Expanded Policy

ADVANCED BUILDING ENERGY CODES

Policy summary: Massachusetts recently adopted a requirement that building energy codes meet or exceed the latest International Energy Conservation Code (IECC) and stay current with its three-year update cycle. In addition, the Commonwealth developed one of the first "stretch" energy codes, which moves away from the traditional code approach that prescribes specific energy measures that must be installed (levels of insulation, methods for air sealing, etc.), toward a "performance" oriented code that mandates a percentage reduction in total building energy use, while allowing developers to make their own design choices on how to achieve that reduction. This policy would complete the transition to performance-based codes by 2020 that go beyond the IECC codes in terms of efficiency while reducing their complexity.

Economy-wide GHG reductions by 2020	1.5 million metric tons; 1.6%
Energy saved by 2020, million BTU (MMBTU)	28 million
Net cumulative benefit 2011 to 2020 discounted (from new residential construction only[27])	$1.3 billion
Jobs created in 2020 (direct and indirect)	3,000 jobs

Clean energy economy impacts: Building construction is one of the largest economic sectors in the U.S. and is a major employer of skilled labor, with excellent potential for clean energy job growth. Between now and 2020 new construction is estimated to account for 7 percent to 10 percent of the total building stock. In addition, major renovations of existing buildings trigger code compliance requirements, and this will affect a significant percentage of buildings. The avoided fuel and electric costs due to enhanced codes will cut the long-term operational costs of this real estate and increase its durability. In addition, these projects will require more energy and design expertise, generating clean energy jobs in these sectors. In taking a leadership position on energy efficient design and construction Massachusetts-based firms are also likely to become national leaders in green design and to grow demand for their services in the increasingly global building design and engineering sector.

Rationale: Massachusetts has recently moved to the forefront of a national shift toward greater energy efficiency in building codes. This growing attention is due to the underlying economics, emphasized in analyses such as the McKinsey climate studies which point to modernized energy codes as one of the most cost-effective climate mitigation strategies.[28] Further, given the long lifespan of the building stock, decisions made today determine energy demands of the buildings sector for the rest of the century and beyond.

Massachusetts has the opportunity to build on its recent leadership in energy codes by developing a clear roadmap for both residential and commercial code reform over the next decade. Clear and bold action can ensure that we put ourselves on a path to zero-net energy buildings, and provide

[27] Cost data is not broadly available for either new commercial buildings or the residential and commercial renovation and retrofit market.

[28] The November 2007 McKinsey report: "Reducing U.S. greenhouse gas emissions: How much at what cost?" lists "improving energy efficiency in buildings and appliances" at number 1 in its 5 clusters of GHG abatement potential in the U.S. by 2030. http://www.mckinsey.com/clientservice/sustainability/costcurves.asp

improved competitiveness for our nation-leading design, construction and developer communities.

The shift from prescriptive codes that try indirectly to reduce energy waste, to performance-based codes that directly measure and reduce energy waste, is one of the clearest ways to improve energy codes. Historically it was not possible to meaningfully measure or model the energy use of residential or commercial buildings, but the advance of diagnostic tools such as duct-testing equipment, blower doors, and infra-red cameras have revolutionized that process for residential buildings. In larger commercial building spaces, the sophistication of energy models has grown rapidly.

Design issues: Building energy codes are relatively complex, particularly for commercial buildings, and there are numerous stakeholders across the design and construction supply chain to factor into the rate of improvement that is possible. The early "windfall" gains come from redirecting the emphasis of the energy code to more directly drive improvements in energy performance. Once these gains have been achieved the rate of progress will depend somewhat on design innovation and the appropriate application of new technologies that respond to marketplace demands. The dominant commercial building types are also the ones with the most turnover in real estate markets: office, retail and lab space and multi-family rental housing. The Commonwealth is looking to pilot programs in these sectors first, and to initially focus code improvement efforts there.

