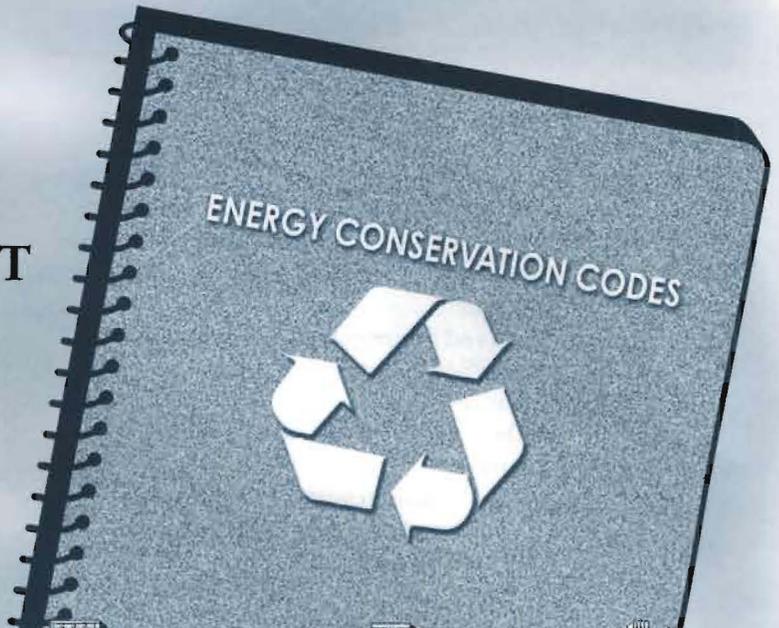


# IMPLEMENTATION OF ENERGY CONSERVATION CODES AND THEIR IMPACT ON ROOF CONSULTANTS

By Kami Farahmandpour, PE, RRC, CCS, CCCA  
and William Waterston, AIA, CDT



## Introduction

In the summer of 2001, the City of Chicago adopted the Chicago Energy Conservation Code. The new code's adoption took many in the roofing industry by surprise. Many in the design community also complained that city officials had not provided an adequate discussion of the code requirements within the design community.

One of the main reasons the Chicago Energy Conservation Code created controversy was its impact on the roofing industry. Due to concerns voiced by the NRCA (National Roofing Contractors Association) and the CRCA (Chicago Roofing Contractors Association), the City of Chicago postponed its original implementation date of January 1, 2002 to June 3, 2002. The implementation of portions of the code related to environmental requirements was recently postponed again to September 3, 2002.

The Chicago Energy Conservation Code is primarily modeled after the International Code Council's (ICC) 2000 International Energy Conservation Code (IECC). ICC is the same organization that developed the 2000 International Building Code. According to ICC, the 2000 International Energy Conservation Code has been adopted by five states nationwide (Arizona, Michigan, North Carolina, South Carolina, and Utah). Texas has accepted the code for local adoption. In addition, over 75 municipalities have also adopted the IECC. Several more adoptions by various municipalities are pending. (To purchase a copy of the IECC and for a detailed adoption listing, visit <http://www.intlcode.org/government/adoptions.htm>).

It should be noted that unlike most building code requirements, the Chicago Energy Conservation Code and IECC requirements are not life safety or primary building performance

requirements; rather, their requirements are intended to conserve energy and, in the case of Chicago Energy Conservation Code, to improve environmental conditions. Improvements of the environmental conditions include reduction of the heat island effect.

While the Chicago Energy Code is primarily modeled after the ICC 2000 International Energy Conservation Code, it added an article titled, "Urban Heat Island Effect." The framers of this code desire not only to conserve energy but also to "minimize the undesirable urban heat island effect" by requiring roofing surfaces to comply with certain levels of solar reflectance and emittance. These requirements caused the greatest concern to the roofing industry.

The Chicago Energy Conservation Code requirements for reflectance are similar but not identical to those established by ENERGY STAR® for both low- and medium-sloped roofing systems. The solar reflectance required by the code for low-sloped roofs (those with slopes 2:12 or less) is 0.65 initially and 0.50 after three years. For medium-sloped roofs (slopes of 2:12 to 5:12), the required reflectivity is 0.15 initially and 0.15 after three years. The City of Chicago also requires an emissivity of 0.90 for roof coverings when tested in accordance with ASTM E 408.

These requirements severely limit the choices for roofing systems. For example, metallic roof surfaces (including uncoated or clear-coated sheet metal roofing and aluminum pigment coatings) do not meet the 0.90 emissivity requirements. Also, at this time, the only membranes that meet the reflectivity requirements for low-slope roofs are white single-ply membranes or traditional membranes with a white coating. Modified bitumen or built-up membranes with a white granular surface do not meet the reflectivity requirements of the City of Chicago Energy Conservation Code for low-slope roofs.

In the implementation of this new component of the City of

Chicago Municipal Code, the City saw the need for additional review of plans submitted for permit and their compliance to this new Energy Conservation Code. The City has defined a new professional to complete this review of plans prior to issuing a building permit, a "Registered Energy Professional." During the building permit process, the Registered Energy Professional must rely on published data on products, including their reflectivity and their emissivity, to certify that the proposed products meet the Chicago Energy Conservation Code requirements.

The City has offered a one-day course for review of the energy code requirements for each residential and commercial building type. By attending these courses, licensed architects, structural engineers, and professional engineers may become "Registered Energy Professionals." This registration is of temporary nature and will expire January 1, 2003. Beginning in 2003, the City will require certification through examination. The new designation will be "Certified Energy Professional." The ICC will administer the examination. Qualification requirements for those who can apply for the examination are not clear at this time.

