Addressing the Energy Efficiency Financing Challenge: The Role and Limitations of a Green Bank

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INTRODUCTION

In 2007, New York City identified improving energy efficiency in existing buildings as one of the vital options for reducing the city's greenhouse gas (GHG) emissions.[1] The City's conclusion is consistent with many studies identifying energy efficiency, and particularly energy efficiency in residential and commercial buildings, as a major piece of any effort to mitigate global climate change. These studies show that energy efficiency investments are an essential low or no-cost option for reducing emissions, but that there are an array of barriers to initiation of energy efficiency projects. One of the most significant of these barriers, especially in residential and commercial building projects, is the lack of available capital. This is due in part to owners' reluctance or inability to fund expensive up-front costs of improvements, in part to lack of information, and in part to lack of ability to attract capital because of collateral issues. New York City's experience following through on its initial policy analysis is instructive. When it recently attempted to put in place a requirement that buildings undertake efficiency improvements that would pay for themselves within five years, there was widespread protest over lack of available financing.[2]

This paper will address how a federal program to aggregate and potentially guarantee loans made to finance energy efficiency projects can be leveraged to promote best practices on the state and local level for opening up energy efficiency projects to external financing. There are a number of existing financing tools that have started to solve the problem of providing access to capital for efficiency projects, but the programs are all relatively small and have had limited market penetration. One essential, but not

[1] *See* City of New York, PlaNYC: A Greener, Greater New York (2007).
[2] *See Infra* Section I.D.

exclusive, solution will be to create a federal entity, based on existing green bank proposals, that has the authority and funding to provide credit support for efficiency financing and that can help create a secondary market for efficiency backed financial products.

The paper proceeds in three parts. Part I reviews the role of energy efficiency in addressing global climate change and the impediments to greater energy efficiency investment. Part II examines existing policy options and financing tools and reviews some of their limitations. Part III looks at existing green bank legislation and suggests modifications to those proposals, as well as additional federal policies that should be considered.

I. RESIDENTIAL AND COMMERCIAL BUILDING ENERGY EFFICIENCY AND CLIMATE CHANGE: THE EFFICIENCY CHALLENGE

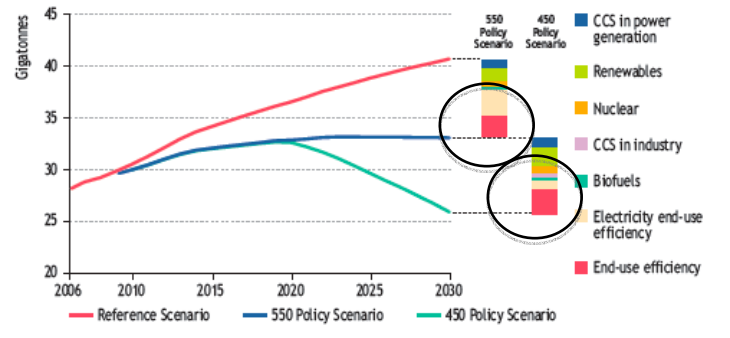
Improving energy efficiency throughout the economy is one of the most important policy imperatives for addressing global climate change, and one of the most elusive. Because energy efficiency presents a significant opportunity for cost savings through energy savings, it has the potential to offset higher cost actions to lower GHG emissions, reducing the overall cost of climate change mitigation. Despite that, there are persistent barriers to greater action on energy efficiency, blocking progress on many of the most effective short and medium-term actions for addressing climate change. Improving energy efficiency in residential and commercial buildings provides a useful example of the challenges associated with improving energy efficiency and a sector where a package of government policies may be particularly effective for removing the barriers to greater efficiency.

A. Energy Efficiency and Climate Change

The importance of energy efficiency measures in mitigating climate change stems from the central role of energy in the climate problem. The International Energy Agency's (IEA) projections suggest that energy demand will continue to grow significantly in the next twenty years, with overall demand growing by 45% between 2006 and 2030.[3] Energy use, however, is the primary driver of GHG emissions, accounting for 83% of all emissions in 2006.[4] Increased energy use is thus a primary driver of emissions growth, with emissions from energy use projected to increase by 45% in 2030 from 2006 levels.[5]

Climate change mitigation requires a transformation of both the type of energy produced and the way energy is consumed. Improving energy productivity—both shrinking energy demand and increasing the amount of energy used per dollar of economic output—is repeatedly identified as a

Figure 1: Energy Related CO_2 Reductions By Source in IEA Policy Scenarios



Source: World Energy Outlook 2008, 447.

[3] INTERNATIONAL ENERGY AGENCY, WORLD ENERGY OUTLOOK 2008 78 (2008).
[4] International Energy Agency, CO2 Emissions From Fuel Combustion Highlights (2009 Edition) 8 (2008).
[5] INTERNATIONAL ENERGY AGENCY, WORLD ENERGY OUTLOOK 2008 382 (2008).

primary source of potential energy-related emissions reductions.[6] For example, the IEA's projections of energy use changes necessary to address climate change show that energy efficiency accounts for 63% of avoided energy-related GHG emissions in scenarios that stabilizes carbon dioxide concentrations in the atmosphere at 550 parts per million (ppm) and even greater end-use efficiency gains are required for a scenario that stabilizes CO_2 concentrations at 450ppm (See Figure 1).[7]

Separate analyses of what efforts will be required to address climate change also suggest that energy efficiency will play a critical role. One analysis has broken down the necessary emissions reductions to stabilize GHG concentrations into wedges, with each wedge representing one Gigaton of avoided GHG emissions per year by 2050.[8] Of the seven wedges discussed in 2004, four could come from energy efficiency.[9] Another analysis based on the initial wedges paper suggests that building energy efficiency alone will need to account for *three* wedges—twenty percent of all avoided emissions.[10]

How to improve energy efficiency, however, represents an enduring energy policy conundrum. It has long been known that many energy efficiency measures will pay for themselves over a reasonable time, however many of these savings are ignored or unrealized. The potential for cost effective energy savings are now particularly important given the potential expense of many alternatives for mitigating climate change. The consulting firm McKinsey & Co. has produced a now well-known cost curve for reducing

