Regional Construction Starts: Trends, Impacts and Energy Codes

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ABSTRACT

Does the adoption of new energy codes impact construction activity? As jurisdictions throughout the country continue to adopt increasingly stringent codes, this question is asked time and again. In 2015 NEEP and SEEA each purchased and then independently undertook an analysis of Construction Market Data (CMD) CMD' and publically available U.S. residential Census data to better understand overall construction trends in the Northeast and Southeast, and to gain a more complete understanding of the impact that energy codes have on the construction market. From this analysis, NEEP and SEEA determined that there is no direct evidence that energy codes depress construction activity. Construction starts are on the rise, despite implementation of more stringent energy codes, and energy codes remain a significant cost- and emissions-savings opportunity. In both regions, renovation projects are growing faster than new construction. In addition, public buildings constitute more than 40 percent of commercial construction starts in both the Northeast and the Southeast, and represent a significant source of energy savings. This paper will provide an overview of these findings and detail how they can be used to tailor and prioritize codes work moving forward.

Introduction

The Regional Energy Efficiency Organizations (REEOs)

The Regional Energy Efficiency Organizations (REEOs) include the Midwest Energy Efficiency Alliance (MEEA), Northwest Energy Efficiency Alliance (NEEA), Northeast Energy Efficiency Partnerships (NEEP), Southeast Energy Efficiency Alliance (SEEA), South-central Partnership for Energy Efficiency as a Resource (SPEER) and the Southwest Energy Efficiency Project (SWEEP). Each REEO is an independent non-profit organization, and together they serve nearly every state in the nation with a mix of policy and program tools to help advance energy efficiency as a first-order resource. In addition to working within their specific regions, the REEOs collaborate on areas of common interest, including policy, programs and communications. Their shared goal is to connect key market actors and best practices to leverage the power of energy efficiency. The regional footprint of each REEO is shown below in Figure 1.

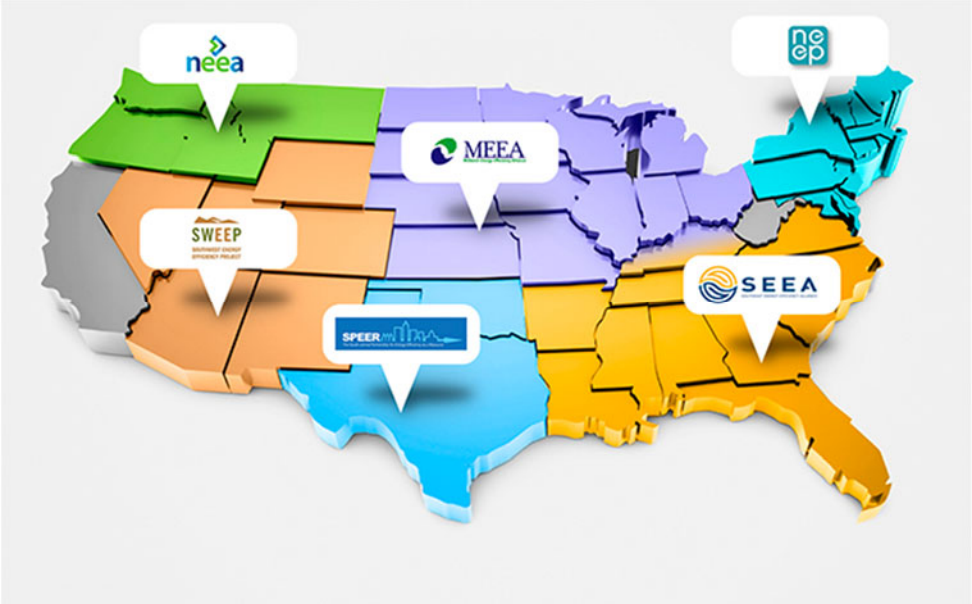

Figure 1. REEO regional footprints. *Source*: SEEA 2016.

The Northeast Energy Efficiency Partnerships (NEEP) was founded in 1996 as a non-profit whose mission is to serve the Northeast and Mid-Atlantic to accelerate energy efficiency in the building sector through public policy, program strategies and education. NEEP's vision is that the region will fully embrace energy efficiency as a cornerstone of sustainable energy policy to help achieve a cleaner environment and a more reliable and affordable energy system. NEEP assists state and local governments by providing resources to develop, implement and comply with building energy codes.

