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NAIMA comments to 6/1/17 workshop on building envelope

Additional submitted attachment is included below.

NAIMA
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION

June 15, 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: staff workshop on high performance envelope measures for the 2019 residential standards

Commissioners and Staff

These comments are submitted on behalf of the North American Insulation Manufacturers Association (NAIMA) regarding proposed changes to the 2019 version of the California Building Energy Efficiency Standards, Title 24 presented at the June 1, 2017 staff workshop on envelope measures. NAIMA is the association for North American manufacturers of fiber glass, rock wool, and slag wool insulation products. Its 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 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 promoting robust and cost-effective measures for the building envelope.

The 2019 residential energy standard update should include measures that substantially set the requirements for zero net energy building envelopes. This helps meet the Governor's goal of zero net energy homes by 2020. It 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 a clean, conventional electricity supply. Finally, taking such action is a logical continuation of the actions taken by the Commission in the 2016 residential energy standards update.

NAIMA makes the following recommendations:

- Increase the stringency of Section 150.0(c) mandatory features for above grade wall insulation by requiring R15 cavity insulation in 2x4 walls and R21 cavity insulation in 2x6 walls.

- Adopt the CASE report recommendations for Section 150.1 performance and prescriptive compliance requirements for above grade framed walls in those climate zones where it is demonstrated cost effective

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- Adopt the CASE report recommendations for Section 150.1 performance and prescriptive compliance requirements for attics in those climate zones where it is demonstrated cost effective. These include changes to the below roof deck insulation requirements in climate zones 4 and 8-16 for both batt and full framing coverage be R25 in attics with no air space and R21 in attics with air space. This will simplify the code and result in economies of scale by reducing the number of various R-values in the market.

- Adopt Quality Insulation Installations (QII) as a performance and prescriptive compliance requirement with deemed compliance for homes using Section 150.1 performance and prescriptive attic and wall requirements and air sealing package.

- Discontinue the current solar PV credit and refrain from providing new credits that slow or prevent the incorporation of energy efficiency measures resulting in a zero net ready energy building envelope

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

The 2016 Title 24 performance and prescriptive measures for above grade framed walls set a standard that promotes the goal of zero net energy (ZNE) construction. However, few homes are actually constructed to the prescriptive measures and more than 90 percent of California homes are built using Title 24's performance path. Homes built under the performance path only need to comply with the standard's mandatory features for walls – R13 insulation for 2x4 walls and R19 for 2x6 walls. The chart below illustrates the benefits homeowners lose by not adopting high performance walls. Cost information referenced in this document is sourced from the National Renewable Energy Laboratory's Building Energy Optimization software (BEopt) Version 2.7.

Cost & Savings – Standard R-13 wall to HPW

CA CZ	Location	Cost Increase ($)	Annual Savings ($)	30 Year Savings NPV ($)
2x4 Wall R-13 -> 2x6 R-21+7.5 (HPW)				
1	Arcata	$2,138	$176	$3,447
11	Red Bluff	$2,138	$143	$2,800
12	Sacramento	$2,138	$115	$2,246
15	Palm Springs	$2,138	$140	$2,735

Moving to a mandatory measure of R15 for 2x4 walls and R21 for 2x6 walls delivers improved efficiency, is cost effective and puts an optimized insulation product in the wall cavity.

An analysis across multiple California climate zones of the move to R15 and R21 using CBECC-RES 2019 v1.0, yielded cost effective results on a net-present value-basis. In select locations, the move to R21 is not cost-effective (CZs 3 &9), but these savings numbers do not take into account the benefits of more easily achieved QII with higher-density batts.

