

COLD CLIMATE ENGINEERING, LLC

March 26, 2017

Senator Anna MacKinnon
State Capitol, Room 516
Juneau, AK 99801-1182

RE: Senate Bill No. 87, Public Comment

Dear Senator MacKinnon,

I first want to thank you, your staff and the Legislature on everything you are doing during these tough economic times. I greatly appreciate your dedication to the citizens of Alaska and our future generations.

I would like to submit public comment on Senate Bill 87 on ways to improve the energy efficiency and cost effectiveness of educational infrastructure. As a professional mechanical engineer who has been designing schools and other government structures throughout Alaska and the Antarctic for more than 20 years, I thank you for taking this issue on. It is a career mantra of mine to design facilities with a hyper-focus on minimizing long-term operational costs. I thank you for taking this very important issue on.

I apologize for the long letter. These issues are complex and not always easy to summarize in a short sentence. If you would rather that I talk through these items with your staff or if there is any way I can be of service, please do not hesitate in contacting me at (907) 770-2653 or cfredeen@coldeng.com.

I am very much in favor of the intent of the bill. There are a lot of items in this bill that I believe are spot-on and a couple items that I agree with but would like to make some constructive recommendations on how they can be better implemented.

Commissioning (Page 2, Line 7)

Adding Commissioning as a requirement is outstanding! As you know, commissioning is a systematic way of verifying that all of the automatic functions in a building (like the energy management systems) are functioning correctly at the time of occupancy. Most School Districts already use this process, but it is good to require it for all projects. There is an additional cost to both the design team and the Contractor from the additional time it takes to complete the testing and verification. The payback in achieving the designed energy savings for the Owner and reduced warranty call-backs for the Contractor are immediate. As an engineer who has commissioned buildings, I can provide your team with a lot more information about this process, the benefits, and the costs if desired.

Life Cycle Cost Analysis (Page 3, Line 23)

I'm assuming the intent of this section was to provide the ability to rank the projects by energy saving potential. I have completed numerous Life Cycle Cost Analysis (LCCA) calculations in my career and it is a decent tool to compare multiple design options of a single system such as a heating plant upgrade. But the LCCA is an involved calculation that most District administrators will not be able to have

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available when submitting their grant application. Using Simple Payback is a simpler and more straight forward analysis and is the basis for most energy audit recommendations. The LCCA is also not applicable for facilities as a whole. For the designers, we also won't know how many LCCA's to budget for in our fee proposal. Though this section is well intentioned, it creates implementation issues.

- Recommendation: Using a Simple Payback would be applicable for a Major Maintenance Upgrade item such as a boiler or roof replacement. For facilities, a better metric would be an expected energy efficiency percentage improvement beyond a baseline energy standard such as ASHRAE 90.1. This is common for LEED compliance and Corps of Engineers projects (i.e. 20% savings beyond ASHRAE 90.1-2010). The Districts need to be careful with this though as too much of an energy saving expectation could result in spending construction budgets on energy conservation systems that are not economically appropriate.
- Recommendation: Work with DEED on how this would be implemented. Based on the other parts of the bill, removing this provision will reduce confusion and unintended cost impacts while keeping the overall benefits of the bill.

Design Awards (Page 6, Line 4 and elsewhere)

I'm sure you'll hear from several people about this. All architects and design professionals want their buildings to look nice. As an engineer, I agree that there are things that some architects design into schools that I too believe are excessive. However, in my experience, these components will be included in a design whether a school is submitted for a design award or not. Nor will it reduce complaints from the public of perceived overspending as they drive by the school. Ultimately, it's up to the Districts and DEED to keep their designers in check on what they believe are excessive finishes and detailing.

- Recommendation: Remove this provision of the bill. It won't deter excessive costs on finishes and removal will eliminate most of the opposition you'll receive from the design community. In my opinion, it is better to incentivize the Districts and Boroughs to hold their design team to appropriate and cost effective finishes and layouts. More on the incentives under Other Considerations.

Reviewing Minimum Energy Efficiency Standards (Page 7, Line 9 and elsewhere)

Increasing the minimum energy standards for the schools is fantastic! I believe that all energy codes, including the more stringent ASHRAE 189.1, are too light on building envelope standards for Alaska. I look forward to the outcome of the Working Group on this fundamental requirement for energy savings.

Shared Maintenance and Support Team Model

Excellent use of services! There is a significant shortage of trained technicians in rural Alaska and this provision will not only save on annual energy costs, but more importantly result in improved preventative maintenance on these facilities which will reduce the more expensive State paid long-term capital costs of replacement. The inclusion of "regional or local organization" will include access to the trained technicians at the local water and wastewater utilities, the clinics, and the power plant. This can also benefit those entities' operational costs as well if the sharing of technical expertise is reciprocal.

- Recommendation: Include the subcontracts with private organizations to these entities.
Private specialty technicians, such as generator or building automation controls technicians,

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are commonly contracted out. Private companies are not noted under the acceptable organizations and may not be eligible for sharing.

- Recommendation: Change “the department may enter into a contract...” to “the department or School District may enter into a contract...”. The School Districts know best what technical resources are available in their communities and what financial agreement will work best for them. This would improve local control and greatly reduce the State administrative overhead in brokering and maintaining these agreements among the numerous local entities throughout the State.
- Concern: This provision should not be a statewide maintenance team as the travel costs alone will likely result in higher total operational costs and the availability of the service team may not be able to handle an immediate need request. Allowing either the “department or School District” to engage in these agreements will ensure the best cost model is utilized.