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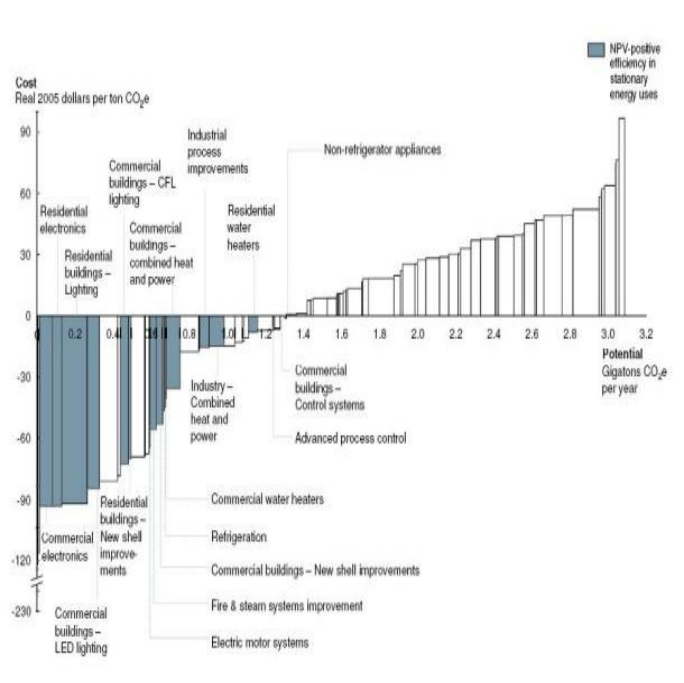
[6] For this reason, energy efficiency is referred to as the "fifth fuel" and avoided energy consumption from energy efficiency measures are referred to as "negawatts." *The Elusive Negawatt*, THE ECONOMIST, May 8, 2008.
[7] INTERNATIONAL ENERGY AGENCY, WORLD ENERGY OUTLOOK 2008 445-447 (2008).
[8] S. Pacala & R. Socolow, "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies," 305 SCIENCE 968 (2004).
[9] *Id*. at 969.
[10] Climate Progress, http://climateprogress.org (Mar. 26, 2009, 17:40 EST).

GHG emissions, and, in turn, addressing climate change (reproduced in Figure 2). Bars below the X-axis of the McKinsey cost curve represent activities that have positive net-present value (NPV), meaning that over time these investments produce a positive economic return, assuming a seven percent discount rate.[11] The shaded bars in the cost curve each represent a different energy efficiency measure, from improvements to consumer electronics to adoption of combined power and heating technologies. The essential lesson to be taken from the McKinsey cost curve is that energy efficiency improvements represent the majority of cost-effective means to reducing GHG emissions and that significant economic savings are being ignored.

Figure 2: McKinsey & Co. NPV Energy Efficiency Analysis



NPV Energy Efficiency savings appear in blue.

Source: Unlocking Energy Efficiency in the U.S. Economy, xxii.

The McKinsey cost curve highlights another fundamental aspect of the energy efficiency challenge—the diverse array off efficiency opportunities for end-users.

[11] HANNAH CHOI GRANADE ET ATL., UNLOCKING ENERGY EFFICIENCY IN THE U.S. ECONOMY III-V (2009) *available at* http://www.mckinsey.com/clientservice/electricpowernaturalgas/downloads/us_energy_efficiency_full_report.pdf.

Setting aside available gains from improved transportation efficiency or gains from improved electrical transmission efficiency, McKinsey's analysis suggests that there are significant efficiency gains that can be realized across the residential, industrial, and commercial sectors.[12] Efficiency gains can come from improved electronic equipment efficiency, industrial process improvement, waste heat management, improved major appliance efficiency, and a wide array of building efficiency retrofits.[13]

B. Opportunities in Residential and Commercial Building End Use Efficiency

Of the potential energy efficiency gains, improvements in existing buildings are particularly notable. First, in the residential and commercial sectors, gains can be achieved with relatively little technological innovation. Second, building efficiency represents the largest category of potential gains in terms of potential emissions reductions. As discussed below in Part I.C., efficiency gains in buildings are also the beset by some of the most difficult barriers to action on energy efficiency.

1. Types of Efficiency Opportunities

Potential energy efficiency improvements in the residential sector include a variety of home insulation upgrades, structural improvements such as sealing air leaks, lighting upgrades, and heating and cooling system upgrades.[14] Other residential sector gains can come from improved efficiency in various household appliances and improved

[12] *Id*. at 10.
[13] *Id*. at 15 (note Exhibit 7 in the McKinsey report, which presents each of the NPV stationary end-use efficiency measures in terms of both how much energy can be saved and the net annual savings from adoption of those measures).
[14] McKinsey & Co., 34.

efficiency in consumer electronics.[15] Residential insulation, windows, and building shell modifications are particularly important as improvements in these features of residential buildings have significant potential to reduce overall residential energy use.[16] Similarly, commercial building energy efficiency opportunities are clustered around building shell improvements and HVAC systems.[17]

These types of energy efficiency measures for residential and commercial buildings are almost entirely based on existing technologies that generally have positive NPVs.[18] While these technologies are almost all cost effective and that their adoption represents one of the most significant sources of potential efficiency gains, significant barriers stand between recognition of their importance and wide scale deployment. These barriers are common to many energy efficiency opportunities, but are particularly notable when considering residential and commercial building efficiency.

2. Scale of Efficiency Opportunities in the Commercial and Residential Building Sectors

Of the various options for improving energy efficiency, measures to improve residential and commercial buildings represent a significant portion of available energy efficiency gains. Overall, the residential and commercial sectors comprise sixty percent of potential energy efficiency gains in 2020.[19] Based on McKinsey's analysis, efficiency improvements to existing commercial and residential buildings account for sixty percent of those efficiency gains—combined, forty percent of the potential efficiency gains will

[15] *Id*. at 46-47.
[16] Philipine de T'Serclaes, *Financing Energy Efficient Homes: Existing Policy Responses to Financial Barriers* 11 (IEA Information Paper, 2007).
[17] McKinsey & Co, 56.
[18] *See* INTERNATIONAL ENERGY AGENCY, PROMOTING ENERGY EFFICIENCY INVESTMENTS: CASE STUDIES IN THE RESIDENTIAL SECTOR 29-31 (2008).
[19] McKinsey & Co, 12.

come from buildings.[20] While other analyses of energy efficiency opportunities do not break down the overall energy efficiency potential in the same way as the McKinsey study, a separate study of existing energy efficiency investments also shows that investments in building efficiency (across sectors) accounts for thirty percent of the current energy efficiency market.[21]

Not surprisingly given the size of the emissions abatement opportunity, residential and business efficiency measures represent a significant market. As noted above, building efficiency improvements make up thirty percent of the $300 billion efficiency investment market—$90 billion.[22] Based on the potential for the energy efficiency market, which could grow to $700 billion overall by 2030, the building efficiency market could eventually represent a $210 billion market.

