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North American Insulation Manufacturers Association

Additional submitted attachment is included below.



October 19, 2017

California Energy Commission
Attention: Docket No. 17-BSTD-01
Dockets Office 1516 Ninth Street, MS-4
Sacramento CA 95814

Subject: Comments from the North American Insulation Manufacturers Association on Docket Number 17-BSTD-01 2019: Draft 2019 Standards

These comments are submitted by the North American Insulation Manufacturers Association (NAIMA) regarding draft changes to the 2019 California Building Energy Efficiency Standards. NAIMA is the association for North American manufacturers of fiber glass, rock wool, and slag wool insulation products. Our role is to promote energy efficiency and environmental preservation through the use of fiber glass, rock wool, and slag wool insulation, and to encourage the safe production and use of these materials.

NAIMA strongly supports the California Energy Commission's (CEC) mission "to reduce wasteful, uneconomical, and unnecessary uses of energy, thereby reducing the rate of growth of energy consumption, [and] prudently conserve energy resources." The Commission is a national leader in promoting building energy efficiency by establishing robust and cost-effective code requirements for the building envelope.

The draft 2019 residential energy standard includes measures that substantially set the requirements needed to achieve zero net energy (ZNE) building envelopes. This is consistent with California's "loading order" establishing that the state, in meeting its energy needs, will invest first in energy efficiency and demand-side resources, followed by renewable resources, and last in clean conventional electricity supply.

NAIMA supports the Commission's draft 2019 building energy standards, including its recommendations to streamline the prescriptive requirements for attic insulation and to increase the stringency of wall insulation prescriptive requirements. NAIMA makes the following additional recommendations:

- Improve Section 150.0(c) mandatory features for above grade wall insulation by requiring R-15 cavity insulation in 2x4 walls and R-20 cavity insulation in 2x6 walls
- Discontinue the current solar PV credit and refrain from enacting new "solar + battery" storage credits, since they slow and prevent market adoption of energy efficiency measures necessary to achieve a zero net ready energy building envelope

- Adopt Quality Insulation Installations (QII) as a performance and prescriptive compliance requirement with clear guidelines for evaluating proper installation of all insulation types and ensuring full compliance with workplace safety requirements

1. Improved mandatory features for walls will result in a more energy efficient envelope in every home built in California.

Current State of Wall Construction in California

The 2016 Title 24 performance and prescriptive measures for above grade framed walls sets a standard that promotes the goal of zero net energy (ZNE) construction. In practice, few homes are actually constructed to this standard since more than 90 percent of California homes are built using Title 24's performance path. Homes built under the performance path need only comply with the standard's mandatory features for walls – R-13 insulation for 2x4 walls, and R-19 insulation for 2x6 walls.

NAIMA recently commissioned a market assessment on current insulation practices for homes participating in the California Advanced Homes Program (CAHP) within PG&E's service territory. This survey, which captures homes from July 2016 to July 2017, showed that over 15% of new homes were built using only the minimum mandatory level of wall insulation (10.5% R-13 + 4.7% R-19). This is striking given that the survey represents CAHP homes that are *more likely* to include above mandatory minimum insulation levels to achieve incentive performance targets. A reasonable conclusion is that a substantial number of homes built in California under the 2016 code will only meet the mandatory minimum requirements of R-13 or R-19 wall insulation.

California also lags behind most of the country with regard to the minimum amount of insulation required in walls. For 2x4 construction, a minimum of R-13 is currently allowed across all California climate zones. The equivalent climate zones in states following the 2012 IECC or newer effectively require R-20 or R-13+5 insulation in walls, with no difference in requirements between 2x4 and 2x6 construction.

Finally, Title 24, subchapter 9 (covering residential additions and alterations) current prescriptive requirements that additions require cavity insulation of R-15 in 2x4 framing and R-19 in 2x6 framing. The CEC is appropriately proposing to increase the R-19 to R-21 in the 2019 code. NAIMA believes these higher R-values, though prescriptive, further supports the case for setting mandatory levels for wall insulation at R-15 and at least R-20.

