Energy Factors in Commercial Mortgages: Gaps and Opportunities

Updated
30 September 2016

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U.S. Department of Energy

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Acknowledgements

This work was supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Building Technologies Office, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231. The authors are especially grateful for the guidance and support of the project managers in the Building Technologies Office, including Elena Alschuler, Holly Carr, and Cindy Zhu.

This report would not have been possible without the input of stakeholders from over thirty organizations. The authors are very grateful to them for their time and expertise.

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Executive Summary

The commercial real estate mortgage market is enormous, with almost half a trillion dollars in deals originated in 2015. Relative to other energy efficiency financing mechanisms, very little attention has been paid to the potential of commercial mortgages as a channel for promoting energy efficiency investments. The valuation and underwriting elements of the business are largely driven by the "net operating income" (NOI) metric – essentially, rents minus expenses. While NOI ostensibly includes all expenses, energy factors are in several ways given short shrift in the underwriting process. This is particularly interesting when juxtaposed upon a not insignificant body of research revealing that there are in fact tangible benefits (such as higher valuations and lower vacancy and default rates) for energy-efficient and "green" commercial buildings.

This scoping report characterizes the current status and potential interventions to promote greater inclusion of energy factors in the commercial mortgage process. It includes the results of a literature review and extensive stakeholder discussions with 40 lenders, owners, service providers, advocacy organizations and others.

We present the following key findings related to current status of energy factors in the mortgage process:

- Energy efficiency is generally not a motivating factor for lenders. It is typically considered a very small piece of the overall risk profile. Furthermore, the commercial mortgage loan process involves high stakes, which creates a disincentive to do anything that deviates from the shortest path to "getting the deal done".
- Although energy costs are part of the NOI calculation, there is currently very limited awareness and analysis of their impacts in underwriting.
- Underwriting is not standardized across the industry and lenders have considerable discretion in underwriting practices.
- The Property Condition Assessment (PCA), a detailed engineering report that lenders usually require, generally does not include information on energy performance. Furthermore PCAs are often ordered too late to influence the basic mortgage terms.
- Most appraisals do not consider existing or planned energy efficiency features in property valuation, and have limited if any access to this information.
- There have been several studies claiming a positive impact of energy factors on building value, but many owners have not been able to discern this in their own portfolios.
- Context matters: all real estate is local. The impact of energy factors on valuation vary significantly by location, building type, quality, and current market conditions.

Overall, current commercial mortgage practices do not fully account for the risks and opportunities that may be associated with the energy-use of buildings. As a consequence, energy efficiency is not properly valued and energy risks are not properly assessed and mitigated. Commercial mortgages are a large lever and could be a significant channel for

scaling energy efficiency investments. We present seven potential interventions to properly account for energy factors in the commercial mortgage lending process:

1. Demonstrate to lenders how and where energy factors “move the needle” on the key underwriting metrics, such as default risk, NOI (and thus, implicitly, valuation, LTV and DSCR), and economic or functional obsolescence.
2. If intervention #1 is successful, provide simple, seamless ways to incorporate energy factors into underwriting - ideally as simple as a score to characterize energy factor risks.
3. Include energy performance in the PCA and move it up in the process. If PCAs included investment-grade information on energy efficiency opportunities, they could be used to facilitate funding for improvements through the mortgage loan.
4. Owners need to demand consideration of energy performance by appraisers and lenders and provide the data.
5. Include energy metrics more explicitly in ARGUS software. Given ARGUS’s widespread use in the real estate industry - it’s a de facto standard - a possible intervention would be to introduce more explicit energy metrics into its analytics package.
6. Get appraisers to properly value energy factors. There are already several efforts under way on this front, including DOE’s Appraisal Working Group.
7. Consider interventions in ancillary products and services such as mortgage insurance premium discounts for energy efficient buildings.

These interventions are technically feasible and could have significant impacts, with benefits to lenders and owners. However, it is also true that the nature of the mortgage lending process – with multiple stakeholders, high stakes and risk aversion – does not lend itself easily to changes. Therefore, these interventions will need to be piloted carefully and modestly with highly motivated early adopters. Wider deployment will likely require aggressive education/awareness efforts and stakeholder engagement and support through relevant industry organizations.

Introduction

It is axiomatic that there is no silver bullet for scaling up high-performance buildings. Over the past three decades there has been a wide range of technical and financing offerings to increase energy efficiency investments in buildings. A host of energy efficiency financing approaches have been developed, from green bonds to energy savings performance contracts, capital leases, PACE, on-bill financing, etc. Very little attention has been paid to the potential of commercial mortgages as a channel for promoting energy efficiency investments. Commercial mortgages currently do not fully account for energy factors in underwriting and valuation, particularly as it relates to the impact of energy costs and volatility on an owner's net operating income (NOI). As a consequence, energy efficiency is not properly valued and energy risks are not properly assessed and mitigated. Commercial mortgages are a large lever and could be a significant channel for scaling energy efficiency investments.

The explicit and carefully considered inclusion of energy factors in mortgage valuation can have two benefits: it improves risk management for lenders while also providing a more accurate price signal for energy efficiency in commercial properties; the latter effect should serve to stimulate greater energy efficiency investment in these buildings.

This study is intended to examine this perceived "energy gap" in the commercial mortgage market. Particularly, our goal was to investigate the legitimacy and severity of the gap, and to identify which areas of the commercial mortgage process (e.g., origination, appraisal, underwriting) and which actors (e.g., buyers/owners, lenders, appraisers) are most susceptible to possible interventions to remedy it. While this report is prepared for the Department of Energy, the hope is that it will be used also by industry actors to help promote greater incorporation of energy factors into the commercial real estate mortgage process. If there are shortcomings in the market that we can identify, their recognition will hopefully be a benefit to a variety of industry actors.

As we conducted the study, first performing a literature review and then conducting discussions with numerous stakeholders, we realized that - like most generic markets - the commercial real estate market is actually a catch-all for many smaller niche markets: multi-family is different from office and retail, and deals headed for the secondary market (specifically, the collateralized mortgage-backed securities, or CMBS, market) are different from those that are not. Needless to say, small buildings are characterized by a different (usually less extensive) underwriting process than larger ones. Several stakeholders even pointed out that different geographies tend to reveal different market features (e.g., Washington, D.C. reveals a high prevalence of and strong demand for high-performance and green-labeled buildings). Maybe most importantly for our purposes, gross leases (where the owner pays the energy bills for the entire building) are a distinctly different entity from net leases, where the tenants are responsible for energy costs in their spaces. In the report, we try to not only document important generalizations we drew from the commercial mortgage process, but also highlight some of these important sub-market characteristics.

How This Study Was Conducted

This scoping report seeks to characterize the opportunities, barriers and potential interventions to promote greater inclusion of energy factors in the commercial mortgage process. It includes the results of a literature review and extensive stakeholder discussions with nearly 40 lenders, owners, service providers, advocacy organizations and others. The over two dozen literature review sources fall into three broad categories:

- Academic papers: 10
- Industry reports (including market characterizations by non-governmental organizations): 10
- "Grey" literature sources (e.g., websites, promotional/educational pieces): 6

Stakeholders were selected based on the experience of the study team (including its DOE sponsors), as well as the recommendations of stakeholders contacted early in the process. Our aim was to get representation from all aspects of the commercial mortgage industry. The 40 stakeholders break down into these broad professional roles:

- Lenders (including commercial and investment bankers, as well as a mortgage banking trade group representative): 11
- Owners (including real estate investment trust (REIT) representatives): 11
- Consultants and other industry experts: 12
- Appraisers (including an industry organization representative): 4
- Insurers: 2

The semi-structured discussions were designed to help us gain insight into the commercial mortgage process and how energy factors are, and might be, incorporated. In preparation for the discussions, we created a number of discussion questions that could be used to guide the calls (see Appendix A). Broadly, the questions fell into three categories:

- **The mortgage process and where energy factors fit in**: these questions aimed to determine the role of the respondent further and get their take on the place(s) where energy factors are already integrated in the process, and also where they might be if they played a more prominent part. Specific prompts regarded issues such as the property condition assessment, the role of building certifications and labels (e.g., LEED, ENERGY STAR), and any consideration the respondent's firm might give to energy performance or price risk.
- **The impact of energy factors on the mortgage process (origination, valuation, etc.)**: assuming respondents indicated that energy factors played a role in the mortgage process, these questions delved into the specifics of that role. For instance, how do energy factors affect rents or occupancy and do they play more prominently in new construction versus existing buildings? Would an energy-efficient building have a lower capitalization rate (and therefore higher valuation)?
- **Lastly, we asked respondents about the degree to which efforts had already been made to raise the prominence of energy factors in the mortgage process, particularly in their organizations, and also, importantly, what interventions they felt might be worthwhile going forward.** Regarding the latter, we let the respondents

know that DOE was seeking to discover whether its intervention was warranted and asked them how it might conducted for greatest impact. We also inquired as to whether they and their organizations might be willing to participate in such an effort, assuming it were relevant to their role.

