

The background of the entire page is a grayscale photograph of various plumbing components, including elbows, tees, and pipe fittings, scattered over a technical blueprint. The blueprint contains various lines, dimensions, and symbols. A dark green vertical bar is positioned on the left side of the page, containing the title and subtitle in white text.

THE ECONOMIC IMPACT OF THE INTERNATIONAL PLUMBING CODE[®]

A comparative analysis of model plumbing codes and their impact on construction, the economy, and the environment

September 2019



INTRODUCTION

I-Codes Development

The International Code Council facilitates the process of developing model codes that benefit public safety and support the industry's need for one set of codes without regional limitations - the International Codes (I-Codes). Consistent with the principles embodied in OMB Circular A-119, which governs the federal government's use of private-sector standards, the governmental consensus process the Code Council uses to govern code changes promotes openness, transparency, due process, balance, and inclusion, and seeks consensus through a series of public forums that are free to attend and open to all.

Changes to the I-Codes are considered every three years. Anyone may submit an amendment, and all amendments are publicly posted. Public hearings are conducted on proposed amendments by code development committees, made up of members with expertise on the subject matter considered. Anyone can apply to be on a code development committee. Public comments are submitted on the outcome of these committee action hearings, which are also publicly available. Public comment hearings are then held on these comments. Following the public comment hearings, local and state governmental members, who are charged with protecting their communities' health and safety and who have no financial stake in the outcome, vote on the adoption of the proposed amendments in person and online. Governmental members can participate in this process without travel cost through the Code Council's cloud-based voting app, [cdpACCESS](#).

The Code Council encourages a healthy debate about proposed changes and the process has built-in safeguards to prevent any one interest from dominating the proceedings. Given its rigor, this process results in codes that provide the highest level of building safety in the world and represent a consensus of interested parties. Free public access to the I-Codes may be viewed online at <https://codes.iccsafe.org/>.

Safety is Paramount

The first and foremost priority in the development of the I-Codes is safety, which is ensured through regular updates that incorporate the latest advances in technology, best practices, and building science. The International Residential Code (IRC) and International Plumbing Code (IPC) establish safety standards for health, property protection and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of plumbing equipment and systems. Both codes are coordinated and correlated with the full suite of I-Codes, which cover new residential and commercial construction and renovation, fire protection and egress, fuel gas, and mechanical systems.

The IRC and IPC's widespread adoption by states and support from the federal government are testament to their thoroughness and relevance. The IRC is utilized in 49 states, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands. The IPC is the most widely adopted plumbing code in the nation, and is in use or adopted in 37 states, the District of Columbia, Guam, and Puerto Rico. The General Services Administration (GSA) requires the IRC and IPC for all civilian governmental buildings¹ and the Department of Defense (DOD) requires the IRC and IPC for all U.S. military bases². The Federal Emergency Management Agency (FEMA) credits the IRC and IPC's mitigation benefits through its Community Rating System (CRS), which provides federal flood insurance discounts for communities undertaking disaster mitigation measures³. The Building Code Effectiveness Grading Schedule (BCEGS), which insurance companies use to provide premium discounts based on community mitigation measures, also credits up to date IRC and IPC adoption.

¹ General Services Administration, *Facilities Standards for Public Buildings Service ("GSA P-100")* (July 2018), available at https://www.gsa.gov/cdnstatic/2018%20P100%20Final%20Updated%2010-16-18_0.pdf.

² Department of Defense, *Unified Facilities Criteria, DoD Building Code (General Building Requirements)* (Nov. 2018), available at https://www.wbdg.org/FFC/DOD/UFC/ufc_1_200_01_2016_c2.pdf.

³ *National Flood Insurance Program Community Rating System Coordinator's Manual, FIA-15/2017* (2017).