The Southeast Energy Efficiency Alliance (SEEA) drives market transformation in the Southeast's energy efficiency sector through collaborative public policy, thought leadership, programs and technical advisory services. SEEA advances energy efficiency in four areas of work: energy equity; state, local and utility policy; innovative finance; and building energy codes. Together and separately, SEEA's collaborative initiatives continue to create favorable outcomes such as smarter energy policies, stronger local energy codes, resources to upgrade the existing building stock and opportunities to provide equal access to affordable energy for all communities. Best of all, as these outcomes occur, the region is able to optimize its use of energy, enhance its productivity and achieve stronger local economies, create new jobs and improved indoor comfort and health for all.

Savings Impacts of Energy Codes

Building energy codes and standards are minimum energy-efficiency requirements for the design and construction of new buildings and renovations to existing buildings. The two most widely adopted energy codes are the International Energy Conservation Code (IECC) and ANSI/ASHRAE/IES Standard 90.1 (ASHRAE Standard 90.1). The IECC applies to all buildings. ASHRAE Standard 90.1 applies to commercial building. [i] Both are updated on a three year cycle.

Figure 2 presents the energy impacts of IECC and ASHRAE 90.1 over time. The 2009 International Energy Conservation Code IECC, when implemented, results in an 8.7 percent decrease in building energy use compared to the 2006 IECC, its predecessor. ASHRAE 90.1-2007, when implemented, results in a 6.4 percent energy savings per building compared to ASHRAE 90.1-2004. With the exception of Tennessee, all states in SEEA and NEEP territories have adopted the 2009 IECC and/or ASHRAE 90.1-2007 or better for both residential and commercial buildings, with a majority of this adoption activity occurring between 2011 and 2013.

