

**Retrofit 2012 Conference:**  
**A Roadmap to Significant Reductions in Energy Use for Existing Buildings:**  
**The Long View**

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**Abstract:**

With the exception of new building standards reinforced by financial incentives and occasional mandates, neither North America nor Europe has enjoyed success in stimulating significant energy efficiency retrofits in buildings. Mandatory standards would do for buildings what appliance and fuel economy automobile standards have done for those industries—occasioned 25-40% reductions in energy demand within a decade. But there is not yet political support for mandatory existing building standards, and there is today too much building owner scepticism, lack of knowledge, undocumented retrofit investment results, financial barriers and split incentive problems to engender near term optimism for such a dramatic policy initiative to be taken seriously—and enforced. This paper posits the near term and intermediate policy, program design, and regulatory approaches required to get us to a political climate receptive to mandatory building standards a decade or less from now. Working backwards, the following must take place: (1) voluntary, then mandatory benchmarking of buildings, coupled with recognition programs by governments and utilities and progressively stricter code enforcement; (2) incentive Programs characterized by one-stop contracting, pay-for-performance utility payments and on-bill financing; (3) workforce training Investment to match supply to demand; (4) independent organizations with a strong mission to manage programs; and (5) appropriate timing, so that each of these facets enjoys success.

**Keywords:**

Mandatory, building standards, incentives, workforce training

# 1 Introduction

Most energy efficiency programs and policies addressing existing buildings on both sides of the Atlantic have failed to meet the goals of policymakers with even modest greenhouse gas and/or energy reduction goals. In the United States, ratepayer funded utility programs routinely fail to keep up with annual growth in electricity sales<sup>i</sup>. European programs, characterized by high energy prices, voluntary standards, and white tags have failed to achieve deep penetration. The success of mandatory new building standards on both continents in meeting 25-40% reductions in energy use inspires greater interest in a similar building code policy for existing buildings.

Indeed Australia and Denmark moved in that direction by adopting mandatory building energy ratings more than a decade ago. In Australia a study undertaken by the Australian Capital Territory, which has a 10-year disclosure policy for rating homes and commercial buildings, reveals that higher ratings earned 3% price premiums at time of sale per star improvement in the rating on a six-point scale.<sup>ii</sup> Commercial buildings enjoyed comparable results. Denmark's residential labelling requirement, in place since 1996, has not seen significant results in real estate appreciation, in large part due to ineffective compliance and low awareness.<sup>iii</sup> Mandatory building labelling is gaining momentum in the US, as city governments in New York, Washington, DC, and San Francisco have large commercial building labelling requirements pending or in place. If these initiatives can be successful, mandatory existing building standards may be politically feasible. Given that energy efficiency greenhouse gas reduction potentials over the next thirty years reside primarily (60-75%) in existing buildings on both continents, policymakers cannot ignore this powerful lever to address the issue.

Yet there are strong entrenched interests opposed to mandatory existing building standards. Owners, realtors, and lenders lead the professions mobilized to undermine policy proposals for mandatory standards. For each of these interests, the strong perception is one of costly regulatory burdens imposed without offsetting benefits. Even local governments bristle at the concept of overburdened building inspectors taking on yet another unfunded mandate. Without strong, indisputable evidence that energy efficiency investments are sound, savings are measurable and sustained, and real estate appreciation is attainable, the political support for mandatory existing building standards will remain weak.

If the emerging mandatory commercial building labelling and disclosure programs are to be successful in triggering significant energy efficiency investments, and if residential building labelling and disclosure programs can be mandated, we must first develop an understanding of what comprises successful energy efficiency programs. It is noteworthy that today the only US "marketplace" for an energy efficiency services industry is in the so-called "MUSH" sector, municipalities (and other government buildings), universities, schools and hospitals. These are the most regulated of building owners, reliant primarily upon taxpayer funding, and lacking the resources to invest in energy-related capital improvements. Ten-fifteen regional and national companies, known as energy services companies, provide a one-stop service, identifying cost-effective energy efficiency measures, securing third party financing, hiring and overseeing installation contractors, guaranteeing savings, monitoring long term utility costs, and providing annual training for maintenance staff to assure the persistence of

savings. Energy performance contracting statues passed by state governments enable this industry to thrive, now approaching eight billion dollars in annual revenues.<sup>iv</sup>