On the residential side the pathway to zero-net energy homes has already been paved by several industry-leading builders, who build and sell net-zero homes at both market and affordable housing prices. However, the broader market transition will take time, a focused set of building codes, and a supporting framework of training, outreach and technical assistance. More than a third of new residential construction in Massachusetts voluntarily adopted the Home Energy Rating System (HERS) index in 2009, and this has been complemented by more than 60 communities opting into the "stretch" energy code. A steady ratcheting down of the maximum allowed HERS index for new construction allows home builders and their subcontractors the time to retrain and modernize their design practices to meet performance targets without major shocks to the price of construction.

GHG impact: Estimated at 1.6 percent of statewide GHG emissions in 2020, based on an average reduction of over 50 percent in the energy use of new code-built buildings in 2020 versus 2008, and improved levels of energy code compliance.

Other benefits: A stronger emphasis on energy use requires earlier attention to building design and performance considerations than is currently practiced. This generally is the most cost-effective time to find cost savings, and results in the use of more skilled labor early in a project, while reducing energy and material costs later during construction and occupancy. Further, more energy efficient buildings can better manage air quality and moisture in a building through controlled ventilation. Energy modeling forces consideration of benefits such as daylighting that improve health, productivity and quality of life for building occupants. Added thermal insulation both reduces drafts and improves sound insulation, and mechanical ventilation reduces dust and mold build-up in homes.

Costs: On average, up-front design and construction costs are likely to increase marginally. To date, cost estimates have been in the 1 percent to 3 percent range for both residential and commercial buildings that achieve a 20 percent to 30 percent improvement over the base code. In

return for this upfront investment the developer is able to more clearly differentiate new construction as higher-performance than the stock of existing buildings, and the final owner/operator of the building receives significant energy cost savings.

Equity issues: Inability to afford heating fuel is widespread in Massachusetts, and the cost of subsidizing fuel needs of low-income households is borne broadly by ratepayers as a result. Higher-efficiency homes are a direct and sustainable method of addressing this social issue. More efficient homes reduce the cost of homeownership, they directly benefit renters who pay the cost of utilities, and indirectly benefit them when utilities are included in rents. For commercial buildings improved codes reduce the cost of doing business for retail and commercial office tenants, and operating costs fall for all investors in new commercial real estate.

Experience in other states: California is the first state to propose a roadmap to zero-net energy homes and commercial buildings, and their approach has several similarities to that proposed in Massachusetts. However, as our climates are somewhat different the specific measures and building designs differ, particularly given our heating-load dominated residential market. The commercial building sector initiatives in New York City, California, and Washington D.C. show broad support for improvement in building energy performance.

Legal authority: The building energy code is governed by the independent Board of Building Regulation and Standards (BBRS). The Department of Public Safety (DPS), EEA and DOER will continue working together to craft future energy code provisions for consideration by the BBRS. The Commonwealth could also pass legislation to clarify the scope[29] and direction of the building energy code and to provide longer-term certainty for the real estate marketplace.

Implementation issues: The residential sector has begun the market-led transition to performance-based energy codes remarkably smoothly. However, as the rest of the market follows and as energy code requirements increase, the need for training and technical assistance is likely to rise. In order to ensure and improve code compliance, ongoing resources will be needed to provide continued training in best practices to builders, designers and subcontractors working in the new construction and retrofit markets.

The commercial sector is perhaps earlier in the transition to high performance buildings, but the professionalization of design and engineering teams is higher. In order to effectively transition to performance-based codes for commercial buildings improvements and standardization in energy modeling will be needed, and there will be increased demand for building energy modelers. These are new clean energy jobs that require 21st century skill sets, and Massachusetts will only retain its leadership in green building design and engineering by cultivating this workforce.

Uncertainty: With the baseline energy codes in Massachusetts now tied to decisions of the International Code Council (ICC) there is a delegation of authority to this national body. The policy described here would reduce the uncertainty inherent in relying on the ICC by laying out a codes road map for the next three code cycles from 2012 through 2018. The impact of these codes on overall GHG emissions depends greatly on the economic performance of the broader economy and the resulting level of investment in new construction and building renovation.

[29] The mandate of the BBRS is presently limited in regard to areas such as water conservation, siting, and other "green" building considerations that impact energy use and that are addressed in recent "green" codes from ASHRAE and the ICC.