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Mechanical insulation: A simple solution with a big impact

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In the last issue of BIC Magazine, I answered the question, "What is the cheapest form of energy?" I explained that energy is generally split into two buckets — renewables and non-renewables. Global investment in low carbon energy technology surpassed $1 trillion in 2022 for the first time and was close to matching the investment in fossil fuels. Several sources have stated that 2022 will be remembered as a turning point in the world's transition to clean power. But the bottom line is that while renewable energy has dropped in price, there is one form of energy generation that is the clear winner: the energy you don't use in the first place. The mechanical insulation industry often says, "Insulate: Find out that the cheapest form of energy is the energy you don't use in the first place."

Blinded by a glimpse of the obvious

Finding out that a simple solution has been the answer all along can feel like being "blinded by a glimpse of the obvious," to quote marketing guru Susan Miller. Mechanical insulation is one of those obvious yet simplistic solutions. The same concept that has caused millions of us to buy Yeti and Pelican coolers for our drinks also applies to manufacturing operations that use or generate temperature-controlled processes, like steam.

Insulation products could even be called superheroes because they do so many things at once beyond temperature control. Just as new technology has brought tremendous gains, there are times when good old-fashioned solutions fit the bill very nicely. I believe that insulation products are good old-fashioned technology. Mechanical insulation could play a larger role in enabling climate goals if the effectiveness of this simplistic technology was better understood.

Adding insulation to mechanical systems cuts both energy and emissions and saves the facility money on future energy costs — money that can be used for other systems to be insulated or some other project. Adding just two inches of fiberglass insulation to an uninsulated 4-inch diameter 350°F pipe causes the energy loss to drop per lineal foot from 1,462 BTU/hour to a mere 71 BTU/hour. To help you visualize this, one BTU is about the same amount of energy that is released from burning a single match. In addition, just one foot of that same pipe insulation will reduce the CO_2 output by one ton per year, every year — from 2,427 pounds per year to only 118 pounds per year.

Trees might be part of the problem

There are some not so simple technologies that are being developed as a way to reduce or remove carbon emissions. As an example, a technology company called Heirloom is pursuing methods to remove CO_2 from the air by utilizing carbon absorbing limestone — where limestone naturally absorbs the carbon. Another company, Kodama Systems, is lining up investors for its technology that will reduce CO_2 in the air by chopping down and burying trees in lined vaults. Surprising, right? A typical living hardwood tree can absorb as much as 48 pounds of CO_2 per year. But when a tree dies, it releases CO_2 into the atmosphere, aided by insects and decay.

Scientists say burying trees can reduce global warming as well — particularly if those trees would otherwise end up burning or decaying, thus releasing their stored carbon into the air. A professor from the University of Maryland, Ning Zeng, explains that the average ton of freshly harvested forest is about 50% carbon by weight, and if left to rot or burn, it would put the equivalent of one ton of CO_2 into the atmosphere. A good rule of thumb, he says, is that "a ton of biomass in the earth is a ton of CO_2 not in the sky."

Insulation is the same. One foot of pipe insulation can save over a ton of CO_2. Using the same analogy as the tree example, "a ton of CO_2 not generated because of properly insulated mechanical equipment is a ton of CO_2 that is not in the sky."

Good old-fashioned mechanical insulation: installing it is a proactive action that many companies can take right now. And it works the minute you put it on.

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