Incorporating Energy Efficiency into Commercial Real Estate Transactions

Energy / “Green” Impacts on Mortgage Valuation

- Rental income
- Vacancy rates
- Utility costs
- Utility cost volatility

Potential Intervention Points

- Appraisals
- Underwriting methods & requirements
- Property Condition Assessments

Potential Outcomes

- Property Valuation
- Interest rates
- Loan-to-Value limit
- Debt Service Coverage limit

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With: Nancy Wallace, UC Berkeley; Andrew White, ReTech; Cindy Zhu, DOE
Energy Factors in Mortgage Valuation
How are energy and valuation (un)linked?

Energy directly affects Net Operating Income (NOI) used in mortgage valuation. Current practice does not fully account for energy factors in calculation of NOI

- Usually based on historical average cost data, if available
- Does not account for energy use and price volatility during mortgage term

Energy risks are not properly assessed and energy efficiency is not properly valued.

Commercial mortgages are a $2.5+ Trillion market and could be a significant channel for scaling energy efficiency.
Analyzing the impact of energy on default rate

Mortgage Default Rate = \( f(\text{EUI}, \text{ElecPriceGap}, \text{CouponSpread}, \text{LTV}, \text{Region}) \)

Empirical analysis combining
- Mortgage loan data (TREPP)
- Energy use data (Benchmarking disclosure, Wegowise)
The link between energy and default

• The coefficient estimates for BOTH the *Electricity Price Gap* and *Source EUI* are significant at better than the .05 level of statistical significance.
  – The higher the *Source EUI* (the more energy usage per square foot) the higher the likelihood of default.
  – The higher the *Electricity Price Gap*, (the larger the difference between the actual and the expected electricity prices since the loan origination), the higher the likelihood of default.
What are the impacts on specific loans?

Collaborate with lenders to:
1. Demonstrate impact of energy use and price on specific mortgage loans
2. Develop recommendations

Approach
- Compile info from Appraisals, PCAs, other sources.
- Estimate source EUI variations.
  - Simulation and empirical approaches
- Compute elec price gap using forward curves.
- Compute default risk impact due to source EUI and elec price gap.
Impact of energy use variations: Denver office

Facilities Management factors:
- HVAC schedule
- Thermostat setback
- Supply air temp control
- VAV min flow control
- Economizer controls
- Lighting controls

Levels: good, avg, poor

Occupyancy factors:
- Occupant density
- Occupant schedule
- Plug load density
- Plug load controls

Levels: good/low, avg, poor/high

<table>
<thead>
<tr>
<th>Case</th>
<th>Fc mgmt factors</th>
<th>Occ Factors</th>
<th>Source EUI var (%)</th>
<th>Default risk var (bp)</th>
<th>Default risk var rel. to TREPP avg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>Good/Low</td>
<td>-54%</td>
<td>-248</td>
<td>-31%</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>Ave</td>
<td>-33%</td>
<td>-127</td>
<td>-16%</td>
</tr>
<tr>
<td>3</td>
<td>Ave</td>
<td>Ave</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Good</td>
<td>Poor/High</td>
<td>+4%</td>
<td>+12</td>
<td>+2%</td>
</tr>
<tr>
<td>5</td>
<td>Poor</td>
<td>Good/Low</td>
<td>+64%</td>
<td>+158</td>
<td>+20%</td>
</tr>
<tr>
<td>6</td>
<td>Poor</td>
<td>Ave</td>
<td>+76%</td>
<td>+181</td>
<td>+23%</td>
</tr>
<tr>
<td>7</td>
<td>Poor</td>
<td>Poor/High</td>
<td>+132%</td>
<td>+268</td>
<td>+34%</td>
</tr>
</tbody>
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Compare to TREPP average default rate of 800bp
Impact of energy price variations: Denver

