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August 8, 2012

Senator Jean Shaheen, Chairman
Senator Mike Lee, Ranking Member
Senate Energy and Natural Resources Committee, Subcommittee on Water and Power
304 Dirksen Senate Office Building
Washington, DC 20510

Hearing on Water Efficiency and Power Impacts, July 25, 2012

The International Code Council is pleased to address the critical issue of the energy and water efficiency relationship. We wish to extend our appreciation to the Senate Energy and Natural Resources, Water and Power Subcommittee, and to Chairman Shaheen and Ranking Member Lee for providing the opportunity to comment.

The International Code Council (ICC) is a member-focused association dedicated to helping the building safety community and construction industry provide safe and sustainable construction. We do so through the development of model building codes and standards used in the design, build and compliance process nationwide. Most U.S. communities and many global markets adopt ICC's International Codes (I-Codes). Presently, all fifty states and the District of Columbia have adopted the I-Codes at the state or jurisdictional level. Federal agencies including the Architect of the Capitol, General Services Administration, National Park Service, Department of State, U.S. Forest Service and the Veterans Administration also enforce the I-Codes for the facilities that they own or manage.

The relationship between water and energy use has long been recognized in many sectors, yet in the United States, we have traditionally addressed each topic individually. There are three primary categories for this energy/water relationship, each with different stakeholders and drivers.

- Centralized Water Supply and Treatment
- Water Point of Use Applications
- Energy Recovery from Wastewater

Centralized Treatment
Since the 1950's an increasing percentage of Americans and businesses receive water supplies and wastewater treatment from centralized, permitted facilities. Energy is consumed in the transport of water to the treatment facility, in the treatment of the water itself, and in the delivery of potable water to the customer. The amount of energy consumed in transport will depend significantly on the terrain and distance between the source and the water treatment facility. This accounts for the fact that the California State Water Project, which pumps water over the

Tehachapi Mountains to users in the southern part of the state, is California's largest power consumer. Notably, future energy consumption for transporting water is likely to be even higher as population centers are forced to reach farther afield for sources of water. Treatment too draws significant amounts of energy, and future energy consumption is also likely to rise as water purveyors are forced to use lower quality sources. One extreme in this regard is desalination, which consumes significant quantities of energy using current technology.

Reduced demand for water resulting from water efficiency measures can provide immediate energy savings from both transport and treatment. Even modest water efficiency measures implemented on a community scale through green codes like ICC's International Green Construction Code (IgCC) can produce measureable energy savings for water purveyors. They can also delay or eliminate the need for the construction of expensive new treatment and pumping infrastructure.

Opportunities exist for similar savings by utilizing more decentralized water sources and treatment. This involves the use of alternate onsite water sources such as collected rainwater, graywater, and HVAC condensate to offset or eliminate the need for conventional centralized supplies with their embedded energy. While these systems are promising, care must be taken to protect the health and safety of the consumer through the use of codes like the IgCC and science-based standards. Research and development is also needed to ensure that the implementation of alternate onsite systems community wide does not consume more energy than a comparable centralized system.

Point of Use Applications

It is the end use of water that determines the overall demand within a region, and therefore sets the total energy consumed by a centralized treatment system. Therefore, the less water consumed by homes, office buildings, industry, and agriculture, the less energy that will be consumed by water purveyors treating and pumping water.

There are many applications where reductions in water consumption directly reduce energy demand at the point of use. The majority of public supply water is delivered to commercial and residential buildings, and ICC's model codes provide the basis for the construction of almost all of these buildings in the United States.

As a result, ICC's model codes and standards are uniquely positioned to provide immediate and measurable savings when implemented in jurisdictions. For example, reductions in hot water consumption carries with it proportional energy savings, all other things being equal. If a traditional showerhead is replaced with a WaterSense certified showerhead consuming 20% less water, as required in the IgCC, 20% less energy is required to heat the water (assuming the duration and temperature of the water stay the same). Within ICC's family of model building codes, such provisions aimed jointly at water and energy appear first in the base codes, like the International Building Code (IBC), International Residential Code(IRC), International Plumbing Code(IPC), and International Mechanical Code(IMC). High-performance model codes, such as the International Energy Efficiency Code (IECC) and the International Green Construction Code (IgCC), can provide even more savings.