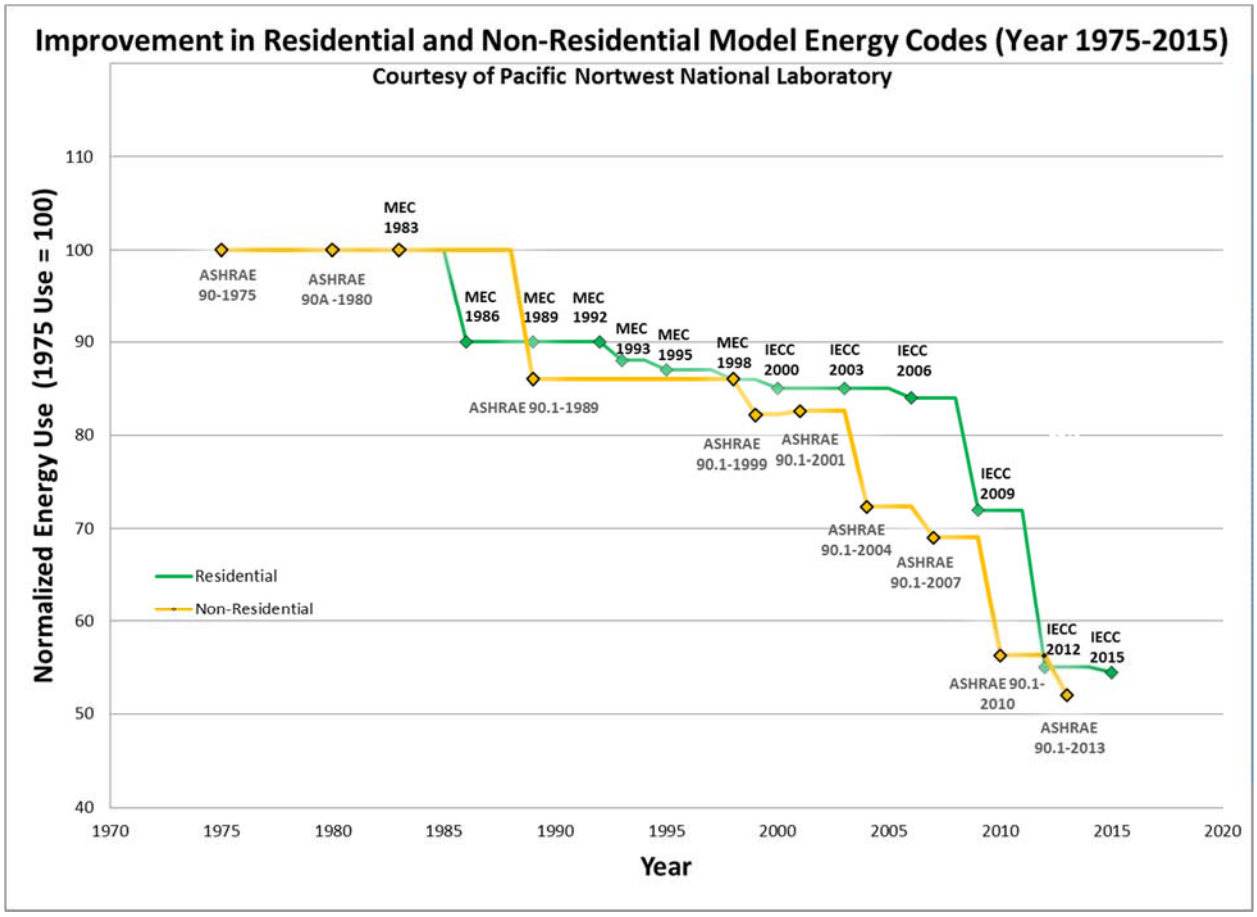

Figure 2. Model building energy code impact on energy usage over time.
Source: PNNL

Perceived Impacts of Energy Codes on Construction

To date, accurate, data-driven information on construction trends has not been publicly available. Opponents of energy codes often raise concerns over perceived complexities and upfront costs associated with code compliance, and suggest these impacts may cause construction projects to relocate to areas that don't require code compliance or have less stringent requirements.

On February 17th, 2009 President Obama signed the American Recovery and Reinvestment Act (ARRA) or more widely known as the Stimulus Package to restart the economy. The package contains several measures from funding for science and engineering to research. ARRA also allocated $3.1 billion to the State Energy Program. As a condition of accepting the funding, states were required to provide assurances committing their state to adopt a building energy code for residential buildings that meets or exceeds the 2009 IECC and adopt a building energy code for commercial buildings that meets or exceeds ASHRAE 90.1-2007 or achieve equivalent or greater energy savings.

This was an important advancement — one that significantly accelerated energy code adoption and compliance throughout the country.

While the move toward stronger energy codes has been an encouraging trend, concerns about the economic and jobs impacts of these new codes have remained, although to date, no evidence has been provided to substantiate them. To determine whether these claims were accurate, SEEA and NEEP undertook a comprehensive assessment of construction trends in their respective regions, as described below.

Methodology

In conducting these analyses, both SEEA and NEEP independently purchased and then reviewed data tracked by CMD Group, Inc[ii]. (Formerly known as Reed Construction Data) on commercial construction starts by year. This purchased data includes information taken from construction permitting, including the project type (new/renovation), location by state and county, building type, square footage, and cost. Residential construction data were sourced from the United States Census Bureau's Building Permit Survey..[iii]

SEEA Methodology

SEEA removed several types of construction from the raw data set in order to capture only the construction starts that are traditionally affected by building energy codes. SEEA then analyzed the data set to identify the top ten counties in each of SEEA's eleven states by construction starts; total square footage; and total cost of construction. SEEA repeated this analysis for a variety of building types, e.g. hospitals, schools, etc. This made it possible to view the construction data on a year-by-year basis, as well as over the aggregate 2005-2013 period. Finally, SEEA sorted the data by construction project type, i.e. renovation or new construction, and used the Consumer Price Index from the U.S. Bureau of Labor Statistics to adjust the monetary value of all projects undertaken between 2005 and 2012 to 2013 dollars. The analysis included an evaluation of more than 136,000 unique building projects.

All single family new construction data was assembled from publicly available U.S. Census data. .

NEEP Methodology

NEEP analyzed construction data from states throughout the Northeast and Mid-Atlantic region to determine whether there is a correlation between the implementation of more energy-efficient building energy codes and any significant changes in construction starts for commercial and residential buildings. Additionally, NEEP developed savings estimates using regional

construction projections to compare the energy use and carbon emissions of buildings under the current code in those jurisdictions to those which would be built to the 2015 IECC, the most recent national model energy code. To develop the projections for dollar savings and cost savings if states adopted the 2015 IECC energy codes, NEEP used Oxford Economics projections. Oxford Economics provides economic forecasting and modeling for different industries to inform policy and business decisions. Their construction forecasting was included in CMD's data for the region from 2015 through 2018.

The majority of the residential new construction data was compiled by CMD Group, Inc. and taken from publically available census data. The U.S. Census website was used to cross check CMD data and for states that weren't included in CMD's data set. Information on residential renovation construction projects is currently very limited because of widely varying reporting practices between municipalities. For this reason, only new construction data was included in the residential analysis.

