IPEEC Building Energy Rating Workshop

29 May 2013

Pre-Workshop Briefing Document

1. Background and objectives

This workshop will assess and document the state of play in the development, implementation, and use of building energy efficiency rating schemes in IPEEC countries, with a specific focus on their goals, their success or failure toward those goals, the trade-off between the complexity of the rating tool and the validity of rating outputs, and the impact that ratings can have on asset valuation.

2. Diversity of building rating schemes

2.1. Summary of existing research

Significant research has been done on individual building energy ratings schemes, though much less has been done comparing different schemes to understand how they are similar, and where they vary.

A recent paper prepared by the Institute for Market Transformation, "How is Energy Efficiency Assessed? - A proposed framework for energy performance assessment systems," proposed a classification framework for energy efficiency evaluation tools by comparing seventeen building energy performance assessment systems from ten countries. The unique assumptions and definitions underpinning the different systems make it difficult to compare results; direct translation is nearly impossible.

But breaking apart the methodological characteristics of each approach enables the systems to be compared and studied. In the IMT paper, each system is evaluated by the approach to six basic underlying characteristics: energy consumption, energy type, building floor area, building type, performance scale, and energy uses. The IMT framework reveals that the systems are diverse, and none of the schemes studied uses the same methodology.

We have attempted to collect other relevant research reports, and compiled those that seem most relevant to the IPEEC initiative in the attached Annotated Bibliography. That listing is not intended to be comprehensive or exhaustive, but we welcome input from workshop participants on other studies that we have missed.

2.2. Dimensions of building rating schemes

Given the complexity involved with comparing a wide array of vastly different building rating schemes directly, a different approach needs to be used to compare and categorize such schemes. By identifying several key dimensions of building rating schemes, we hope to eventually be able to develop several "groupings" of building rating schemes.

As a first task, in preparation for the May 29 workshop, we have developed a preliminary list of dimensions. We'd like feedback on any dimensions that may be missing and which of those listed below are the most important, with an objective of reducing the total list to no more than four or five dimensions.

Descriptive dimensions:

- Mandatory vs Voluntary
- Asset vs Operational Rating
- Homes vs Commercial building Rating
- Whole building vs. Tenant/landlord split

Dimensions related to timing and disclosure of rating:

- Periodic/annual
- Time of sale/lease
- Public/Private (level of public disclosure required)
- "One-Time"/snapshot rating vs ongoing score/rating

3. Impact of building rating schemes on asset valuations

3.1. Summary of known research

Similar to the broader review of relevant research reports on building rating schemes, we have compiled a listing of the recent work on asset valuation impacts of building energy rating that seem most relevant to the IPEEC initiative. Much of the research has been done by a fairly small group of academic experts, as the overall field of energy rating schemes is fairly new, and experts acknowledge that it takes time for different issues to have a measurable impact on property valuation.

We would like feedback about other significant work that may be currently underway.

3.2. Identifying gaps from known, current research

One area that we found in this research is that much of the current literature on this topic mixes building energy rating schemes with broader environmental sustainability ratings of buildings. Among some of the studies there is a good deal of ambiguity and inconsistent use of datasets between "green" building ratings vs. energy only rating schemes. For the purpose of the IPEEC project, we will try to separate out the "building energy" issues that contribute to property and asset valuation from other work that focuses on broader sustainability ratings.

As energy and carbon performance are often an important indicator of broader sustainability ratings, we seek input at the workshop on what other "hard indicators" of sustainability performance can be teased out, to help give guidance to the property valuation industry as this topic evolves in the coming years.

We would like feedback on this issue, and also hope to identify other gaps in property valuation research that might be pursued by IPEEC member countries.

4. Evaluating building rating schemes

4.1. Summary of existing evaluations

There are numerous studies that have been conducted in the last five years assessing building rating schemes. These studies usually fall into three categories:

- **Comparative studies commissioned by a government** as part of their process to assess different options for developing their own building rating scheme. While these studies tend to cover a broad array of different rating schemes, the lens through which they are assessed is highly specific to the host country's needs.
- **Evaluations of a jurisdiction's rating scheme** by that jurisdiction's government (or hired consultant), usually focused on assessing whether the rating scheme is achieving its goals and ways it can be improved.
- **Independent assessments** of one or more building rating schemes by a third party entity. These studies usually have a specific focus, such as the Climate Policy Institute's 2011 assessment of Germany's scheme and the IDEAL-EPBD's 2011 analysis of numerous European schemes, which both focused on the impact of these schemes on consumer behavior. The Northeast Energy Efficiency Partnership's 2013 analysis of different US rating schemes, and the Buildings Performance Institute Europe's 2010 assessment of Europe's Energy Performance of Building Directive implementation, were both broader, with a focus on overall scheme effectiveness.

We list some details of these papers, and other assessments, in the Annotated Bibliography at the end of this paper (see the sections on overall building rating schemes). However, more evaluations are likely to exist, some of which may not be publicly available. We encourage workshop participants to identify and share any other evaluations they are aware of such that a more comprehensive collection of building rating scheme assessments and evaluations can be developed.

