MAKING M.U.S.H. ENERGY EFFICIENT

Energy Efficiency in the Governmental and Institutional Sector

EXECUTIVE SUMMARY

Retrofitting the nation's public and institutional buildings for greater energy efficiency, financing these retrofits from the savings achieved, and requiring local-hire and job and advancement standards for those who do the work can provide the widespread high-road job creation needed in today's economy. Publicly controlled buildings are an obvious place to focus for a number of reasons. There are almost 140,000 entities in this sector in the United States, including state and local governments, school districts, colleges and universities, and medical institutions. We estimate that these entities control about 16.5 billion square feet of floor space and use about 3.87 quadrillion BTU a year, at a cost of about $40.7 billion. The estimated cost of upgrading this building stock is between $38.3 billion and $61.2 billion. Such upgrades would save approximately $8.1 billion dollars per year and create between 164,690 and 428,400 FTE. We discuss the financial structures that can be used, the barriers to doing this work, and the policies needed to overcome these barriers and create high-road jobs.

In the current economic climate, there are few opportunities for widespread job creation that don't face enormous structural or political hurdles, and even fewer that plausibly promise high-road[1] jobs. But retrofitting the nation's public and institutional buildings for greater energy efficiency, financing the retrofit from the savings achieved, and requiring local-hire and job and advancement standards for those who do the work does just that. The relevant market is established, with widely recognized prices and products, settled financial instruments, and established players with known methods and proven results.

However, it is a market that is nowhere near its potential, and one in which carefully crafted policies and programs pushed by enlightened leaders could rapidly create new opportunities for job creation. This sector possesses unique characteristics that make jobs created and work done in it more likely to be high road. And because the work done is largely high road, the energy savings can be deeper, and the potential for continued growth and investment increases. There is tremendous potential in this space — for savings and job creation — but unlocking it is by no means easy. We examine here this potential, explore the unique qualities of this market, and outline strategies for driving greater investment in it.

This sector is commonly described as the Municipal/Government, University, School, and Hospital sector, commonly abbreviated as the MUSH or GUSH. (we will use MUSH here). As we define it, the MUSH sector includes all buildings under governmental control (thus State, County, City, utility, transit organization, and other assorted governmental entities, excluding the federal government due to its vastly different financial and bureaucratic structure); schools (public and private); two- and four-year colleges and universities; hospitals, clinics, and other health care facilities (nonprofit and otherwise); and other assorted large institutional buildings, such as museums, places of worship, and nonprofits. Some analyses consider the MUSH sector to be a subset of the commercial one. For our purposes here, we will treat them as separate. While most of the strategies we outline are applicable universally across this sector, we give those in which public actors have direct

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The Center on Wisconsin Strategy (COWS) is a nonproft, nonpartisan think-and-do tank, based at the University of Wisconsin-Madison, that promotes "high road" solutions to social problems. These treat shared growth and opportunity, environmental sustainability, and resilient democratic institutions as necessary and achievable complements in human development. COWS is nonpartisan but values-based. We seek a world of equal opportunity and security for all.

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control (government buildings themselves, public universities and hospitals, school systems) special consideration due to the unique goals and accessible decision-making structure of these entities.

Investing in energy efficiency in government-controlled buildings is not a new concept. Indeed, Energy Services Corporations (ESCOs) have worked in this sector for decades. However, no state or local government has come close to capturing all the savings and job-creation potential contained in their buildings, and ESCOs are concerned primarily with their bottom line — not job creation, economic development, or environmental sustainability. A targeted, intelligent approach can unlock the potential in the MUSH sector, producing jobs quickly. We outline here what this approach would look like, the gains such an approach would achieve, and the barriers to overcome in getting this work done.

THE ENERGY EFFICIENCY MARKET

Increasing energy efficiency in the buildings we use — to save money, protect the environment, and create jobs — is a simple concept that becomes complex in policy and implementation. We use "energy efficiency" in this work to describe the reduction of electric and thermal (gas, fuel oil, propane, etc.) energy use in buildings via the installation of efficient building technologies and the application of building science and management techniques, such as more efficient lighting, improved heating, ventilation and air conditioning (HVAC) systems, and a tighter building envelope. We do not explicitly include efforts to change the behavior of a building's occupants, although the boundary between technology and behavior can be somewhat less than clear.

When looking for opportunities to use energy more efficiently, buildings are an obvious target. In the United States, buildings account for 73 percent of electricity (U.S.DOE, 2011, p. 1.1.9) and 55 percent of natural gas used (U.S.DOE, 2011, p. 1.1.10). This use, approximately 29.29 quadrillion BTU (U.S.DOE, 2011, p. 1.1.1), costs about $448.5 billion per year (U.S.DOE, 2011, p. 1.2.3). Estimates of the amount of energy that can be saved in the average building vary from 20 to over 50 percent, depending on what kinds of improvements are included (Osborn, Goldman, Hopper, and Singer, 2002). Even using the conservative estimate, that's over $80 billion in potential savings that could be achieved nationwide — and invested in other priorities. (This calculation is of course simplified, but it gives us a starting point.)

In addition to the financial savings associated with lower utility costs, there are many benefits to improving building energy efficiency. Energy efficiency can reduce emissions that contribute to poor air quality, negative public health impacts, and global climate disruption. Decreasing the amount of energy we use can protect against price volatility and supply disruption, increasing our energy security. Energy efficiency efforts contribute to economic development as well, through the direct spending incurred, the redirection of dollars saved, the jobs created, and the accompanying multiplier effects. Finally, this work can extend the lifespan of buildings, preventing costly future investments. Energy efficient buildings are often more comfortable and healthy for their occupants (Fisk, 2000), leading to gains in productivity of as much as 16 percent and decreases in absenteeism of up to 25 percent (Romm and Browning, 1994, revised 1998). In schools, efficient buildings can lead to higher student test scores (HMG, 1999).

The best approach to increasing energy efficiency in buildings is to conduct a thorough, investment-grade audit and determine what measures that increase energy efficiency are cost effective over a reasonable time horizon (often between 10 and 20 years; state enabling legislation may limit this for ESCO projects). Public policies (applicable beyond the MUSH sector) to increase energy efficiency have focused on financial incentives (e.g., tax credits or rebates), or mandates of baseline technology improvement (e.g., appliance standards or building codes). This results in a piecemeal approach and a disproportionate focus on new construction. Incentives have fallen far short of available return on public expenditures, as they generally fail to design around a number of obvious barriers[2] to uptake. Mandates show, in theory, considerably more promise, but they have thus far been relatively modest in their aims and generally applicable only to new purchases or construction.