Outside of the MUSH sector and public housing, energy performance contracting is rare and there is no effective energy efficiency services marketplace: the US lacks a significant one-stop contracting, comprehensive retrofit industry, or readily accessible financing. Nor are there demonstrated savings results across residential neighbourhoods or commercial districts, or even for specific building types. The oft-mentioned barriers in small and large, residential and commercial buildings are too difficult to surmount—lack of knowledge, absence of accessible financing, shortage of documented results, split incentives, and the hassle of arranging for multiple contractors. We have in the US instead a patchwork of utility and government-funded programs, focused primarily on specific measures, end users and geographies with high electricity costs and progressive state governments. Comprehensive building treatments for all cost-effective measures, regardless of fuel type, does not happen outside of a few US Department of Energy pilot programs.

This paper sets forth a theoretical framework or roadmap for how we get from today's multiplicity of largely ineffectual policies and programs in the United States to a set of conditions preparing us for a political climate in which mandatory standards for existing buildings can be effective, create a fully functioning energy services marketplace, and trigger energy efficiency investments an order of magnitude greater than what we are experiencing today. The author believes the basic principles of market formation embraced in this thesis will have major applications not only in the United States but in Europe as well.

It will take perhaps a decade to mobilize the political will to mandate existing building standards, arguably the only feasible way to achieve building savings in the 25-40% range across the buildings sector within the next 25-30 years. But the ambitious goals set by our national, state and local governments to reduce energy usage and greenhouse gases cannot be met with a gradual, incremental approach to prompting energy efficiency investments. And the consensus required for mandatory existing building standards will not develop. Instead an aggressive and intelligent path might follow a trajectory as follows, working from 2020 backwards to the present:

- Building benchmarking, labelling and disclosure, moving from voluntary to mandatory;
- Incentive programs characterized by one-stop contracting, on-bill and property assessed financing, utility incentives based on savings performance, documented savings, strong quality assurance measures, delivered by competent organizations with a singular focus;
- Unprecedented marketing, featuring innovative social marketing efforts;
- Workforce Training investments;
- Appropriate timing for each of these developments

## **2. Research Methodology and Approach**

This paper generates hypotheses and is forward-looking, drawing from published and unpublished research over the past half-decade. More prominently, the conclusions drawn from the author's observations over the past thirty years implementing and evaluating energy efficiency programs across the United States inform the judgments that form the basis of this effort. Examining the results of energy efficiency programs underway for the past two decades by three California utilities and those operating for the past decade by the New York State Energy Research and Development Authority have been most helpful. Most recently, a US Department of Energy (DOE) stimulus program initiated in 2009, the \$420 M competitive Better Buildings program, funding 25 pilot programs by local governments and nonprofit organizations, designed to achieve comprehensive building retrofits, inspires this inquiry. While the results from this ongoing program are not yet tabulated, the program managers, technical assistance providers and evaluators have contributed much to the thinking revealed here.

## **3. Discussion: The Building Blocks of a Successful Energy Efficient Future in Buildings**

The progression backwards from existing building standards, accomplished by some combination of prescriptive equipment measures and consumption per square foot metrics, must be deliberate, aggressive, and adaptive. As new technologies and methodologies are introduced to lower the cost and/or simplify the tasks associated with reaching each milestone along the path to major EE investments, policymakers must be flexible in adapting programs, regulations, and incentives appropriately. Indeed any existing building standard should be phased in, starting with large buildings, and moving to smaller ones. As is the case with fuel economy standards for vehicles and appliance standards, they should be made more stringent over time.

### **3.1 Building benchmarking, labelling and disclosure**

There are two ways to effectively label buildings associated with disclosures: (1) triggered disclosures at time of sale; and (2) scheduled disclosure, within a specified time frame. The first is common with single family homes; the second, with large commercial buildings. For both the label should be simple, understandable and straightforward; and it should be repeated or renewed every 3-5 years. To impact home buyers, renters or building investors, the label or energy performance scoring should be prominent and visible. For home buyers, that is the offer sheet from the seller; for the commercial building, it should be comparable to an elevator inspection rating, or a restaurant cleanliness rating, prominently displayed in the building lobby. The labelling methodology itself must be credible, reliable, and delivered by a third party.

Beyond passage of the labelling and disclosure requirement, government can be most helpful by researching the impact of building labels on rents, vacancy rates, and building sales prices. In many areas of the US, mandatory labelling will only gain traction when voluntary labelling has been adopted first. Pilot programs with voluntary labelling should focus on high adoption rates in concentrated geographic areas—such as a neighborhood or commercial business district.

