New codes are making it easier to be green

The two predominant model code organizations—the International Association of Mechanical and Plumbing Officials (IAPMO) and the International Code Council (ICC)—are both developing plumbing and building codes to assist communities in enacting sustainable construction codes that include water and energy conservation requirements. Although these “green codes” might ensure uniformity in water-efficiency regulations, they may not provide an effective level of water conservation nor be available in time to mitigate the severe water supply shortages in some regions of the United States. This article details how green codes, if properly implemented, could greatly reduce water demand as well as the cost to water agencies of implementing water conservation programs in the future.

HOW DO GREEN CODES SUPPORT WATER INDUSTRY STRATEGIES?

There are many provisions in the green codes that can affect water demand, water quality, wastewater treatment operations, and stormwater management. The codes are written to promote reduction of water demand, use of alternative water sources, recycling of onsite water, maintenance of sanitary conditions, and protection of potable water from cross-connection and backflow. Although code provisions do not address all water-efficiency needs, the new codes are both comprehensive and proven effective means of reducing demand on potable water sources. Early drafts of the codes indicate the published green codes will likely include water-efficiency provisions for the following:

- 1.28-gpf toilets,
- 0.5-gpf urinals,
- 0.5-gpm faucets for domestic use,
- metering faucet flow limits,
- 2.0-gpm showerheads,
- showerheads per shower space,
- clothes washer maximum water factor,
- dishwasher water use limits,
- whole house pressure regulators,
- water softener and filter efficiencies,
icemakers, commercial food service equipment, medical and lab equipment, dedicated meters for major end uses, cooling towers, reclaimed water, rainwater collection and use, stormwater collection and use, gray water, water recycling, and hot water pipe sizing, insulation, and recirculation.

The green codes do not cover all areas of water efficiency, nor do they necessarily require the most water-efficient products and practices available. The codes are written with the intent of being practical and useful throughout the United States. Although region-specific measures are usually omitted, they are allowed through local amendment and acceptance by the local jurisdiction. Landscape irrigation is one example of an area the codes do not address in detail, because regional climates require specific water-efficiency mandates that are not applicable throughout the United States. Water professionals would be wise to carefully examine green codes and amend and enhance the codes to best fit the needs of their local region.

Green codes provide an array of benefits for the water industry. Water professionals have the opportunity to use green codes to better serve the needs of the water industry. Proper and effective green codes can drastically reduce or eliminate the need for operating expensive incentive programs to maintain water demand within the available local supply. On the other hand, each year that passes without green codes allows more homes and businesses to be constructed or remodeled using inefficient fixtures, appliances, and plumbing designs. The cost of implementing efficiency measures in new construction adds less than 10% to standard construction costs. In contrast, the cost of implementing water efficiency by retrofit or replacement after construction or remodeling can be four to 10 times greater.

Adopting green codes has several distinct advantages over enacting ordinances and statutes—pre-established code enforcement structure is the primary one. Many water conservation ordinances and statutes fail to be effective because there is no enforcement. For example, laws prohibiting water waste are common but rarely effective because the enforcement system to monitor and cite violators is never established. Even on a federal level, the 2.5-gpm showerhead law in the Energy Policy Act (HR 776, 1992) is widely violated because there is virtually no enforcement of the regulations. The enforcement arm for plumbing and building codes is already established, funded, and functioning in the building code enforcement departments of state and local jurisdictions.

Inspection and enforcement occur any time a permit is required for the work. Project scope and size usually dictate where permits are required, and these criteria vary by jurisdiction. Water-using fixtures and appliances are often replaced within an average 10-year remodeling cycle, and most bathroom and kitchen remodeling requires a permit. Green codes will be an effective means with which to improve the water efficiency of more than half the customer base within six years of a jurisdiction’s adoption of the model code.

Using model green codes developed by technical experts and stakeholders representing all facets of the code provisions provides the assurance that the codes are technically sound and likely to provide benefit.
Code provisions are vetted by experts and based on the available research and field studies at the time of code development. Although there are no guarantees for effectiveness, model codes offer a strong technical support that the code reflects consensus agreement derived from good science.