The building energy efficiency market is generally divided into three sectors: Residential, Commercial and Industrial (C&I) and MUSH. While the boundaries are not clear cut (consider a city-owned apartment building), this organization is sufficiently useful that we continue it here. Recently, a great deal of attention has been paid to the residential sector. In 2009, there were over 130 million residential housing units in the United States (American Housing Survey, 2009) that accounted for over 50 percent of national energy use (US EIA, 2010). Residential energy efficiency policy has traditionally been limited to rebates and tax credits for specific measures (e.g., a new refrigerator) and grants for the weatherization of low-income homes. Recently, however, there has been an increased interest in innovative residential program design. For example, the U.S. Department of Energy released $508 million in grants to 41 communities with the express purpose of creating innovative building energy efficiency (EE) programs — many of them focused on the residential space. Thanks to this, significant innovation is taking place, and programs across the country are experimenting with a variety of programs designs, including applying the "value capture" model to the residential sector, something that has only been done with limited success in the past.[3]

Several residential programs have achieved some success by stimulating demand for EE retrofit measures, including Efficiency Maine, which, via a combination of loans and rebates, retrofitted 1,700 homes in seven months, and continues to experience high demand (EnergySavvy.com, 2011). In addition to facilitating efficiency improvements, residential retrofit programs have been successful in creating jobs as well. The City of Portland, for example, used $1.1 million of Energy Efficiency and Conservation Block Grant formula funds to leverage nearly $7 million in private homeowner investment, retrofit 500 homes, and create 48,047 new construction job-hours, which led to 29 new hires by participating contractors (Ho and Hays, 2011). Neighborworks of Western Vermont experienced a similar result — the extra work from their residential retrofit program has caused every participant contractor involved to hire more workers (Biddle, 2011). Unless policy specifically addresses job quality, however, residential construction jobs tend to be low road (Zabin, Chapple, Avis, and Halpern-Finnerty, 2011).

While some of these residential programs are successfully operating, program design has been more complicated than anticipated. It is unlikely that residential programs will grow quickly enough for the jobs they create and the expenditures they spur to significantly impact the current fiscal crisis, nor will many of the jobs created go to those in greatest need — there is simply too much slack in the job market. An analysis of Chicago's labor market found that even with significantly increased funding, as much as 60 percent of new work could be accomplished by unemployed or benched workers (CWIC, Civic Consulting Alliance, Bain & Co, and CJC, 2010). An analysis of California's labor market is even bleaker — it found that investment in further training for energy efficiency jobs was unjustified based on the number of unemployed workers in the relevant trades (Zabin et al., 2011).

The C&I sector covers 78.8 billion square feet (U.S.DOE, 2011, p. 3.2.1) and uses 18.43 quadrillion BTU (U.S.DOE, 2011, p. 3.1.1) of energy a year, which costs about $193.9 billion (U.S.DOE, 2011, p. 3.3.3). It also holds significant potential for energy efficiency investment and commensurate job creation potential. However, due to significantly shorter budgeting cycles, aversion to indebtedness, and, especially in manufacturing, short product and process life cycles, implementation of energy efficiency — beyond measures with very short paybacks — is uncommon. The median simple payback period for projects in the MUSH sector is seven years, while in C&I it is a mere three (Goldman, Hopper, Osborn, and Singer, 2005). Clients in the C&I sector are also more likely to pursue single-measure upgrades — replacing lighting only, for example — than the full-building retrofits more commonly pursued in the MUSH sector (Osborn et al.). In addition, projects in the MUSH sector tend to be larger than in C&I. Even when normalized for floor area, median project investments in MUSH are 1.8 times larger than in C&I (Osborn et al.). The split incentive is a problem here as well — building owners will not invest in energy efficiency because tenants pay the utility bills, and tenants will not invest because they don't own the building. Finally, businesses are motivated primarily by profit, not the desire to create high-road jobs.

All three sectors (Residential, Commercial and Industrial, MUSH) have potential for much larger scale energy efficiency efforts, and effort in all sectors is important and should be made. However, if the goal is the rapid creation of high-road jobs, the MUSH sector is the obvious place to focus, due to the potential scale, centralized and publicly motivated decision-making structure, likelihood jobs will be high road, and established players and procedures.

Below we discuss in depth the barriers relevant to the MUSH sector, but it is instructive to consider here a barrier common to energy efficiency work across sectors: the lack of upfront capital to invest in energy efficiency projects. Note that the long-term lack of capital should not be a problem, because it is possible to structure energy efficiency efforts so they pay for themselves (by reducing utility costs) over time. Nonetheless, few of us, even governments, have extra cash sitting around, and if we do, we likely have more pressing concerns than building energy efficiency projects. So the problem becomes: how do we capture the value of energy efficiency improvements at the start of the project and use that value to conduct the improvements? Because the energy — and thus financial — savings associated with various energy efficiency improvements can be estimated with some accuracy, it is possible to "capture" their value in a properly structured financial deal, where the initial cost of the improvements is secured by the improvements themselves, and the utility cost savings are used to pay back this obligation over time. A much more thorough discussion of this model can be found in Rogers (2007). Capturing this value and directing it to energy efficiency improvements is not a new concept — in fact, it is the basis of the ESCO business model — and is not the only key to unlocking the energy efficiency market. It does, however, provide an important financial basis for this work, which coupled with other policy and program elements we discuss below, offers a way to increase the scale of MUSH energy efficiency work to match its potential.

ATTRIBUTES OF THE MUSH SECTOR

There are almost 140,000 MUSH entities in the United States (see Table 1). Each entity presumably controls at least one building, and many control multiple buildings. This number does not include any of the almost 10,000 buildings the Federal Government controls (U.S. GSA, 2011). Municipalities spend up to 10 percent of their budget on energy costs, though many are unaware of this as they don't calculate energy costs separately (EnergyStar). Total municipal energy bills alone amount to over $12 billion per year (CEE). With so many buildings, the potential for job creation through energy efficiency retrofits in the MUSH sector is vast. Financing is available (through traditional ESCO lending, private investment, off-balance-sheet financing, municipal or state bonding — especially energy-specific bonding authority), and because the government or leadership has direct control, job quality, targeted hire, and training provisions can all be included in the deal. But this potential goes largely untapped. Buildings are controlled by multiple departments; energy use is not tracked; no one is empowered to address the issue; staff lacks the knowledge necessary to negotiate the auditing, contracting, and financial deals; and most of all, the political will to drive these projects to fruition is lacking (except in certain rare locales).

Table 1
NUMBERS OF CONTROLLING ENTITIES BY TYPE

Type of Building Owner	*Number*	*Source*
State	50	
City	19,492	(U.S. Census Bureau, 2009)
County	3,033	(U.S. Census Bureau, 2009)
Town	16,519	(U.S. Census Bureau, 2009)
Special District	37,381	(U.S. Census Bureau, 2009)
School District	13,629	(Keaton, 2011)
Private K-12 School	33,740	(NCES, 2008)
Charter School Agency	2,236	(Keaton, 2011)
Public Higher Education	2,672	(NCES, 2010)
Private Higher Education	2,823	(NCES, 2010)
Hospital	5,795	(American Hospital Association , 2010)
Total	137,370	

The various components of the MUSH sector share several key attributes. The primary and most important attribute is that decision-makers in this sector usually control multiple buildings, facilitating large projects and the bundling and aggregation of smaller ones. They are also frequently among the most energy-intensive buildings, as they are likely to comprise older or historical buildings, significant energy users (such as water utilities and stormwater treatment facilities, which account for up to 35 percent of municipal energy use, with estimated potential savings of up to 30 percent, or 31 billion kWh nationally (CEE, 2007), and the energy-intensive hospital sector (due, among other things, to stringent health and safety requirements and round-the-clock operation).