Improvements to Mandatory Minimums are Cost-effective

NAIMA performed a cost and savings analysis on the increase in mandatory minimum insulation levels from R-13 to R-15 and R-19 to R-20. As a part of this cost-effectiveness analysis, NAIMA gathered cost information from a contractor that operates statewide and from big box store locations across the state. Energy savings calculations were performed using the most recent release of CBECC-RES 2019.0.4 (released June 2017). California Energy Commission prototypical homes were used (both 2,100 and 2,700 SF homes) and

modeled across all 16 California climate zones with results weighted 45% for the 2,100 SF prototype and 55% for the 2,700 SF prototype.

The homes were modeled to the 2016 Prescriptive Path with the exception of wall characteristics, producing a total of 64 energy models. Energy cost savings were calculated from kTDV/ft² results using the 2019 TDV 30 year NPV Conversion Factor (Table 13 of the [2019 TDV Methodology Report](#)).

Wall Type	Wall Cavity R-value	
	Baseline	Upgrade
2x4	R-13	R-15
2x6	R-19(18)	R-20

Cost-Effectiveness: R13 to R15 Cavity Insulation

CZ	Savings 2019 TDV PV (\$)	Incremental Cost \$	Cost-effectiveness Ratio
1	\$535	\$198	2.70
2	\$408	\$198	2.06
3	\$297	\$198	1.50
4	\$321	\$198	1.62
5	\$308	\$198	1.56
6	\$219	\$198	1.11
7	\$118	\$198	0.59
8	\$268	\$198	1.35
9	\$344	\$198	1.74
10	\$381	\$198	1.92
11	\$643	\$198	3.25
12	\$541	\$198	2.73
13	\$606	\$198	3.06
14	\$600	\$198	3.03
15	\$668	\$198	3.38
16	\$597	\$198	3.02

The transition from R-13 to R-15 cavity insulation is cost-effective across all California climate zones, with the exception of climate zone 7, a coastal area with a mild climate. The improvement in wall efficiency does provide savings to homeowners in that climate zone, but not enough to overcome the initial cost, falling \$80 short after 30 years of home ownership. However, when looking across the state and taking into account the housing starts in each climate zone, the transition from R-13 to R-15 is strongly cost-effective on a statewide basis.

Cost-Effectiveness: R19 to R20 Cavity Insulation

CZ	Savings 2019 TDV PV (\$)	Initial Cost \$	Cost-effectiveness Ratio
1	\$305	\$24	12.78
2	\$237	\$24	9.92
3	\$166	\$61	2.72
4	\$190	\$61	3.11
5	\$175	-\$27	-6.58
6	\$126	-\$27	-4.74
7	\$57	-\$27	-2.13
8	\$150	-\$27	-5.62
9	\$184	-\$27	-6.92
10	\$221	-\$27	-8.29
11	\$352	\$24	14.73
12	\$317	\$24	13.27
13	\$352	\$24	14.72
14	\$356	-\$27	-13.38
15	\$376	\$61	6.16
16	\$345	-\$27	-12.97

The transition from R-19 to R-20 cavity insulation is strongly cost-effective across all California climate zones, without exception. In many locations the cost to move from an R-19 product to an R-20 product actually resulted in a reduction of cost. Initial incremental costs were gathered from big box stores at locations across the state to represent local variations in price. California contractor data on the R-20 product is not available as it is not specified en masse in California due to lack of code requirement – however, it is a readily available product.

Product Incremental Cost: R19 to R20 Cavity Insulation

Location	\$/SF
	R-19 to R-20
Redding	\$0.01
West Sacramento	\$0.01
San Jose	\$0.04
Bakersfield	\$0.01
Glendale	-\$0.02
San Diego	-\$0.02
Palm Springs	\$0.04
Palmdale	-\$0.02

Product Links:

R-20 Kraft Faced Fiberglass Insulation Roll 15 in. x 384 in.

