**ELECTRONIC SUBMISSION**

June 11, 2018

Clerk of the Board

California Air Resources Board

1001 I Street

Sacramento, CA 95814

RE: NAIMA’s Comments on California Air Resources Board’s Draft Staff Report: Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets

To Whom It May Concern:

INTRODUCTION

The North American Insulation Manufacturers Association (“NAIMA”) appreciates the opportunity to provide comments on the California Air Resources Board’s (“CARB”) Draft Staff Report on Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets (April 2018).

NAIMA is the trade association representing fiber glass and mineral wool insulation manufacturers. NAIMA promotes energy saving and energy efficiency through the use of insulation products. NAIMA submitted comments on previous CARB proposals specifically related to the Cap and Trade Program, but in those comments, NAIMA always advocated for energy efficiency as a mechanism for reducing greenhouse gas emissions. In these comments, NAIMA offers support for CARB’s commitment to doubling the efficiency savings “achieved at existing buildings.”

In considering these comments supporting doubling of efficiency savings achieved in existing buildings, NAIMA asks CARB to recognize several key points: 1) the building sector is a significant source of greenhouse gas emissions due to its use – and waste – of electricity; 2) that insulation can provide the most cost-effective and immediately available means to reduce this energy use; 3) that major studies have underscored the key role insulation can play in this regard, including significant energy savings from retrofitting existing buildings; and 4) how insulation in the industrial sector can have a significant complementary role.

Indeed, buildings are the largest users of energy, and, therefore a potentially tremendous source of reduction of energy consumption, representing “one of the last great frontiers of wasted energy.”[[1]](#footnote-1) There is a direct relationship between energy consumption of buildings and greenhouse gas emissions; in fact, heating and cooling buildings accounts for 40 percent of energy use and greenhouse gas emissions in the United States.[[2]](#footnote-2) When it comes to improving the energy efficiency of buildings, insulation is the key resource. Indeed, insulation – more than energy efficient appliances or CFL light bulbs – can have the greatest impact on improving energy efficiency. Unlike these other efficiency products, insulation, once installed, requires no further use of energy to save energy and lasts for the life of the building.

As demonstrated by “A Cost Curve for Greenhouse Gas Reduction,” insulation is the most cost-effective tool available; it is a measure that carries no net life cycle cost – in effect the reductions come at negative cost, *i.e.*, end-use energy efficiency enhancements both reduce utility greenhouse gas emissions AND save money.[[3]](#footnote-3)

Numerous studies[[4]](#footnote-4) have analyzed the benefits of increased insulation in existing and new residential buildings and projected resultant reductions of conventional pollutants (fine particulate matter (PM2.5), nitrogen oxide (NOx), and sulfur dioxide (SO2)) and greenhouse gases. These studies determined that improving energy efficiency of homes not only saves energy and reduces environmental air pollution, but also has a significant, immediate positive impact on public health. Improving the energy efficiency of commercial and industrial buildings will provide these benefits as well. Each Btu saved through insulation means cleaner air and improved public health. Indeed, upon reviewing these findings, the Harvard and Boston University researchers concluded that the “magnitude of the economic and public health benefits indicates that creative public policies to encourage” increased insulation “may be warranted.”[[5]](#footnote-5) Harvard researchers also concluded that:

[t]his approach allows us to quantify the benefits of energy efficiency on a national scale not seen before, which takes us far beyond energy savings and energy security. Now, improving energy efficiency not only helps us as a nation, but also has an immediate, positive impact on us, as individuals, and our families.[[6]](#footnote-6)

ENERGY SAVINGS FROM INSULATION OFFERS THE BEST SOLUTION BECAUSE IT IS COST-EFFECTIVE AND SIGNIFICANTLY REDUCES POLLUTION

Insulation offers cost-effective reductions and is immediately available to yield expeditious results. Unlike other energy efficiency equipment, once installed, insulation requires no further energy use, is permanent, and does not need regular upkeep, so reductions are long-term. Most important, California’s insulation upgrade/incentive programs should be applied broadly across the power, housing, commercial, and industrial sectors.