GREEN CODES ARE LESS THAN PERFECT

Developing green codes is not an easy or straightforward process. No model code should be assumed to embody the latest water-efficiency science and technology available. Developing codes in a consensus process necessitates a concerted effort by many professions. Draft development and the review and public comment process often require more than a year to accomplish, even when the project is expedited by the sponsoring organization. It is virtually impossible to publish a model code that is less than four months behind the latest technology and science, and time is not the only impairment to achieving a perfect code.

The development of model codes is influenced by many interest groups, not just water-efficiency professionals. (In fact, codes affecting water use frequently are developed without advice from any water supply professionals.) Many published code provisions are the result of compromises with these diverse interest groups. For example, manufacturers seldom support code provisions that do not allow for consumers to purchase their most popular or profitable products. Plumbing contractors oppose installation requirements that could entail concerns about labor overruns, high consumer dissatisfaction, or call backs for warranty work. Health officials consider sanitation to be paramount over any water-efficiency goals.

In addition, new water conservation products and strategies are often viewed with great skepticism until a proven track record is developed; a history of poor performance from first-generation products impairs consumer confidence. Also, the water efficiency profession itself is a new player in the code development process, with efficient water use sometimes considered less important than the traditional code concerns of consumer choice and public safety. The water conservation industry has faced an arduous process in educating other stakeholders about the link between water demand and public safety, i.e., that a safe, affordable, and reliable water supply is absolutely vital for the health and safety of the public. Ironically, the water industry’s conservation efforts are somewhat stymied by its own past successes. The industry’s 100-plus-year history of supplying whatever potable water volume was demanded has lent a false sense of security that an affordable and ample supply will always be available.

Codes can be tailored to fit local needs and requirements. Like other model codes, green codes are fully amendable before and after adoption by a jurisdiction (see the sidebar on page 58 for additional information on how codes become law). Before adopting a code, it is best to carefully read the code language and make alterations to meet the needs of the local community.

Every jurisdiction has the ability to make the green code greener and more suitable to the needs of the community. The options are endless: add chapters for irrigation regulations appropriate for the local climate, mandate dual-flush toilets, outlaw 200-gal water jet tubs, ban water-cooled woks in commercial kitchens, mandate stormwater cap-
ture and onsite use, or even remove entire chapters deemed irrelevant or contrary to the community’s goals. Nothing prevents the individual jurisdiction from improving the model code to fulfill community water-efficiency needs and expectations. The state of California, for example, recently amended its plumbing code based on the UPC 2006 (see the sidebar on p. 59). Although the task of deciphering interrelated code provisions may seem daunting, revising or amending the codes is not as difficult as it first appears. If assistance is needed, many water-efficiency professionals with code expertise are available.

THE FUTURE IS LOOKING GREENER

What is the timeline for green codes? IAPMO launched the development of the green codes in early 2008 with the formation of the Green Technical Committee (GTC). The GTC is responsible for the development of a draft of the Green Plumbing and Mechanical Supplement, an adjunct to IAPMO’s Uniform Plumbing Code and Uniform Mechanical Code. The supplement, which includes improvements in energy, water, and environmental concerns, is designed to complement any pre-existing plumbing and mechanical codes but is most compatible with other IAPMO model codes. The target date for publishing and release of the Green Plumbing and Mechanical Supplement is February 2010.

ICC officially began its venture with green codes in July 2009 with the formation of the Sustainable Building Technology Committee (SBTC), which was charged with developing the International Green Construction Code (IGCC). The 28-member SBTC comprises architects, builders, product manufacturers, and code enforcement officials, but to date the ICC has not chosen to include water conservation professionals on the committee. As of this writing, the SBTC has completed and posted three versions of its first draft of the IGCC. The finished first draft is tentatively scheduled to be posted for comments Mar. 15, 2010, with a tentative deadline for public comments of May 14, 2010.

City, county, and state jurisdictions can take steps to make codes greener. Municipal and county-owned water suppliers have a distinct advantage in being part of the same government entity that serves as a jurisdiction over the local plumbing and construction codes. Water department managers need only to coordinate with the building departments to adopt the new green codes as an amendment to current building codes. This kind of interdepartmental coordination is not easy but can pay off in significant water conservation.