Not all questions, of course, were relevant for all actors in the process. We tailored the discussions given the particular roles, expertise, and interest of the respondents.

The Commercial Mortgage Market: An Overview

Size and Composition

Figure 1 presents the total commercial mortgage origination volume in the U.S. It is clear that the financial crisis had a significant effect on the volume of commercial mortgage origination, leading to a trough in mortgage origination in 2009 of only $82 billion and a gradual expansion of the market through 2015 to a total new origination level of $463 billion annually. The total outstanding commercial real estate (including multi-family) mortgage debt is enormous: $3.1 trillion. Most of these loans carry a 5-10 year term, though the amortization period for multi-family mortgages issued by government agencies or government-sponsored enterprises (Fannie Mae and Freddie Mac) often stretch 30 years or longer.

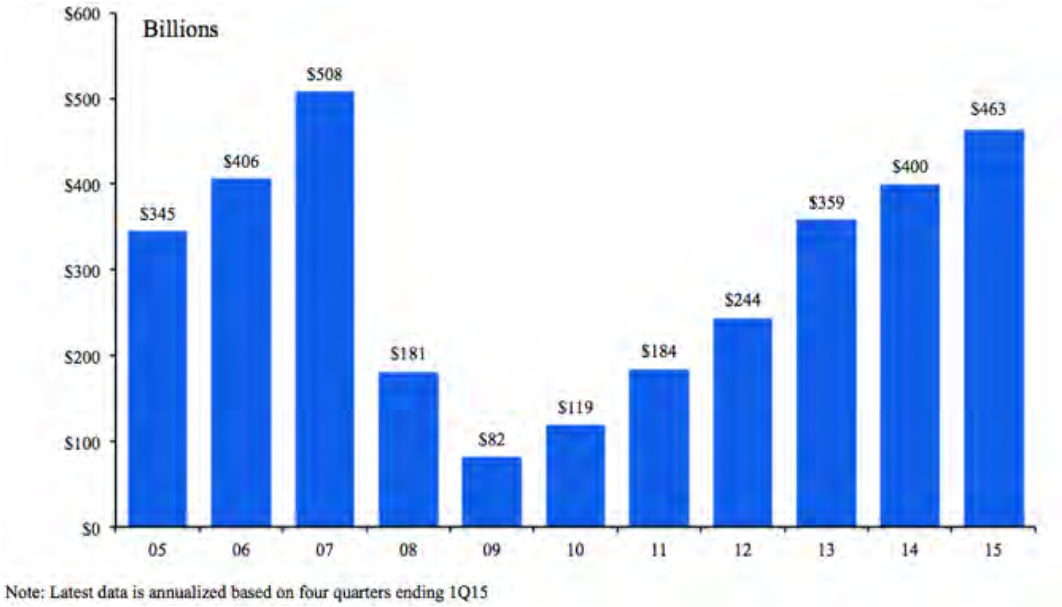

Figure 1. New domestic commercial real estate mortgage origination in billions of dollars. Source: Mortgage Bankers Association.

As shown in Figure 2, the total stock of commercial mortgage investment in the U.S. is dominated by commercial banks, insurance companies, and the commercial mortgage backed securities (CMBS) market. The former two are also the largest commercial mortgage originators. The "other" category includes real estate investment trusts (REITs), finance companies, private pension funds, and the government-sponsored enterprises (GSEs), Freddie

Mac and Fannie Mae. The mortgage investment holdings of the GSEs are exclusively multifamily residential mortgages. Total GSE issuances increased from about $10.6 billion in 2010 to about $51.5 billion in 2015 (Commercial Mortgage Alert 2016).

The product type breakdown for the CMBS holdings is more diverse than that of the government-sponsored enterprises (GSEs). In 2015, as shown in Figure 3, more than 24% of commercial mortgage origination was for office buildings, 23% for retail, 20% for hotels, and 15% for multifamily. Unfortunately, comparable breakdowns of the holding by mortgage product type for commercial banks and life insurance companies are not available.

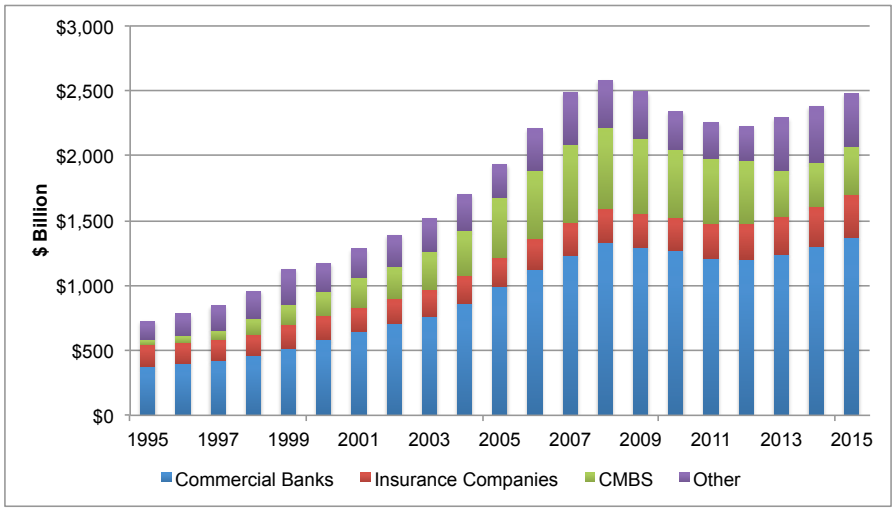

Figure 2: U.S. commercial mortgage holdings.
Source: Federal Reserve Statistical Release, Z.1 Financial Accounts of the United States.

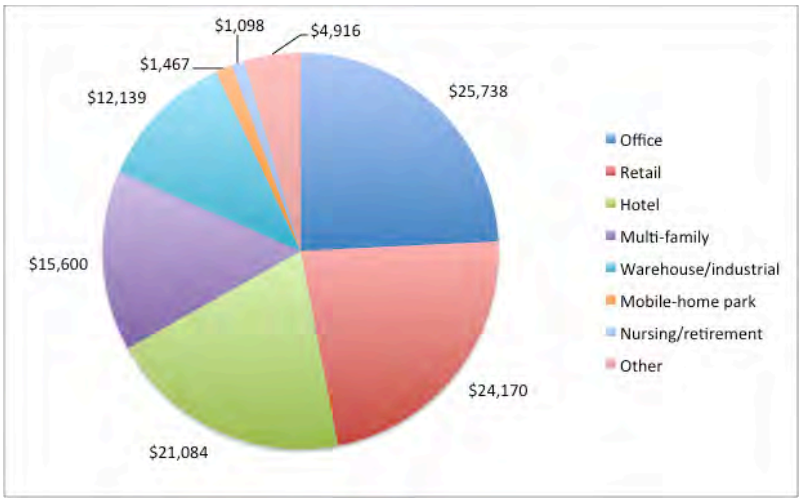

Figure 3: Composition of U.S. CMBS Issuance ($ Millions) in 2015 by product type.
(Source: Commercial Mortgage Alert 2016)

Underwriting Process

Despite the heterogeneity of entities that originate commercial mortgages, the mortgage underwriting process is quite similar, regardless of the borrower type. Figure 4 presents a schematic of the typical sequence of activities that occur in underwriting a commercial mortgage transaction.

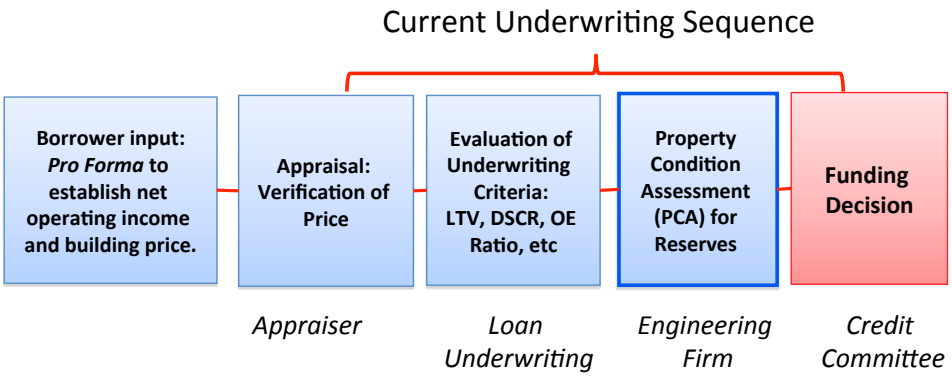

Figure 4: Commercial mortgage underwriting sequence for commercial banks, insurance companies, and others (REITS, pension funds, etc.).