1. Insulation Provides Cost-Effective Reduction of Energy Consumption

Energy efficiency is defined largely as cost-effective ways to either reduce energy consumption to accomplish the same work or keep energy consumption constant while doing more work. The idea behind energy efficiency is quite simple – if people consume less energy, there will be correspondingly less emission of greenhouse gases as the result of the burning of fossil fuels.  Energy efficiency technologies and practices can therefore play a pivotal role in reducing the threat of global climate change.

One of the easiest and most effective energy efficient technologies available today is insulation.  Overall benefits from insulation are numerous, including thermal performance, personal comfort, sound control, condensation control, fire protection, and much more.  The thermal insulating properties of insulation materials provide important energy and environmental benefits.  Made from a variety of substances including fiber glass, foam, cellulose, mineral fiber, and other materials, insulation products are primarily designed to reduce the transfer of heat through building structures in residential, commercial and industrial applications.[[7]](#footnote-7) As will be discussed more fully below, insulation products enable consumers to reduce more energy use in the first several months than it takes to manufacture the insulation material.  This results in a very positive overall energy and environmental balance for thermal insulation.  As will be shown below, there are also dramatic savings realized from industrial process and mechanical insulation as well.

Perhaps the most effective way of illustrating the impact of insulation on energy savings in the United States is to elaborate upon a study that documented the magnitude of energy savings derived from insulation already in place.[[8]](#footnote-8) In the study, conducted by Energy Conservation Management, Inc. (“ECM”), researchers compared the energy used to make insulation with the energy that was currently being saved by insulation products installed in the building envelope of residential and commercial structures as well as in industrial applications. According to the study, the benefits from insulation far outweighed the cost, with the ratio of energy investment to energy savings having a range of 12 to 1 per year. This ratio means that for every Btu invested in the manufacture of thermal insulation, 12 Btus in energy savings are realized in the first year of service.

Indeed, the findings of the ECM study indicated the dramatic reductions in energy demand resulting from use of thermal insulation. The study reported that “because of home insulation, drastically less energy is needed to heat and cool homes in the United States today when compared to the same homes without insulation. . . . this difference results in annual energy savings of 51 percent or 10.4 quadrillion Btu nationwide.”[[9]](#footnote-9) That 10.4 quadrillion Btus was equivalent to a 255-day supply of gasoline for the entire United States or to 51 percent of the total annual industrial energy consumption in the United States. In the commercial building sector, the study found that insulation that was currently in place saved 18 percent or 1.51 quadrillion Btus annually, or a 37-day supply of gasoline for the entire United States. Cumulatively, the savings were 42 percent or 11.91 quadrillion Btus annually.

While these numbers may be impressive, future energy savings may be even greater. The study also considered the potential for additional energy-savings and environmental impact if insulation levels in all homes and buildings were increased to meet standard energy codes. While this study is more than 20 years old, it effectively demonstrates the tremendous impact achieved with future improvement in insulation levels.

The environmental implications of the energy savings from insulation go right to the heart of global climate change, simply because less energy consumption means reduced emissions of greenhouse gases. Consider again the 10.41 quadrillion Btus saved as the result of insulation that was currently in place in residential homes, *see* above. According to the ECM study, if those current levels of residential insulation did not exist, U.S. carbon dioxide emissions (CO2) would have increased by 15 percent, with 1.35 trillion pounds of CO2 being emitted into the atmosphere each year. In order to eliminate that much additional CO2 from the atmosphere, nearly 300 million acres of trees would need to be planted.

As discussed herein, researchers at the Boston University, Harvard School of Public Health, and other independent studies have achieved similar results. NAIMA will provide these detailed studies to CARB upon request.

1. Insulation and Insulation-Related Reductions Are Immediately Available

The tremendous benefits from the reduction of energy demand and greenhouse gas emissions do not have to wait for further technological development. Insulation, whether through fiber glass, spray foam, cellulose, mineral wool, or rigid foam, is widely and commercially available today, *i.e.*, insulation is literally off-the-shelf technology. And, once in place, reductions in energy use are immediate. Benefits can accrue as rapidly as the material is installed.