C. Barriers to Energy Efficiency Uptake

The availability of cost effective efficiency measures, and the importance of those measures for addressing both climate change and growing costs of energy consumption, suggests that uptake of energy efficiency measures is hindered by a number of barriers.[23] Barriers can be divided into two categories—market barriers and financial barriers.[24] Market failures include lack of information and split incentives. Related to market failures, there are a number of behavioral failures that may also be relevant.[25] Financial

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[20] *Id*.
[21] Karen Ehrhardt-Martinez & John A. "Skip" Laitner, *The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture* 13 (ACEEE Report No. E083, 2008).
[22] *Id*. at 14.
[23] *The Elusive Negawatt*, THE ECONOMIST, May 8, 2008.
[24] Promoting Energy Efficiency Investments, 34, 37.
[25] Kenneth Gillingham et al., *Energy Efficiency Economics and Policy* 15 (RFF Discussion Paper DP 09-13, 2009).

barriers include high up-front costs and limited financing options. Notably, many of these barriers are exacerbated by the fragmented nature of energy efficiency opportunities.

Market failures lead to significant distortions in the market for energy efficiency improvements. A critical market failure, particularly for large-scale investments like building efficiency upgrades is lack of information. Information failures come in the form of difficult to understand technical information, insufficient information about the long-term operating costs of an investment, and lack of standardized assessment of investment opportunities.[26] Energy efficiency opportunities may be complex and difficult to understand, they may span a range of different parts of a building—from windows to heating systems to different types of insulation for various parts of a house or building, and they may be difficult for an individual home or building owner to aggregate.[27] Market failures also include a significant principle-agent issue where people who will benefit from efficiency measures are not necessarily the people making decisions about whether to make efficiency investments.[28] This principle-agent problem often leaves the person paying for electricity not in a position to make a decision about whether to invest in a given efficiency opportunity, and reduces incentives for building owners that do not have to pay energy costs from absorbing higher up-front costs for an investment that will provide no return.[29]

Market failures interact with behavioral preferences that inhibit rational energy

[26] Promoting Energy Efficiency Investments, 35.
[27] *Id*.
[28] Trevor Hauser, *The Economics of Energy Efficiency in Buildings* 4 (Peterson Institute for International Economics Policy Brief PB09-17, 2009).
[29] Gillingham et al., 12.

efficiency investment decisions. Specifically, faced with lack of information, consumers will display loss aversion and status-quo bias, leading them to shy away from investments they do not understand.[30] Consumers have also been shown to assign irrational discount rates to energy efficiency investments, expecting fifty to seventy-five percent returns on those investments—a payback of one to two years.[31]

Financial failures affect both home and building owners and financial institutions that may be interested in providing capital for energy efficiency investments. For home and building owners, the initial capital costs of an energy efficiency improvement—even one that pays for itself over a few years—may make that improvement impossible to afford without outside financing.[32] For both owners and financial institutions, uncertainty over calculating energy savings makes evaluation of individual efficiency projects difficult. Similarly, lack of a widely agreed upon measurement and verification standard makes systematic evaluation of projects difficult for financial institutions.[33] Project dispersion also creates a significant financing failure. Because individual energy efficiency projects are relatively small and diverse in commercial financing terms, an individual project may be particularly uncertain and may be too small to attract investors.[34]

Efforts to increase investment in energy efficiency in buildings will thus depend on both overcoming information failures and creating a framework for increasing access to financing to overcome the cost structure of efficiency investments. Local and national

[30] *Id*. at 16.
[31] McKinsey & Co., 25.
[32] Promoting Energy Efficiency Investments, 37.
[33] *Id*. Note, there is an international standard for measurement and verification used by many Energy Service Companies, but has not been widely adopted outside of ESCOs.
[34] *Id*. at 39-40.

efforts to increase energy efficiency investments show that efforts to address both types of barriers must come in conjunction to effectively increase efficiency investments.

D. Financing Case Study: New York as an Example

New York City's efforts to promote energy efficiency investments provide a useful case study for the relevance of barriers to energy efficiency measures and the need for wider policy initiatives. In 2007, New York City launched PlaNYC 2030, a comprehensive sustainability plan designed, in part, to address the city's GHG emissions.[35] One element of PlaNYC is an initiative to revise the city's building codes for existing buildings. In April 2009, Mayor Bloomberg unveiled a package of laws that would have required existing buildings in the city larger than 50,000 square feet to undergo regular energy efficiency audits—comprehensive certifications of energy efficiency opportunities—and to undertake any measures that were identified to pay for themselves in five years.[36] In December 2009, the Mayor and City Council dropped the investment requirement amid significant criticism that there would be insufficient financing available for such projects.[37]

The experience in New York is a useful example of both the kinds of comprehensive policy measures that might be needed to promote greater energy efficiency investment and the persistence of the barriers to those investments. The New York City law provided both a means for overcoming information failures, through the efficiency audit, and a mandate that will generate a market. The absence, however, of a

[35] *See* City of New York, PlaNYC: A Greener, Greater New York (2007).
[36] Andrew Revkin, *City Plans to Make Older Buildings Refit to Save Energy*, N.Y. Times, Apr. 22, 2009, at A19.
[37] Mireya Navarro, *Bloomberg Drops an Effort to Cut Building Energy Use*, N.Y. Times, Dec. 4, 2009, at A1.

well-defined market for energy efficiency financing undermined the viability of the entire legislative package.

II. POLICIES FOR FINANCING ENERGY EFFICIENCY: AVAILABLE OPTIONS AND CRITICAL GAPS

A. Policy Options for Improving End-Use Energy Efficiency

There are an array of policy options available for spurring energy efficiency, not all of which are directly related to increasing access to financing. These options are worth considering because while this paper focuses on improving access to financing, most studies recognize that no single policy will solve the energy efficiency challenge.[38] Indeed, many of these policies may be complementary to or will help reinforce policies aimed at improving efficiency financing. Additionally, these policy options could work hand-in-hand with larger policy initiatives, including efforts to put a price on carbon. While a broader price signal alone will probably not work because of the scattered nature of potential efficiency gains, it will make many of those gains more readily apparent.[39]

The first type of policy is to set standards and codes for energy efficiency. This approach is particularly relevant for non-building related efficiency measures, such as appliance standards.[40] Codes can also play an important role in ensuring energy efficient designs in new construction by setting minimum efficiency standards for new homes and building. Codes may also be important creating a framework for energy efficiency improvements in existing buildings, along the lines of the aborted efforts in New York

[38] McKinsey & Co., 91-92.
[39] *Id*. at 97.
[40] WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT (WBSCD), ENERGY EFFICIENCY IN BUILDINGS: TRANSFORMING THE MARKET 31 (2009); *see also* McKinsey & Co., 94.