Mean: +330 bp
1 Std dev: -159 - 501 bp
Five case studies show material impacts

<table>
<thead>
<tr>
<th>Building</th>
<th>Source EUI variation (%)</th>
<th>Default rate variation (bp)</th>
<th>Default rate variation relative to TREPP avg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denver Office</td>
<td>-54% to +132%</td>
<td>-248 to +268</td>
<td>-31% to +34%</td>
</tr>
<tr>
<td>Sonoma Office</td>
<td>-40% to +183%</td>
<td>-161 to +331</td>
<td>-20% to +41%</td>
</tr>
<tr>
<td>San Jose Office</td>
<td>-62% to +119%</td>
<td>-308 to +249</td>
<td>-39% to +31%</td>
</tr>
<tr>
<td>Denver Hotel</td>
<td>-11% to +17%</td>
<td>-37 to +49</td>
<td>-5% to +6%</td>
</tr>
<tr>
<td>San Francisco Multi- family</td>
<td>-20% to +26%</td>
<td>-72 to +74</td>
<td>-9% to +9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wholesale price region</th>
<th>Default rate variation (bp)</th>
<th>Default rate variation relative to TREPP avg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denver area</td>
<td>+159 to +501</td>
<td>+20% to +63%</td>
</tr>
<tr>
<td>Northern California</td>
<td>-49 to +705</td>
<td>-6% to +88%</td>
</tr>
</tbody>
</table>
"These results showing the impact of energy on default risk are clearly meaningful. I don't currently consider energy efficiency when making a loan and seeing this makes me think I would want to ask about it”

"I would like to apply these findings but would want an easy way to use it. A simple score or ratio for energy risk would be good. In fact, I would be interested to pilot test it."

*Keith Hanley, Silicon Valley Bank*
Actions you can take now

**Lenders:**
- Ask owners to provide info on energy cost range.
  - Could be done as part of Property Condition Assessment.
  - Can reference ASTM standard
- **Incorporate energy risk factor into underwriting and terms**
  - e.g. Interest rate discount for lower risk
- **Offer additional loan proceeds for EE investments**

**Borrowers:**
- Ask lenders to account for energy efficiency when setting mortgage terms.
- **Provide data on energy costs to lender.**
  - Historical and anticipated
  - In appraisal and/or PCA
Appraising High-Performance Buildings
Context

• Regulatory and market changes increasing commoditization of appraisals
  – Little budget or reward for making “unusual” adjustments, even when warranted
  – Fragmented, aging, and skeptical appraisal workforce
  – Lack of confidence in addressing green buildings
• Poor communication of high-performance building features amongst owners, lenders, and appraisers
• Lack of relevant education, training, and energy-related knowledge amongst appraisers
The Appraisal Foundation has released three advisories

*Intent: identify actions, skills, and knowledge appraisers need to competently value buildings with green or high-performance attributes*

- **Valuation Advisory #6**: Valuation of Green and High-Performance Property: Background and Core Competency
- **Valuation Advisory #7**: Valuation of Green and High-Performance Property: 1-4 Unit Residential
- **Valuation Advisory #9**: Valuation of Green and High-Performance Property: Commercial, Multi-family, and Institutional Properties
Appraisal Process

1. Identify the Need for Appraisal and Valuation
2. Define Scope of Work
3. Collect Property Data and Information
4. Analyze Property Data and Information
5. Apply Approaches to Value
6. Reconcile Value and Provide Final Opinion
7. Submit final report

Focus of DOE working group
DOE Appraisal Toolkit

• A comprehensive toolkit with links to case studies, reference resources, courses, and seminars

• Guidance for Owners ordering appraisals of high-performance, energy-efficient buildings

• Sample Scope of Work Language for Appraisers valuing high-performance, energy-efficient buildings
Energy Matters! Training for Appraisers

• Provides appraisers with:
  – Background on green buildings and real estate trends
  – Explanation of how energy efficiency and high-performance features can impact appraisal processes and property values
  – Overview of ENERGY STAR, DOE BPD, and DOE Asset Score and how data contained within each tool can be used by an appraiser

• Available in three formats from Earth Advantage
  – In-person, 7-hour course
  – Live online, 4-hour course
  – Recorded online, 4-hour course FREE
Real Estate leaders taking action

• Providing energy information and requesting standard treatment of energy in appraisal process
• Leveraging DOE’s Appraisal Toolkit to revise their own Appraisal RFPs
• Communicating with appraisers about TAF advisories
• Developing case studies on recent appraisals
• Increasing communication on valuation of high-performance properties
Looking Ahead

Vision: Energy factors are **fully and routinely incorporated in commercial mortgage process, accelerating demand for buildings with lower energy risk.**

Show that energy matters

Develop and pilot interventions

Disseminate best practices

Institutionalize

Scope of current effort

Long term

Analysis of energy impacts

Case studies on actual mortgage loans

Protocols and tools for lenders and owners

Industry Standards
Thank You

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