1. Insulation Requires No Further Energy Use

As noted above, once installed, insulation requires no further energy investment to operate or maintain. This is a distinct difference from and advantage over energy efficient appliances and light bulbs. Not only is the application of insulation typically done once during the life of a building, it does not require additional electricity to operate or generate reductions in overall energy use. All reductions from installed insulation are net reductions.

1. Insulation and Insulation-Related Reductions Are Permanent

The energy being saved in the studies above, whether beginning in 1996, 2002, or 2003, is still being saved. Insulation yields expeditious results and those results continue through the years. Indeed, insulation typically lasts the life of the building. Insulation does not require regular upkeep or replacements or, importantly, action by homeowners. In sum, the energy savings and the pollution reductions are long-term and unlikely to diminish over time.

1. Insulation Programs Should Apply to All Building Sectors

CARB’s goal is the reduction of greenhouse gas emissions. Therefore, insulation upgrade/incentive programs should be employed broadly across all economic sectors that significantly contribute to a state’s energy use and greenhouse gas emissions. Thus, insulation programs can apply broadly across the power, housing, and industrial sectors. While such programs can be employed in any one sector, there is no reason they should be so limited, especially if they become a key part of a state’s program to reduce energy demand and greenhouse gas emissions from the utility sector.

Based on all these factors detailed above, NAIMA urges CARB to recognize the vast savings yet to be achieved through improvement in insulation levels.

1. Energy Savings and Emission Reductions From Insulation Are Real, Quantifiable, Verifiable, Permanent, and Readily Available

In addition to the significant energy savings and emission reduction benefits of insulation upgrade/incentive programs, the savings are real and permanent, can be quantified and verified through programs and tools, and can be applied immediately.

There exists sufficient modeling methodologies and data to substantiate the real energy savings derived from insulation and to allow verification of those reductions. In fact, public utilities, public interest groups, state and local governments, and other parties have been calculating and relying on these savings for many years.

1. Specific Suggestions on Incentivizing Insulation

NAIMA recommends that CARB provide incentives for: 1) adoption, enforcement, and upgrades to building energy codes; 2) programs to encourage or provide improved insulation in residential, commercial, and industrial sectors; 3) policies and regulatory programs to encourage, provide, or require upgrades to insulation; 4) loan and grant programs; 5) programs to improve energy efficiency of power plants; 6) tax holidays on insulation products; and 7) tax credits or deductions.

NAIMA requests that CARB also consider providing incentives for above-code programs. The programs that exceed traditional minimum building codes include International Residential Code (“ICR”), International Building Code (“IBC”), International Mechanical Code (“IMC”), International Energy Conservation Code (“IECC”), and standards such as ASHRAE 90.1. Please consider the modeled national and state energy savings highlighted in a National Association of State Energy Officials (“NASEO”) presentation and the subject of an American Council for an Energy-Efficient Economy (“ACEEE”) study:[[10]](#footnote-10)

Modeled national codes savings:

* Net savings $150‐250B (NPV); benefit‐cost ratio 3:1
* Energy savings in 2030:
  + 1.8‐2.9 quadrillion Btu
  + 2‐3% U.S. energy use; 5‐7% U.S. building energy use
* CO2 avoided in 2030 100‐160 million metric tons

Modeled state 2030 annual electric savings:

* CO ~4‐7%
* FL ~5‐8%
* HI ~7‐12%
* MN ~3‐4%
* TX ~4‐6%
* VA ~5‐8%
* WA ~3.5‐5.75%

These figures demonstrate the magnitude of savings that are derived from improved building codes. The ACEEE article concluded “[t]here is a tremendous potential for CO2 reductions to be achieved with the adoption and implementation of national model building energy codes.”