City. Codes are limited, however in that they cannot be implemented on a national scale, and thus leave the possibility of missed opportunities, and as seen in New York, in the case of existing buildings, they do not necessarily solve the up-front capital issues. Therefore, while codes may be an important part of creating a market for efficiency investments, they cannot operate in a vacuum.

The second type of program is direct or indirect government funding. Direct government funding may help finance demonstration projects or spur a market, and will be very important for government-owned facilities, but probably cannot fill the gap needed to finance energy efficiency on an optimal scale. Government subsidies and tax breaks are potentially relevant—current tax breaks for efficiency investments are relatively low and could be increased, and additional subsidies through grant programs could provide the seed for state or local level financing initiatives.[41] At the state level, indirect funding can come through a systems benefit charge assessed by utilities. A systems benefit charge is added to utility bills and is used to finance energy efficiency projects, typically for low income homes.[42]

A third category of policy options may revolve around addressing information issues. Government can play a major role in addressing information problems by setting up education programs such as labeling regimes and mandating wider use of information

[41] *See* Promoting Energy Efficiency Investments, 88-89. A version of federal grant funding for financing initiatives is already in place and is discussed further infra. *See* Department of Energy, Energy Efficiency and Conservation Block Grant Program, *available at* http://www.eecbg.energy.gov/about/competitive_grants.html.

[42] Matthew Brown, *Models for Administering Ratepayer-Funded Energy Efficiency Programs* (Alliance to Save Energy State Energy Efficiency Policy Briefs #4, 2009) *available at* http://ase.org/uploaded_files/6099/EE_Admin_Structures.pdf.

programs.[43] Local and state governments can play an important role in building efficiency by adding requirements for energy audits upon sale of a property or other steps to ensure homeowners or purchasers have verified information about energy efficiency opportunities. Here again, New York's codes provide a good example of a policy that may eventually reinforce financing efforts. By mandating energy efficiency audits on a regular basis—a part of the bill that was preserved—information about potential savings will at least now be readily accessible.[44]

Finally, governments can intervene to promote access to financing for energy efficiency projects. Through rules and regulations and through financing programs, governments may be able to promote the flow of financing to efficiency projects. This is the policy option addressed in the following sections of this paper.

B. Existing Programs for Financing Energy Efficiency Improvements

There are a number of existing alternatives for financing energy efficiency investments. These programs will provide the foundation for any expansion of financing for energy efficiency and will show the relevant gaps that a policy initiative needs to fill. Current financing options are divided between private and public financing, with some overlap between the two categories.

1. Private Sector Financing

Two areas of private financing are worth considering in examining energy efficiency financing. Direct private financing shows the limits of current financing schemes. Energy Service Company financing provides a good model for how third-party

[43] WBCSD, 31.
[44] Navarro, *Bloomberg Drops an Effort to Cut Building Energy Use*. *See also* WBCSD, 31.

financing might work, but also shows the limits of the current third-party private financing market.

The most basic form of private financing is direct financing for energy efficiency retrofits by the building owner. Direct end-user financing involves the consumer paying for the costs of energy efficiency retrofits, offset only by available subsidies and tax incentives.[45] As discussed above, direct financing is limited by most of the information problems associated with energy efficiency and by access to capital. Home and building owners' unreasonably high discount rates in assessing energy efficiency projects and lack of necessary information to guide investment decisions are especially prominent when considering direct financing. More importantly, limited by access to capital will continue to hinder direct financing. However, for incremental and emergency replacements, direct financing will continue to be a relevant piece of the efficiency financing world.

An alternative form of private financing is third party financing independent of government intervention or support. Energy performance contracting by Energy Service Companies (ESCO) is a well established, if small, form of energy efficiency financing.[46] ESCOs operate by developing and overseeing energy efficiency projects, bearing the up-front costs while receiving a payback over five to ten years.[47] ESCOs have developed an effective system of evaluating and measuring potential efficiency gains and financing the necessary improvements while sharing the savings with the client. The market for ESCOs, however, remains quite small. In 2006, revenues from the ESCO industry

[45] McKinsey & Co., 100.
[46] For an overview of the ESCO industry, see generally Nicole Hopper et al., *A Survey of the U.S. ESCO Industry: Market Growth and Development from 2000 to 2006* Ernest Orlando Lawrence Berkeley National Laboratory LBNL-62679, 2007).
[47] Edward Vine, *An International Survey of the Energy Service Company (ESCO) Industry*, 33 ENERGY POLICY 691 (2005).

reached $3.6 billion with $2.5 billion of that coming from efficiency investments.[48] The ESCO industry's energy efficiency activities thus represent approximately two percent of energy efficiency investments in commercial and residential buildings.[49]

One issue for ESCOs is that the current market is dominated by contracting with government and institutional building owners, and is much smaller in the residential and commercial sectors. The municipal and state government, university, college, schools, and hospital market accounts for fifty-eight percent of the ESCO market, with federal government and public housing contracting accounting for another twenty-four percent of the market (a combined eighty-two percent of the ESCO market).[50] This is in part due to issues with reluctance relating to encumbering private properties with additional loans, as well as limited access to capital for non-public sector contracts.[51]

2. Public Sector Financing Programs

Alternatives to private financing come from financing based on public programs or legislation and complete publically managed financing programs. Examples of public financing include private financing based on a public mandate, such as energy efficient mortgages and utility based financing, and direct public financing programs such municipal bond programs to provide financing to home and building owners.

