HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEES ON OVERSIGHT AND ENERGY

"Green Buildings – An Evaluation of Energy Savings Performance Contracts"

QUESTIONS FOR THE RECORD

Answers: Submitted by Ronald (Ron) L. King, President Advisor, National Insulation Association.

Questions submitted by Chairman Paul Broun and Chairwoman Cynthia Lummis

1) How often is mechanical insulation used as an energy efficient improvement within ESPCs? Do you find this to be sufficient? If not, why do you believe this technology is not further utilized?

ESPC projects can be, and usually are, comprehensive and employ a wide array of cost-effective measures to achieve energy savings. These measures often include high-profile energy efficiency measures such as high-efficiency lighting, high-efficiency heating and air conditioning, efficient motors and variable speed drives, and centralized energy management systems. Mechanical insulation and potentially other less known energy efficiency initiatives may or may not be included. Unfortunately, we have found that mechanical insulation is easily and often overlooked.

Upgrading, replacing, or repairing mechanical insulation is in most cases determined by the scope of the ESPC project. Because mechanical insulation is located on piping and ducts that are often in walls or above ceilings, it is normally not considered due to ease of accessibility. Replacing missing or damaged accessible mechanical insulation may or may not be considered depending upon the approach utilized by the Energy Service Company (ESCO).

Mechanical insulation typically yields a return on investment ranging from a few months to less than 7 years. Because of the significant and proven return on investment, mechanical insulation is well suited to be an integral part of energy service contracts and the resulting holistic savings verification. Mechanical insulation adds value in achieving the projected energy savings, return on investment expectations, emission reduction, and other high-performance objectives. Mechanical insulation should be considered on every ESCO project.

2) Is mechanical insulation included in most building codes standards and are those standards being enforced?

Unfortunately, the benefits of mechanical insulation are often overlooked by all key stakeholders during new construction, retrofitting, and maintenance opportunities. While most building codes do include mechanical insulation based upon ASHRAE, or other reference standards, the benefits of this technology are reduced because most of those standards include only minimum requirements and those stated minimums are seldom exceeded. Maintenance is also often neglected and not accomplished in a timely and proper manner.

Building codes from a technical thermal perspective are in large part believed to be enforced, but there are hundreds, if not thousands, of examples where a lack of understanding and resources leads to mechanical insulation system specifications being modified incorrectly and/or not being installed by experienced contractors. Thus, compliance and enforcement is a major concern.

Other concerns include the length of time it takes new standards or codes to be implemented and enforced in new construction, old or new codes being followed or enforced in retrofit projects, and the lack of concern for replacing missing or damaged mechanical insulation that conforms to the original or any new code requirement.

Improved mechanical insulation codes and enforcement present an opportunity for energy efficiency and emission reduction that should be priority at all levels of government.

3) Can you explain the term "Energy – Water Nexus" in the context of what role mechanical insulation can have in it?
   a. Is there a role for Congress to be involved in this issue either through ESPCs or other legislative avenues?

Hot water delivery systems routinely use thermal insulation (pipe insulation) to maintain the temperature of the water as it travels from the source (the hot water heater) to the destination (the faucet at the sink). All current energy codes and standards require some degree of thermal insulation on potable hot water piping. However, the requirements between codes vary and except for the newer "green" codes, most requirements are normally considered minimum levels.

Existing research has not considered the value of water when making the business case for putting additional pipe insulation on hot water piping, increasing the thickness of insulation, or identifying a scope of work for insulation installation. While studies have looked at energy efficiency, they have not addressed the short-term economics, which depend on frequency, duration, and pattern of usage, and remain the overriding consideration for most building owners.

Thermal insulation for mechanical systems is a simple and cost-effective technology for reducing heat losses and gains in building systems and manufacturing processes. As energy codes, standards and associated regulations—both prescriptive and holistic—become more stringent, and building owners, operators, and tenants strive for higher performing and more sustainable buildings, designers and owners should focus on how and where to use more, not less, insulation.

Initial studies and analysis demonstrate that pipe insulation reduces the amount of time it takes to get the correct temperature water to the end user, thereby conserving water resources and, in hot water delivery systems, saving energy. Planning for, and installing, proper thermal insulation systems at the time of construction is significantly easier and more cost effective than retrofitting or upgrading the insulation systems later. Therefore, when facilities are renovating or repairing facilities, building owners should not overlook the opportunity to upgrade pipe insulation, and other insulation systems should not be overlooked. Efforts to reduce thermal insulation levels to minimize up-front costs significantly diminish the ability to achieve long-term performance of building systems.

The National Institute of Building Science's (NIBS) Consultative Council recommends the federal government, with support and expertise from the building industry, conduct a study to determine how the use of thermal insulation on potable and other hot water delivery systems impacts both energy and water use, and examine the business case and return on investment of that opportunity.

