_Transcript.pdf, pp: 115:21-116:11; AEC Cost Summary, p. 2.

provided how the statistical principles governing research on human behavior apply to market analysis. There is no analysis in the record establishing a minimum sample size, and no evidence in the record of contradictory data on roofing costs.

6. Statistical significance analyses are not necessary predicates for demonstrating cost effectiveness of the proposed roofing standards, particularly where the price volatility of a measure is more dependent on intangible construction influences such as geographic construction practice, building code constraints (outside of energy code requirements), product availability, installation training and practices, etc. The record does not establish that the regression model in the record is insufficient.
7. The record does not establish that the cost analysis lack sufficient data, where not every contractor installs all roofing product types, and all roofing product types are not uniformly used in every geographic region of the state. It is reasonable and appropriate that the data reflects that not all survey respondents provided cost data for all roofing types. The AEC Cost Summary details the responses received and summarizes those results representing all roofing products. The record does not establish that increasing the number of survey responses would lead to different conclusions.⁹
8. The cost survey's hierarchy of gathering data is provided on Page 2, second paragraph, of the AEC Cost Summary. Table 4 identifies that distributors were contacted representing a range of geographic construction regions ("Eleven (11) distributors were contacted throughout the state.").
9. As explained above, not all distributors carry every roofing product type. Geographic regions, local construction markets, and the customer-contractor base dictate the materials that individual distributors supply in their warehouses. The distributor relied upon for Modified Bitumen SBS was used to provide data for this roofing product type because other distributors did not provide data, and represented the average of costs for this product type given the variations in price.
10. The AEC Cost Summary shows cost information for roofing coatings in Tables 3 and 5 (contractor and manufacturer respectively). Roof coatings tend to be specialized products with specialized component and chemical formulations and have specialized uses; hence, Table 5 data indicates the varied range of cost information for roof coatings overall. To distill this varied information on roof coating types with different reflectance values into useful cost data representative of coatings as a class of roofing product types, a regression analysis was used (Figure 1) resulting in a single representative cost data point. The regression analysis enables correlating cost to reflectance.
11. Not every contractor installs all roofing product types, and all roofing product types are not uniformly used in every geographic region of the state. Effort was made to gather sufficient data, including follow-up telephone surveys, to ensure cost information represented geographical construction regions of the state and a cross-section of sources representing the roofing industry. After receiving a low response

⁹ See Tr. 45-Day Hrg., pp. 115:21-116:11.; AEC Cost Summary, pp. 2, 7.

rate to e-mail surveys, data was obtained through telephone surveys as the AEC Cost Summary states. All cost data obtained was considered.¹⁰

12. Table 2 indicates that estimates of energy savings were generated using the prototype buildings from the "single-story office building prototype in the CASE report". Analysis procedures for estimating energy savings are documented in: <http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/>, and http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/2010-11-16_workshop/presentations/03-AEC-Life-Cycle_Cost_Methodology.pdf

¹⁰ See Tr. 45-Day Hrg., pp. 115:21-116:11; AEC Cost Summary, p. 2; CEC Response E-mail to ARMA Comments and Supporting Data on Proposed 2013 Building Standards TN-65234, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/public_comments/45-day/2012-05-15;_CEC_Response_E-mail_to_ARMA_Comments_and_Supporting_Data_on_Proposed_2013_Building_Standards_TN-65234.pdf; p. 2.