High-Performance Building Week

Achieving a High-Performance Built Environment

Findings and Recommendations from the National Institute of Building Sciences Consultative Council

Luncheon Briefing, June 6, 2017

Welcome
Representative David McKinley and Representative Peter Welch Co-Chairs, High Performance Building Congressional Caucus

Welcome and Introduction to the Consultative Council
Dain Hansen, Chair, High-Performance Building Coalition and Sr. VP, The IAPMO Group

Developing a Skilled Workforce
Sara Yerkes, Sr. VP, International Code Council

Water Resources and the Built Environment
Ryan M. Colker, Presidential Advisor, National Institute of Building Sciences
Public Law 93-383
93rd Congress, S. 3066
August 22, 1974

An Act

To establish a program of community development block grants, to amend and extend laws relating to housing and urban development, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That this Act may be cited as the “Housing and Community Development Act of 1974”.

NATIONAL INSTITUTE OF BUILDING SCIENCES

SEC. 809. (a)(1) The Congress finds (A) that the lack of an authoritative national source to make findings and to advise both the public and private sectors of the economy with respect to the use of building science and technology in achieving nationally acceptable standards and other technical provision for use in Federal, State, and local housing and building regulations is an obstacle to efforts by and imposes severe burdens upon all those who procure, design, construct, use, operate, maintain, and retire physical facilities, and frequently results in the failure to take full advantage of new and useful developments in technology which could improve our living environment; (B) that the establishment of model building codes or of a single national building code will not completely resolve the problem because of the difficulty at all levels of government in updating their housing and building regulations to reflect new developments in technology, as well as the irregularities and inconsistencies which arise in applying such requirements to particular localities or special local conditions; (C) that the lack of uniform housing and building regulatory provisions increases the costs of construction and thereby reduces the amount
Congress directed the Institute to “exercise its functions and responsibilities in four general areas........”

- Develop and maintain performance criteria for maintenance of life, safety, health, and public welfare for the built environment
- Evaluate and prequalify building technology and products
- Conduct related and needed investigations
- Assemble, store, and disseminate technical data and related information
The Institute shall establish, with the advice and assistance of the Academies-Research Council and other agencies and organizations which are knowledgeable in the field of building technology, a Consultative Council, membership in which shall be available to representatives of all appropriate private trade, professional, and labor organizations, private and public standards, code, and testing bodies, public regulatory agencies, and consumer groups, so as to insure a direct line of communication between such groups and the Institute and a vehicle for representative hearings on matters before the Institute.
Annual report to President for transmittal to Congress;

contents The Institute shall submit an annual report for the preceding fiscal year to the President for transmittal to the Congress within sixty days of its receipt. The report shall include a comprehensive and detailed report of the Institute’s operations, activities, financial condition, and accomplishments under this section and may include such recommendations as the Institute deems appropriate.
Consultative Council

The Consultative Council assembles high-level building community representatives to make recommendations directly to the executive and legislative branches of government to improve our nation’s buildings and infrastructure

• Congress authorized the Institute to bring together representatives of government, the professions, industry, labor and consumer interests to identify and resolve building process and facility performance issues

• Policymakers are making decisions impacting the entire building community—where possible, a united building community can influence the appropriate action

• The Institute is the unbiased forum for discussing issues and identifying opportunities within the building community

• The Consultative Council provides a forum for regular interaction and discussion among staff leaders of key organizations within the building community
Consultative Council Members

- ASTM International
- American Institute of Architects
- American Society of Civil Engineers
- ASHRAE
- American Society of Plumbing Engineers
- Associated General Contractors of America
- Building Owners and Managers Association
- Center for the Built Environment
- Construction Specifications Institute
- ESCO Institute
- Estime Enterprises, Inc.
- Extruded Polystyrene Foam Association
- Glass Association of North America
- Green Building Initiative
- Green Mechanical Council
- Grundfos Pumps Company
- HOK
- Illuminating Engineering Society
- Ingersoll Rand
- International Association of Lighting Designers
- International Association of Plumbing and Mechanical Officials
- International Code Council
- Laborers' International Union of North America
- NEBB
- National Insulation Association
- NORC at the University of Chicago
- RCI
- Royal Institution of Chartered Surveyors
- United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry
The Consultative Council and the High Performance Building Coalition