Cost Effectiveness - Increasing Mandatory Wall Insulation

CA CZ	Location	Cost Increase ($)	Annual Savings ($)	30 Year Savings NPV ($)
2x4 Wall R-13 -> R-15				
3	Oakland	$130	$11	$217
9	Burbank	$130	$7	$143
12	Sacramento	$130	$13	$262
15	Palm Springs	$130	$17	$329
2x6 Wall R-19 -> R-20				
3	Oakland	$65	$3	$63
9	Burbank	$65	$2	$41
12	Sacramento	$65	$4	$75
15	Palm Springs	$65	$5	$90
2x6 Wall R-19 -> R-21				
3	Oakland	$130	$6	$121
9	Burbank	$130	$4	$77
12	Sacramento	$130	$8	$148
15	Palm Springs	$130	$9	$175

When moving to R21 high density batts, and taking into account the fact that R19 batts are not typically inspected and certified as meeting the QII requirements, the move to R21 meeting QII becomes immediately cost-effective. The cost increase of this improvement is only approximately 15-30% of the net-present value in savings of the upgrade. When expressed in terms of payback period, the 15-30 percent investment is paid back within six years or less of the life of the home.

Cost & Savings - R-21 as QII

CA CZ	Location	Cost Increase ($)	Annual Savings ($)	30 Year Savings NPV ($)
2x6 Wall R-19 non-QII -> R-21 QII				
3	Oakland	$238	$53	$1,036
9	Burbank	$238	$38	$741
12	Sacramento	$238	$67	$1,321
15	Palm Springs	$238	$86	$1,690

2. NAIMA supports CASE Report recommendations for improved performance and prescriptive standards for walls and attics in those climate zones demonstrated cost effective

The 2016 Title 24 energy standards established new performance and prescriptive requirement for "high performance attic" (HPA) and "high performance wall" (HPW) insulation. These measures are necessary to meet the State's ZNE goal. They also challenge the residential construction industry to change long standing building practices. The Commission, recognizing that changing building practice takes time, provided a temporary rooftop solar credit available to use against these new envelope requirements. The Commission also worked with California's utilities to establish a comprehensive training program to help the construction industry with this market transformation.

California utilities have dedicated substantial resources and developed world class training courses and provided financial incentive programs to help builders transition HPAs and HPWs into their building practice. Insulation manufacturers recognize the importance of training and have been active participants and partners in California's Advanced Home Program's Master Builder program and the Workforce Instructions for Standards and Efficiency (WISE) training opportunities to help builders, insulation contractors and raters understand how best to achieve ZNE goals for HPA and HPW insulation systems.

Our experience to date leads us to the following conclusions:

- California builders already incorporate the principal design elements for high performance walls and can easily transition to this practice

- Using 2x6 24" on center framing or high performance framing can actually reduce lumber usage and cost, as well as increase thermal performance

- High performance walls meeting QII would have an effective air barrier that will improve the homes overall performance

- Manufacturers are bringing innovative new high performance attic systems to the market that reduce installation complexity and lower cost

- Contractors installing below deck high performance attic systems quickly master the installation process and deliver a QII compliant jobs

California's utilities, the Commission and manufacturers have delivered on their commitment to provide builders with every opportunity to gain expertise on these requirements. If builders continue to avail themselves of these training opportunities over the current code cycle, they should be well equipped to incorporate HPW and HPA measures in every required home built in California under the 2019 code.

3. NAIMA supports simplifying and strengthening the high performance attic standard recommended in the CASE Report.

While NAIMA supports the CASE reports recommendation to continue to strengthen the requirements of the Section 150.1-A performance and prescriptive compliance approaches for attics in low rise buildings, we recognize they add complexity that can be avoided while strengthening the provisions. Specifically, the CASE study proposes below deck roof insulation packages for single family occupancies that would require 4 different R-values (R18, R19, R23, and R25) depending on climate zone and attic configuration in single family occupancies. And, for multifamily occupancies, the CASE study proposes below deck roof insulation packages that would require 5 different R-values (R13, R18, R19, R24, and 28) for multi-family occupancies.

NAIMA recommends reducing the number of prescribed insulation products in single family occupancies to 2 (R25 and R21) by making the requirements for options B1 and B2 the same in in climate zones 4 and 8-16. This change would simplify the code by changing the requirements for R23 in single family occupancies and replacing it with a higher density R25 product which is a standard batt product offered in the market today. This will promote greater QII compliance by simplifying the tables and replacing the R23 with a higher density and commonly available R25 batt product.