Results

National Construction Trends

Across the country, residential construction experienced a steep decline as a result of the 2008 economic recession (see Figure 3). Comparable public benchmarks are not available for commercial construction. However, many have drawn the conclusion that there is considerable similarity between how all types of construction fared during the recession.

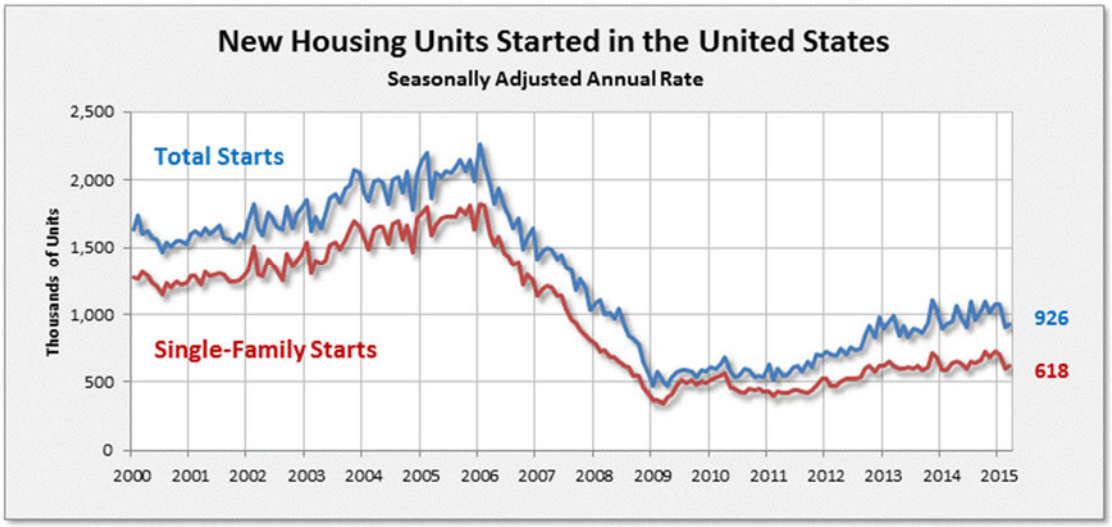

Figure 3. Housing starts, 2000-2015. *Source*: U.S. Census Bureau 2013.

Commercial Construction Starts in the Southeast

SEEA's analysis demonstrated that while all of the southeastern states experienced a decline in commercial construction starts during the recession, this decline was not of the same magnitude as the monumental drop that resulted from the collapse of the housing bubble. Rather,

it was more of secondary effect, driven by the economy-wide ripple caused by the housing market crash.

Nine out of the 10 SEEA states that implemented stronger energy codes since the start of the recession also enjoyed a greater number of commercial construction starts in 2013, as compared to 2008, the heyday of pre-recession building. Every one of these nine states had a stronger energy code in place in 2013 than it did in the period from 2005 to 2008. Kentucky was the only exception to this trend toward greater construction starts following the adoption of a stronger energy code.

In the timeframe analyzed (2005-2013), commercial renovations grew faster than new construction projects, as seen in Figure 4.

Figure 4. Commercial permit issuance in SEEA states, 2005-2013. *Source*: Westmoreland and Knight 2015.

Of the construction types analyzed, the share of public building construction projects since 2005 represents the largest: 41 percent of the total construction activity. The top four overall construction project types in the region were college and universities, Offices government offices, preschools and elementary schools, and junior and senior high schools.

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Commercial Construction Starts in the Northeast

Since the recession, all 12 states in the NEEP region have adopted updates to commercial building energy efficiency codes. Five of these states have updated their energy code twice in this time period. Of these 17 code updates, eleven showed rising trends in permit applications from the year before to the year after the new code took effect. Five showed no significant changes in activity, and only one showed a downward trend. These increases in construction activity demonstrate that the timing of new code taking effect and the year following are not

correlated with any significant drop in construction project activity. This overall trend is illustrated below in Figure 6.

Similar to the Southeast, commercial renovation projects have grown much faster than new construction, with a 258 percent increase since 2005. In addition, public building projects make up a significant portion of construction activity in the region (44 percent).

Figure 6. Commercial permit issuance in NEEP states, 2005-2013.
Source: Taylor and Port 2015.