The US Environmental Protection Agency (EPA) has pioneered a commercial buildings energy rating system, known as the Energy Portfolio Standard. Customized by building type, the standard can be self-scored, and meets the standards of simplicity, clarity, and ease of application. It is also not notably precise, but it is a forward step for a voluntary standard. Peer pressure among buildings in similar geographic regions and building types is triggering energy efficiency investments that probably would not have happened in the absence of the EPA program. But widespread adoption of voluntary standards is a necessary precursor to a mandatory existing buildings standard.

### **3.2 Carrots: Incentive Programs integrated with one-stop contracting, & on-bill financing**

For twenty years and longer, utilities and state governments have offered residential and commercial incentive programs for energy efficiency to their customers. While they have varied considerably and have been limited by utility avoided cost tests (the cost of building a new power plant) until recently, they have not been notably successful in generating significant customer participation or utility fuel reductions. Far less than 1% in both categories is typical. More recently program budgets, marketing sophistication, and customer ease of access have improved in some parts of the country. In 2009, the US DOE made a significant investment in this area, committing \$420 Million to 25 local governments and nonprofit agencies to create or build upon energy efficiency programs committed to comprehensive retrofits of buildings. The program, a stimulus effort known as Better Buildings, is the most ambitious attempt to inspire a major push forward in the theory and practice of energy efficiency targeted solely to the existing buildings market. The program continues through the fall of 2013.

Investigation of best practices in this program and in a few of the best utility managed programs around the country that have preceded Better Buildings suggest the recommendations for well designed incentive programs. The best of these programs are characterized by 15-25% grant incentives against total project cost and a significant rebate to bring down the cost of initial building assessments; multiple points of entry for the customer to access the program; one-stop contracting to ease customer hassles in moving from the assessment to installation stage; a quality assurance program to inspect the work of contractors by a third party; on-bill financing provided by the local utility; the opportunity to address all utilities, including electricity, gas, oil, steam and water; and a sophisticated, targeted marketing strategy. The programs also require a minimum of 15% savings achieved, in contrast to many of the utility programs targeting a single measure, such as lighting.

The on-bill financing is a critical element; participation rates and investment levels can double or triple with accessible, affordable financing associated with monthly utility bills or quarterly property tax bills. While residential property tax assessments are temporarily not feasible in the US, commercial property tax assessments which include energy financing and stay with the property at the time of sale are being demonstrated. Utility on-bill financing exists today in a few areas, and should expand rapidly within the next two years. The commitment by the UK to offer customers on-bill financing in 2012, if implemented and marketed aggressively, could constitute a major step forward for Europe.

### 3.3 Innovative marketing

The marketing strategy deserves special mention. In light of recent research detailing the difficulty of selling social marketing programs, and with the benefit of applying the principles learned from successful efforts in recycling and public health campaigns, the marketing effort has to inform customers; motivate their follow through after assessment recommendations are presented; generate a sense of commitment; provide utility savings feedback; reward investments, reconnect with customers to provide second and third opportunities to take additional actions; and leverage existing customers to motivate their neighbours.<sup>v</sup>

Customizing messages to particular building types—restaurants or grocery stores, for example—coupled with testimonials from early adopters is important. Branding is important, as are multiple delivery methods for the messaging: the internet, TV, radio newspapers (especially free media), door-to-door canvasses from volunteers recruited by community partner organizations, trade allies, bill stuffers in utility mailings, and posters. The more the marketing effort resembles a sustained political campaign in its intensity, ingenuity, and use of diverse distribution channels, the more successful it can be. Offering promotional “sales” where higher incentives are available for brief periods, and group discounts for enrolling neighbours in the program are commonplace.

On-line applications are routine, and a sophisticated information technology platform to record the job process, utility data, contractor actions, installed measures, and monitored savings is vital. For the first time ever on a sizable scale, we can look forward to the prospect of widely documented and reported savings from retrofits available to customers and the general public. The absence of documented savings, arrayed against investment costs, has been a major barrier to investments in buildings to date. The credibility and local nature of program management organizations add to the effectiveness of the marketing campaign.

#### **TABLE ONE: Marketing Strategy**

## Unprecedented Social Marketing Effort

### Strong Community Base is Vital

#### Multiple Segments Served

- Targeted Messages to Multiple Segments
- Branding similar to Energy Star



CLEAN ENERGY  
SOLUTIONS, Inc.