Energy efficiency mortgages (EEM) are one example of a hybrid financing arrangement where a federal mandate has created a market for private energy efficiency financing. EEMs are based in part on a Federal Housing Administration (FHA) program

[48] Hopper et al., v.
[49] Based on author's calculations using market size numbers from Ehrhardt-Martinez & Laitner and ESCO market data from Hopper et al.
[50] Hopper et al., 13.
[51] Vine, 693-94.

established in 1992. The FHA, an agency charged with increasing home ownership by insuring mortgages, will underwrite mortgages that include funds to undertake energy efficiency upgrades based on a home energy rating system evaluation.[52] The Department of Veteran Affairs and both government-sponsored enterprises (GSE), Fannie Mae and Freddie Mac, also provide EEM products. EEMs provide a good example of adjusting a current financing program to account for energy efficiency gains when combined with information programs (the energy efficiency audits required for the EEM). The program, however, is limited by the requirement for an audit and by the overall size of the program.[53]

A second example of hybrid financing comes from utility financed energy efficiency improvements. Utility financed energy efficiency programs involve a utility company providing funds to a customer to finance energy efficiency investments with repayment coming through either through a loan which is paid back as a line-item on the utility bill or through an additional tariff.[54] These programs are a mix of independent utility activity and regulator-authorized initiatives, with on-bill loans not requiring regulatory approval but some tariff programs requiring sign-off.[55] These programs, like most other efficiency financing programs, require an energy efficiency audit. Based on

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[52] Promoting Energy Efficiency Investments, 265; *see also* Steve Baden et al., *Hurdling Financial Barriers to Low Energy Buildings: Experiences from the USA and Europe on Financial Incentives and Monetizing Building Energy Savings in Private Investment Decisions* 8-12 (Florida Solar Energy Center FSEC-PF-396-06, 2006).

[53] EEMs are limited to 5% of the FHA portfolio. *See* U.S. Department of Housing and Urban Development, *Housing and Economic Recovery Act of 2008 Boosts Energy-Efficient Mortgages*, RESEARCH WORKS, Nov. 2008, at 4.

[54] Matthew Brown, *Paying For Energy Upgrades Through Utility Bills* 1 (Alliance to Save Energy State Energy Efficiency Policy Briefs #3, 2009) *available at* http://ase.org/uploaded_files/5476/On-Bill%20Loans%20-%20Final.pdf.

[55] *Id*. at 2.

the audit, the utility will finance and often service improvements with the costs being repaid over time through utility bills.[56] Recourse for failure of payment can be the same as with any failure to pay a utility bill—disconnection of the utility service.[57]

While these programs provide a potentially attractive solution to some of the financing issues discussed in the next section, they have not been widely adopted. One issue is that in many cases they require regulatory approval. The programs also require updating billing systems and create potential losses from loan defaults and administration. Finally, and perhaps most importantly, the programs stray from a utility's core competency, requiring a utility to act as a financing entity.[58]

A final example of public financing is municipal financing for efficiency investments. The best developed model for this kind of program is municipal Property Assessed Clean Energy Bonds (PACE Bonds) in which a town or city issues a bond to raise capital for energy efficiency projects, and home or building owners receive financing for efficiency improvements, paid off as a special assessment to the building's property taxes.[59] These bonds have received significant attention and have been adopted in California as well as by towns in New York.[60] To establish a PACE Bond program, typically a state needs to pass enabling legislation; a municipality needs to create a PACE

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[56] *Id*.
[57] *Id*. at 3.
[58] *Id*. at 10-11.
[59] Daniel Kammen, *Financing Energy Efficiency with Taxes*, SCIENTIFIC AMERICAN, March 27, 2009, *available at* http://www.scientificamerican.com/article.cfm?id=financing-energy-efficiency-with-taxes.
[60] *Id*. PACE Bonds are a program that has received some attention in conjunction with the 2009 economic stimulus funds. PACE Bond programs are eligible for some DOE grants and were the subject of an administration white paper on energy efficiency funding. *See* Council on Environmental Quality, *Recovery Through Retrofit* (Middle Class Task Force Report, 2009) *available at* http://www.whitehouse.gov/assets/documents/Recovery_Through_Retrofit_Final_Report.pdf.

district; and the district then needs to issue a PACE master bond. Once a PACE Bond is created, building owners can conduct an efficiency audit and apply for loans to pay for efficiency improvements. Loans are funded through the bond issue and are paid back through regular assessments on property tax bills.[61]

PACE Bonds provide one of the most attractive models for financing efficiency improvements by creating a well recognized financing structure and providing a system for bringing in outside capital. The programs, however, are still quite new and face a variety of issues, particularly with commercial buildings over security for the loans and sources for initial seed funding for the bonds.

C. Issues that Need to Be Addressed for Financing Energy Efficiency

While there is a wide array of programs that have the potential to improve access to financing for energy efficiency improvements, there are four macro-level impediments to improving the flow of capital to these financing opportunities. First, for many of the financing arrangements, security for the loans remains a challenging issue. Second, there is a lack of institutional expertise in many financial institutions, leaving these types of financing arrangements without a natural constituency. Third, the size and scale of these opportunities creates an issue where aggregation is necessary to attract capital. Finally, while there are some existing measurement and verification standards, standardization of loans is still a problem.

The first financing issue that a policy will need to address is security from default risk for financing arrangements. A critical issue with efficiency loans is that because

[61] Fir Tree Partners, *Pace Finance: Innovative Funding the Accelerate the Energy Retrofit of America's Buildings*, *available at* http://pacenow.org/documents/Basic_Slide_Intro_to_PACE.pdf.

there is no asset to secure the loan, there are limited recourses for failure to pay.[62] For private third party financing through ESCOs or banks, this reduces the attractiveness of many small residential or commercial projects and raises the cost of lending for those projects.[63] The issue of security also arises for building owners, especially in the commercial sector. Owners may not want to encumber a property with additional debt as this may reduce their ability to sell the property freely.[64] Finally, even where there are streamlined means to secure a loan—through on bill financing or PACE Bonds—there remains issues over what priority efficiency loans would be given and whether new liens would adversely affect existing loans.[65]

The second financing issue is lack of institutional expertise in efficiency financing. While ESCOs certainly have the relevant expertise to oversee financing, they remain a small part of the overall efficiency market. Other financial institutions that might be expected to fill the remaining gap, however, suffer from a lack of relevant personnel with necessary expertise.[66] This leads to a lack of awareness of financing opportunities, limited experience with project evaluation, and resistance to working with unfamiliar financial products that fall below a certain scale requirement.[67]

The third issue to overcome for energy efficiency financing is scale and aggregation. As noted above, individual energy efficiency projects are relatively small.