### The ICC Energy Conservation Code

As stated earlier, the Chicago Energy Conservation Code is primarily modeled after the ICC 2000 International Energy Conservation Code (IECC). The City of Chicago adopted the IECC, revised it to become a chapter within the City of Chicago Municipal Code, and edited the tables and charts to be specific to the City of Chicago. It provides tables and requirements that are based on the climatic conditions for the City of Chicago. As discussed previously, the City of Chicago added the Urban Heat Island requirements to the IECC.

### How Can These Codes Change the Way We do Business?

The implementation of the Chicago Energy Conservation Code and IECC codes can impact roof consultants in many ways. For example:

1. In the City of Chicago: Permit documents for re-roofing projects will require that the documents be reviewed and stamped by a "Registered Energy Professional." Currently, the City of Chicago requires that licensed architects, structural engineers, and professional engineers are the only professionals who can become "Registered Energy Professionals." This excludes the roof consultant who is not also an architect or engineer, clearly having an impact on the roof consultant's ability to review and stamp documents for compliance to the code.
2. In the City of Chicago: Some of the code requirements will impact the selection of roofing systems and significantly limit choices for roof membranes. In the case of Chicago Energy Conservation Code, stringent reflectivity and emissivity requirements that are currently included in the Code will require the use of white color membranes or a white coating. Metallic finishes, including metal panels without a white coating, will no longer be acceptable. Also excluded are white granule-modified bitumen roofs and gravel-surfaced built-up roofs. Although some of these requirements will probably be relaxed to allow a wider range of selection, the code will likely eliminate the

possibility of using dark color roof membranes altogether.

3. The IECC insulation requirements will likely result in a significant increase in the overall roofing system thickness. While this may not impact new construction, it may pose significant difficulties for re-roofing projects where increasing the height of the parapets, adjacent through-wall flashings, and roof penetrations will be required to accommodate greater thickness of insulation.
4. In some instances, a complete analysis of the building energy consumption will be required. While IECC clearly indicates that repair or replacement of one of the building components will not necessarily require that other building components be updated to meet the Code, there are instances when the Code does not allow the design of a building component (such as the roof) without an analysis of the entire building envelope, the mechanical systems, and lighting. Such instances include those commercial buildings whose window/wall ratio exceeds 50%. Once again, such requirements may not pose significant difficulties for design of new buildings. However, re-roofing of an existing building with over 50% window/wall ratio will require extensive information regarding the mechanical and lighting systems and the building envelope. Gathering the information required for the analysis on a large building will be a costly task that will present several challenges to roof consultants.

### RCI's Position

RCI members and other professionals throughout the country should realize that the implementation of IECC (or variations of it) by various municipalities throughout the United States is a necessary step toward conservation of energy and protection of our environment. As more states and municipalities adopt the International Building Code, they are also likely to adopt its sister code, the IECC.

In the authors' opinions, as professionals who are dedicated to the betterment of our industry and environment, we should embrace the idea of conserving energy and reducing the impact of the roofing systems on our environment. We have been doing just that through our involvement with the Cool Roofs Rating Council (CRRC) and our monitoring of the green roofs industry. However, we should remain informed of the impact the adoption of energy codes will have on our industry. Most importantly, we should be proactive in the code community so that responsible, reasonable, and prudent energy code requirements are implemented, while maintaining a high level of roofing system performance.

During the RCI convention in Galveston, Texas, this issue was discussed by several committees, including the Building Envelope Committee, the Chicago Energy Code Committee (a committee that was formed several months ago to address the changes to the Chicago Municipal Code), and the Advocacy Committee. The Building Envelope Committee plans to perform a review of the IECC to evaluate its impact on our practices. The findings of that study will be shared with the Advocacy Committee so that our concerns and ideas can be conveyed to those outside RCI. The Chicago Energy Code Committee is diligently working to offer its assistance to the City of Chicago so that the

various proposals by other industry associations and manufacturers can be scientifically evaluated for adoption in future versions of the Code.

Members should become familiar with proposed code adoptions in their area. Through region and chapter activities, such information should be funneled to the Advocacy Committee so that appropriate and timely action can be taken.

What is important to remember is that affecting change to a code is much easier before it is adopted. Timely information and response are the keys to ensuring that sensible building codes that impact our environment (and our practice) will be implemented. ■

*The authors appreciate the contributions made by Tom Hutchinson and Tom Smith in preparing this article.*

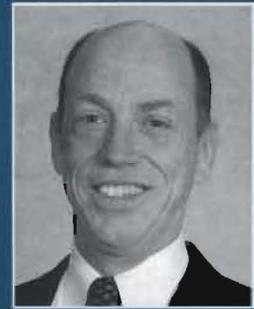
## ABOUT THE AUTHORS



**KAMI FARAHMANDPOUR**

**Kami Farahmandpour** is the Principal of Building Technology Consultants, PC in Arlington Heights, Illinois. Kami is a Licensed Professional Engineer, Registered Roof Consultant, Certified Construction Specifier, and a Certified Construction Contract Administrator. His experience includes the evaluation and repair of existing building envelope components. Kami is the Chairman of RCI's Building Envelope Committee and a member of RCI's Chicago Energy Code Committee.

**William Waterston, AIA, CSI**, is a Senior Architect with experience in specification writing, construction document preparation, and project management with Wiss, Janney, Elstner Associates, Inc. He has over fourteen years of specific experience in roofing products and systems. Waterston's work at WJE includes the investigation, evaluation, and design of roofing and waterproofing systems. Previously, he was Midwest Region Sales Manager for Honeywell Commercial Roofing Systems. Bill serves on a committee of the CRCA to work with the City of Chicago on its interpretation and implementation of the Chicago Energy Conservation Code and is a liaison between CRCA and RCI.



**WILLIAM WATERSTON,  
AIA, CSI**