Shared Space (Page 8, Line 14)

This makes a lot of sense. DEED has allowed joint use of facilities in the past, but this improves on that model. The unions will likely push back on the background checks. In the end, I do not see the additional safety risk between a state service that is attached yet separate from a school verses one that is across the street. Please note that the separate entry and exit requirements mentioned in the committee meeting on the 24th is not currently in the bill. There is no need for any access between the two spaces except under dual usage such as libraries.

- Question: How does this play into the DEED school funding and total square footage caps?

Working Group (Page 8, Line 28)

I appreciate and agree with the intent and representation on the committee. Having AHFC, AEA, and CCHRC on the committee will provide a fresh perspective on energy conservation policy for our State facilities. Their numerous studies and project experience will provide invaluable information. But none of them have designed or constructed a school or major public use facility. The inclusion of Contractors on the committee will provide practical cost and logistical input and I applaud their inclusion on the committee.

This is a good policy group, but in my opinion the current make-up does not have enough hands-on and technical experience with the specific energy systems that are being discussed to provide practical and implementable recommendations.

- Recommendation: Replace the superintendents on the committee with School District Facility Managers, one rural and one urban. These are the individuals who are in charge of maintaining the schools and will have to live with the consequences of this legislation. They know best what works and what doesn't work. Superintendents are valuable resources, but they don't have the knowledge that their Facility Managers have on this subject. Having worked collaboratively with these individuals for decades, I can say without a doubt that Facility Managers will be the most important people to include for this Working Group to be successful.

- Recommendation: You need design professionals on this committee. We're the ones that bridge policy to constructability. Recommend adding one architect, one mechanical engineer, and one electrical engineer.
 - Architects have the overall educational design experience from planning through construction and are the subject matter experts on the building envelopes and most importantly on the current best practices on the design of the learning environment to maximize the educational process. A school is very unique in this aspect from other vertical construction that the other group members are experienced with.
 - Mechanical and electrical engineers are the subject matter experts on the systems that are noted for standardization. We've completed the LCCA analysis, we know the different manufacturers and equipment that is out there, we know how the various system solutions work and where they are best applied. The current group members have a few engineers on staff that they can refer to, but most of them are specialized in a specific area of design such as renewable energy and not fluent on the building systems this legislation is addressing. The field of knowledge is too broad for just one engineer to effectively cover both disciplines, even for those rare individuals who are dual-stamped.

Other Items to Consider:

This bill tackles several items on ways we can better utilize our capital expenditures and reduce long term operational costs. I'd like to suggest a couple more opportunities.

Reduce the Full Spending of Grants

My experience is that Boroughs and School Districts fully spend the grants they are provided. DEED could provide more information on this perception. There is almost always money left over from construction (if the design team has done their job) that could be returned to the State.

The design team can provide a frugal design and the Contractor can provide highly competitive and cost effective construction services resulting in 5%, 10%, or higher in remaining construction budget. Yet all of the grant will still be spent through change orders at the end of the project in a "use it or lose it" mentality on items outside of the original design. Niceties, but not required for an operational school. This is not limited to DEED grants.

- Recommendation: Talk to the Districts and Boroughs to see what would incentivize them to return excess grant money back to the State. Some thoughts include:
 - Allow 25% or 50% of the remaining funds be reallocated to the School District towards energy upgrades at other facilities.
 - Add a line item on the grant request form requiring a summary of the Districts last four (?) projects with the amount of grant requested and percentage returned to the State. That way it doesn't matter if it was a small roof project or a new high school.

Incentivize Value Engineering

Value Engineering (VE) is the process of identifying alternate ways to accomplish the same design intent at a reduced costs. Though this should be occurring throughout the design process, there is an

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opportunity during the construction process as well since the Contractor is not as attached to a design solution as the design team may have been.

- Recommendation: Research how some government agencies (I believe the Corps of Engineers) utilize VE incentive plans to reduce costs. I believe it includes a financial incentive for the Contractor through them being able to keep a percentage of the credit provided for all approved VE ideas. This would need to be implemented as part of the previously noted incentive to return the excess grant funds back to the State or the savings will just be spent elsewhere on the project.

Maximize the Grant Impact

The square footage limitation ties the hands of the design team in providing cost effective square footage. This could lead to excess funds that are spent on “fancy” finishes. If a School District or Borough sees an opportunity to be able to get another classroom or more storage space, they would be more inclined to keep the design team in check on utilizing cost effective design solutions.

- Recommendation: Use the square footage as a basis of the grant, but free the design team to go beyond that square footage with their design.

Provide Proper Space for Maintenance and Energy Savings

The square footage limitation also counts towards mechanical and electrical spaces. Every square foot of a mechanical or electrical room counts against classrooms space. Hence these spaces are squeezed in size to where it costs more to maintain and operate these systems. Mechanical spaces specifically provided in mezzanines and penthouses, which also count against square footage, are cost effective spaces that can be inexpensively added to a facility while reducing operational costs and providing more learning space.

- Recommendation: Exempt mechanical and electrical rooms from square footage calculations.

Square footage calculations are based on the outside dimensions of the facility. This includes the exterior walls. The more energy efficient a wall is (higher R value), the thicker it is, and this results in reduced classroom square footage because of the square footage cap.

- Recommendation: Exempt the building envelope from square footage calculations.

Again, thank you for your time and consideration on these important issues. If there is any way that I can be of further assistance, please do not hesitate in contacting me.

Respectfully Submitted,



Craig Fredeen, PE
President
Principal Mechanical Engineer