#### Multiple Delivery Methods

- Web 2.0
- TV, radio, newspapers
- Door-to-Door, Personal
- Trade Allies
- Telemarketing
- Bill Stuffers, Posters



### 3.4 Workforce Training

Energy efficiency programs cannot assume that creating demand will automatically generate supply to match. Too many start-up programs have struggled because the contractor community did not have the requisite skills to deliver the comprehensive retrofits recommended in diagnostic assessments. To succeed in their own missions—and to deliver measurable value to their communities and the local political leadership—program managers of EE programs must allocate some resources to the whole process of:

- Recruiting workers with aptitudes for this work, paying attention to affirmative action and equal opportunity in employment and promotion
- Ensuring training and certification matched to the real and continuing job market
- Placing graduates appropriately, ensuring on-the-job training and career advancement opportunities
- Soliciting feedback from trainees, employers, and trainers, to improve the process

In the US residential sector today, very few residential contractors possess both air sealing AND insulation skills; fewer still can also serve as general contractors to arrange for HVAC installations. Likewise, too few HVAC design and installation companies understand how to do air sealing well. In the commercial sector, most energy service firms have strong lighting design and installation expertise. Outside the

performance contracting marketplace, however, few are proficient at HVAC, controls AND lighting. Without better skills, a capacity to manage a broader range of measures, and project management experience, the workforce will not meet the challenge implicit in comprehensive building retrofits.

Labor unions, community colleges and other workforce training institutions must also overcome their too common mismatch of training emphases with the available demand in a community. Too frequently, training has emphasized solar installers to the detriment of air sealing, assessment skills and other skills more commonly required in the emerging energy efficient marketplace. Accurately gauging the number of jobs required in each skill category is another problem that adequate market characterization can solve.

Certifications and placement must be carefully calibrated to teach appropriate skills well, provide affordable courses, and facilitate the placement of graduates in situations where they can thrive. Training institutions should recertify, and incrementally add to the depth of the curriculum. Facility managers are a particularly important constituency to service. The solicitation of feedback from facility managers, students, employers, and other training institutions can improve both the curriculum and the experience for new hires. In the short run, government and utilities must be in the business of subsidizing both training institutions and their students to move the workforce forward at an accelerated pace.

### **3.5 Independent program management organizations with credibility, strong missions and focus**

It matters a great deal what kind of organizational entity manages an energy efficiency program. In the United States, utilities whose chief mission is selling electricity or gas encounter difficulties in effectively managing programs to “unsell” their product. They also face considerable scepticism in convincing their customers to commit themselves to their programs. While regulatory decisions and state laws to decouple utility commodity sales from profits on energy efficiency investments have mitigated these issues in a few regions, the problems are still widespread. Two of the most successful energy efficiency programs in the US are managed by non-utility third parties: a non-profit agency, Vermont Energy Investment Corporation, in Vermont; and a state energy office, the New York Energy Research and Demonstration Authority, in New York. In both states the regulators and state legislatures have funnelled ratepayer contributions for energy efficiency to these third party program managers.

The ongoing Better Buildings program has funded 25 new community-based programs, most of whose grantees are local governments. Those local governments which have outsourced their program management, marketing and other key functions to third parties have performed significantly better than those which kept these functions within City Hall. Government procurement, hiring, and invoicing requirements can delay essential program elements for months or longer. Just as damaging to program execution is the difficulty of local governments in focusing their staff and other resources on the mission of planning and delivering energy efficiency programs geared to building owners.

Overcoming the barriers to building owner acceptance and participation in energy efficiency programs is an inordinately challenging undertaking. Any organization that assumes this challenge cannot be distracted by serving other masters, pursuing other goals. Skilful, dedicated program managers are required. Enjoying the respect of key stakeholders is necessary to the success of the program management organization. The implementing organization must have flexibility in its hiring, procurement, and other management functions.

Several non-profit organizations with singular missions to provide energy efficiency programs to existing building owners have done particularly well in the Better Buildings program.<sup>vi</sup> Their strong missions, absence of bureaucratic rules undermining flexibility, local credibility, marketing expertise, laser-like focus, and community partnerships in part explain their success. While this is not the only model for successful program management, it is one worthy of further study and replication.