STUDY PURPOSE

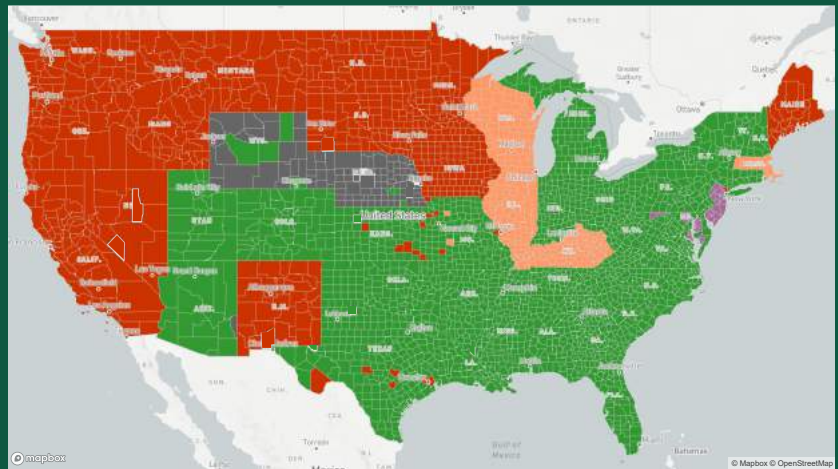
Building codes are the DNA of the built environment.

They inform the affordability, safety, resiliency and sustainability of our buildings. Plumbing codes are a critical component of the built environment, accounting for a considerable share of a building's cost and materials, as well as its corresponding water and energy use. To understand more about plumbing codes and their impact on society, the International Code Council commissioned a comprehensive independent study of the 2018 International Plumbing Code® (IPC) in comparison to the 2018 Uniform Plumbing Code (UPC).

The study performed by Henderson Engineers and Hatch's Sustainable Economics group evaluated differences in building materials and labor by applying the two plumbing codes to otherwise identical buildings. After determining the difference in construction labor and materials, the study estimates the employment and environmental gains the nation would have received if the IPC had been applied nationally over the last 12 years (2007 to 2018). The differences between the IPC and the UPC are stark, resulting in considerable savings in construction costs and plumbing materials under the IPC. These savings result in more productive buildings, communities and regional economies.

How are Plumbing Codes Applied Today?

The most common plumbing code in the US is the IPC. Approximately 168 million, or half of the total population, lives in a state that has adopted the IPC. Still more residents live in states that are "home rule" where the individual county or city selected the IPC as their building code (e.g. City of Paris, Texas). The IPC is most common along the East Coast and Midwest, and some of the most densely populated corridors are in IPC states, counties, and localities. The second-most common plumbing code is the UPC. Approximately half as many people (83 million) live in states that use the UPC. Another 45 million people are in localities that have their own state or county plumbing code.









Plumbing Code by County



FINDINGS

In applying the two plumbing codes (IPC and UPC) to otherwise identical buildings, Henderson Engineers identified considerable savings in materials, labor and overhead costs under the IPC in comparison to the UPC. Table 1 summarizes the savings for each building typology based on national construction cost data from R.S. Means. For example, after designing and pricing a single family residence with two different plumbing configurations, Henderson Engineers found the average new home would save up to \$3,000 in construction costs using the IPC. The savings result in greater home affordability and reduced resources in the construction of the home without sacrificing safety.

Table 1: Average Savings by Building Typology

	Material Cost Savings	Labor Cost Savings	Overhead Cost Savings	Total Cost Savings
APARTMENT BUILDING 	\$207K	\$44K	\$47K	\$298K
ELEMENTARY SCHOOL 	\$12K	\$11K	\$4K	\$27K
GROCERY STORE 	\$40K	\$25K	\$13K	\$78K
HOTEL 	\$13K	\$6K	\$4K	\$23K
OFFICE BUILDING 	\$12K	\$4K	\$3K	\$19K
SINGLE FAMILY HOME 	\$0.7K	\$2K	\$0.6K	\$3K

Totals may not sum due to rounding.