In the first stage, the borrower produces a loan application packet that includes a pro forma representation of all the acquisition costs and disposition proceeds, the operating expenses and lease revenues of the building, along with all of the assumptions about vacancy, cost and rent growth projections. The key underwriting variable from the pro forma is the net operating income (NOI) for the property. The NOI is calculated as the gross revenues (e.g., from rents) minus the operating expenses, which includes energy costs. However, there is limited, if any, consideration of the volatility of cost—that is, unintended or unexpected changes in use or price. Furthermore, there is a range of rigor in how the average energy cost is determined. The borrower also provides a large number of supporting documents including the larger lease contracts, the janitorial and utility contracts, often utility bills, and an existing appraisal to establish building value. Commonly, the pro forma information is summarized with the help of ARGUS, a software that computes NOI. ARGUS includes utility-related expenses, which are entered as aggregate costs per rentable area per month (ARGUS 2015). The second stage of the underwriting sequence typically includes an appraisal (usually conducted by an appraiser hired by the lender) that provides the lender with a verification of the market price of the building using a reconciliation of the cost, income capitalization, and comparable sales approaches to market valuation. For commercial properties, the income capitalization approach is generally most heavily weighted.

Using the verified building price and the borrower's pro forma, the lenders evaluate the underwriting criteria such as the loan-to-value (LTV) ratio, the debt service coverage ratio (DSCR), and the operating expense (OE) ratio to determine acceptable contract terms such as the amortization period, the maturity period, the interest rate on the mortgage, and the loan amount. For larger loans, once the mortgage is essentially approved, the lender will require a property condition assessment (PCA), or engineering report, to be prepared for the building (all CMBS loans carry this requirement). PCAs, undertaken by engineering companies, evaluate the

building's remaining useful life and the quality of the heavy equipment in the building, such as chillers and boilers, air circulation equipment, electrical conduits, security systems, and the roof. These reports are primarily used to determine the reserves that the lender will require an owner to maintain to assure the property's quality and value is preserved through scheduled maintenance and replacement of capital equipment. The final step is the decision by the lending institution (generally a dedicated "credit committee") as to whether or not the loan will be funded. The length of this process varies, and can take several months for a complicated loan.

Energy Factors in the Mortgage Process: Current Status

Below are key findings on the current status vis-a-vis consideration of energy factors in the commercial mortgage process, based on the stakeholder discussions and literature review.

1. Energy efficiency is generally not a motivating factor for mortgage lenders.

The commercial mortgage loan process involves high stakes - with many actors making risk-based decisions, often under time pressure. This creates a disincentive to do anything that deviates from the shortest path to getting the deal done. As one stakeholder put it, "The brokerage community and the transactions team is bonused on volume of production. They just want it done. Nobody wants another road bump." Furthermore, commercial lending is still a very "risk-averse exercise in which landlords are trying to hide risk and lenders are trying to uncover it," as characterized by one owner.

Given this environment, energy efficiency is not a motivating factor in decision-making because it is typically considered a very small piece of the overall risk profile. As one mortgage servicer stated "..in my 35 years I've never seen a default because of lights being turned off. The primary reason for default is because they lose a tenant." Furthermore, lenders perceive that the benefits of energy efficiency and sustainability accrue only to the developer or owner, not the lender. The vast majority of lenders are only concerned with interest payments and getting the principal paid back. However, some lenders showed concern about economic or functional obsolescence that may be associated with non-green buildings, especially in certain markets like parts of San Francisco and Washington, DC. And some respondents pointed out the important distinction between gross and net leasing - i.e., the picture may be significantly different where the owner is paying the energy bills for the whole building (gross) versus when they are only covering energy expenses for some common area (or none at all).

More recently, a few new initiatives explicitly promoting energy efficiency in the mortgage lending process have been introduced.

- Fannie Mae offers several programs for multi-family housing. The Green Rewards program provides additional loan proceeds and an interest rate discount to invest in energy efficiency. Another program provides an interest rate discount for buildings with green building certification (LEED or ENERGY STAR). As of April 2016, the interest rate discount has been raised from 10 basis points to 13-39 basis points depending on loan size and credit quality.

- The U.S. Department of Housing and Urban Development (HUD) is launching a program to offer lower mortgage insurance premiums for green and energy-efficient multi-family housing. The discount on premiums can be used to invest in energy efficiency improvements.
- In Europe, at least two lenders - ING and ABN AMRO - are offering to finance energy improvements to increase the performance of buildings that have low energy efficiency ratings based on European benchmarking rating and disclosure schemes. Much of this is being driven by environmental policies and lender concern about potential functional obsolescence of properties that they end up owning if a loan forecloses (i.e., they fear being left holding a conspicuously underperforming building).

We note that none of the stakeholders were opposed to the idea of properly accounting for energy factors or even promoting and rewarding energy-efficient buildings. Rather, their perspective is that energy factors are not enough of a motivator to justify additional effort in the mortgage lending process and therefore would have to be seamlessly integrated into the current process.

2. Although energy costs are part of the NOI calculation, there is currently very limited awareness and analysis of their impacts in underwriting.

Lenders are generally aware that energy costs are included in the NOI calculation, a finding also corroborated by another lender survey (IMT 2016b). However, they do not currently see it as a factor worthy of more careful analysis in underwriting practices. The current situation is characterized by a) very limited efforts to identify energy-efficient buildings (usually limited to Energy Star Ratings and LEED certification); b) limited transparency concerning energy performance (the commonly used ARGUS software does not break down the energy costs of the property but instead just clusters their cost with all utilities, including such items as garbage disposal). Even a major institutional investor with sustainability goals indicated that they do not have a policy to adjust underwriting standards for sustainable properties.

A *common view among lenders is that energy is simply not a big enough risk factor*, especially for net leased buildings. As one lender put it: “with energy costs the way they are, things other than energy efficiency are occupying folks’ minds.” None of the lenders in this study considered variations in future energy use or price volatility and some held the view that any energy cost volatility could easily be absorbed within the DSCR “cushion.” Volatility will matter more if a lender is “skinning it really close on DSCR.” While regulated banks cannot do this, non-bank debt funds could. Two lenders indicated that if historical utility costs vary dramatically it will raise some questions and they may look into it, but sometimes they don’t even have more than one year’s utility data when bidding. With regard to projected energy savings over the mortgage term, respondents showed little confidence that appraisers and lenders truly believe in the likelihood that future savings can actually be achieved in a given building going forward.

Another issue is that *owners don’t always provide energy cost information to lenders*, even when performance is impressive, and it’s unlikely that lenders would demand this information

from owners because financing is based primarily on more prominent factors like rents and vacancy. This may be a chicken-and-egg situation where owners don't bother to provide energy information because they think lenders may not consider it anyway. One lender said that even if they get information about the energy efficiency of a building they say "that's nice, but from the nuts and bolts of a credit decision, we do not look at utility costs." A notable exception is Fannie Mae's Green Rewards program, which does in fact consider a portion of projected future energy savings in its NOI calculation, and the borrower, with plans to embark on a qualifying retrofit effort, gets additional proceeds based on these savings.

We note the above *lender perspective appears to be more due to a lack of awareness than to an informed opinion about energy factors*. Simply put, there appears to be a quite limited appreciation of the degree to which energy savings can "move the needle" on NOI - at least with gross leases. For example, a prior DOE-sponsored study (Jaffee et al. 2012) analyzed the impact of price volatility and energy use reduction on mortgage valuation based on sample of 8,497 loans on commercial office buildings.

- The inclusion of the energy price volatility generated mortgage values that are on average about 9% below the value of the mortgages using the traditional modeling approach (which ignores the energy price volatility in valuing the embedded default options). On average, the lenders would have had to charge about 19 basis points to assure that the market price of the loan with the embedded default options was valued at the same amount that was dispersed to the borrower in principal.
- Reducing the electricity and natural gas consumption of each building by 20% and then re-estimating the value of the mortgage on the more efficient, but otherwise, equivalent building resulted in value of the mortgages on these buildings being about 1.3% higher, on average. The size of these variations varies importantly across buildings, mortgage contract structures, and regions. Overall, the reductions in energy consumption appear to benefit more the higher loan-to-value ratio mortgages and larger buildings.

Such information clearly piqued the interest of some lenders and indicated that they would pay more attention to energy factors if shown that they had an impact. Indeed, one lender held the view that "an energy-efficient building is more valuable and less risky (from a lender's perspective) than one that isn't." One building owner (a REIT representative) mentioned that recently, for the first time, their mortgage lender asked them whether the building they were trying to refinance had any green certifications. Another respondent noted that the importance of energy costs will likely vary by location, building type, and other factors (e.g., energy is likely to be more critical for Class B and C buildings than Class A buildings, since the latter's leasing expense would more dwarf its energy costs). Finally, several stakeholders noted that it is important to look at the impact of energy factors on the revenue side of the NOI calculation. This is discussed more in item 6 below.