Moving Forward:
Findings and Recommendations from the Consultative Council

Policy Priorities for the 115th Congress

Buildings Are A Critical Part Of America’s Infrastructure:
Providing sufficient federal funds to invest in our nation’s aging building, transportation, energy, and water infrastructure is vital to the country's economy and the U.S. building industry. Recent studies have demonstrated that every $1 billion invested in nonresidential construction would add $1.4 billion to the gross domestic product (GDP), add 9,500 jobs to the existing workforce, and would enable the country to reduce its annual energy consumption by 5%. In 2015, the Consultative Council supported the passage of the bipartisan BEET Act which would allocate $1 billion in direct federal funding to state energy programs. Since 2015, the Consultative Council has continued to support the BEET Act, which will directly employ more than 2 million Americans. We urge Congress to recognize the critical role buildings play in public safety, national security, economic growth and see a critical part of our nation’s infrastructure. We also encourage Congress to invest in buildings that provide opportunities to promote high performance and resilient systems in buildings and to promote the most cost-effective buildings with these systems in their infrastructure proposals that Congress will consider.

Save Taxpayer Dollars By Increasing Efficiency Of Federal Buildings

- Expand the use of Energy and Utility Saving Performance Contracts (ESPCs)/Utility Conracts
  Under this financing mechanism, private sector service companies finance and install new energy and water efficient equipment at minimal or no up-front cost to the Federal government. Federal agencies repay this investment over time with funds saved on energy costs. The private sector contractors inspect, verify and guarantee these energy savings. In 2011 the President issued a Directive to Federal agencies to save at least $2 billion worth of performance-based contracting for energy savings over a two year period. The Consultative Council supports this directive and urges the administration to extend this program for another five years. Related bill is H.R. 6323.

- Reform the Federal Buildings Personnel Act (PL 113-306) and support research relative to the impact of workforce training on building performance
  The Federal Buildings Personnel Training is required for all federal personnel providing building operations and maintenance services to demonstrate competency in their performance areas. The law’s purpose is simple. When buildings are maintained properly by trained and certified facility managers, they will perform better at lower cost, protect occupants’ health, safety and productivity and ultimately save more at their time of disposal, thereby providing a return on investment to the American taxpayer.

Promote Water Efficiency

- Authorize EPA’s WaterSense Program
  WaterSense is a voluntary partnership program created by the U.S. Environmental Protection Agency. It offers a simple way for consumers to identify water-efficient products and services. Products that have earned the WaterSense label have been certified to be at least 10 percent more efficient without sacrificing performance and have been verified by an independent, third-party certification laboratory. To date, WaterSense has helped consumers save a cumulative 7.5 billion gallons of water and over $1.2 billion in water and energy bills.

- Direct NIST to conduct water efficiency research
  In its 2016 Report to Congress, the National Institute of Building Sciences recommended that Congress act swiftly to require NIST to re-examine its plumbing research facility. It found that federal government leadership is essential to address the profligacy of water uses in buildings. Current water supply piping methods were developed by NIST in the 1950s. The nation’s plumbing codes have used these methods ever since. The federal government should initiate new research programs to develop and apply modern pipe-sizing methods. While the problem is complex, right-sizing plumbing can improve water quality and increase water energy efficiency for the life of the building without affecting cost. Related bill is H.R. 2017.

- Support the effective implementation of WIF (PL 114-322) drinking water provisions
  In the wake of the Flint Water Crisis, many Americans realized their drinking water sources are vulnerable to lead contamination and need to be adequately tested, monitored, and protected. The Water Infrastructure Improvements Act for the Nation (WIF) provides $1 billion in funding for water infrastructure projects, including lead line replacement, and other measures to improve the overall quality of nationwide drinking water. The Consultative Council encourages the creation of a lead replacement registry, and assisting the income and disadvantaged communities with replacing the amount of contaminants in their drinking water. The Coalition supports collaboration with industry in the effective implementation of these programs and provisions.
2016 Council Recommendations

- Advancing a Skilled Workforce
- Water Resources and the Built Environment
A Narrow Definition of Success

• ... the definition of success has prioritized earning a college degree.
• However, not every young person is suited to attending a four-year college.
• Technical careers add value, can be quite lucrative and create highly skilled workers essential to our economy.
• Messaging and outreach to the public must evolve.
Congress, the U.S. Department of Education (DoEd), state and local governments, schools and industry stakeholders should promote technical and trade programs in K-12 and technical schools, emphasizing good career opportunities, not a societal judgment. This is applicable to ALL students—all genders, all races, all economic backgrounds—to break down preconceived notions of who can choose to go into technical building careers.