Another key attribute is the likelihood that those who make decisions about the MUSH sector's building stock will have motivations beyond the financial bottom line, such as a desire to create jobs, protect the environment, or stimulate the local economy. Programs in this sector are more likely to seek deeper retrofits, and to consider job creation and job quality in addition to the project's financial return on investment. This is not to say that the financial savings represented by energy efficiency retrofits are of lesser importance in the MUSH sector. Indeed, as the recession has impacted budgets, decision-makers in the MUSH sector are increasingly looking for any and all ways to save money, and are likely to be more aggressive on this front than in the past.

Work currently done in the C&I and MUSH sectors (which tend to contain larger buildings) is more likely to be done by high-road contractors, with the concomitant wage, training, and career pathway benefits. In the MUSH sector, it is often easier to adopt policies to ensure high quality work and high-road jobs than in the C&I or Residential sectors. The use of a high-road workforce is important for generating increased investment and scale, as higher quality work enhances both the savings potential (Zabin et al.) and consumer confidence that energy efficiency represents a good investment. In addition, higher wages paid to local workers mean a higher multiplier effect in the local economy.

Finally, large public entities tend to have access to relatively cheap long-term capital and be fairly sophisticated financially, with in-house expertise in bonding and other financial tools. Governmental entities in particular have experience with long-term borrowing (frequently well beyond the time span of most energy efficiency projects).

While there remains untapped potential in the MUSH sector, it is important to recognize that it is far from an immature market — indeed, it comprises the bulk of ESCO business. However, while it is true that there exists a functioning market for energy efficiency in the MUSH sector, it is nowhere near as extensive as it could be, and is not being effectively leveraged as a job creation strategy. No MUSH entity has comprehensively addressed its entire building stock, many current efficiency retrofits cherry pick only the most profitable projects, and job quality is rarely a consideration. Current estimates of energy efficiency market penetration in the MUSH sector range from 20 percent (Bharvirkar et al., 2008) to 50 percent (Hopper, Goldman, and Birr, 2004), and that says nothing about the comprehensiveness of the retrofits performed. As new technology arrives and the cost of energy and technology changes, so does the opportunity in the space — meaning that even buildings that have had energy improvements relatively recently could harbor cost-effective upgrade opportunities.

Energy Savings Potential in the MUSH Sector

Determining how many buildings, and how much floor space, the roughly 140,000 MUSH entities in the U.S. control is difficult. The Department of Energy (U.S.DOE, 2011, p. 3.2.3) estimates that governments control 24 percent of total commercial floor space: 3 percent is federal, 5 percent is state, and 15 percent is local. That puts MUSH floor space at about 16.5 billion square feet. This square footage uses about 3.87 quadrillion BTU a year, which costs about $40.7 billion. Savings from energy efficiency upgrades done under ESCO contract in the MUSH sector are historically around 20 percent of utility bill baseline (Hopper, Goldman, McWilliams, Birr, and Stoughton, 2005). Higher savings are certainly possible if strategies for deepening retrofit work are implemented, though the figure will serve here as a conservative estimate. If the MUSH sector conducted retrofits of the entire building stock to achieve 20 percent savings, that would represent $8.1 billion dollars in savings per year. These figures are illustrative only, but even using conservative estimates it is clear that there exists significant energy efficiency and savings potential.

Others have estimated similar scale savings potential. McKinsey, for example, estimates that the U.S. could reduce non-transportation energy use by 23 percent by 2020, preventing the waste of more than $1.2 trillion — for an upfront cost of $520 billion (Choi Granade, Creyts, Derkach, Farese, Nyquist, and Ostrowski, 2009). Lawrence Berkeley National Laboratories estimates that, even given recent increases in ESCO activity in the MUSH space (here defined as excluding federal buildings), there exist potential annual energy savings in larger MUSH buildings alone of 160 million MMBtu. Lifetime MMBtu savings could reach 2.4 billion. To capture those savings, an additional $35 billion would need to be invested if the work were to be done using ESCOs (Satchwell, Goldman, Larsen, Gilligan, and Singer, 2010). Reducing energy spent on drinking water and wastewater systems alone by 10 percent would save $400 million and reduce consumption by 5 billion kWh yearly (EnergyStar).

To use a real-life example, the City of Milwaukee controls 229 buildings directly (excluding the universities, schools, and hospitals that comprise the full MUSH sector). They spend approximate $16 million per year on energy. If the average savings per building are 30 percent, the city could save nearly $5 million per year — a significant impact on a municipal operating budget of $69 million per year. These savings will only increase in the face of upward energy price pressure.

It should be noted that estimating savings potential is a tricky business. There is an important distinction to be drawn between what is technically possible (achieving full energy efficiency retrofits in every single building) versus what is actually achievable (somewhat less than that). Many factors influence both of these, and are constantly changing, including available technology and its cost, energy prices, and continually aging building stock (Hopper et al.). Thus the savings potential from energy efficiency retrofits is dynamic, though most of these factors point to increased potential.

Job Creation Potential in the MUSH Sector

There are many estimates of how many jobs have been or could be created in energy efficiency across all sectors; not surprisingly they vary widely, depending on the sector and the assumptions used, and a fair amount of skepticism is appropriate when evaluating them. For example, Roland-Holst (2008) estimates that the redirection of $56 billion in household energy savings achieved between 1972 and 2006 via the State of California's energy efficiency policies resulted in the creation of approximately 1.5 million jobs. In 2006, The American Solar Energy Society (2008) estimated that energy efficiency technologies and services created more than 8 million jobs. Further, the ACEEE estimates that a 20 to 30 percent gain in energy efficiency across the entire U.S. economy could yield 500,000 to 1.5 million jobs by 2030 (Laitner and McKinney, 2008). Numbers like these tend to include direct, indirect, and induced jobs. Direct job creation is complicated enough to estimate; measuring the impact of those jobs throughout the economy requires enough assumptions that we choose not to put much faith in them.

Perhaps more useful are jobs created per dollar invested estimates. The American Solar Energy Society (ASES and MSI, 2008) estimates 8.6 jobs per $1 million in both the energy efficiency and renewable energy industries. Pollin, Heintz, and Garrett-Peltier (2009) estimate 7 direct jobs created by each $1 million invested in building retrofits. Garrett-Peltier (2011) estimates 5.7 direct jobs created per $1 million invested in C&I retrofits. Sundquist (2009) estimated that direct job creation in the residential sector is between 7.4 and 9.1 Full Time Equivalents (FTEs) for every $1 million spent, and in the MUSH sector is about 4.3 FTE for every $1 million spent. Despite the varying estimates, there is no disagreement that investing in building energy efficiency creates jobs. In fact, this industry is one of the few where investment should create net new jobs, rather than moving jobs from another sector or geography, since the work is not currently being done, and the capital to finance it comes from the associated energy savings rather than the diversion of other resources. Further, these are jobs that cannot be shipped overseas and must be done by at least semi-skilled, if not highly-skilled labor. The MUSH sector is more likely than other sectors to have in place high-road workforce standards already, or to be amenable to instituting them. This, of course, is important since we wish to create not just jobs, but good jobs.

If we work with the range of between 4.3 and 7 jobs created for every $1 million spent on energy efficiency projects, we can estimate a range for job creation potential for the MUSH sector. Hopper et al. (2005) estimate that the MUSH sector spent between $12 and $16 billion on energy efficiency improvements between 1990 and 2003, and that MUSH market activity in 2002 was between $0.8 and $1 billion. Even this base level of investment would create 3,440 to 7,000 FTE per year. If we estimate potential investment based on the total square footage in the MUSH sector, using per square foot costs from Hopper et al. (2005), we can expect between $38.3 billion to $61.2 billion needed to upgrade the entire MUSH sector. This has the potential to create between 164,690 and 428,400 FTE. Realizing even a portion of that investment would be a tremendous boon to the job market.