3. Underwriting is not standardized and lenders have considerable discretion in underwriting practices.

Government regulations set overall DSCR and LTV limits for regulated banks, but lenders have considerable discretion in how they execute underwriting. There are commonalities in underwriting practices and the process, in general, is fairly similar across the industry, as described in Section 2 above. However, specific practices within each lending institution are governed by their own proprietary policies and standards. As such, there are no industry-wide standards for underwriting practices beyond the aforementioned DSCR and LTV limits, and no inherent motivation for stakeholders to develop common standards. This has pros and cons. Any given lender has the flexibility to act on its own to modify its own practices. At the same time, any changes in underwriting practices have to be advocated separately for each lender as there is not a common point of intervention.

4. The Property Condition Assessment (PCA) generally does not include information on energy performance.

Most mortgage applications require a PCA[1] (although one lender indicated that it does not require a PCA for smaller loans where the building is less than 15 years old; another lender indicated that it may not always require a PCA for refinanced deals). PCAs are typically conducted by professional engineers. Lenders often have pre-existing agreements with one or more PCA firms. As noted in section 2, the primary purpose of the PCA is to determine the requirements for reserves and to identify any serious liabilities that would preclude the loan from being approved (e.g., PCAs became an effective tool for identification of asbestos and seismic risks). It is important to note that PCAs happen late in the process, after the basic parameters of the loan decision have already been approved. Part of the reason for this is that PCAs are relatively expensive (compared to other loan requirements) and lenders want to minimize "dead deal" costs so delay it until there is high certainty that the loan will be approved.

PCAs do not currently include any direct information on the energy performance of the building as a whole or even the efficiency of building systems. One notable exception is with PCAs on deals aspiring to participate in the Fannie Mae Green Rewards program, which added a high performance building module - essentially an energy audit - to its baseline PCA requirement (See Appendix B). Several stakeholders were of the view that the engineering firms conducting the PCA would generally be capable of assessing energy performance as part of their scope of services.

5. Most appraisals do not consider existing or planned energy efficiency features in valuation.

Mills (2015) provides a comprehensive view of the role of appraisals in the commercial real estate market, which was reinforced by stakeholders in this project. Currently, the appraisal

[1] PCAs are also referred to as Property Needs Assessments (PNAs). We use PCAs in this document.

includes very little to no information, beyond the NOI calculation, concerning the impact of the relative energy performance of the building on its market value. The difficulty of obtaining, or lack of, usable data on green or energy-efficient features, as well as valid sales comparisons or cash flow analyses, presents a significant information deficiency. However, the appraisal may give "credit" to Energy Star ratings or LEED certification in its evaluation of the quality of the property and adjust its capitalization rate accordingly. Energy costs also directly affect the NOI as a component of operating expenses, of course, although some appraisers just use industry standard assumptions for future utility costs, even if the building has been performing better (or is expected to do so in the future due to retrofit work). Energy factors may also affect the property's expected income via enhanced "rentability" or leasehold stability estimates, although this does not appear to be happening much in practice.

Several stakeholders were of the view that appraisers are not adequately trained to incorporate energy performance information into their appraisals or even to recognize its contribution to property value. Relatedly, approximately half of the lenders interviewed during IMT's commercial lender survey (IMT 2016b) recognized the value of having appraisers with experience valuing high-performance buildings.

One issue raised by respondents is that the incentives for appraisers to incorporate such information are likely not strong enough. Appraisers are increasingly squeezed on fees, which makes it very challenging to add new scope to their appraisal process. Sometimes appraisers are willing to incorporate energy features in their appraisals, but lenders resist this either because of added cost or because they do not know how to use this information - for example, the appraisal reviewer may tell appraisers to ignore energy efficiency issues (potentially not even accepting the appraisal, according to one respondent). There is also some risk aversion from concerns around veracity and accuracy of energy data, the impacts of building operations, and industry pressures not to overvalue buildings, especially after the last financial crisis. Appraisers were characterized by more than one respondent as being a bit gun shy in this post-Great Recession era.

Despite some of these challenges, there are several on-going efforts to incorporate energy factors in appraisals. In fact, appraisals may be the one part of the mortgage process that has been the most active vis-a-vis efforts to incorporate energy factors. The Appraisal Institute has developed and is actively promoting its "Commercial Green and Energy Efficient Addendum" for appraisals. Also, the U.S. Department of Energy has an active appraisal working group that is looking to identify opportunities and pilot new ideas. Furthermore, the Appraisal Foundation's Appraisal Practices Board (APB) has issued background and core competency guidance on valuing high-performance properties and will soon release an exposure draft that will provide greater detail on valuing commercial properties.

6. There have been several studies claiming a positive impact of energy factors on building value, but many owners have not been able to discern this in their own portfolios.

The U.S. DOE conducted a review and synthesis of studies to date on the impact of energy efficiency on building value (DOE 2015). Over 50 academic studies have been conducted on this subject (See Figure 5a-b for an illustrative example), and found that buildings with LEED and ENERGY STAR certifications have:

- higher rental rates – LEED buildings display a 15-17% premium and ENERGY STAR buildings display a 7-9% premium over similar non-rated buildings;
- higher occupancy rates – LEED buildings have 16-18% higher occupancy than non-rated buildings, while ENERGY STAR buildings have 10-11% higher occupancy;
- lower utility costs – Electricity and gas expenses in ENERGY STAR buildings are more than 13% lower compared to similar non-rated buildings;
- increased sales prices – LEED buildings exhibit a 10-31% premium and ENERGY STAR buildings exhibit a 6-10% premium over non-rated buildings.

However, our respondents, including most owners and almost all lenders, generally relayed that they are dubious about the link. One even remarked that he believes that green buildings cost *more* to operate because a) they are often Class A buildings, and relatedly, b) they generally have more services and possibly more sophisticated ones. Some stated that they are hearing that cost benefits exist with green buildings, but only on a purely anecdotal basis (which is interesting given the plethora of studies.

On the more positive side, one respondent did claim that LEED buildings have less downward price pressure) and remarked on “brown” properties facing a valuation penalty. Another claimed to have seen “cap rate adjustments” - i.e., decreased capitalization rates for green buildings, implying higher valuation for the same NOI.

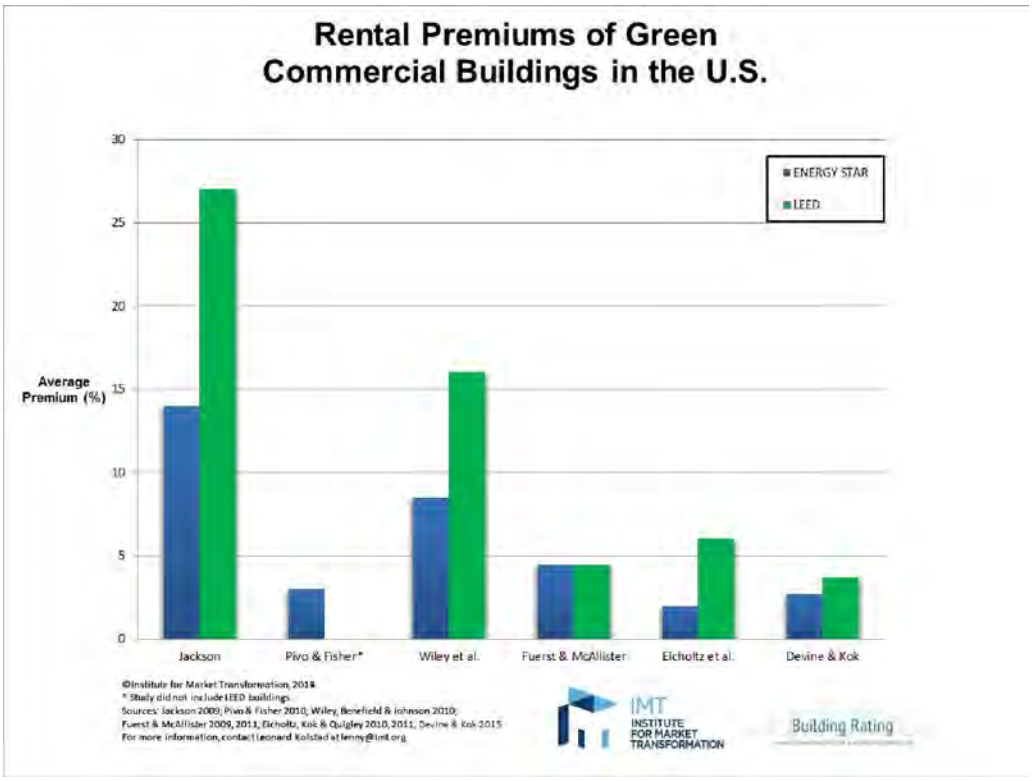

Figure 5a. Rental premiums of green buildings. (IMT 2016)