With shortages in water and energy anticipated in the near future, and both resources escalating in cost, combined with the long service life of hot water piping systems and the relatively minor incremental cost of insulation, the potential impact achieved by increasing insulation can be substantial and immediate. Before regulators, code officials, designers, owners, and others will consider the advantage of expanding the scope of pipe insulation, researchers must determine, beyond that of small examples,

the impact that increased insulation would have on energy efficiency, water conservation, and the business case.

4) Can the savings generated by mechanical insulation be verified?

Mechanical insulation opportunities can be easily identified, with potential energy savings and emissions reduction determined with proven DOE-utilized software technology: 3EPlus®, developed by the National Insulation Manufacturers Association (NAIMA). For facility owners and operators, the savings are swift and sustainable, and the return on investment from mechanical insulation in building applications is typically less than 4 years (and sometimes as little as 6 months).

In addition, as part of efforts by the Department of Energy's (DOE) Advanced Manufacturing Office (AMO) to improve the energy efficiency of the U.S. industrial and commercial sectors, the National Insulation Association (NIA), in conjunction with its alliance partners, developed a series of "Simple Calculators." The calculators provide the user with instantaneous information on a variety of mechanical insulation applications in the industrial-manufacturing and commercial markets.

The calculators are online and housed at the National Institute of Building Sciences Mechanical Insulation Design Guide (MIDG), *www.wbdg.org/midg*, or can be linked from NIA's website, *www.insulation.org*. They are fast, free, and functional. These tools make it easy to discover energy savings, financial returns, and other information about the design of mechanical insulation systems for above or below ambient applications.

NIA and its members are committed to working with Congress, the Department of Energy and other federal agencies, and key stakeholder groups to bring together a coalition to help develop, implement, and provide mechanical insulation educational awareness programs. Congress could help lead the way in the formation of this coalition which could be funded in partnership with industry and Congress.

Listed below are available resources that will provide additional information on the many benefits of mechanical insulation. All of these resources can be found directly or via links on the NIA website, *www.insulation.org*.

- **National Insulation Association, *www.insulation.org***
- **National Institute of Building Sciences, Mechanical Insulation Design Guide (MIDG), *www.wbdg.org/midg***
- **Midwest Insulation Contractors Association, National Commercial & Industrial Insulation Standards Manual, *www.micainsulation.org***

- **E-Learning Modules—DOE National Training & Education Resource, *www.nterlearning.org*,**
- **Simple Energy Calculators can be found at the Department of Energy's Industrial Technologies Program's Software Tools website, *www1.eere.energy.gov/industry/bestpractices/software.html***

5) In your testimony, you mentioned a mechanical insulation assessment in the State of Montana. Would a federal building mechanical insulation assessment be feasible, and what experience do you have with such assessments for federal buildings?

Completing an assessment of mechanical insulation in any building, regardless of ownership or occupancy, is feasible and recommended. The Montana assessment is one example of many our members have completed in government and private buildings and facilities.

The National Insulation Association (NIA) is committed to educating industry and promoting the benefits of mechanical insulation. One effective approach is establishing public-private partnerships to provide public education and awareness regarding the benefits of mechanical insulation through pilot program assessments.

The purpose of such a program is to determine and communicate the energy efficiency, emission reduction, and return on investment opportunities available in federal buildings with the repair, replacement, and/or maintenance of mechanical insulation systems on specific mechanical systems within the respective facilities covered in the scope of the assessment. This can be accomplished through an assessment of mechanical insulation in a sampling of mechanical systems in the respective facilities.

NIA would be interested in exploring this type of pilot program concept with any of the Federal agencies.

Questions submitted by Rep. Randy Hultgren (R-IL)

1. Have mechanical insulation companies experienced or noted any disadvantages when partaking in the ESPC program?
    a. If so, what have those been and how often have they occurred?
    b. Have these disadvantages dissipated over the years as the program has evolved?
    c. How can the program be improved to eliminate such weaknesses?

We have not noted any specific disadvantages other than not always being considered. As addressed in one of Chairman Broun and Chairwoman Lummis's questions, ESCO projects can be comprehensive and employ a wide array of cost-effective measures to achieve energy savings. High-profile energy efficiency measures such as high-efficiency lighting, high-efficiency heating and air conditioning, efficient motors and variable speed drives, and centralized energy management systems are normally included, whereas mechanical insulation may or may not be included. Unfortunately, we have found that mechanical insulation is frequently overlooked.

This oversight may have improved slightly over the last few years but mechanical insulation remains the "Rodney Dangerfield" of energy efficiency initiatives. It does not receive the respect it should for the return on investment yielded. Mechanical insulation should be considered and be an integral part of energy service performance contracts and the resulting holistic savings verification process. Mechanical insulation adds value in achieving the projected energy savings, return on investment expectations, emission reduction, and other high-performance objectives.

Respectively submitted,

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