The DoEd, DOE, EPA, DOL and other relevant federal agencies should work with the private sector to create a public service announcement campaign highlighting the importance of the building industry to the economy, the many exciting opportunities available in the industry and potential educational pathways to entering the industry.
Attracting Essential Audiences

• Many veterans have obtained highly desirable skills during their service that would be valuable to the building industry.

• New tools within the industry, including building information modeling (BIM), virtual and augmented reality and the use of drones, offer exciting opportunities requiring specialized knowledge.

• The industry needs training programs and recruitment efforts directly targeted at women to increase their participation.
Industry Making Efforts

ICC High School Technical Training Program

NIBS/TLRI Mars City Facility Ops Challenge
Attracting Essential Audiences

Industry stakeholders, educators, the U.S. Department of Labor (DOL) and state and local governments should support programs and training that encourage women to enter the construction sector.

The U.S. Department of Defense, U.S. Department of Veterans Affairs (VA), labor unions, technical education providers, industry trade groups and veterans groups should provide returning veterans with information, support and training to enter rewarding careers within the building industry as they transition into civilian life.
Financing Education

• Students interested in building industry fields such as architecture and engineering face the rising burden of student debt.
• Federal student loan programs should provide equal access for students wishing to enter technical education programs.
• When high schools face financial challenges, they often consider dropping vocational education options, even as electives, which perpetuates the lack of access and exposure.
Financing Education

Congress and the DoEd should create opportunities for building industry professionals to apply their skills in underserved communities in exchange for reductions in student debt.

The DoEd should promote industry credentials/certifications as a viable use of federal money, such as through the Federal Perkins Loan Program (formerly known as the National Defense Student Loans), National Direct Student Loan and Perkins Loan Program, which provide low-interest loans to help needy students finance the costs of post-secondary education, and allow the use of such funds to support maintenance of those credentials through continuing education courses.

Federal student loan programs should provide equal access for students wishing to enter technical education programs. Reauthorize the Carl D. Perkins Career and Technical Education Act including provisions to specifically support the role of local educational institutions—high schools and community colleges—in preparing the workforce needed to keep businesses growing and contributing to the economy.
Upgrading the Current Workforce

• It is imperative that members of the existing workforce continually upgrade their knowledge and skills to support increasingly higher levels of performance.

• Continuing education and certifications support the achievement of high-performance building goals.
Continuing Education and Certification

Congress and the DoEd should encourage states to develop regional and, wherever possible, national reciprocity programs for certified trade professionals. Careers that allow for geographic mobility are more attractive to students and young people investigating career options.

Congress, through the DoEd and DOL, should support research aimed at quantifying the benefit of a trained building workforce in order to facilitate wide-spread certification and ongoing training and to allow capture of the benefits in legislation and budgetary actions.
Federal agencies with building-related responsibilities, including the U.S. General Services Administration, DOE, DOD and VA, should recognize the necessity and value of having certified trade professionals by incorporating certification requirements into procurement and contracting processes. This is a natural extension of the necessity and value of having safety and building requirements in the first place. The federal government has shown it values using updated codes for resilience in the face of disasters. It is equally important to have qualified contractors, tradespeople, building officials and other disciplines to implement them.

Congress and GSA should require the certification and ongoing education and training of building-level federal employees and contractors who work in federal facilities by accelerating the implementation of the Federal Buildings Personnel Training Act across federal agencies and development of criteria for contractors.
Water Resources and the Built Environment

Ryan Colker
National Institute of Building Sciences
Why Water?

• All buildings require a connection to a safe, reliable and continuous water supply in order to fulfill their purpose
• 40 of the 50 states will experience water shortages by 2024
• Nation’s distribution systems are failing due to decades of neglect
• Aging wastewater systems are leaking and increasingly susceptible to failure and flooding due to strong storms
Why Water?

- Unintended consequences of short-sighted decision making leading to lead and legionellosis risks (e.g., Flint, MI)
- A holistic approach to water-use cycle considering source, treatment, distribution, use & reuse
- Exploring new technologies, materials and systems, smarter processes and new ideas
Water Distribution

• ASCE gave the nation’s drinking water and wastewater systems both a grade of “D” (poor) in its Report on America’s Infrastructure, estimating 240,000 water main breaks per year

• Approximately 6 billion gallons of treated water are lost each day (over 2 trillion gallons/year) due to leaking from aging and poorly managed distribution systems

• Nearly 170,000 drinking water distribution systems; approximately 14,780 wastewater treatment facilities and 19,739 wastewater pipe systems
Water Distribution

• Appropriations for water projects have actually declined from 2008 to 2012, averaging $1.38 billion annually or $27.6 billion over 20 years—a mere 8% of EPA’s estimated required investment needs.