CONCLUSION

NAIMA strongly supports CARB’s efforts to double the efficiency savings achieved in existing buildings and urges CARB to adopt the specific incentive measures described herein, and to expand those incentives to all building sectors.

Sincerely,

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Angus E. Crane

Executive Vice President, General Counsel

1. Energy Efficiency Codes Coalition, Testimony of William D. Fay Before the Subcommittee on Energy and Air Quality of the Committee on Energy and Commerce, U.S. House of Representatives, Thursday, July 17, 2008. [↑](#footnote-ref-1)
2. U.S. Department of Energy, Energy Efficiency and Renewable Energy, “Energy Efficiency Trends in Residential and Commercial Buildings” (October 2008). [↑](#footnote-ref-2)
3. Enkvist, Per-Anders, Tomas Nauclér and Jerker Rosander, 2007, “A Cost Curve for Greenhouse Gas Reduction,” *The McKinsey Quarterly* 1: 38. [↑](#footnote-ref-3)
4. Jonathan I. Levy, Yurika Nishioka and John D. Spengler, “The public health benefits of insulation retrofits in existing housing in the United States,” *Environmental Health: A Global Access Science Source*, April 2003, pp. 1‑16; Yurika Nishioka, Jonathan I. Levy, Gregory A. Norris, Andrew Wilson, Patrick Hofstetter, and John D. Spengler, “Integrating Risk Assessment and Life Cycle Assessment: A Case Study of Insulation,” *Risk Analysis*, Vol. 22, No. 5, 2002, pp. 1003-1017; Jonathan I. Levy, May K. Woo, and Yann Tambouret, “Energy savings and emissions reductions associated with increased insulation for new homes in the United States,” *Building and Environment*, 96 (2016), 72-79; Jonathan I. Levy, May K. Woo, Stefani L. Penn, Mohammad Omary, Yann Tambouret, Chloe S. Kim, and Saravanan Arunachalam, “Carbon reductions and health co-benefits from US residential energy efficiency measures,” *Environ. Res. Lett.,* 11 (2016) 034017; Stefani L. Penn, Saravanan Arunachalam, Matthew Woody, Wendy Heiger-Bernays, Yorghos Tripodis, and Jonathan I. Levy, “Estimating State-Specific contributions to PM2.5-andO3-Related Health Burden from Residential Combustion and Electricity Generating Unit Emissions in the United States,” *Environ Health Perspect*, 125:324-332 (2017). [↑](#footnote-ref-4)
5. Levy, Nishioka and Spengler at p. 14. [↑](#footnote-ref-5)
6. North American Insulation Manufacturers Association (“NAIMA”), “Harvard Study Findings,” Pub. No. NAIMA‑036, September 2003. [↑](#footnote-ref-6)
7. The study of the subject of insulation necessarily involves an understanding of certain fundamental principles. These principles include the theory of heat, the unit of heat, temperature, methods of heat transfer, and the units of measure of the rate of heat transfer through individual materials and compound wall and roof structures. There are two major types of insulation: 1) mass insulations; and 2) reflective insulations. Mass insulations are those that depend on a definite thickness of material to provide heat resistance and include all types except the reflective, which depend only on the character of the surface, which is emissivity. The effectiveness of a mass insulation in reducing heat transfer is due to the fact that such material has a low rate of heat conduction and practically no transfer of heat by convection and radiation, and these characteristics in turn are due to the condition of subdivision or density of the material. Reflective insulations typically are effective only for heat transfer by radiation. [↑](#footnote-ref-7)
8. “Green and Competitive: Energy, Environmental and Economic Benefits of Fiber Glass and Mineral Wool Insulation Products,” by Energy Conservation Management, Inc.; The Alliance to Save Energy; and Barakat & Chamberlin, Inc., June 1996. [↑](#footnote-ref-8)
9. *Ibid.* [↑](#footnote-ref-9)
10. Hayes, Ungar and Herndon, 2015, “The Role of Building Energy Codes in the Clean Power Plan,” ACEEE. <http://aceee.org/white-paper/building-codes-111d>. [↑](#footnote-ref-10)