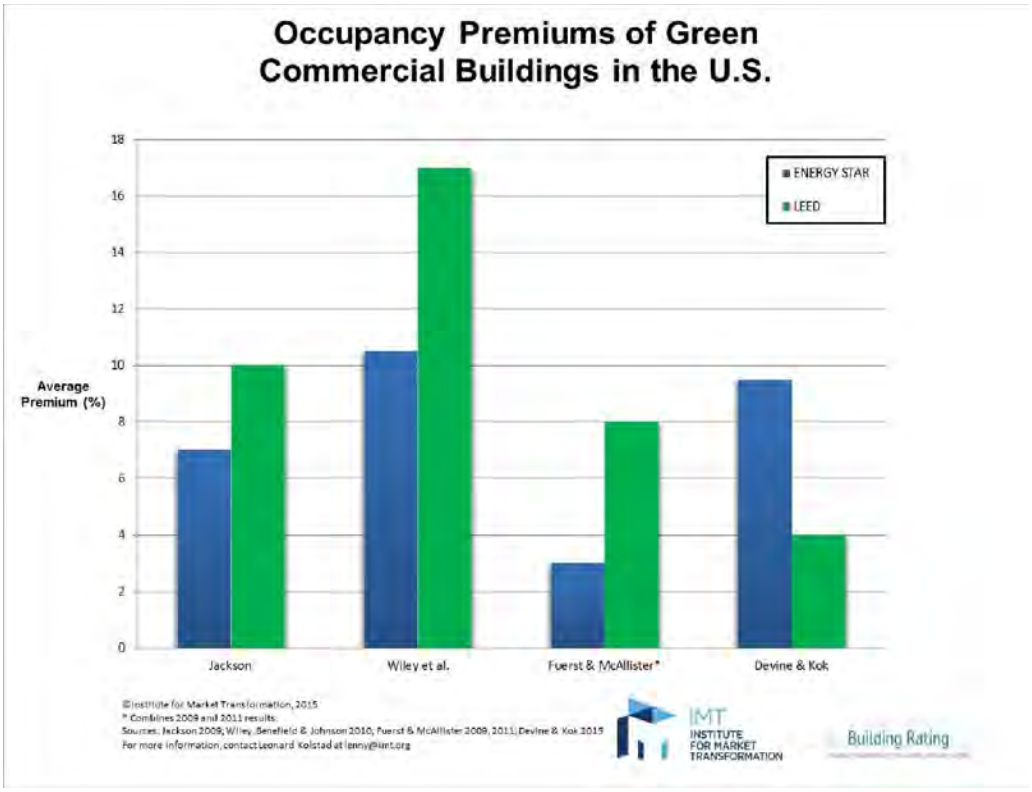

Figure 5b. Occupancy premiums of green buildings. (IMT 2016)

7. Context Matters. All Real Estate is Local.

One clear message came through from our respondents regarding the potential of a price premium for green and energy efficiency: context, particularly geography, matters. Several respondents highlighted markets such as Washington DC, where the federal and municipal government have both pushed LEED, and ones like San Francisco, where many of the tenants are demanding, or at least strongly favoring, green buildings. The CBRE Green Building Adoption Index report (CBRE 2015) provides information on the uptake of green building practices in the 30 largest US cities. It shows that at the end of the fourth quarter of 2014, 13.1% of the commercial building stock now has an ENERGY STAR label, LEED certification, or both. It also shows wide variation based on market (37% in Minneapolis to 6% in Kansas City) and wide variation based on size (less than 5% of buildings smaller than 100,000 sf and more than 62% of buildings over 500,000 sf).

Regarding specific building types, one industry trade group respondent reported that in apartment buildings, members don't believe energy efficiency makes a difference in rents. "If I'm in a two-bedroom apartment, the impact of energy efficiency on my bill is extremely low." The same respondent conceded, however, that millennials often want to be in a green building - and this theme regarding millennials was echoed by two other respondents. But the industry group representative went on to say that apartment building occupancy numbers are so high at this point - bordering on 96% - that he was dubious if the phenomenon was truly driving behavior at this point.

Somewhat echoing this sentiment, but regarding the current state of the overall commercial real estate market more broadly, another respondent commented on the difficulty of gauging the role of factors like energy in a market that has moved from its nadir during the Great Recession to a "frothy" state currently. "We still don't have an equilibrium market to really assess … [so] appraisers are gun shy" regarding applying significant credit to something that they perceive as new and untested. Moreover, as a couple of other respondents noted, interest rates are very low now. Consequently, the impact of additional reduction for green is not of much consequence for some borrowers. More encouragingly, though, at least two others said that lower rates (e.g., from Fannie Mae's initiatives) would get their attention - assuming there was not a lot of additional work involved to obtain them.

Recommendations

Potential Interventions

Overall, current commercial mortgage practices do not fully account for the risks that may be associated with the energy-use inefficiencies of buildings. Figure 6 conceptually illustrates the primary energy and green feature impacts on mortgage valuation, along with potential intervention points and outcomes.

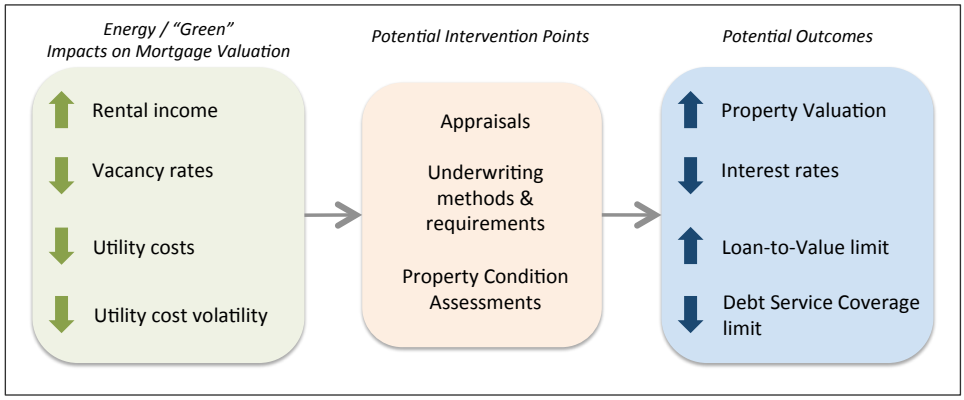

Figure 6. Conceptual illustration of energy and "green" features, potential intervention points and outcomes for mortgage valuation.

We present seven potential interventions to properly account for energy factors in the commercial mortgage lending process. These are based on explicit suggestions from stakeholders and follow-on analysis of the findings presented above.

1. **Demonstrate to lenders how and where energy factors "move the needle" on underwriting metrics.**

It appears that there have been few if any efforts to address the underwriting process. While the underwriting process may implicitly consider energy factors via the NOI calculation, stakeholder discussions showed that underwriters have very little appreciation of the range and magnitude of energy impacts on NOI and risk management (and that, as mentioned above, average energy cost estimates rather than actual figures are sometimes used in the formula). Several lenders said they would pay more attention to energy factors if they could see how energy factors actually "move the needle" on the key underwriting metrics, such as default risk, NOI (and thus, implicitly, valuation, LTV and DSCR), and economic or functional obsolescence.

The analysis should *show how the impact varies for different market segments* (building types and locations) and building characteristics and *how lower energy use reduces risk*. Specifically, the analysis would account two aspects of energy costs: 1) energy use and its volatility over the course of the mortgage term; and 2) energy price and it volatility over the course of the

mortgage term. Toward that end, the analysis should also explicitly show the extent to which current methods for calculating the energy term in NOI fall short in characterizing these risks and how existing risk models could be augmented. Ultimately, from a lender's perspective, it should be demonstrated that a loan will be more secure if it is financing an energy-efficient building that yields better cash flow and is more competitive. While the primary audience is underwriters, these findings would also be useful to the appraisal community.

Several stakeholders mentioned that it would be futile to turn this into an initiative to "educate" lenders from the standpoint of energy efficiency ("It would be like climbing Mt. Everest in winter"). Furthermore, lenders typically do not have continuing education requirements that could serve as a channel for this intervention. Therefore, it cannot be overemphasized that any such analysis should be conducted and presented to lenders on *their* terms - resonant with language and perspective that is familiar to *them*. For example, from a risk management perspective lenders are far more concerned with rollover risk (likelihood of losing a tenant) than energy cost volatility. To the extent that energy-efficient and green buildings can help reduce rollover risk from functional obsolescence, it could be structured as part of their risk management strategy for functional obsolescence.