Consider the following example resulting from improvements in toilet efficiency. A city of 100,000 homes and a 2% growth rate likely will have more than 10,000 toilets replaced and/or installed in the next five years. Implementing a green code to require that all 10,000 toilets use a maximum of 1.28 gpf costs the city only the staff time to facilitate the code change. In comparison, implementing a toilet rebate program for 10,000 toilets could cost more than $150,000 in incentive payments and administration. Clearly, the green code option is more cost-effective even if facilitating the code change requires more than 4,000 hours of staff time (in any event 400 staff hours is a more likely total). There is no cost increase for enforcement because the building department is already inspecting such installations where permits are required.
In areas where water utilities are not operated by local government, the utility usually has strong ties to the local government as part of the regulatory process. The water supplier can assist the local jurisdiction in adopting green codes for the benefit of the rate-payers and citizens. Making the most of water supplies makes sense, especially given that the costs of meeting growing water demand are a well-documented major cause of rising water rates. (AWWA and its members have provided substantial documentation for the financial benefits of demand-side management.)

In summary, green codes provide an excellent resource to improve the water-efficiency of a water utility’s customer base. Green codes are a fundamental part of a long-term water-efficient strategy, not a drought-response initiative. Implementing water conservation strategies at the time of new construction and remodeling is the most cost-effective means to achieve sustainable water efficiency for both the water utility and its customers. The coming availability of green model codes will allow water suppliers to expedite the implementation of water efficiency mandates in plumbing and building codes.

ABOUT THE AUTHOR

Thomas E. Pape is technical advisor to the Alliance for Water Efficiency and principal at Best Management Partners, 6303 Windy Oaks Lane, Waterloo, IL 62298; bmp4b2o@aol.com. He holds advanced degrees in environmental design and comprehensive planning and design from Southern Illinois University in Carbondale. He has served as a principal on International Association of Mechanical and Plumbing Officials committees, is a member of International Code Council’s International Plumbing/Mechanical/Fuel Gas Code Council, chair of the AWWA Water Efficiency and Technology Committee, and member of the AWWA Standards Council.

REFERENCES


How States May Improve Upon Codes

The extensive graywater system requirements in the Uniform Plumbing Code (UPC) are an example of well-intentioned zealous concerns for sanitation thwarting implementation of water efficiency. The UPC's stringent hardware, installation, and inspection requirements, born of genuine concern for public safety, were too expensive and cumbersome for homeowners to implement in a practical manner. As a result, thousands of graywater enthusiasts have assembled and operated do-it-yourself graywater systems without any technical guidance or inspection from government health and safety officials. Despite this widespread disregard of code, no incidences of illness have been reported.

Recently, the California Department of Housing and Community Development issued the Emergency Rulemaking: California Plumbing Code—Graywater Systems to establish more practical and cost-effective means to use graywater resources (CDHCD, 2009). This ruling amends the California Plumbing Code, which is based on the UPC 2006.

The codes are written to reduce water demand, use alternative water sources, recycle onsite water, maintain sanitary conditions, and protect potable water from cross connection and backflow.

How Plumbing Codes Become Law

Most jurisdictions (states, counties, and cities) adopt one of various model codes rather than create their own original building and plumbing codes. The International Association of Mechanical and Plumbing Officials publishes the Uniform Plumbing Code (UPC) and the International Code Council publishes the International Plumbing Code (IPC). Model codes become law only after a jurisdiction adopts the chosen code as an ordinance or law. When the green codes are published and become available, however, they do not become law until a jurisdiction adopts the model code as a statute or ordinance.

Before adoption, each jurisdiction has the power to amend, adapt, bolster, enhance, and append the model code to meet the needs of the community. In most states, cities and counties are allowed to enact their own codes as long as the codes are equal to or more stringent than the state code and are substantive without undue prejudice to a particular vendor or manufacturer. Although the opportunity exists to amend codes at the local level, few jurisdictions do so.
Each year that passes without green codes allows more homes and businesses to be constructed or remodeled using inefficient fixtures, appliances, and plumbing designs.