Following are the proposed changes for single-family high performance attics:

SECTION 150.1 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR LOW RISE RESIDENTIAL BUILDINGS – **NAIMA Proposal for High Performance Attics**
Single Family

			Climate Zones															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Option B1 Below roof deck insulation (batt)	Roofing Type	no air space	NR	NR	NR	~~R18~~ R25	NR	NR	NR	~~R18~~ R25	~~R18~~ R25	~~R18~~ R25	~~R18~~ R25	~~R18~~ R25	~~R18~~ R25	~~R18~~ R25	~~R18~~ R25	~~R18~~ R25
		with air space	NR	NR	NR	~~R13~~ ~~R19~~	NR	NR	NR	~~R13~~ ~~R19~~	~~R13~~ ~~R19~~	~~R13~~ ~~R19~~	~~R13~~ ~~R19~~	~~R13~~ ~~R19~~	~~R13~~ ~~R19~~	~~R13~~ ~~R19~~	~~R13~~ ~~R19~~	~~R13~~ ~~R19~~
			NR	NR	NR	21	NR	NR	NR	21	21	21	21	21	21	21	21	21

CASE
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			Climate Zones															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Option B2 Below roof deck insulation (full framing coverage)	Roofing Type	no air space	NR	NR	NR	~~R18~~ ~~23~~ R25	NR	NR	NR	~~R18~~ ~~23~~ R25	~~R18~~ ~~23~~ R25	~~R18~~ ~~23~~ R25	~~R18~~ ~~23~~ R25	~~R18~~ ~~23~~ R25	~~R18~~ ~~23~~ R25	~~R18~~ ~~23~~ R25	~~R18~~ ~~23~~ R25	~~R18~~ ~~23~~ R25
		with air space	NR	NR	NR	~~R13~~ ~~18~~	NR	NR	NR	~~R13~~ ~~18~~	~~R13~~ ~~18~~	~~R13~~ ~~18~~	~~R13~~ ~~18~~	~~R13~~ ~~18~~	~~R13~~ ~~18~~	~~R13~~ ~~18~~	~~R13~~ ~~18~~	~~R13~~ ~~18~~
			NR	NR	NR	21	NR	NR	NR	21	21	21	21	21	21	21	21	21

CASE
NAIMA

NAIMA also recommends revising the insulation R-values requirements in multifamily occupancies so that they are consistent with the commonly available materials in the market. Currently the industry does not produce R18, 24, or 28 batts. Setting minimum R-value requirements in Title 24 that are consistent with the standard materials available, will likely reduce cost by not requiring special materials be manufactured for the California market. Additionally, requiring similar and higher density products for below roof deck applications (B1 and B2) will simplify the code and promote greater QII compliance.

The following tables would align the new HPA R-value requirements with standard materials in the market:

Multifamily

			Climate Zones															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Option B1 Below roof deck insulation (batt)	Roofing Type	no air space				~~R18~~				~~R18~~	~~R18~~		~~R18~~	~~R18~~	~~R18~~	~~R18~~	~~R18~~		
			NR	NR	NR	~~28~~	NR	NR	NR	~~28~~	~~28~~	~~18~~	~~28~~	~~28~~	~~28~~	~~28~~	~~28~~	~~18~~	CASE
			NR	NR	NR	30	NR	NR	NR	30	30	21	30	30	30	30	30	21	NAIMA
		with air space				~~R13~~				~~R13~~	~~R13~~		~~R13~~	~~R13~~	~~R13~~	~~R13~~	~~R13~~		
			NR	NR	NR	~~19~~	NR	NR	NR	~~19~~	~~19~~	~~13~~	~~19~~	~~19~~	~~19~~	~~19~~	~~19~~	~~13~~	CASE
			NR	NR	NR	21	NR	NR	NR	21	21	15	21	21	21	21	21	15	NAIMA