Workforce Standards and Development

Jobs in energy efficiency, MUSH and otherwise, are for the most part familiar jobs across a range of production, design, construction, engineering, operations, and maintenance occupations. The initial direct impact is simple: driving demand in the MUSH sector creates jobs in the building trades. These run the gamut from HVAC technicians and energy auditors to roofers and insulation installers (White and Walsh, 2008).

A high-road approach to job creation in this sector needs to embrace Community Workforce Agreements (CWAs, discussed below) or other mechanisms to establish strong job quality standards, like wage, safety, and training requirements, while creating a pipeline that moves local residents into apprenticeship and middle-class careers. High-road jobs demand high-quality training. In the MUSH sector, this typically but not exclusively looks like registered joint apprenticeship programs. Creating clear and integrated bridges into apprenticeship is critical to ensuring an inclusive strategy for MUSH job development. But in and outside of apprenticeship, aligning education and training with the interests of quality, sustainability, and equity are not new. The best way to ensure access and advancement for low-income workers in energy efficiency is to organize skill delivery into navigable career pathways aligned with demand; advance curricular modularization and competency-based credentialing; and, where necessary, integrate social service supports to make advancement possible (White, Dresser, and Rogers, 2010).

Creating these pathways that allow workers to access training does not just benefit the workers. For the energy efficiency sector to truly flourish, decision-makers need to have confidence that energy savings will be realized. A high-quality well-trained workforce makes this significantly more likely. For example, as many as 85 percent of replacement HVAC systems in California are improperly installed, resulting in a loss of potential energy savings (Zabin et al., 2011). This issue could be remedied through more and better training. Large-scale projects in the MUSH sector can demand contractors with high standards, creating market pressure to compete on quality, not simply price. Increased opportunity for high-road firms (frequently signatory contractors), will increase demand for apprenticeable work. Increased high-road investment in the MUSH space could create a virtuous cycle — demand for higher quality leads to higher wages leads to apprenticeable careers leads to higher job quality, which stimulates further demand for large-scale energy efficiency projects.

Financial Structures Used in the MUSH Sector

The advantages of energy efficiency retrofits in the MUSH sector are meaningless without access to the capital with which to fund their implementation. There are several ways MUSH entities can secure this capital, which we outline below. It's important to remember that not all entities in this space can access all these options — a nonprofit, for example, may not be able to issue tax-exempt bonds — but all have some way to access financing, and usually at significantly better rates than other sectors. We focus here primarily on the publicly-controlled building stock.

Most government entities have access to relatively cheap long-term capital in the form of tax-exempt debt. Municipalities frequently bond for large capital projects without the expectation that the projects will generate the revenue to pay for themselves — rather, they repay the debt with tax levy. This makes bonding for projects that will create the revenue to repay the debt all the more attractive, and more likely to overcome political resistance should it exist. A thorough discussion of government bonding is not appropriate here; suffice it to say that states or municipalities wishing to use bonds for energy efficiency generally have two options: General Obligation (GO) bonds (secured by the ability to levy taxes) or revenue bonds (secured by the expected revenue, in this case the expected cost savings). Both options take advantage of tax-exempt interest rates. Qualified Energy Conservation Bonds (QECBs), a relatively new type of taxable bond subsidized by the Federal Government (see U.S. DOE (2011) for more information), offer even lower interest rates on revenue and GO bonds. It should be noted that the transaction costs inherent to the bonding process make this an unlikely option for many smaller projects (of less than approximately $1 million). ESCO project costs can range from less than $200,000 to over $20 million (Goldman, Osborn, Hopper, and Singer, 2002).

There are, however, various reasons a government would be unable or would choose not to bond. The anticipated debt service may have too large an impact on the operating budget, or may be above a self-imposed or statutory limit. The government's total debt capacity may already be stretched thin, or may require a public referendum to increase. The government's credit rating may make bond issuance impossible. Lack of political appetite for borrowing may be a barrier as well. Waiting for the budget and bonding cycle may also constrain the timeline of projects, and energy efficiency is a field in which every day a project is delayed can cost money.

One recently popular alternative to bonding is federal grants. While the Obama administration has certainly shown a commitment to energy efficiency — so much so that the report from Vice President Biden's Middle Class Task Force was entitled *Recovery Through Retrofit* — it cannot be expected that the federal government will continue to directly subsidize MUSH energy efficiency improvements. A more likely alternative to bonding is to employ an energy services company, or ESCO.

ESCOs are companies that exist to increase the energy efficiency in building stock, usually entering into a contract with a property owner whereby they install a suite of energy saving measures with guaranteed energy cost savings, and are paid for their work over time from the savings. ESCOs also traditionally perform monitoring and verification of the work themselves (a possible conflict of interest) and hold the maintenance and operations contracts for specialized equipment.

ESCOs frequently use Energy Savings Performance Contracts (ESPCs) in which they guarantee a certain level of financial or energy savings, removing the risk to the building owner and tying their compensation to performance. Although the majority of states allow ESPCs, a few do not. These guarantees make the offer particularly attractive when the client has a low tolerance for risk — so much so that three-quarters of ESCO projects in the MUSH sector are performance-based (Satchwell et al.). The ESPC model can, however, result in the installation of only measures with a short payback time (such as lighting improvements), rather than a full suite of measures that pays back over a longer time period. This "cherry-picking" or "cream-skimming" makes it difficult to return to a building and pursue deeper savings, since the most profitable measures have already been done, and the payback time on other measures may be prohibitive, whereas if they had been installed concurrently, the payback time would have been reasonable. Recently, however, the trend has been towards clients demanding deeper retrofits and ESCOs accommodating those demands (Satchwell et al.).

The amount of project savings that ESCOs capture to repay project costs and turn a profit varies according to the length of the project, but for a six-year project can be as high as 90 percent, and only drops to 75 to 80 percent on an eight-year deal (Peretz, 2009).The capital for the project can be sourced from many places, though ESCOs usually have relationships with private lenders who are willing to fund their projects on the strength of their energy assessments and contract structure — and who are attracted by the tax-free status of municipal bonds. Almost all — 95 percent — of ESPCs with ESCOs in the MUSH sector involve private lending structured as a municipal lease, also known as a lease-purchase agreement (Morgan, 2011). This is a common financing alternative in the public sector that allows the cost of the improvement to be paid via the operating budget, without incurring debt. It is, in essence, a "rent to own" program for governments, in which the cost of energy efficient equipment is paid for over time out of utility savings. For example, the Shenendehowa school district in Saratoga County, New York, contracted with an ESCO to improve the energy performance of seven buildings. They used a 10-year tax-exempt lease-purchase agreement to fund the deal. The agreement contained non-appropriation language that limited annual payments to the savings achieved in the operating budget, which allowed the district to make the improvements without raising taxes (U.S. EPA, 2004). It should be noted that municipal leases may count against a government's borrowing limit, making alternative debt structures necessary in the event that that limit is reached, and may be a factor in determining credit rating (U.S. EPA, 2004).