Within ICC's family of codes, provisions that save water and energy can be found for:

- Bathing water (showers/baths)
- Pre-rinse spray valves
- Evaporative cooling towers
- Hot water distribution plumbing systems
- Dishwashers
- Clotheswashers
- Humidification systems
- Carwash systems

Notably, the development of codes and standards for many of these technologies are evolving rapidly. ICC's code process is designed to reliably and predictably update all of our model codes every three years, to incorporate new technology, recognize cost saving techniques and systems, and to adopt alternative methods of achieving safe and sustainable buildings. But the codes have no impact on buildings, or on water and energy use, unless they are adopted and enforced by the state and local jurisdictions with authority to regulate building construction.

Therefore the importance of communities adopting updated and current building codes cannot be overstated. Even relatively recent editions of the codes do not contain provisions for many new water and energy innovations. Failure to update codes may leave communities ill-prepared to safely implement new technologies and systems and the benefits they can bring when properly implemented. Both for financial reasons, and sometimes due to the opposition of groups who want to avoid the first cost of some code requirements, some jurisdictions have delayed adopting current codes. In many jurisdictions, the codes are 10 or more years old, and do not reflect current energy and water realities.

To promote the adoption of current building, sustainability, electrical and life safety codes, ICC and the National Fire Protection Association (NFPA) founded the Coalition for Current Safety Codes (CCSC). Dozens of safety, environmental, and business organizations, as well as hundreds of individuals, have joined this coalition to remind states and local governments of the importance of regular code review.

Federal support for the adoption of updated model codes, through both example and incentives, is essential for the safe implementation of water and energy conservation measures of various types, and the federal government should continue efforts to support the adoption of current codes. Federal agencies have long been leaders in adopting the latest codes and standards to assure long term sustainability and safety of Federal buildings, and that leadership should be supported and encouraged.

Coordination between the codes is also of critical importance. When building, plumbing, mechanical, energy and green codes are designed to work together seamlessly; the greatest opportunity to support water and energy savings in the built environment is realized. For this reason, ICC promulgates a coordinated family of codes that ensure that provisions impacting energy or water are coordinated. This is the best way to avoid unintended negative consequences

to water or energy-related codes, and to take advantage of positive interactions between disciplines.

The IgCC, a new model code first issued as a 2012 edition, takes the water/energy relationship one step farther than traditional model codes, and seeks to balance the interactions between all elements of sustainability in a building. Developed in partnership with the American Institute of Architects and ASTM International, it features the ASHRAE/USGBC/IESNA 189.1 standard as an alternate compliance path. This model code takes a balanced approach to sustainability, and ICC recommends it as a framework for sustainability in federal facilities and future legislation.

Energy Recovery from Wastewater

The final category in the energy/water relationship involves the recovery of energy from wastewater streams. Here, thermal and nutrient energy contained within wastewater is treated as a resource to be utilized, rather than waste alone. At the point of use, drainwater heat recovery can be used to recover thermal energy in wastewater to preheat incoming water. Nutrients and chemicals in wastewater streams can be mined using various technologies to extract energy in various forms. This practice has already become common at wastewater treatment plants where the energy is used to power plant operations. New research and technologies aim to move that energy recovery closer to the waste source.

Unique among green building rating systems and model codes, the IgCC addresses the emerging technologies associated with energy from wastewater, and provides for tools to measure such energy

In summary:

- Promoting water efficiency for all users of public service water reduces pumping and treatment energy use and directly reduces energy use at the point of use.
- Modern, coordinated building codes are a vital means of reducing both energy and water consumption that is immediately available. These codes are essential to ensure that new technologies and systems are implemented in a safe and balanced manner. Federal efforts to encourage states to update codes can produce measurable savings.