### 3.6 Appropriate **Timing**

Workforce development and incentive programs can take place now. So too can voluntary benchmarking. Documenting energy savings and demonstrating how to enlist building owner participation, small and large, are the near-term challenges. Once we have learned how to cost-effectively attract customer participation in comprehensive retrofit programs, we can anticipate a tipping point in participation rates. Unfortunately that day is not yet on the horizon.

Mandatory benchmarking, labelling and disclosure programs will trigger the reaching of that tipping point. The emerging mandatory benchmarking programs in California, New York City and Washington, DC may pioneer a path for the rest of the United States. Realistically, we are 2-4 years distant from widespread adoption of mandatory benchmarking and disclosure. In some parts of the nation, we may be a decade away.

When mandatory benchmarking and disclosure are in place, we can anticipate another 4-6 years of experience before the real estate professionals, lenders, building owners and elected officials will seriously consider mandatory existing standards. It will take a decade or more to sweep the country, unless a federal mandate is put into place. A climactic disaster widely attributed to global warming may accelerate this schedule, but neither planning for nor advocating such a disaster is wise public policy.

## **4 Conclusion and Further Research**

Once energy efficiency practitioners and researchers accept the premise that-- outside of the institutional and government sectors--there is no private sector energy efficiency marketplace, they can understand the depth of the challenge in motivating building owners to invest in comprehensive energy retrofits. More than 90% of the US experience to date has been rate-payer funded, utility administered programs focused primarily on electricity measures, most commonly one or two at a time. The concept of fuel-blind (and water) comprehensive retrofits based upon the building owner's economic perspective is quite novel. The absence of documentary evidence testifying to the economic impact of energy efficiency retrofits is a large impediment to owner

commitment. So too is the absence of a workforce infrastructure capable of providing expert, one-stop contracting for measures encompassing multiple fuels and multiple end uses. Finally, the paucity of affordable, accessible financing opportunities stymies even motivated owners without the cash on hand to finance retrofits.

This paper posits a pathway to mandatory existing building standards, the only compelling vehicle to assuring significant owner investments in energy efficiency measures. The ongoing US DOE Better Building Program is the first large scale experiment in facilitating comprehensive building retrofits. It is too early to evaluate its results. In two years, DOE will have completed several evaluations. Meanwhile the research opportunities to evaluate the near term policy and programmatic elements articulated in this paper--incentive programs, accessible financing, marketing strategies, strong quality assurance components, intelligent workforce development activities, mission-driven program management organizations, documented cost and savings results—together and individually merit careful and thorough research efforts.

Likewise the early ventures in local mandatory benchmarking and disclosure for commercial buildings deserve similar scrutiny from the research community. Can we demonstrate that comprehensive retrofits result in higher real estate values, lower vacancy rates, higher rents, and reasonable returns on investments? These and similar economic evaluations await the documentation of investment costs and savings in measures spanning several end uses: space conditioning, water, lighting, appliances, hot water and plug loads.

It is also quite possible that there may be alternative pathways to achieving the 25-40% energy reductions in existing building use necessary to attain the mid-century greenhouse gas levels climate scientists state are required to stabilize our planet. Emerging and new technologies may provide a huge boost in that direction; alternative policies may also contribute significantly. It is abundantly clear that we must move beyond our present energy efficiency programmatic efforts that contribute less than 1% savings results to programs and policies that contribute close to an order of magnitude improvements. That UK has committed to on-bill financing for its utility customers could be a significant trigger to EE investments. We eagerly anticipate this initiative and these broader efforts: the next few years should signal the best paths to pursue.

## 5 References

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<sup>ii</sup> Department of the Environment, Water, Heritage and the Arts, 2008. **Energy Efficiency Rating and Housing Price in the Act**, Canberra, Australia

<sup>iii</sup> Anvendt Kommunal Forskning, Danish Institute of Governmental Research, 2008. **Does Energy Labeling on Residential Housing Cause Energy Savings**, Copenhagen Denmark

<sup>iv</sup> Goldman, CA et al, Lawrence Berkeley Laboratory, 2010, the Energy Services Company Industry.

<sup>v</sup> McKenzie-Mohr, Douglas, 2011, *Fostering Sustainable Behavior*, 3<sup>rd</sup> Edition. New Society Publishers. Mohr's work has been widely disseminated to energy efficiency practitioners in US and Canada in the past two years.

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<sup>vi</sup> Charlottesville, Portland, Oregon, and Cincinnati are examples of Better Buildings programs with singular missions, talented staffs, marketing skills, and adequate funding to offer successful programs.