ESCOs have become increasingly willing to negotiate all aspects of their contracts, allowing institutional building managers to incorporate non-standard contract provisions such as conducting deeper retrofits, having the work done by their own (or at least non-ESCO) workers that are qualified, applying labor standards to the contracts, providing for third-party monitoring and verification, and allowing (and even training) their own workers to maintain and operate equipment (Morgan, 2011). Using the ESCO option means that many of the barriers to large-scale retrofit projects can be minimized. However, navigating the ESCO contracting process itself represents a barrier in some instances, especially for smaller jurisdictions. This can be overcome with the use of an owner's agent – a consultant familiar with the ESCO world that can negotiate on behalf of the municipality. This is becoming more popular, with both clients and ESCOs, and some states have even retained the services of an owner's agent for the benefit of their various departments and subsidiary jurisdictions. The owner's agent's fees can even be negotiated into the overall funding package, removing even that upfront cost barrier.

When working with ESCOs, it is vital to remember that they are large companies, with a primary (though not always exclusive) imperative to make money. When entering into an ESPC, their strong interest is to choose measures that will pay back quickly, in a contract that will give them a large buffer for error. This is only logical. However, if a program's goals are deep retrofits and maximal job creation, this approach is less than optimal. If a municipal or institutional customer has the capacity to manage an energy project end-to-end (including audit, contracting, monitoring, verification, and of course, financing) in a long-term, integrated fashion to prevent savings erosion (where due to poor building management and occupant behavior, systems cease to operate at full efficiency) over time, it should do so. This will allow deeper retrofits, more significant savings, and more job creation. If this (admittedly complicated) function can't be achieved internally, an ESCO is a logical alternative, though use of an owner's agent to assist with contracting, verification of potential savings, and to negotiate on the owner's behalf is highly recommended.

Should a MUSH entity choose not to pursue an ESPC with an ESCO, the most common route to implement energy efficiency projects is to enter into a design/build contract. The contracting entity determines the scale and scope of the project, secures financing, and issues an RFP for the work. The problem with this approach in the energy efficiency world is that it can lead to project fragmentation, where multiple contractors have responsibility for various parts of a system, and no one is responsible for the overall performance or energy savings. Additionally, design/build contracts lack the long-term energy management that an ESPC has. This can lead to savings erosion over time — as much as 50 percent within five years (Strategic Industries Division, 2011). While there's nothing wrong with design/build contracts per se, they should be used in the context of "end-to-end" project management as described above.

Barriers to Energy Efficiency in the MUSH Sector

The idea that energy efficiency is valuable isn't new, nor is the idea that municipalities can save money through building retrofits. However, no community has successfully retrofitted all its buildings, even where the value and need is recognized. Why has this seemingly common-sense step been neglected? For many decision-makers faced with running governments or large organizations, this may simply not be a priority, or the barriers to prioritizing it may be too high. It requires sophisticated knowledge and expertise, and lacking that, the promised savings from energy efficiency may be dismissed. It may involve multiple jurisdictions. Here we discuss these and other barriers.

Upfront capital cost: As previously noted, without ready access to cheap capital, the size and number of potential projects is limited, along with job creation potential and economic benefit. Even with cheap capital readily available, the upfront capital cost of comprehensive whole-building retrofits is daunting and decision-makers often choose to cherry-pick measures that will pay for themselves quickly — the low-hanging fruit.

Inability or limited ability to borrow/bond and impact of project bonding on credit rating: State and local governments across the country are facing diminished revenues as a result of a contracted tax base, reduced federal contributions, and other factors. While a tight budget should provide an incentive to invest in cost-saving energy efficiency retrofits, the poor financial condition of many governments impacts their ability to borrow. Not all jurisdictions are in dire straits — some may be able to issue GO bonds for energy efficiency investments. However, in jurisdictions where the debt capacity is at or close to a state or self-imposed limit, or where the credit rating is weak, or the project size is small, bonding for energy efficiency projects may not be feasible, in spite of the project's ability to cover the debt service through efficiency savings.

Diffuse control of buildings and/or building systems and lack of reliable information on energy expenditures: Hard though it may be to believe, many municipalities are unaware of how many buildings they own. If they do know this, they are unlikely to know how much energy each property uses. Procedures for tracking this data are likely to vary significantly from department to department, and in many instances, there is no single person who is aware of or responsible for tracking energy usage at either a departmental or municipal level. Without this knowledge, and without centralized control, it is very difficult to determine which buildings are wasting the most energy, what the potential for savings are, and where opportunities lie. This is why many projects are of the "change the lighting in city hall" variety — a good showcase, but nowhere near the comprehensive effort needed.

Political will and turnover in elected/appointed leadership: To put it bluntly, energy efficiency projects are not politically sexy. The improvements are not visible, the savings are not immediately apparent to constituents, and the payback is in the long term, not before the next election. If political leadership does decide to implement an energy efficiency plan, it risks becoming labeled as a political pet project. Incoming administrations might not understand or support the projects, and if the person in charge is a political appointee, with their replacement support for the project could evaporate.

Lack of experience with energy efficiency, ESCOs, etc.: The basic concept behind energy efficiency retrofits is relatively straightforward. The technical details of the projects, however, can become complicated, and issuing an RFQ and assessing responses for a design/build or ESCO contract can be challenging. Negotiating the contracting process, especially an ESPC, is far from straightforward as well. This is exacerbated in smaller jurisdictions where personnel, expertise, and finances are likely to be scarcer.

In addition to the barriers faced by individual government entities in doing this work, there are some barriers to scaling this up to a national level. Most significant is the sheer number of MUSH entities that exist. While this presents enormous potential, it also presents organizational problems – how do you convince all fifty states, much less almost 20,000 cities that they should upgrade their building stock? This "adoption barrier" is not insignificant, and must be overcome for the true potential for energy efficiency in the MUSH sector to be realized. There is, however, an upside: you do not have to convince all for one to start, and every building retrofitted is progress.

PRINCIPLES, POLICIES, AND PROGRAMS TO INCREASE ENERGY EFFICIENCY UPTAKE IN THE MUSH SECTOR

The barriers to creating large-scale energy efficiency programs listed above are significant, but can be overcome through a variety of program design choices and policies. Below we include two types of policies and programs: those that a government entity should adopt when working on its own building stock, and those that states should adopt to make it easier for local government entities to do this work. Table 2 contains a summary of these policies.

Emphasize Job Quality and Opportunity

High-performing governments and leaders seek to maximize their returns on investment — financially, certainly, but also in terms of environmental, social justice, and job creation outcomes. A well-designed retrofit program can improve each of these.

A public entity has direct control over the contracting process and can use this power to ensure that jobs created possess key high-road features. The point is not just to create jobs, but to create good jobs, and to make sure that those jobs — or pathways into them — are accessible to low-income, low-skill workers. Depending on the labor market, these structures can be implemented in a number of different ways. They could be simply mandated, they could be phased in over time, or firms that meet key criteria could be given preferential treatment in the bidding process. A wage floor, mandating the lower limit that workers employed on retrofit jobs can be paid is a good start. Targeted or local-hire provisions can instruct contractors or ESCOs to use (and hire if necessary) workers from particular geographies or other targeted groups on projects. First-source hiring requires that workers from key training programs are brought on first. Firms that are minority- or woman-owned can be given preference, as can those who use such firms as subcontractors, or demonstrate a mentoring relationship to them.