<http://www.homedepot.com/p/Owens-Corning-R-20-Kraft-Faced-Fiberglass-Insulation-Roll->

[15-in-x-384-in-RF50/301828172](#)

R-19 Kraft Faced Insulation Continuous Roll 15 in. x 470.4 in.

<http://www.homedepot.com/p/Owens-Corning-R-19-Kraft-Faced-Insulation-Continuous-Roll-15-in-x-470-4-in-RF40/202585898>

Sites visited on: 10/3/2017

- 1. 2019 Title 24 should discontinue the solar PV credit and not include any new generation or plug load credit that can be used to avoid building envelope efficiency measures.**

Renewables and efficiency are needed to build a ZNE home. The code should operate first to promote the most efficient home envelope so as to optimize mechanical systems and minimize generation requirements. The 2019 draft standards gets it right by establishing a new Energy Design Rating (EDR) metric for the performance path's energy budget with separate targets for energy efficiency and solar generation/demand flexibility. As the draft makes clear, there is a firewall between these two budgets.

Some stakeholders suggest a new "solar + storage" trade off against new insulation measures in the proposed 2019 code. We oppose such a trade-off and believe it is contrary to the Commission's stated commitment to eliminate solar generation trade-offs in the 2019 code. Trading envelope efficiency measures, which deliver savings for the life of the building, for the uncertain benefit of homeowner controlled battery storage is contrary to guiding principles of California's building energy code.

A recent Electric Power Research Institute (EPRI) study, funded by the California Public Utilities Commission, explored the grid impact and economics of zero net energy communities and made the following observation about battery storage:

"Energy storage batteries, added to 9 of the 20 homes, demonstrated limited future potential. The still-maturing technology marginally reduced peak load at the transformer but was not cost-effective for grid balancing. To enhance cost-effectiveness and controllability by grid operators, EPRI recommends further research on deploying storage on the utility side of the meter in community solar systems or on transformers, feeders, and substations." (*Zero Net Energy for the Masses, EPRI Journal, September 19, 2017*)

The study concluded that:

"better insulation and air sealing drives greater efficiency, reducing the size of the solar array needed for zero net energy. This benefits the grid by reducing surplus solar generation during midday hours and reducing steep increases in energy demand after the sun goes down." (*Zero Net Energy for the Masses, EPRI Journal, September 19, 2017*)

NAIMA supports California state laws, municipal ordinances, utility incentive programs and Energy Commission policies that support the use of onsite generation, battery storage and energy saving plug load devices and appliances. NAIMA does not support policies within the building energy code that allow for the substitution of such measures against demonstrated cost effective, energy efficient building envelope measures.

2. NAIMA supports requiring Quality Insulation Installation (QII) as a prescriptive measure with guidance issued ensuring compliance by all insulation types

The QII requirements contained in the 2016 Residential Compliance Manual and supporting Certificate of Verification (CF3R-ENV-23-H) require the same installation criteria as required in NAIMA's installation guidance. And the 2016 Residential Compliance section RA3.5.3.1 **Requirements for Walls, Roof/Ceiling and Floors** item (d) states "Materials shall be installed according to manufacturer specifications and instructions." As such, QII should be the rule, not the option.

As California moves to increase the number of homes with high performance attics and walls (HPA and HPW) it should maximize the potential energy savings by increasing the number of insulation jobs meeting QII criteria. Making QII a prescriptive measure will provide a strong incentive to install insulation properly and assure the maximum energy savings possible are realized in every new California home.

NAIMA encourages the commission to work with the interested parties to review the QII requirements and checklists so they apply equitably to all types of insulation materials. This includes checklist measures ensuring compliance with applicable workplace safety standards.

3. Conclusion

NAIMA believes that continued improvements on mandatory, performance and prescriptive requirements for envelope insulation and quality insulation installation, along with the termination of the solar credit will combine to help deliver on the goal of ZNE residential building in California in the near future. The recommendations made in the 2019 Draft standards establish a cost effective roadmap for accomplishing that goal.