ECONOMIC AND ENVIRONMENTAL IMPACTS

Over the past 12 years, counties that applied the IPC rather than the UPC have saved \$38 billion in construction costs, emitted one million fewer tons of carbon dioxide, realized 166,000 additional jobs, and saved 880 million feet of pipe. These savings do not account for the increased home affordability benefits or the energy efficiency benefits resulting from fewer roof penetrations required under the IPC.

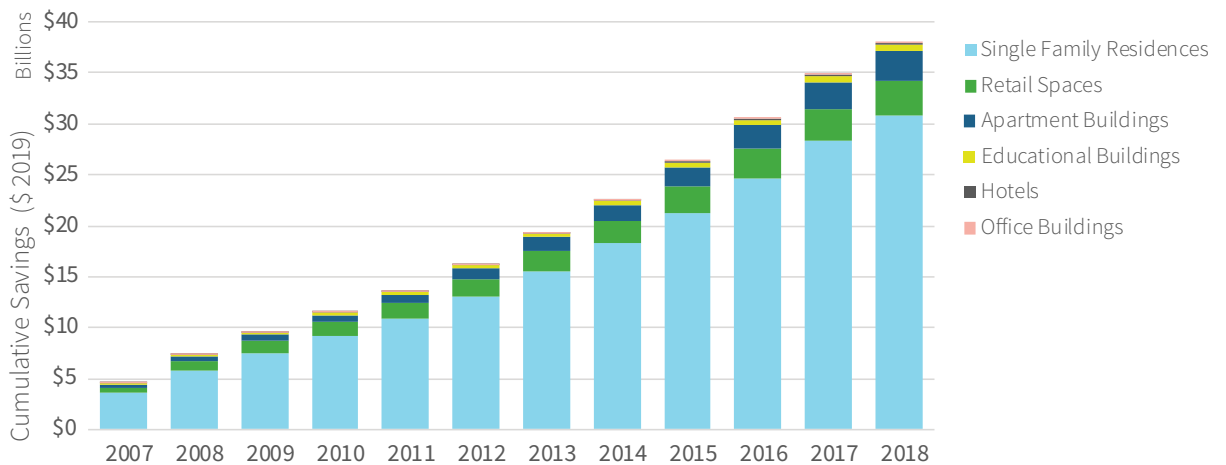


\$38 billion saved

Cumulative Construction Savings

In estimating historic building activity from 2007 to 2018, IPC states and counties have realized a total cumulative construction savings of approximately **\$38 billion** over the 12-year period, or approximately \$3.5 billion per year. This construction period includes the Great Recession, where building activity was at historic lows. In contrast, states using the UPC and other codes paid an additional \$20 billion during the same period.

Chart 1: Cumulative Savings Associated with the IPC



166,000 jobs created

Employment Gains

The increased efficiency and savings provided by the IPC leads to more money in consumers' pockets. This money can be spent in the local economy, generating jobs and growing businesses. The losses from not adopting the IPC are more evident in states that already have the largest economies, for example in California (a UPC state). Over the 12-year study period, California would have created 19,000 additional jobs if the state had used the IPC,

including 3,000 jobs alone in Los Angeles County. Meanwhile, in New York (an IPC state), **7,000 new jobs** were created by the additional spending power consumers had between 2007 and 2018, even when accounting for reduced building activity during the recession. Overall, from 2007 to 2018, IPC states and counties realized an estimated **166,000 additional jobs**, while UPC states and counties realized 85,000 fewer jobs.



1 million tons of CO₂ saved

Emissions Savings

The IPC requires less pipe and fewer fixtures than the other plumbing codes without sacrificing safety. Less pipe equates to lower emissions, realized by lower transport requirements, lower installation requirements and fewer materials that need to be

manufactured, processed and stored. From 2007 and 2018, counties that do not use the IPC emitted an additional **500,000 tons of CO₂**. That is equivalent to taking 100,000 passenger vehicles off the road for one year.

Learn more about the IPC at iccsafe.org/IPC



HATCH

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