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[62] *See* Promoting Energy Efficiency Investments, 41.
[63] *Id.*; *see also* Hopper et al., 15-17.
[64] McKinsey & Co., 26.
[65] *See* Brown, *Paying For Energy Upgrades Through Utility Bills* for a discussion of reluctance to disconnect service; *see also* Jones Hall Memorandum to PACE Working Group, May 14, 2009, *available at* http://pacenow.org/documents/7a.%20JH%20Lien%20Issue%20Paper%20CLN.pdf.
[66] UNEP FI CLIMATE CHANGE WORKING GROUP, ENERGY EFFICIENCY & THE FINANCE SECTOR: A SURVEY ON LENDING ACTIVITIES AND POLICY ISSUES 28 (2009).
[67] *Id.*

The cost of retrofitting a house, for example, might be $20,000. While this might amount to a significant outlay for a homeowner, it is a small financing opportunity for a bank or even an ESCO.[68] The small size of efficiency projects suggest that unless the projects can be aggregated in a way that will draw institutional investment, they will pose greater costs than will be recouped through the loan terms.[69]

The final issue is one of standardization. The range of financing opportunities for energy efficiency investments makes it difficult to standardize loan terms and evaluation of projects.[70] This problem, especially when combined with the scale problem, makes institutional investing particularly difficult, as there are little in the way of models for standardized loan products and arrangements.[71] While the existence of energy efficiency mortgages suggests that there are ways to create some standardization, the link to the more established, and larger, loan product probably explains how mortgages are different than separate efficiency loans.

A set of policies to promote significant expansion of efficiency investment will therefore need to address each of these issues. As with efficiency policy in general, the range of issues blocking expanded financing suggests that a single policy initiative alone will not solve the problem of expanding access to and scale of efficiency financing.

III. THE ROLE FOR FEDERAL POLICY: ADJUST AND IMPLEMENT EXISTING GREEN BANK PROPOSALS TO SPEED FLOW OF CAPITAL TO ENERGY EFFICIENCY PROJECTS & PROMOTE STATE AND LOCAL POLICIES THAT CREATE FINANCING OPPORTUNITIES

Given the array of issues blocking access to financing and limiting the scale of the

[68] *Id*. at 31.
[69] *Id*.; *see also* Promoting Energy Efficiency Investments, 38-39.
[70] Promoting Energy Efficiency Investments, 40.
[71] *Id*.

finance market, a policy to expand efficiency financing needs to combe actions at the local, state, and national levels. The solution proposed in this paper seeks to pair efforts at the national level to increase available capital with actions to open up more markets by pushing local and state governments to adopt best practices that enable investments in energy efficiency. This combination has the potential to alleviate the challenge that many programs that would benefit from greater capital flows are also dependent on legislative or regulatory changes below the federal level that might otherwise not happen or be completely disconnected from an increase in capital flows.

The core of this policy proposal builds off existing federal financing proposals contained in pending green bank legislation. Most reviews of financing challenges suggest that loan guarantees and other credit enhancements will be necessary to promote greater flow of capital to energy efficiency projects, in part to make up for the difficulties in identifying collateral for energy efficiency loans.[72] A green bank can help to address that problem by providing support for loans and by spurring greater investment into energy efficiency savings-backed financial assets, so that contracts or securities that do not have collateral issues will also benefit from greater access to capital.

Separate legislation creating financing agencies has been passed in the House of Representatives and is pending in the Senate, and features of both bills should be combined.[73] The proposals should look to take the best features of existing government sponsored enterprises such as Fannie Mae as wells as fully government funded and controlled financial institutions such as the Export-Import bank. In its final form, the green bank should be able to function as a largely autonomous entity that has the power

[72] *See, e.g.*, McKinsey & Co., 60.
[73] *See* S. 1462, 111th Cong. §§ 101-109 (2009) and H.R. 2454, 111th Cong. §§ 182-191 (2009).

to both directly support loans and aggregate efficiency investments and issue securities based on those investments.

A. Overview of the Green Bank Concept

1. Green Bank Proposals

Green bank proposals have gained significant traction in the past year. In conjunction with legislation to address energy policy and climate change, there has been a significant advocacy effort to establish and fund a green bank that would provide financial support for clean energy technology, including renewable energy generation and energy efficiency measures.[74] There are a number of models for federal financing entities, which provide useful insight into design features for a green bank. The Senate and the House have each taken up a measure creating a "Clean Energy Deployment Administration" (CEDA) to act as a green bank.[75] The most effective model for a green bank will probably come from selecting specific provisions from both proposals, while also expanding certain features that may improve access to energy efficiency financing.

2. Potential Green Bank Models

While there are a wide variety of federal financing programs, from direct loans to indirect support through presumed federal guarantees. Two financing models are particularly relevant for a green bank. The first is the Export-Import (Ex-Im) Bank, a wholly owned federal corporation, which provides financial support to companies

[74] The Center for American Progress, a prominent liberal think tank has been at the forefront of promoting a green bank. *See* John D. Podesta & Karen Kornbluh, *The Green Bank: Financing the Transition to a Low-Carbon Economy Requires Targeted Financing to Encourage Private-Sector Participation* (Center For American Progress, 2009); *see also* Green Bank Coalition, http://www.coalitionforthegreenbank.com/.

[75] *See* S. 1462, 111th Cong. §§ 101-109 (2009) and H.R. 2454, 111th Cong. §§ 182-191 (2009).

exporting goods out of the United States. The second is the government-sponsored entity model for home and student loan financing. Both models involve institutions that operate outside of the federal bureaucracy but that rely on various levels of government support to support their financing activities.

The Ex-Im Bank was established in 1934 and has the mission of providing credit support for U.S. exports.[76] The bank operates as an independent entity, separate from any departments or agencies. Early in its development, the Ex-Im Bank provided both direct and indirect support for exports through direct loans and indirect credit support. Currently, the bank focuses primarily on credit support through loan guarantees and loan insurance.[77] The Ex-Im Bank is a potentially useful model as a financing entity that operates outside of existing agencies but with the full support of the federal government. It plays an analogous role to a green bank by providing credit support for specific projects that the Bank's staff has established standards for assessing.[78] The Bank does not, however, aggregate and securitize loan products for a secondary market.

The home and student loan corporations backed by explicit and implicit federal guarantees provide the second potential model. Fannie Mae and Freddie Mac, and until recently Sallie Mae, are all Government-Sponsored Enterprises (GSEs) that operate as privately funded corporations with government charters.[79] Before the current financial crisis, each was explicitly independent of direct government support, though a

[76] EXPORT IMPORT BANK OF THE UNITED STATES, ANNUAL REPORT OF 2008 32 (2008).
[77] James K. Jackson, *Export-Import Bank: Background and Legislative Issues* 3-4 (Congressional Research Service Report for Congress 98-568 E, 2001).
[78] EX-IM BANK, ANNUAL REPORT OF 2008, at 29.
[79] For an overview of GSEs, see Kevin R. Kosar, *Government-Sponsored Enterprises (GSEs): An Institutional Overview* (Congressional Research Service Report for Congress RS21663, 2007).

government guarantee of debt issued by these corporations was widely assumed.[80] The GSEs operate on a different model than the Ex-Im Bank with executives and staff appointed and overseen by the board of directors, and the primary financial product being securities based on loan aggregation.[81] While the GSEs have encountered severe financial difficulties in the past two years, they have succeeded in creating a broad secondary market for home loans.[82] The process behind this success has eased access to home and student financing and created generally accepted loan standards for a significant subset of home mortgages and student loans.