It is also important to consider the scale of the impact and how much it will matter to borrowers. Fannie Mae currently offers a 10 bps discount for green multi-family buildings. Stakeholders expressed mixed views on the strength of this as a market signal. Some indicated that it would definitely get their attention, while others said that borrowers are already getting very good breaks on interest rates and that this discount would not be much of an incentive.

2. If #1 is successful, provide simple, seamless ways to incorporate energy factors into underwriting.

If intervention #1 is successful i.e. it has been demonstrated and lenders are convinced that energy factors do in fact have enough of an impact to be analyzed and incorporated more carefully into the underwriting process, the next task is to develop effective means to implement this. There was broad consensus among stakeholders to "dumb it down and keep it simple," given that the average corporate real estate investor finds energy efficiency "amorphous, difficult to measure, and shrouded in mystery." One idea mentioned by several stakeholders was to use a simplified energy score to characterize energy risks and adjust interest rate basis points or other underwriting metrics. An interesting precedent for this approach exists with regard to seismic vulnerability, where a simple score was developed to incorporate this risk into the mortgage underwriting risk analysis process.

An energy score for mortgage underwriting could build on the widely used and accepted ENERGY STAR Portfolio Manager score, as well as the emerging 'asset' scores such as those from the U.S. DOE Asset Scoring Tool. Portfolio Manager provides an operational rating - it implicitly incorporates the efficiency of the building's installed assets (e.g., high efficiency chillers) and operations (e.g., if the lights are turned off at night) by rating buildings on their overall usage (adjusted for weather, hours of operation, etc.). An asset rating characterizes the

efficiency of the installed assets assuming standardized operations. Both scores are relevant for underwriting.

The imperative to "keep it simple" does not necessarily preclude an appropriate level of complexity in how the score is calculated (e.g., using investment grade value-at-risk analysis (Jackson 2010)), especially to account for the range of contextual and building parameters that affect energy performance - as long as the underwriters themselves do not need to deal with this complexity, and can integrate these methods into existing processes with minimal effort.

3. Include energy performance in the PCA and move it up in the process.

Beyond properly accounting for energy factors as noted above, there is also the opportunity to use the underwriting process to sanction additional loan proceeds to invest in energy efficiency. Energy-efficient improvements often happen after acquisition, and there is currently no mechanism for lenders to incorporate and reassess the benefits for NOI.

As noted in the key findings section above, lenders routinely require a PCA for a mortgage loan, but the PCA rarely if ever includes an assessment of the energy efficiency and sustainability attributes of a property. However, if PCAs included investment-grade information on these aspects, they could be used to facilitate funding of energy efficiency improvements through the mortgage loan. Fannie Mae does this with its Green Rewards program for multi-family housing. They require that the PCA include a high performance building module that identifies the costs and projected savings from energy efficiency measures, based on an investment grade energy audit. Fannie Mae then sanctions additional mortgage loan proceeds based on 50% of the projected savings materializing. This approach could be applied more broadly to other commercial buildings provided that the lender has confidence in the PCA and that the PCA is conducted early enough in the loan process.

One current limitation is that PCAs are typically conducted late in the process, only after the basic mortgage terms (size, interest rate, term, etc.) have already been set. In order for this intervention to be truly effective at drawing attention to energy, PCAs might need to be conducted earlier in the underwriting process. In addition, they are not standardized – i.e., different lending institutions use different formats with different information required. As one stakeholder mentioned, PCAs were extremely helpful with managing asbestos risk, so could also be helpful with energy risk if it could be quantified accurately. Another good example is the process that evolved around the Phase 1 Environmental Site Assessment (ESA). Over time, standardized reports entered the market and the cost of completing an ESA dropped. In a similar vein, a standard for energy analysis needs to be created that's easy enough and important enough for the investment - then it could become common practice within the mortgage chain.

Several stakeholders were of the opinion that this intervention could have high impact. One stakeholder mentioned that it "could be a 'door opener' if the PCA has energy efficiency measures showing ROI of 20-30% that could be funded through the mortgage." Several

stakeholders also said that lenders are likely to have greater confidence in information from a PCA rather than an appraisal, since it is performed by professional engineers. The engineering firms are already on site, already evaluating the age/replacement cost of current equipment and therefore evaluating energy savings potential is not a big reach from their current scope. The ASTM PCA E2018-15 standard could be used as an intervention point. It already now references the Building Energy Performance Assessment (BEPA) Standard E2797-15. PCA firms may find that increasing their scope of services to include an energy assessment increases their competitiveness.

Incorporating energy efficiency information in PCAs could also have other uses: it could establish a floor for efficiency (much like asbestos concerns), essentially establishing benchmarks where underwriting might lead to reputational or default risk exposure. A contrary view was that it is unlikely that loans will be rejected because of poor energy efficiency unless the lender is very concerned about functional obsolescence. Finally, PCAs could be used for efficiency-related contingencies and as a lever on price of the property.

4. Owners need to demand consideration of energy efficiency by appraisers and lenders and provide the data.

Some appraisers and lenders indicated that owners need to demand consideration of energy efficiency in the mortgage loan process. One former lender stated that "unless the borrower is explicitly bringing up energy efficiency, lenders probably won't consider it." When owners make energy efficiency investments, they should demand consideration of projected savings in the NOI calculations. Furthermore, they need to be proactive in providing the necessary information - energy efficiency features and energy use and cost information. Providing basic ENERGY STAR Portfolio Manager information is not overly burdensome. Owner demand may also help move the PCA earlier into the process to get projected savings factored into the NOI calculation. Furthermore, IMT (2016b) reveals that "energy savings not materializing" was the greatest risk cited by interviewed lenders, and that receiving energy data from the owner may increase lenders' willingness to lend to energy efficiency projects.

This intervention will require advocacy to owners. Potential channels include the Building Owners and Managers Association (BOMA) and programs such as the Better Buildings Alliance (BBA).

5. Include energy metrics more explicitly in ARGUS software.

ARGUS is the leading industry software product for reporting and projecting building-level discounted cash flow pro formae, analyzing acquisition and disposition strategies, undertaking real estate asset management scenario analysis, and sensitivity analyses of lease management strategies. The reporting and presentation tools available in ARGUS have made the product an essential tool for many real estate investors and most commercial real mortgage underwriters. Given ARGUS's widespread use in the real estate industry - it's a de facto standard - a possible intervention would be to work with ARGUS to introduce more explicit energy metrics into its

analytics package. Current versions of ARGUS allow for reporting complex expense recovery structures by lease, however, these expenses are reported as a cost per square foot and the energy usage, costs and volatility component is not explicitly recognized (ARGUS 2015). Similarly, the energy component of expense reimbursement in net leases is not explicitly recognized, so it is difficult for underwriters or analysts to distinguish buildings with respect to the energy component of net operating income.

6. Get appraisers to properly value energy factors.

Appraisals are an obvious key intervention point for valuation. As one appraiser described the current situation: "...energy is a single factor that usually equates to about 1.5 lines in a 150 page commercial valuation report [and] you have a lot of education and awareness raising to do to get appraisers and owners to acknowledge the impact that energy efficiency might have longer term." There have already been some efforts to get appraisers to consider energy factors in the mortgage valuation process. As noted earlier, the Appraisal Institute has developed a "green addendum" form to characterize energy efficiency and sustainability features in an appraisal report. There are also awareness and training efforts underway, including by the U.S. DOE. All these are still fairly incipient and it is too early to assess their impact. One owner who recently attended a training session on energy factors in appraisals indicated that for "9 out of 10 [attendees] it was all brand new." In addition to awareness and training, Mills (2015) documents a range of opportunities pertaining to energy and appraisals, including:

- Improved information resources that provide better sales comparison data that can be related to building efficiency features. The U.S. DOE currently has an initiative to collect such data and make it available for analyses of the links between building value and energy-related attributes.
- Energy benchmarking and rating tools that are adapted to appraiser needs, for example by including essential energy cost metrics.
- Better risk analysis information as noted in item #1 above for underwriters.
- Appropriate compensation for the additional time and effort to consider energy factors in appraisals. Creating standardized forms and access to the relevant information would help reduce the time and effort.
- Enhancing the demand for better appraisals from lenders and owners.

The U.S. DOE appraisal working group is already considering many of these interventions and how to develop and pilot them among working group members and more broadly.

7. Consider interventions in ancillary products and services such as insurance.

During the course of stakeholder discussions for this scoping project, some stakeholders highlighted potential interventions in ancillary products such as insurance. The U.S. Department of Housing and Urban Development (HUD) is rolling out a program to offer a 25 bps discount on mortgage insurance premiums for energy efficient multi-family housing. The Federal Housing

Administration (FHA) estimates that the multifamily insurance rate reductions will spur the rehabilitation of an additional 12,000 units of affordable housing per year nationally.