In Portland's Clean Energy Works residential pilot program, stakeholders decided early that they wanted 20 percent of contracting work to go to businesses owned by people of color and women. The program initially had no contractors from those communities, but as part of the Community Workforce Agreement they negotiated, contractors who subcontracted with targeted firms and mentored targeted firms received preferential access to work in the program. New contractors had access to business support and training. By the conclusion of the pilot, 23 percent of the Clean Energy Works Portland work was being completed by contractors from targeted groups (Ho and Hays, 2011). The MUSH sector is especially conducive to approaches like these, where governmental or other MUSH entities can set and enforce such goals, where supportive services (financing, training, etc.) can be leveraged, and where the work likely includes the opportunity to employ numerous subcontractors.

Seek out sustainable financing: A goal of a high-road MUSH sector retrofit program should be long-term sustainability. Even the most ambitious programs will take years to retrofit every building in which cost-effective energy conservation measures are to be found, and even once that process is complete, the maintenance, monitoring, and verification of such projects will remain an expense. In order to maximize the public good from such a program by going as deeply and into as many buildings as possible, and keeping the ability to engage in further work in the future as technology or finances warrant, sustainable long-term funding must be established.

Table 2
POLICIES TO PROMOTE HIGH-ROAD ENERGY EFFICIENCY IN THE MUSH SECTOR

Policy	*Level of Government*	*Purpose*	*Example*
For governments conducting EE work			
Living or prevailing wage standards	State and local	Ensure that EE jobs are high road	
First-source or targeted-hire policies	State and local	Require contractors to hire a certain percent of their workforce locally or from targeted communities	Portland, OR
Apprenticeship utilization requirements	State and local	Require use of apprentices on projects as a way to create opportunities in the building trades	St. Paul, MN; Oakland, CA
Safety and training requirements	State and local	Require certain training or certification to ensure safety and quality of work	Babylon, NY; Portland, OR; Los Angeles, CA
Community workforce agreements	State and local	Address the interests of under-represented communities	Portland, OR; Los Angeles, CA
Inventory building energy use	State and local	Identify and prioritize projects	Atlanta, GA; Arlington County, VA
Publish building energy use data	State and local	Transparency	Washington state
Capture savings for future EE work	State and local	Retain a portion of the cost savings achieved to fund additional EE work	Phoenix, AZ; Ann Arbor, MI
To assist state agencies and local governments in doing EE work			
Provide software to create energy inventories	State	Assist local governments to identify and prioritize projects	Massachusetts
Revolving loan fund	State	Finance EE projects in state agencies and local governments	New York state; Oregon; Kansas
Technical assistance and/or contract with owner's agent	State and local	Assistance negotiating ESCO contracts; provide this assistance to local governments at no or low cost.	New York state; Oregon; Kansas; Massachusetts
Negotiate master contracts with ESCOs	State	Establish favorable contract terms that can be accessed by local governments	Kansas

Generally speaking, cities that can afford and have the statutory authority to issue GO bonds (as QECBs, if possible) to finance energy efficiency policies are likely to find that this is the cheapest way to finance these programs, providing they have a relatively good bond rating and that the projects being considered are of significant enough size to spread out the transaction costs. Should this not be possible, cities should consider working with ESCOs or other private entities to find private capital to finance energy efficiency investments — likely a more expensive (though not prohibitively so) proposition.

Projects should be designed such that the administration, transaction, monitoring and verification, and other fees are addressed and incorporated, and not left to be a burden on the general fund (and not giving program opponents any reason to attack the financial responsibility of the program). This can be achieved in a number of different ways. If an ESPC is being considered, the measurement, verification, and administration can be built into the contract and paid for over time by savings. Alternatively, a portion of self-administered programs' savings could be earmarked to cover associated program costs, if suitable accounting provisions are implemented. Similar provisions can capture savings for use on future projects. For example, the City of Phoenix established their Energy Conservation Savings Reinvestment Fund in 1983. Energy Management staff work with departments around the city on HVAC and lighting projects using the Fund. Phoenix has realized at least $75 million in savings over forty years from its efforts (City of Phoenix, 2011).

Embrace data-driven decisions: In the MUSH space, retrofits can sometimes be driven by politicians seeking "halo" projects — retrofitting City Hall to achieve LEED certification,[4] for example. While these projects are laudable, our goal is rather to create "halo" policies that drive deep retrofits of all MUSH stock. The decision as to which buildings ought to be retrofitted, in what order, and using which technologies should be driven by data. Data can also help maintain the long-term viability of these projects, and ensure that projected energy savings materialize.

By assessing each building's current energy consumption, historic energy consumption, purpose, and square footage, rational decisions about where to start can be made. A simple energy cost per square foot analysis gives a measure of the building's energy intensity. Buildings with the highest energy intensity are logical places to start the assessment. Software programs to do this are available — the EPA provides the free EnergyStar Portfolio Manager[5] to assist in taking inventory of the energy usage of building stock, for example. Similarly, the Massachusetts Department of Energy Resources makes a free, web-based tool, MassEnergyInsight,[6] available to Massachusetts cities and towns. It provides customized reports on electricity, natural gas, and oil use.

Once inventory is taken, audits can be scheduled, starting with the most energy intensive (with some filter for building age/purpose applied — a new water processing plant is going to be highly energy intensive, but there are unlikely to be significant savings to be found there, unless the facility was designed without any consideration of efficiency). Once a suite of audits has been conducted, the projects can be sequenced in a number of different ways, though starting with those where the biggest savings are to be found is one logical approach. The City of Cincinnati, for example, owns or operates almost 400 buildings. They chose 88 of those to be audited and conducted energy efficiency upgrades in 69 of them. Over $14 million of work was done under an ESCO contract. The expected savings are over $1.1 million annually (Cincinnati OCM, 2010). The City of Atlanta is currently processing the results of a request for qualifications to audit all of their facilities and install all measures that pay for themselves over 15 years (Hosken, 2011).

Data should also inform the contracting and financing process. Post-retrofit, tracking a building's ongoing energy performance is crucial (Energy Star Portfolio Manager can facilitate this). Projects that are not completed under an Energy Savings Performance Contract tend to be vulnerable to savings erosion over time, with many achieving only half of their intended savings after five years. This makes the measurement and verification portion of the project particularly important. If an entity is lacking the technical acumen to sufficiently project manage an energy efficiency program in the long-term, an ESPC is likely to make sense – though the profit margin for the ESCO reduces the depth of the potential retrofit program. In addition, transparency, especially where public dollars are involved, is important. EnergyStar Portfolio Manager allows energy performance to be published directly to the web, and some leading states (such as Washington[7]) and municipalities are already providing this information.

Pursue Deep Retrofits: The goals of a retrofit program should extend beyond simply saving money. Pursuing retrofits with longer payback periods and higher upfront costs dramatically increases the scope of work to be done — with associated increases in energy savings, job creation, and environmental benefits. The State of New Hampshire, for example, goes well beyond the low-hanging fruit in its Building Energy Conservation Initiative, incorporating not just lighting upgrades but also water conservation and hot water systems, HVAC, building envelope improvements, and energy management controls (NH OEP, 2011). The concept of performing deep retrofits can be applied to the entire building portfolio as well. If the entire portfolio of buildings is accounted for as an entity, the energy savings from buildings with significant savings potential can be used to offset the cost of pursuing retrofits in buildings with less potential — expanding the scope of the overall project, and increasing the job creation potential. The ability to perform deep retrofits is primarily driven by a program's finances (and energy costs, though those are generally beyond the scope of a program's control).