• Maintaining and expanding water efficiency measures required to do more with less. Behavioral changes necessary to reduce waste and promote water-neutral development.
Water Distribution

• With increased efficiency & decreased use comes additional challenges:
  – Length of time water spends in distribution system increases
  – Expanding current distribution systems to accommodate new development while overall use is declining
  – Blockages and corrosion in wastewater system due to reduced flow rates in all fixtures
    • Regulatory reductions in flow rates reaching practical limits
Water Distribution

Congress and EPA should expand and adequately fund SDWA and CWA SRF; the Water Infrastructure Finance and Innovation Act; and the Water Infrastructure and Resiliency Finance Center programs to help utilities improve infrastructure while also meeting federally mandated water quality requirements. Also, expand the SRF program to allow funding of specific projects that address water reuse.

EPA should examine the potential use of new technologies and practices to protect public health while addressing changes in water use patterns and availability.

The federal government should consider a moratorium on mandating further flow rate and water consumption reductions for consumer plumbing products and appliances, pending research to investigate the effect of lower flows in water pipes on biofilm growth and the associated health and safety-related implications.
Water Distribution

HUD, through the Community Development Block Grant Program (CDBG), should expand its criteria and work with local officials to encourage applicants to apply for water-related upgrades and installations.

Congress and EPA should support research to develop a set of best practices for utilities pertaining to changes in water treatment sources and processes and to the repair and replacement of water distribution pipes; best practices for wastewater utilities to effectively mitigate sewer blockages; and identification of the best materials for new and rehabilitated sewer lines.
• Since 1999, Americans reduced indoor household water use by 22% and per capita water use by 15%, attributed to Energy Policy Act of 1992, utility incentive programs, and creation of EPA WaterSense

• Research needed to support pipe sizing requirements, building off NIST research from 1930s & 40s

• WaterSense marked 10th Anniversary in 2016, saving 1.5 trillion gallons, $32.6B for consumers and 212B kWh

• Outdoor water use varies regionally, but can be up to 70% of residential use in arid areas
Congress should authorize and increase funding for EPA’s WaterSense program.

NIST should reconstitute its research surrounding premise plumbing in order to modernize water pipe-sizing calculations for non-residential buildings and update existing requirements, which were developed in the 1930s and 1940s.

All levels of government should offer more financial incentives to promote the removal of old water-guzzling plumbing fixtures and appliances and the installation of new, high-efficiency models.
Congress should authorize DOE and EPA to provide incentives to state and local jurisdictions to adopt and enforce progressive water-efficiency codes and standards.

State and local utility commissions should require utilities to provide and install smart water meters that can identify leaks in buildings and provide real-time feedback to consumers regarding their usage of water.

Congress should consider legislation that requires compliance with new industry standards developed to help mitigate outbreaks of legionellosis and other diseases caused by waterborne opportunistic pathogens in building water systems.
Water Reuse

• Graywater and rainwater present great potential to reduce potable water use. However, it must be carefully considered and adequately regulated to ensure that systems are installed and maintained properly and that water is adequately treated for intended use.

• Up to 40% of residential water use and up to 90% of non-residential building water use is consumed for non-potable applications.
Water Reuse

Figure 1: 40% of Demands are Non-Potable in Residential Buildings

- Toilet (non-potable) 24%
- Faucet 20%
- Clothes Washer (non-potable) 16%
- Shower/Bath 23%
- Misc. 16%
- Dishwasher 2%


Figure 2: Up to 90% of Demands are Non-Potable in Non-Residential Buildings

- Sanitary (non-potable) 40%
- Cooling Tower Make-up (non-potable) 25%
- Irrigation (non-potable) 23%
- Misc. 9%
- Single Pass Cooling (non-potable) 1%
- Kitchen 1%

Source: EPA, Guidelines for Water Reuse, 2012
Water Reuse

Congress should instruct EPA to issue uniform “fit for use” water-treatment and water-quality requirements for use of non-potable water.

NIST, EPA and industry stakeholders should conduct research to determine the best approach for the installation of dual plumbing systems in buildings.

Utilities, consumers and state and local governments should support legislation mandating the installation of dual plumbing systems in areas where utilities are currently able to, or will be able to, provide recycled (reclaimed) water.

DOE, EPA, NIST and industry stakeholders should support research on zero or near-zero energy, water and waste for residential and commercial buildings.
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