In a related vein, one stakeholder suggested that energy savings insurance could be used to insure risks related to energy use projections used in NOI calculations. These products already exist and are used in energy savings performance contracts. They could be adapted for use in commercial mortgage underwriting.

Many reinsurers are also increasingly concerned about resiliency in the face of climate change impacts. To the extent that energy efficiency can help mitigate some of these risks, it may offer another avenue for insurance cost savings that could eventually be incorporated into NOI calculations.

Getting Started

The interventions presented above are technically feasible and could have significant impacts, with benefits to lenders and owners. However, it is also true that the nature of the mortgage lending process – with multiple stakeholders, high stakes and risk aversion – does not lend itself easily to changes. Therefore, these interventions will need to be piloted carefully and modestly with highly motivated early adopters. Wider deployment will likely require aggressive education/awareness efforts and stakeholder engagement and support through relevant industry organizations such as the Mortgage Bankers Association and the American Bankers Association.

For the near term (~6-9 months), we recommend pursuing three interventions in a staged manner as shown below.

Intervention #1: Demonstrate to lenders why and when energy factors "move the needle"

Near term goal: First and foremost, lenders need to be convinced that energy factors matter for underwriting. Given that underwriting practices are not standard and that specific underwriting practices and risk management perspectives can vary between lenders, we recommend working closely with three to five lenders to analyze the impact of energy factors for market segments that are relevant to each of them. The intended outcome is for lenders to affirm or refute the need to modify their current underwriting practices based on these findings.

Tasks:

ID	*Task*	*Description*
1	Define demonstration requirements	Conduct follow up discussions with lenders and owners to: confirm metrics of interest; determine extent of impact needed for it to matter for underwriting; identify building types and markets of primary interest; discuss alternative analysis approaches.

2	Develop analysis approach	Consider statistical and case-study based analysis approaches. Identify datasets that can be used for a statistical approach. Identify potential case studies. Vet and obtain signoff from selected lenders on analysis approach and scope. (Go/No-Go stage gate)
3	Conduct analysis	Analysis will be conducted by project team, with periodic input and review of interim results by lenders.
4	Present results to lenders and identify next steps	Synthesize and present results to lenders, who will affirm or refute need to modify current underwriting practices based on analysis results. If affirmed, identify process for designing and implementing changes to underwriting practice.

Intervention #3: Develop energy performance requirements for PCAs.

Near term goal: Several stakeholders suggested that the PCA could be an effective mechanism to incorporate energy performance into the mortgage valuation process. As a first step, we recommend investigating this further to confirm viability and then develop and pilot an energy performance module for the PCA, building on existing standards such as ASTM 2797 (ASTM 2015) and ASHRAE Audit Procedures (ASHRAE 2011). The intended outcome is to demonstrate how the energy performance information from the PCA can inform the underwriting process.

Tasks:

ID	*Task*	*Description*
1	Confirm viability and approach	Engage three to five PCA firms to discuss and document viability and adoption potential, technical approach, market and other constraints, and deployment channels including the ASTM standard.
2	EE module scope	Develop scope for the energy performance module and sample version.
3	Confirm pilots	Discuss scope and sample with lenders and confirm interest for pilots. (Go/No-Go stage gate)
4	Develop EE module	Leverage HUD MapGuide and Fannie Mae Green Rewards requirements. Consider approach used for ESA and seismic score.
5	Pilot	Use the EE module as part of the PCA for selected loans and document how added information was used in underwriting.

Intervention #5: Include energy metrics in ARGUS.

Near term goal: Given ARGUS' position as a de facto standard software for reporting and projecting building-level discounted cash flow, it presents a potentially effective channel for ensuring that energy metrics are properly represented in the cash flow analysis. As a first step, we recommend exploring the viability of this intervention and developing an implementation path.

Tasks:

ID	*Task*	*Description*
1	Confirm viability and approach.	Engage ARGUS to confirm viability of incorporating energy metrics and approach to ensure user acceptance. (Go/No-Go stage gate)
2	Develop specification and user guidelines for energy metrics	Define energy metrics, calculation methodology, how they will be represented in ARGUS. Work with selected users to develop guidelines on how to interpret and use metrics.
3	Develop implementation plan and schedule	Work with ARGUS to develop implementation plan and schedule.

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Appendices

Appendix A: Stakeholder Discussion Questions

The mortgage process and where energy factors fit in

- Can you describe your typical process for completing your role (origination, underwriting, servicing, portfolio investments, etc.) for a typical building? What steps do you undertake? Where do you get information from and who uses the results of your work?
- Where and how are energy factors (e.g. 3rd party energy assessment) currently considered in your process? Where should they be considered?
- How is the process different for existing buildings vs. new construction?
- Does the process vary by bank, private vs. institutional lenders, equity funding, by building type, by size, or other factors?
- What information is proprietary, and what can be shared?
- How does the engineering report, or Property Condition Assessment (PCA), affect your underwriting process?
- Do you account for the level and volatility of energy consumption or energy price volatility?
- How do you factor energy risk in your commercial real estate mortgage investment portfolios (e.g. does it affect your analysis of default risk, does it affect the diversification strategy)?
- Do you look at green labels such as Energy Star and LEED?

Impact of energy factors on the mortgage process (origination, valuation, investment, etc.)

- What are the factors that would drive variance in impact of energy-related variables (e.g. energy performance, price risk, condition of assets, new construction vs existing, tenants versus owner occupied, planned retrofit vs stable building)?
- Have you assessed the impact from each of these factors? If yes, can you share any results? What are the biggest variables to focus on?
- How do energy factors impact rents, occupancy, absorption, operating expenses?
- Does this matter more for new construction and renovation? Is improved performance already reflected in stable existing buildings, and is therefore already underwritten adequately?
- How do you account for energy factors in the capitalization rate (e.g., would an energy efficient rating building have a lower capitalization rate)?

Potential interventions and efforts to date to incorporate energy factors in mortgage valuation and underwriting

- What is the current perspective/awareness of energy-related issues in the field? (e.g. not on their radar, skeptical, etc). What would make people care?
- Do you know of any efforts to date in your organization or by others such as government, non-profit, or industry organizations? What were the successes and failures? Why? How does industry climate and culture affect this?

- What are potential interventions? (e.g. standardized energy risk analysis procedures, data, standardized utility bills, ….)?
- What are the barriers to these interventions? technical, economic, regulatory, market, organizational (e.g. bank silos), industry culture,...What would it take to be successful?
- Are there particular market sectors or ownership types that you would prioritize in terms of benefits or ease of adoption?
- Can you think of other examples where new aspects/procedures were incorporated into mortgage underwriting and valuation that were not previously standard practice? What were these changes and why and how did they happen?
- What about mortgage backed securities and secondary market demand for “green” investments?
- How does PACE impact potential interventions?

Appendix B: Fannie Mae High Performance Building Module for PCAs

The following pages show the template for the Fannie Mae high performance building module for the PCA, entitled: “Appendix H to the Instructions for Performing a Multifamily Property Condition Assessment: Templates for a Property Condition Assessment Report with a High Performance Building Module”

Appendix H to the Instructions for Performing a Multifamily Property Condition Assessment

Templates for a Property Condition Assessment Report with a High Performance Building Module

v.2.1

HOW TO USE THIS FILE

1) Fill in required information on the "INPUTS" tab. This information will be used to populate other tables.
2) Review each table, providing additional information as needed. Please note that Table 1.3 will require all data to be entered manually.
3) Copy and paste tables into the PCA report.

WHAT IS IN THIS FILE?

Title (This tab) includes title and overall instructions.
INPUTS tab: all project information is entered on this tab.
Table tabs (1.3, 2.3, 7.1, 7.2a, 7.2b) contain tables to be pasted into the PCA report. With the exception of Table 1.3, these tables are auto-populated from the INPUTS tab.
Drop Downs and Assumptions tab: most users should not touch these tabs. If needed, assumptions and dropdown choices can be adjusted for special projects.

INSTRUCTIONS

Complete all required inputs and optional inputs (if applicable) for the three tables on this page. This tab will be used to populate other tables.

HISTORICAL UTILITIES: Please enter metering, payor, and historical cost and consumption data for the whole property.
Note: if your whole property consumption inputs are Source rather than Site, please use cells J11-14 rather than cells G11-14
Note: if your project uses a utility type not listed in the table (e.g. district steam, district heating or cooling) you will need to manually edit the Utility Type, Units and Consumption Savings columns, and check source energy conversion formulas on later tabs.

ENERGY AND WATER USES: Please indicate which utility type powers each of the listed uses.