Some MUSH entities will view the savings from energy efficiency improvements as strictly a boost to their bottom line. In the current economic climate, that's certainly an understandable approach, and doing the work will still drive job creation and create environmental benefits. However, if a program is seeking to maximize these last outcomes, reinvesting some portion (or all, if financial considerations allow it) of the savings in further energy efficiency projects (or in renewable generation, if that makes sense after a cost/benefit analysis) will deepen the project's impact. Projects financed this way would save money on a per-project basis (as they would not be subject to the same interest rates as other potential funding sources), and would conceivably allow investment in efficiency measures with longer payback periods. This would be predicated on developing a method to account for energy savings resulting from energy efficiency investments as a separate funding stream. Ann Arbor, Michigan, for example, established a Municipal Energy Fund in 1998. By allocating $100,000 a year for five years to energy efficiency projects and requiring that 80 percent of the savings from each project return to the fund for five years, the City has created a stable, long-term source of funding for clean energy projects (C40 Cities, 2010).

Build strong and independent partnerships: How a retrofit program is developed, organized, and governed is vital to its long-term success, and particularly important if high-road job creation is a program goal. Programs can be created by decree — from a mayor, council, board, or other governing entity, providing the political will exists to do so. In the absence of such will, or if there is the need to educate elected officials about the benefits of a retrofit program, a strong coalition pushing for energy efficiency investments can be very effective. The elements of such a coalition would ideally include business (e.g., contractors, ESCOs, property owners), community groups (e.g., minority groups, youth development organizations, neighborhood associations, environmental organizations), and labor unions. Other coalition members could include training programs and the local philanthropic community. Such a group would be well positioned to convince politicians of the importance of deep, equitable energy efficiency retrofit programs. The continued involvement of affected constituencies will additionally strengthen the program in the long run, especially in the face of turnover of elected officials. In Seattle, the Emerald Cities Collaborative brought together business, the City, and local labor and community groups to spur $38 million in investment in city and hospital buildings (Seattle.gov, 2010).

To survive the ups and downs of political cycles and politicians' careers, a sustainable retrofit program should be housed in a non-political department, or in a separately created new entity — likely some form of public-private partnership, with an independent funding source, ideally drawn as a percentage of retrofit investment (or savings). The New York Power Authority has created a turnkey energy efficiency division charged with this sort of project, complete with its own financing — essentially an in-house ESCO (Bharvirkar et al., 2008). Their Energy Services Program has financed 1,500 projects across the state, resulting in $93 million in savings per year (NYPA, 2011).

If a program is contracting with an ESCO, the use of an owner's agent (a consultant hired to guide the contracting entity through the ESPC or other contracting process) is recommended in instances where in-house expertise is insufficient to evaluate proposals, negotiate financing, determine project scope, ensure labor standards, and otherwise manage the decision-making process. The cost of the owner's agent can be written into the overall contract and paid for from project savings, maintaining the no-upfront-cost nature of the program.

Seek to maximize scale: For smaller entities, such as rural municipalities or school districts, individual projects might be of insufficient size to attract either the financial or contracting expertise needed to make them realistic. In such instances, aggregating properties with similar entities can reduce the transaction costs and attract the financing and contractors necessary for a successful project. Energy efficiency projects can also be bundled with other capital improvement programs, and the savings from them used to bring down the overall cost of the project. For example, the City of Amherst, New York, bundled a wastewater treatment plant, ice rinks, a police station, three recreation centers, four libraries, a museum, and various other properties into a $5.2 million performance contract (U.S. EPA, 2004). Similarly, energy efficiency projects can be bundled with renewable energy generation. The City of Reno, for example, combined energy efficiency with solar and wind generation into a $20 million project that will save them $1.3 million a year, and has retained or created 279 jobs (Geddes, 2011).

In addition, larger organizations (especially states) have the ability to assist smaller entities by facilitating aggregation and bundling, providing technical assistance, or creating a large pool of capital to finance smaller projects. Oregon Governor Kitzhaber, for example, launched the "Oregon Cool Schools" program in the spring of 2011. Under it, 500 schools in the state will receive full energy audits. Funded through a combination of federal bonds, public benefit charge monies, lottery dollars, and existing loan programs, it aims to achieve greater than 35 percent energy reductions system-wide by providing low-interest loans to schools that have comprehensive retrofit plans. To further decrease costs and increase the scope of work (and consequently job creation), they are incorporating seismic retrofits (using different bonding sources) into the overall project. Using dollars that could never be spent for classroom education, retrofitting schools nonetheless improves educational outcomes and reduces absenteeism by improving indoor air quality and comfort (Bailey, 2011). The State of Kansas has a similar initiative, the Facility Conservation Improvement Program, which has negotiated master contacts with a group of ESCOs and either provides financing or assists in finding it. The program is open to state agencies, municipalities, counties, and public schools. To date, it has overseen $85 million worth of energy efficiency improvements in 22 million square feet of public space (Ploger, 2006). Massachusetts offers technical assistance to municipalities in the form of Green Communities regional coordinators, who provide assistance with policy and investment that encourage energy efficiency (Executive Office of Energy and Environmental Affairs, 2011).

Adopt best practices in workforce development: Best practices for human capital development in energy efficiency are no different, really, than best practices elsewhere in the labor market, particularly for those industries that rely on skilled workers with more than a high school but less than a four-year college degree. The challenge is the same everywhere in the United States: a fragmented education and training system that has largely failed poor and working class communities, leaving some 88 million adults without the basic skills required to start earning a post-secondary credential (National Commission on Adult Literacy, 2008). Best practices are those that address this challenge through programs — and the system reform and policy initiatives to support them — that a) offer clear and affordable steps to entry and advancement; b) deliver and measure competencies credible to employers; c) lead to quality jobs or entry-level jobs with pathways to better ones; and d) increase workers' labor market mobility (White et al.).

In energy efficiency this typically, but not exclusively, means connecting individuals to construction apprenticeships. And the best way to structure the entrance of marginalized or underprepared workers into quality construction careers — and help them over the high bar that is a building trades apprenticeship — is a Community Workforce Agreement (CWA), combined with high-quality pre-apprenticeship or contextualized basic skills training, and, where necessary, social services.

There are, then, two inter-related parts to this human capital equation: access to jobs, and access to training. CWAs address the first. Building on the successful track record of Project Labor Agreements, CWAs go further to explicitly address the interests of under-represented communities, targeting hiring by geography and/or economic status, as well as specifying percentages of the workforce on a given project from a) those targeted categories of workers; b) jointly-administered registered apprenticeship programs; and c) the first-year apprentices and/or total apprentice workforce that come from targeted categories of workers. CWAs can also contain clear mechanisms for accountability (ECPC of the BCTD, AFL-CIO, 2010).

The experience of Portland and other cities using CWAs for residential retrofit programs is promising (Ho and Hays, 2011). But the most exciting and concrete results can be found in Los Angeles. Over the past decade, the City of Los Angeles has negotiated at least ten community workforce agreements designed to establish strong job quality standards, like wage, safety, and training requirements, while creating a pipeline that moves local residents into apprenticeship programs and middle-class careers.

