Time to Ratchet up Energy Efficiency

By David A. Johnston

For the past four or five years, the topic of climate change and the warming of the earth’s atmosphere has been guiding, if not dictating, policy decisions of all types around the world. Much of the major impetus of this comes from the recommendations of scientists who are advising that we must aim for global greenhouse gas emissions reductions within 10 years in order to avoid catastrophic climate change.

Buildings have been identified as a major, if not the major source of demand for energy and materials that produce by-product greenhouse gases. Slowing the growth rate of greenhouse gas emissions and then reversing it over the next ten years is the key to keeping global warming under one degree centigrade above today's level.

It will require immediate action and a concerted global effort. Yet there are hundreds of coal-fired power plants currently on the drawing boards in the U.S. alone. A whopping 76% of the energy produced by these plants will go to operate buildings.

Although the preponderance of evidence shows that the actions and activity of mankind is contributing significantly to this change, there is some credible evidence to the contrary. No matter where scientific evidence falls in this debate, the simple fact is that it is far better to maximize the earth’s scarce resources to the fullest extent, than to deplete them.

The decision on what course of action the U.S. should take on climate change and global warming is now being decided. The proposed American Clean Energy and Security Act of 2009 will establish new and more stringent requirements for energy efficiency.

The proposed legislation, which is expected to pass in this session of Congress and be signed into law, will necessitate embracing emerging technologies, improving existing technologies, and developing new technologies to meet the requirements of the proposed law.

The proposed new energy efficiency requirements will not be easy to meet. With the enactment of the new law, all buildings must reduce energy use by 30%, comparable to a building designed and constructed using the ‘baseline code.’

And the law does not stop there. It also stipulates a 50% reduction in energy use relative to the baseline code must be met by January 1, 2014, for residential buildings, and January 1, 2015, for commercial buildings.
In addition, a 5% additional reduction in energy use relative to the baseline code will become effective January 1, 2017, for residential buildings, and January 1, 2018, for commercial buildings. The reduction will apply every 3 years thereafter through January 1, 2029, and January 1, 2030, respectively.

The proposed law intends that its provisions will be enforced through the model building or baseline code. For residential buildings, this is essentially the 2006 International Energy Conservation Code published by the International Code Council (ICC). Commercial buildings must meet ASHRAE Standard 90.1 – 2004 published by the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE).

The proposed law considers successor codes to be any code containing a high level of energy efficiency that is developed through a recognized consensus process. This is similar to how ICC codes are developed.

However, the requirements and enforcement mechanisms don’t end there. If a ‘successor code’ to the baseline codes provides a greater reduction in energy use than is provided for in the law, then the code with the more aggressive level of energy saving becomes the target within all building codes.

If the Secretary of Energy determines that such greater reductions in energy use can be achieved with a code that is life cycle cost-justified and technically feasible, then, by rule, he may establish a national building code energy efficiency target for residential or commercial buildings achieving greater reductions in energy use than the targets prescribed in the law.

The successor code must achieve a reduction in energy use that is greater than zero but less than the targets previously prescribed. The Secretary must determine that such a lesser target is the maximum reduction in energy use that can be achieved through a code that is life cycle cost-justified and technically feasible.

Substantial savings can only result from larger investments in energy saving equipment and solutions, many of which are still evolving or in development.

The building industry accounts for 40% of total energy use. The U.S. Department of Energy is involved in a landmark study with the EIFS Industry Members Association (EIMA) that compares the temperature and moisture control of various exterior wall claddings.

Exterior insulation and finish systems (EIFS) are multi-layered exterior wall systems used on both commercial buildings and homes. According to the DOE study, EIFS perform better that brick, stucco, and cement fiber siding in tests measuring the key building performance goals of energy efficiency, temperature control and moisture control in mixed, coastal, Zone 3 climates.

In addition, EIFS offer more design flexibility than other cladding products.

Developed in Europe in the 1950s, EIFS were introduced in the U.S. almost 40 years ago. They were first used on commercial buildings and later on homes. Today, EIFS account for nearly 30% of the U.S. commercial exterior wall market.

EIFS typically consist of the following components:

- Insulation board, made of polystyrene or polyisocyanurate foam, which is secured to the exterior wall surface with a specially formulated adhesive and/or mechanical attachment.
• A durable, water-resistant base coat, which is applied on top of the insulation and reinforced with fiber glass mesh for added strength
• An attractive and durable finish coat—typically using acrylic co-polymer technology—which is both colorfast and crack-resistant.

The results of the DOE studies conducted over three years by researchers from Oak Ridge National Laboratory also concluded that EIFS and drainage EIFS performed better than the other typical exterior claddings (e.g., brick, stucco and cement fiber siding) in moisture resistance and insulation.

Adding further validation to the study is EIFS inclusion in the 2009 International Building Code and International Residential Code (IBC/IRC). These model building codes are the foundation for local building regulation around the U.S. and are a major influence on how buildings are constructed around the world.

The action by the ICC validates EIFS both as a product and as a process. It further removes any ambiguities in the interpretation of what EIFS are and how they are implemented into the building code construction process.

The ICC action, announced during its Final Action Hearings in Minneapolis in September 2008, clearly demonstrates a collective consensus among building officials that EIFS meet fire resistance requirements and safeguards public health and general welfare through its energy conservation properties.

In this day and age where energy efficiency is the new currency for judging the performance of any kind of building, taking another look at proven energy efficient systems such as EIFS is a realistic response to almost unrealistic energy efficiency requirements.

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