Within the NEEP footprint, the share of public building construction projects since 2005 represents 44 percent of the total construction activity. The top three overall construction project types in the region were government offices, preschools and elementary schools, and junior and senior high schools.

Residential Construction Starts in the Southeast

SEEA's review of residential construction starts revealed that, at both the state and regional levels, residential permit numbers decreased from 2005 through 2008. From about 2009 through 2011, residential permit numbers remained steady. From about 2011 through 2013 residential permit numbers increased. This residential construction data trend mirrors the regional trends found in the commercial building market, showing no evidence that stronger residential building energy codes depress residential construction activity. Of the five states that adopted their current residential codes prior to 2013 — the final year for which data are available — construction starts increased in the subsequent year. As a whole, the region saw an increase in permits pulled, as illustrated below.

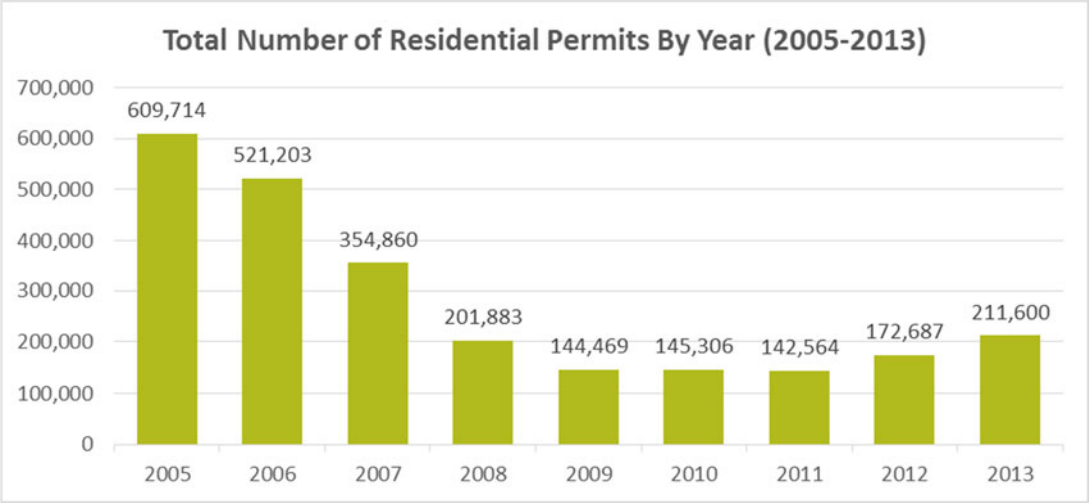

Figure 7. Residential permit issuance in SEEA states, 2005-2013. *Source*: Fournier et al. 2015.

Residential Construction Starts in the Northeast

The number of new residential building projects have shown a downward trend since 2005. There has been a slight rebound since the market bottomed out in 2009 and these numbers are expected to rise significantly through the coming years (note that this analysis only included new construction for the residential market).

Figure 8. Residential permit issuance in NEEP states, 2005-2013. *Source*: Taylor and Port 2015.

In addition, NEEP's findings demonstrate that significant savings opportunities exist in the adoption of the newest codes. In the NEEP region alone, the energy savings potential is more than $260 million dollars over the next four years. The regional carbon savings potentials are 1.5 million metric tons—the equivalent of taking 316,618 cars off the road for a year.

Conclusions

Neither SEEA nor NEEP identified any evidence supporting the claim that energy codes depress construction activity. In both regions, permit numbers are on the rise, and most states have surpassed their pre-recession peak, despite implementation of updated energy codes. Instead, energy codes appear to offer significant energy and cost savings without negatively impacting the state's construction industry.

Notably, renovation activity is growing more rapidly than new construction projects, which are currently in decline in both regions, and renovation projects are outpacing new construction. This trend indicates a significant energy-saving opportunity for renovation projects. Historically, both SEEA and NEEP have focused the majority of their technical assistance efforts on new construction; however, both are currently evaluating tactics for more effectively addressing renovations. In the future we will evaluate available data to gain a better understanding of why renovations projects are happening more frequently than new construction and if there is any correlation in the various building sectors or potential triggers that are making this happen.

Finally, in both regions, public building projects represent more than 40 percent of construction activity over the timeframe analyzed. This suggests a renewed focus on public buildings as a source of energy savings.

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[ii] http://www.cmdgroup.com/
[iii] http://www.census.gov/data.html