In January 2009, the Bureau of Contract Administration released the following outcomes for seven completed community workforce agreements worth $491 million in construction (Owens-Wilson, 2010):

- Workers from targeted zip codes worked 23 percent of all construction hours on these projects.
- New apprentices from targeted zip codes worked over 10 percent of all hours.
- Over 1500 new African American apprentices entered careers in the construction trades through these projects.
- Workers from targeted zip codes earned over $22 million in wages across all seven projects.

Los Angeles also offers a leading model for training system reform that supports the advancement of low-skill, low-income workers in energy efficiency careers. Integrating "green" construction and basic education skills training, together with significant student advising and cutting edge career mapping, LA Trade Technical College has figured out how to break construction career programs into manageable short-term chunks clearly documented by industry-recognized credentials.[8] While it is beyond the scope of this paper to address related credentialing questions, it is worth noting that standardized skill delivery and measurement in the energy efficiency sector remains elusive, despite the worthy efforts of BPI, the Laborers International Union of America, and others (White et al.).[9]

A final prominent and well-documented high-road example is the Wisconsin Regional Training Partnership (WRTP/BIG STEP), whose successful role as a labor market intermediary — including significant wage, employment and benefit gains for community participants — was recently documented (Maguire, Freely, Clymer, Conway, and Schwartz, 2010). WRTP has long brokered relationships between community-based organizations, labor unions, and employers in the construction industry. The partnership now offers a "green" entry-level construction skills certificate whose value is negotiated with each of the trades individually, providing a navigable career pathway for low-income workers (White et al.).

Implement complementary policies: A strong retrofit program in the MUSH sector can do much to drive demand for such work in the commercial and residential space, and can support a contractor base and workforce able to meet that demand. Wage and benefit standards from the MUSH sector ideally are embraced as the norm. These other markets can be supported in many ways (most of which warrant considerable examination, well beyond our ambitions here), some of which we will mention briefly here.

Two of the most promising (and complementary) policy approaches are: a) generating market demand for efficiency through labeling, and b) requiring energy efficiency upgrades through Residential/Commercial Energy Conservation Ordinances (RECO/CECO) or retro-commissioning programs. Building labeling is simply a requirement that buildings put on the market disclose past energy consumption so that the value of energy efficiency (or the cost of the lack of it) is a factor that prospective occupants consider. RECO/CECOs are requirements that upon transfer of ownership, a property has to be brought up to a particular standard of efficiency. The cost of the upgrades is rolled into the sale.

CONCLUSION

Increasing the energy efficiency of public buildings will create jobs. But to get to significant scale — where many high-road new jobs are created — requires a methodical and focused approach, backed by political will. The barriers to large energy efficiency projects in the MUSH sector (lack of upfront capital; information, education, and building control disaggregation; lack of political will; and political turnover) can all be overcome.

For state, city, municipal, or institutional leaders, the first step is to determine what your building stock is, how much energy it uses, and what potential exists to reduce that use. Tools such as the EPA's Energy Star Portfolio Manager can facilitate that process. Indeed, benchmarking the energy use of public buildings and disclosing their performance is an important good governance step to take, regardless of intent to commit to a full retrofit program, and can be done rapidly with very little cost — many an internship has been built around this process. Once the list of worst performing buildings is created, there exist a number of options, but all involve determining financing options and who will do the work. With either a design/build or ESPC contract, an RFP should be issued. In jurisdictions with little experience in this area, retaining an owner's agent can facilitate this process. RFPs should include explicit language concerning intended labor standards for the project — local hire, minimum wage, apprenticeship utilization requirements, etc. Concurrently, financing options should be explored. If the project is of sufficient scale, using bonding authority (including possibly QECBs) is likely to be an attractive option. If an ESCO is being employed to do the work, then a municipal lease structure could be used. Once the work is complete, savings should be used to further finance energy efficiency projects. Building performance over time should be tracked, and as new technologies come on the market and energy prices rise, new projects should be considered.

These processes needn't take a long time. Benchmarking is quick, and the public disclosure of the results can have an immediate impact on energy use. If there is political consensus to move forward with a project, lining up financing and/or contracting with an ESCO can also happen relatively quickly. As with most projects, the speed at which things occur is a direct result of the resources committed to the task. The need to create jobs in many communities should provide some urgency to move the process forward.

For those not in direct control of buildings (community advocates, nonprofits, etc.), determining who has the ability to authorize a large-scale retrofit program is the first step. Ideally, they can be easily convinced of the merits — job creation, building improvements, savings, and environmental benefits — and the relative lack of risk, and will proceed. In larger entities, or where multiple decision-makers are involved, a labor-community partnership, similar to the ones created by the Emerald Cities Collaborative,[10] is a powerful force to drive implementation and ensure that the programs have high-road standards.

Using large-scale energy efficiency building retrofits to drive job creation makes sense. When you factor in the additional economic, environmental, and community benefits from a high-road retrofit program, it doesn't make sense not to. Given the severity of our economic crisis, the stubbornness of our unemployment rates (especially in the construction sector), and our environmental imperative we should seize this opportunity immediately. The relative ease of doing so only compounds the urgency. Many buildings are controlled by those who have a broader public interest. We can determine how much energy they use. We can finance the retrofits. We have the power to ensure that jobs created are good jobs. And we can make sure that economic benefits accrued expand the scope of the program and reach the communities who need them most. All we need is the will to do so.

Notes

1. Most broadly "high road" (HR) denotes a family of public and private strategies for human development under competitive market conditions that treat shared prosperity, environmental sustainability, and efficient democracy as necessary and achievable complements, not tradeoffs. As applied to private firms, HR implies competing less on price than on productivity (defined as revenue per unit of input) of managed human, physical, and natural capital; and sharing resulting surpluses with non-owner stakeholders (e.g., employees, government, communities) who helped produce it.

2. For a more thorough description of these barriers, particularly those in the residential sector see Sundquist's chapter of the ECW *Energy Efficiency Guidebook* (ECW, 2009).

3. For a discussion of best practices in residential program design, see *A Short Guide to Setting up A City Scale Retrofit Program* (Ho & Rhodes-Conway, 2009).

4. Leadership in Energy and Environmental Design, a green building certification system developed by the U.S. Green Building Council. For more information, see www.usgbc.org/DisplayPage.aspx?CategoryID=19.

5. EnergyStar Portfolio Manager, developed by the U.S. EPA, is an online building energy management tool that can be used to track energy and water use across a portfolio of buildings. For more information, see www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager.

6. See www.massenergyinsight.net/home for more information.

7. See the Energy Use Reports from the State of Washington's General Administration at www.ga.wa.gov/energy/EnergyUse.htm for an example.

8. For program overview, see the Los Angeles Trade Technical College's website at college.lattc.edu/green/education-training-programs. Excellent summaries and model career lattices can be found in the accompanying collection of presentations at college.lattc.edu/green/presentations.

9. The home performance upgrade guidelines and certification structure under development by the U.S. Department of Energy, and their potential expansion to commercial and industrial sectors, promises to better organize skill formation for energy efficiency careers. See their Residential Retrofit Guidelines here: www1.eere.energy.gov/wip/m/retrofit_guidelines.html.

10. See www.emeraldcities.org for more information.

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