3. Design Issues

The critical design considerations that these models raise are placement within and relationship with the federal government and role in the market for the financial products created or supported by the financial institutions. A critical difference between the Ex-Im Bank and the GSEs the explicit nature of the institutions' financial support. Because the Ex-Im Bank is a government corporation with explicit government credit, its full loan portfolio must be accounted for in the federal budget. The GSEs on the other hand, operated independently of the federal government before being placed in receivership with little more than an implicit loan guarantee. Because of this, their portfolios of loans were not accounted for, and the eventual government support was essentially an unanticipated budgetary expense. These two models suggest that federal financing entities can play a significant role in expanding a market for financial products

[80] *See generally* N. Eric Weiss, *Options to Restructure Fannie Mae and Freddie Mac* (Congressional Research Service Report 7-5700, 2009).
[81] *See* Kosar, *Government-Sponsored Enterprises*, at 3.
[82] *See generally* Andreas Lehnert et al., *GSEs, Mortgage Rates, and Secondary Market Activities*, 36 J REAL ESTATE FIN. ECON. 343 (2007).

or financial support, but the role within the federal government will determine how effectively the risk exposure of the entities is accounted for.

B. Existing Green Back Proposals

The House and Senate are either considering or have passed green bank legislation that will create a federal financing entity for clean energy projects. The mission of the proposed institution would be to finance both energy efficiency projects and renewable energy generation projects. The two models are broadly similar, but differ in two critical ways.

The Senate is currently considering the American Clean Energy Leadership Act (ACELA), a broad energy bill that creates a Clean Energy Deployment Administration within the Department of Energy.[83] The agency will operate independently of other parts of DOE, but under the oversight of the Secretary. The Administrator would be appointed

Table 1: ACELA vs. ACES – Key Provisions

Provision	S. 1462 – ACELA	H.R. 2454 – ACES
Institution type	§105 – Agency within the Department of Energy.	§186 – Wholly owned independent corporation.
Administrator	§105(b) – Senate confirmed appointment, compensated at Senior Executive Service rate.	§186(b) – Senate confirmed appointment, compensated at market rates for similar positions.
Staff	§105(e) – Limits on number of people paid outside of normal governments civil service pay-grades.	§186(e) – General power for Administrator to hire, no wage rate language.
Funding	§107 - $10 billion capitalization through transfer from Treasury.	§184 - $7.5 billion capitalization through bond issue.
Credit Enhancement	§106 – Indirect support both through aggregation of financial products and support of debt obligations.	§188 – Indirect support for financing variety of transactions through credit enhancement.

[83] S. 1462, 111th Cong. § 105 (2009).

and Senate Confirmed and would be paid on the Senior Executive Service Salary Scale.[84] The Senate version of CEDA would be responsible for both direct financing of clean energy projects and indirect financing through loan support and credit enhancement.[85] Notably, the Senate CEDA is explicitly empowered to develop and issue securities based on aggregated projects, or to provide credit support for such securities.[86] The Senate CEDA is funded through a $10 billion transfer from the Treasury.[87]

The House version of CEDA, incorporated into the American Clean Energy And Security Act of 2009 (ACES) is structured slightly differently. (See Table 1 for a comparison of relevant provisions) Instead of being housed within an existing agency, the House CEDA is an independent corporation similar to the Ex-Im Bank.[88] While the Administrator would be Senate confirmed, he or she, along with the CEDA staff, would not be subject to federal pay scales.[89] The House CEDA would also be in a role to provide both direct and indirect credit support for a variety of clean energy projects, but is not explicitly authorized to aggregate loans and issue securities based on those loans.[90] A $7.5 billion bond issue would fund the House CEDA.[91]

C. Proposed Modifications to Existing Green Bank Proposals

The existing legislation, if enacted, would go a long way toward providing the necessary financing structure for energy efficiency investments. Both would identify

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[84] *Id*. at § 105(b).
[85] *Id*. at § 106.
[86] *Id*.
[87] *Id*. at § 107.
[88] H.R. 2454, 111th Cong. § 186 (2009).
[89] *Id*. at § 186(c).
[90] *See Id*. at § 188.
[91] *Id.* at § 184.

worthwhile funding opportunities, both would establish standards for the types of projects that would receive direct and indirect credit support, and both would create a significant pool of capital for those projects. Both proposals, however, should draw on features of the other chamber's legislation to strengthen the final concept. Additionally, the bank should be established with an eye toward its long-term role in an energy efficiency market.

The first issue in reconciling the House and Senate CEDA bills is the status and placement of the bank. Of the two proposals, the House model of an independent government corporation is more consistent with the other successful financing models. Perhaps the biggest advantage for an autonomous agency is the ability to pay at prevailing market rates, as opposed to government salary scales. At least one analysis of green bank proposals has concluded that this will draw a wider range of finance professionals.[92] While there is a good argument for keeping CEDA closely aligned with DOE, and, in turn, drawing on DOE's existing experience with energy project funding, the process of developing underwriting standards and potentially securitizing energy efficiency loans will likely demand specific financial skill sets that may not be as easily drawn under the constraints of the federal civil service pay system. For this reason, the House provisions on institution type and organization should be kept.

The second, and related issue is the power of the bank to aggregate and securitize energy efficient loans. Here, the Senate provisions explicitly empowering CEDA to issue securities based on aggregated efficiency financing provides a stronger basis for an array of energy efficiency financing. While the House definitions of credit support are useful

[92] Susan Leeds & Rick Dukes, *Scaling Up Investment in Energy Efficiency with a Federal Energy Efficiency Financing Facility (FEEFF)* 2 (NRDC CAP 2.0 Policy Brief, 2009).

and may help provide credit enhancement for certain types of energy efficiency project—particularly PACE Bonds—the lack of explicit language about aggregation probably limits the role CEDA could play in expanding the energy efficiency financing market. A critical role for CEDA will be to develop standards for efficiency loans and to spur a secondary markets for those loans. The ability to aggregate, similar to that of the GSEs, is a well-established model for accomplishing these goals.