RECOMMENDED ENERGY AND WATER EFFICIENCY MEASURES: Please list all requested data for each recommended Energy and Water Efficiency Measure (EWEM).
Note: if you have more than 20 EWEM, you will need to add rows to this table and to the corresponding tables 2.3, 7.2a and 7.2b

Required inputs	Fill in information or select from drop-down
Optional inputs	Fill in information if applicable
Pre-filled or calculated	Do not enter data into these cells

HISTORICAL UTITLIES

			Cost		*Whole Property Consumption*			
Utility Type	**Are Tenant Units Individually Metered? (Enter "n/a" if fuel is not used on site)**	**Utility Payor (Owner, Tenant, both)**	**Current Owner Annual Energy and Water Cost ($/property/year)**	**Current Tenant Annual Cost ($/property/year)**	**Site Consumption**	**Units**	**Source Energy Use Conversion Factor (Fuel Unit/Source BTU)**	**Source Energy Use Total (BTU/property/year)**
Electricity						kWh	10714	-
Natural Gas							0	
Fuel Oil							0	
Propane							0	
Water & Sewer							n/a	n/a
TOTALS			$ -	$ -				

Source Energy Use Total (BTU) 0

ENERGY AND WATER USES

Utility Type	**Cooling**	**Heating**	**Domestic Hot Water**	**Irrigation**
Electricity	☐	☐	☐	
Natural Gas	☐	☐	☐	
Fuel Oil	☐	☐	☐	
Propane	☐	☐	☐	
Water & Sewer				☐

RECOMMENDED ENERGY AND WATER EFFICIENCY MEASURES

			Costs and Savings				*Whole Property Consumption Savings*					
EWEM Item No.	**Energy or Water Efficiency Measure Name**	**Cost Category**	**Installed Cost of Measure**	**Whole Property Projected Annual Cost Savings**	**Owner Projected Annual Cost Savings**	**Tenant Projected Annual Cost Savings**	**Annual Electricity Savings**	**Annual Natural Gas Savings**	**Annual Fuel Oil Savings**	**Annual Propane Savings**	**Water Savings**	**Measure Useful Life**
			$	$	$	$	kWh	0	0	0	0	Years
1				$ -								
2				$ -								
3				$ -								
4				$ -								
5				$ -								
6				$ -								
7				$ -								
8				$ -								
9				$ -								
10				$ -								
11				$ -								
12				$ -								
13				$ -								
14				$ -								
15				$ -								
16				$ -								
17				$ -								
18				$ -								
19				$ -								
20				$ -								

MANDATORY TEMPLATE

Section 1: Executive Summary

Section 1.3: Summary of Recommended Repairs and Replacement Cost Estimates

Summary of Recommended Repairs and Replacement Cost Estimates

	Costs without implementation of EWEM	Costs Adjusted for Selected EWEM	Reference
Immediate Repairs: Life Safety Items (may impact health or safety)	$XXX,XXX	$XXX,XXX	See Tables 2.1, 2.3
Immediate Repairs: Critical Items (Recommend Completion within 6 months)	$XX,XXX	$XXX,XXX	See Tables 2.1, 2.3
Immediate Repairs: Deferred Maintenance (Recommended Completion with 12 months)	$XX,XXX	$XXX,XXX	See Tables 2.1, 2.3
Energy and Water Efficiency Measures: Selected Measures (Completion within 12 months)	N/A	$XXX,XXX	See Table 2.3
Total of Immediate Repairs	**$0**	**$0**	**See Tables 2.1, 2.3**
Replacement of Capital Items (Uninflated per unit / per annum)	$XXX	$XXX	See Tables 2.2, 2.3
Replacement of Capital Items (Inflated per unit/ per annum)	$XXX	$XXX	See Tables 2.2, 2.3
Inflation Rate:	3.0%		

INSTRUCTIONS
Table wil populate from the INPUTS tab.
Please hide unused measure rows (as indicated in column D) before copying table into report.

Table 2.3 Cost Estimate for Recommended Energy and Water Efficiency Measures

EWEM Item No.	Energy or Water Efficiency Measure Name	Cost Category	Installed Cost of Measure	Whole Property Projected Annual Cost Savings
1	0	0	$ -	$ -
2	0	0	$ -	$ -
3	0	0	$ -	$ -
4	0	0	$ -	$ -
5	0	0	$ -	$ -
6	0	0	$ -	$ -
7	0	0	$ -	$ -
8	0	0	$ -	$ -
9	0	0	$ -	$ -
10	0	0	$ -	$ -
11	0	0	$ -	$ -
12	0	0	$ -	$ -
13	0	0	$ -	$ -
14	0	0	$ -	$ -
15	0	0	$ -	$ -
16	0	0	$ -	$ -
17	0	0	$ -	$ -
18	0	0	$ -	$ -
19	0	0	$ -	$ -
20	0	0	$ -	$ -
Totals			$ -	$ -

INSTRUCTIONS

Table wil populate from the INPUTS tab.

Note: If property uses a utility type not listed, adjust row titles and units manually.

Table 7.1 Historical Annual Energy and Water Consumption and Costs

					Whole Property Consumption	
Utility Type	**Energy / Water Uses**	**Utility Payor (Owner, Tenant, both)**	**Current Owner Annual Cost**	**Current Tenant Annual Cost**	**Consumption**	**Units**
Electricity	Electricity usea include lighting, appliances, electronics, pumps, motors, fans	0	$ -	$ -	0	kWh
Natural Gas	n/a	0	$ -	$ -	0	0
Fuel Oil	n/a	0	$ -	$ -	0	0
Propane	n/a	0	$ -	$ -	0	0
Water and Sewer	Water uses include toilets, showers, kitchen and bathroom faucets	0	$ -	$ -	0	0
Total Historical Energy and Water Consumption and Costs			$ -	$ -		

INSTRUCTIONS
Table wil populate from the INPUTS tab.
Please hide unused measure rows (as indicated in column j) before copying table into report.

Table 7.2(a) Projected Energy and Water Cost Savings per Energy and Water Efficiency Measure

EWEM Item No.	Energy or Water Efficiency Measure Name	Installed Cost of Measure	Whole Property Projected Annual Cost Savings	Owner Projected Annual Cost Savings	Tenant Projected Annual Cost Savings	Measure Life (years)	Owner's Return on Investment (using owner's projected savings)	Simple Payback (using owner's projected savings)	Net Present Value (whole building savings)
1	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
2	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
3	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
4	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
5	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
6	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
7	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
8	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
9	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
10	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
11	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
12	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
13	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
14	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
15	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
16	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
17	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
18	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
19	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
20	0	$ -	$ -	$ -	$ -	0	#DIV/0!	#DIV/0!	$ -
Totals		$ -	$ -	$ -	$ -		#DIV/0!	#DIV/0!	$ -

INSTRUCTIONS

Table wil populate from the INPUTS tab.

Please hide unused measure rows (as indicated in column j) and fuel columns (as indicated in row 30) before copying table into report.

Note: If property uses a utility type not listed, adjust column titles, units and source energy calculations manually.

Table 7.2(b) Annual Projected Energy and Water Consumption Savings

EWEM Item No.	Energy or Water Efficiency Measure Name	Annual Electricity Savings	Annual Natural Gas Savings	Annual Fuel Oil Savings	Annual Propane Savings	Water Savings	Projected Whole Property Source Energy Savings (%)	Projected Whole Property Water Savings (%)
		kWh	0	0	0	0		
1	0	-	-	-	-	-	#DIV/0!	#DIV/0!
2	0	-	-	-	-	-	#DIV/0!	#DIV/0!
3	0	-	-	-	-	-	#DIV/0!	#DIV/0!
4	0	-	-	-	-	-	#DIV/0!	#DIV/0!
5	0	-	-	-	-	-	#DIV/0!	#DIV/0!
6	0	-	-	-	-	-	#DIV/0!	#DIV/0!
7	0	-	-	-	-	-	#DIV/0!	#DIV/0!
8	0	-	-	-	-	-	#DIV/0!	#DIV/0!
9	0	-	-	-	-	-	#DIV/0!	#DIV/0!
10	0	-	-	-	-	-	#DIV/0!	#DIV/0!
11	0	-	-	-	-	-	#DIV/0!	#DIV/0!
12	0	-	-	-	-	-	#DIV/0!	#DIV/0!
13	0	-	-	-	-	-	#DIV/0!	#DIV/0!
14	0	-	-	-	-	-	#DIV/0!	#DIV/0!
15	0	-	-	-	-	-	#DIV/0!	#DIV/0!
16	0	-	-	-	-	-	#DIV/0!	#DIV/0!
17	0	-	-	-	-	-	#DIV/0!	#DIV/0!
18	0	-	-	-	-	-	#DIV/0!	#DIV/0!
19	0	-	-	-	-	-	#DIV/0!	#DIV/0!
20	0	-	-	-	-	-	#DIV/0!	#DIV/0!
Totals		-	-	-	-	-	#DIV/0!	#DIV/0!