			Climate Zones															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Option B2 Below roof deck insulation (full framing coverage)	Roofing Type	no air space				~~R18~~				~~R18~~	~~R18~~		~~R18~~	~~R18~~	~~R18~~	~~R18~~	~~R18~~		
			NR	NR	NR	~~24~~	NR	NR	NR	~~24~~	~~24~~	~~18~~	~~24~~	~~24~~	~~24~~	~~24~~	~~24~~	~~18~~	CASE
			NR	NR	NR	25	NR	NR	NR	25	25	21	25	25	25	25	25	21	NAIMA
		with air space				~~R13~~				~~R13~~	~~R13~~		~~R13~~	~~R13~~	~~R13~~	~~R13~~	~~R13~~		
			NR	NR	NR	~~18~~	NR	NR	NR	~~18~~	~~18~~	~~13~~	~~18~~	~~18~~	~~18~~	~~18~~	~~18~~	~~13~~	CASE
			NR	NR	NR	21	NR	NR	NR	21	21	15	21	21	21	21	21	15	NAIMA

4. NAIMA supports requiring Quality Insulation Installation (QII) as a prescriptive measure

Installing insulation materials to the QII criteria with an effective air barrier assures the materials deliver the expected energy savings to home owners. The added energy savings resulting from properly installed insulation will move California closer to its stated energy savings goals by saving more energy during the entire life of the building.

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 entitled, *Recommendations for Installation in Residential and Other Light-Frame Construction*. 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 the State 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.

As an added incentive to meet the QII criteria, NAIMA recommends the Commission consider insulation jobs that use higher density insulation products like R15 and R21 batts or blown in type wall insulation be "deemed to comply" with QII. Experience has shown the higher density materials, like R-15 and 21, and blown materials are easier to install properly and are more likely to fill the wall cavity because it is more difficult to compress them. In addition, insulation materials that are blown into walls tend to fill odd shaped cavities with less time and skill. NAIMA recognizes using higher density or blown materials does not guarantee a QII compliant job and therefore would support requiring a less rigorous inspection of the insulation and air barrier.

Finally, NAIMA encourages the commission to work with the interested parties to review the QII requirements and checklists so they apply equally to all types of insulation materials.

5. **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.**

Both renewables and efficiency are needed to build a ZNE home. The 2019 standards should promote a highly efficient and cost effective envelope so as to optimize mechanical systems and minimize generation requirements. Many stakeholders opposed the policy decision to create a temporary solar credit in the 2016 code allowing builders to postpone adoption of new prescriptive building envelope measures until 2020 or later. NAIMA is relieved the Commission sent a clear, unambiguous message to the market that this credit is temporary and will not be included in the 2019 code.

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As the chart below illustrates, insulation differs from other building components by delivering energy savings for the life of the building.

Life-span of Various Building Components (Years)

Component	NAHB Study	NREL
Insulation		
Cellulose	100+	999
Fiberglass	Lifetime	999
Foam	Lifetime	999
Appliances		
Refrigerator	13	17.4
Dryer	13	13
Washer	10	14
Gas Range	15	15
Electric Range	13	13
Dishwasher	9	11
Electric Furnace	15	20
Gas Furnace	18	20
Heat Pump	16	15
Air conditioner	10-15	16
Tankless water heater	20	13
Tank water heater - Gas	11	13
Tank water heater - Electric	10	13
Lighting		
Lighting - Incandescent	-	2.6
Lighting - CFL	-	14.1
Lighting - LED	-	66.5
Solar		
Tank water heater - Solar	-	30
Solar PV panels	-	25
Solar PV inverter	-	10

We support California state laws, municipal ordinances, utility incentive programs and Energy Commission policies that support the use of onsite generation, battery storage and Energy Star appliances. We do not support policies within the building energy code that allows for the substitution of such measures against a demonstrated cost effective, energy efficient building envelope.

6. Conclusion

NAIMA believes that continued improvements on mandatory, performance and prescriptive requirements for envelope insulation and quality insulation, 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 CASE reports establish a cost effective roadmap for making many of these improvements and serve as the foundation for the 2019 standards update.

Thank you for considering these comments and NAIMA looks forward to working with the Commission to meet its goals in the development of the 2019 Title 24. Please contact me if you have any questions regarding these comments.

Sincerely,

Curt Rich

President and CEO
North American Insulation Manufacturers Association