The final design consideration relates less to underlying legislation and more to the eventual internal organization of the CEDA. As presently designed, CEDA will provide financing for a variety of clean energy technologies, not just energy efficiency investments. While it arguably makes sense for practical reasons to keep clean energy financing activities in one institution, if CEDA does play a central role in creating a secondary market for efficiency backed securities, it is possible that the efficiency and clean energy financing functions will begin to look very different. If CEDA successfully creates and efficiency security market, its role in that market will probably shift from providing direct and indirect credit enhancement to a role analogous to the GSEs play in the secondary market for home mortgages and student loans. For this reason, one possible outcome would be for the efficiency financing functions of CEDA to be spun off into a self-financing GSE reliant exclusively on private capital. While this would raise a number of issues relating to oversight of such an organization, creation of a thriving private market for efficiency finance should be a goal for CEDA. As such, in setting up CEDA, it may be worth creating a separate division that focuses exclusively on loan aggregation and underwriting, as this could serve as the eventual seed for a new entity.

D. Cost of a Green Bank

The final issue for consideration in designing CEDA is how, and for how much, it is funded. The Senate and House legislation provide CEDA with $7.5 to 10 billion of financing through eventual bond issues. This pool of money is not dedicated to efficiency financing alone, but spans all technologies financed by CEDA. A critical question is whether this will provide an adequate fund for commercial and residential efficiency finance.

As discussed above, the overall market for commercial and residential energy efficiency was $90 billion in 2004 with the potential to grow to $210 billion in 2030.[93] While CEDA would probably not need to provide credit support for the entire energy efficiency market, these numbers provide useful upper limits for how much financing might be required within the efficiency market. CEDA will almost certainly be required to operate under the budgeting rules of the Federal Credit Reform Act, which requires that an agency providing credit support budget the net present value of the expected default on the loans. Default rates for other federal financing programs, such as the GSEs range from three to five percent, meaning that at any given time, a credit supplying federal agency's budget should reflect that percentage of its loan portfolio.[94] Assuming CEDA has a default rate at the upper end of the federal program default rate, this suggests that in 2004 CEDA would have had a budget of $4.5 billion for a $90 billion efficiency financing portfolio. In 2030, this budget would need to grow to approximately $10 billion for a $210 billion loan portfolio.

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[93] See *supra* Section I.B.2.
[94] *See generally* Deborah Lucas et al., *Estimating the Value of Subsidies for Federal Loans and Loan Guarantees* (Congressional Budget Office Study, 2004).

Based on the existing financing proposals for CEDA, the $7.5 to $10 billion budget should be sufficient to providing financing in the efficiency market. This however, depends on the internal allocation within CEDA for efficiency efforts versus other clean energy technologies. The founders of the Coalition for A Green Bank have called for a prioritization of efficiency projects because of their immediate job creation potential.[95] The founders suggest CEDA's enabling legislation add an explicit provision establishing a jobs-creation mission.[96] Such a proposal might be limiting in the long run, where best technology financing might be a better goal. Instead, enabling legislation could be strengthened by perhaps segregating the initial funding into a fund aimed at immediate deployment, which would likely favor efficiency financing.[97]

E. Additional Federal Policies: Expanding Incentives for Energy Efficiency Financing Options

While the creation of a green bank is an essential step for increasing access to financing for energy efficiency projects, it is almost certainly not a sufficient solution. As noted above, the array of market barriers and policy options goes beyond simple lack of access to capital and requires a number of policy tools. Even in considering the financing challenge, policies and programs to create loan and finance programs may need to be initiated at the state or local level. Creation of a green bank, therefore, cannot take place in a vacuum.

One option to expand financing opportunities would be to pair the launch of

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[95] Reed Hundt & Todd Filsinger, *Create a Green Bank to Create Green Jobs* (Coalition for the Green Bank Paper, 2009).
[96] *Id*.
[97] This is the premise underlying the Coalition's call for a jobs mission. If their assumptions are correct, which based on the low technological hurdles for energy efficiency projects, then an immediate deployment allocation should favor efficiency projects. *See Id.*

CEDA with an effort to use existing and future federal funding for energy efficiency to promote best practices on the state and local levels. One possibility would be for the federal government to expand funding available for energy or efficiency projects that are subject to competitive grant making. The current Energy Efficiency and Conservation Block Grant Program could be expanded to provide grants for state and local programs that put in place a policies that facilitate the aggregation of energy efficiency investments. Another option would be to divide CEDA funding into a competitive loan pool that provides preferred lending terms to programs that will help create underwriting standards and that can be expanded nationally. The overall goal of this policy would be to create enough different categories of investments that can be aggregated and sold to financing institutions, which would, in turn, be prompted to buy up such contracts based on financing incentives created by the green bank.

F. Potential Issues With an Effort to Increase Efficiency Finance

There are two primary issues with a green bank policy initiative. First, there is legitimate concern about creating another federal financing program that would expose the government to default risk. Second, the link between a new financing initiative and creation of projects to finance remains tenuous. While neither of these concerns is insurmountable, they both should be addressing when considering the legislation and subsequent regulations for a green bank, and in considering other federal policies to promote energy efficiency investment.

The first of these concerns comes in the wake of a financial crisis that was partially caused by failures in the secondary market for mortgages. While the crisis was based in part on mortgages outside the purview of the GSEs, the crisis still left the GSEs

in dire financial condition and the federal government in a position of having to take the two home mortgage corporations into receivership. The concern over financial condition and exposure is probably best addressed in the initial organization design of CEDA. While CEDA should not be created as an agency within DOE, its status as a wholly federally owned corporation and its budgeting requirements under the Federal Credit Reform Act should allow for effective accounting of the bank's risk exposure.

The second concern is more difficult to address because the barriers to energy efficiency investment have been very persistent. While access to funding and, in turn, creation of widely accepted underwriting standards should serve to help break down some of the financial barriers to energy efficiency investment, other policies will also be necessary to generate financing opportunities. Linking the creation of CEDA to such policies will be one step, but may not be sufficient. This is an issue that will require continued study and analysis, as well as recognition that the task of financing energy efficiency will not be complete when CEDA is launched.

CONCLUSION

Securing capital for residential and commercial energy efficiency projects remains a primary impediment to greater investment in these sectors. Despite widespread recognition that investment in these areas is a critical element to any effort to address global warming, the current financing options have not proved adequate for the task of funding efficiency projects. If current proposals for the CEDA are adjusted in ways that creates an independent green bank with the power to aggregate and securitize efficiency projects, the resulting institution has the potential to alleviate this problem by both providing access to secured capital and by helping standardize financing in a way that

will draw increased private investment. This initiative, however, should not be the only effort to address financing, and instead should be implemented holistically with other efforts to promote state and local financing projects.