4.2. Our proposed approach

While certain jurisdictions and international organizations have conducted evaluations of their or other building rating schemes, there is not yet a consistent framework for such evaluations. We propose some preliminary parameters below, some of which have been drawn from the research outlined above, which could be used to assess the effectiveness of a building rating scheme. The guiding logic in developing these parameters was to focus on the rating tool and scheme's output and results.

These concepts will be presented in significantly more detail at the May 29th workshop to obtain participant feedback on this proposed evaluation framework.

Robustness of building rating tool

- Technical robustness of tool
- Quality of tool results

Effectiveness of building rating scheme

- Consistency with stated goals of scheme
- Participation rates (voluntary programs)/compliance rates (mandatory programs)
- Level of consumer awareness and buy-in
- Clarity and intuitiveness of rating label, where relevant

Impact of building rating schemes

- Consumer awareness, confidence and support
- Compliance rates/participation rates
- Impact on building rent or sales price
- Impact on behavior

5. Key issues for discussion/further research

During the May 29 workshop, we will explore the following questions to advance the current understanding of the state of play in building energy rating, and identify additional areas of research that need to be done in the future. The questions are grouped into three main "baskets" as follows:

Diversity of building rating schemes

- What are stated "Objectives" for the scheme? How have these objectives shaped tool development and evolution?
- What technical components of rating tools have the biggest impact on ratings and perceived validity?
- What policy components of rating schemes have the biggest impact on perceived validity of rating scheme?
- What are the trade-offs between the complexity of the rating tool and the validity of the output?
- Whole building vs. tenant/landlord ratings: when is one more relevant; do they impact what improvements get implemented?

Better understanding how rating schemes fit into asset valuations

- Are there other studies completed or underway that are not listed on the Annotated Bibliography?
- What are barriers to incorporating building ratings into asset valuations?
- What are rating scheme characteristics that help the real estate community incorporate asset valuations into asset valuations?

- Are there any implications of asset vs. operational ratings, or landlord/tenant vs. whole building ratings, on valuation?
- Other needs in building rating schemes and tools from real estate financing perspective that have not been addressed/discussed yet?
- What research or analysis would be useful to test some of these valuation ideas?

Developing an approach to assessing building rating schemes

- Are there other written evaluations in IPEEC countries not included in the Annotated Bibliography? Even non formal, non-public ones?
- What criteria did you use in assessing your or other building ratings schemes?
- Did you weigh some criteria more or less?
- Did the impact of asset valuation play a role in assessing scheme options? Might that be a factor in the future?
- For schemes that include efficiency improvement recommendations, have those had notable impacts?
- Feedback on the proposed approach?

Appendix: Annotated Bibliography for IPEEC BEET Workshop

Note: all of the documents listed below have been posted on a site accessible to invitees; see www.BuildingRating.org/ipeec

The following provides a detailed list of documents that have been consulted to date as part of this project. The bibliography is divided into five categories:

- Documents comparing building rating tools across jurisdictions
- Documents describing a building rating tool in one jurisdictions
- Documents comparing building rating schemes (which may include some discussion of the rating tool itself but also addresses broader policy and program issues) across jurisdictions
- Documents describing one jurisdiction's building rating scheme
- Documents discussing and analyzing the impact of building ratings on the economic and/or financial valuation of buildings

Within each of those sections, the documents are simply listed by order of date, starting with the most recent document.

Documents comparing building rating tools (multi-jurisdiction)

Title	Author	Date	Description
Comparing Building Energy Performance Measurement: A framework for comparing international energy efficiency assessment systems	David Leipziger, Institute for Market Transformation	2013	Proposed a classification framework for efficiency evaluation tools by comparing 17 building energy performance assessment systems from 10 countries.
Building Labels Vs. Environmental Performance Metrics: Measuring What's Important About Building Sustainability	Andrew Nelson and Ari Frankel, RREEF Real Estate, Deutsche Bank	October 2012	Author argued that many of the sustainability related rating systems send misleading or inadequate signals to those charged with greening their assets, inhibiting funding for energy efficiency and minimizing impact. Discusses some new initiatives and approaches underway to simplify and unify sustainability data collection and reporting.
Study into the Suitability of Building Sustainability Ration and Assessment Tools for Australia	BRANZ for the Dept of Climate Change and Energy Efficiency	July 2012	Screened 55 international tools to assess residential building rating tools; 12 of these were shortlisted for a more detailed assessment and ranked against one another.

Comparative Analysis of US and China Building Energy Rating and Labeling Systems	Kevin Mo, Lane Burt, Bin Hao, Jie Cheng, Andrew Burr, and Sonal Kemkar	2010	Comparative analysis of building energy rating tools in the US and China with an brief discussion of market barriers in each country and opportunities for alignment.
Review of Current Building Energy Efficiency Tools and Technologies in Australia	National Research Flagships CSIRO	June 2009	Analyzed and compared tools assessing total building energy consumption, tools assessing the thermal efficiency of building envelope, and tools assessing the overall environmental impact of buildings to identify future research needs for Australian building energy efficiency.
A Study into the Suitability of Sustainability Tools as Part of a National Implementation Model	BRANZ	2007	Assessed rating tools currently available in Australia to determine their suitability for use as part of a standardized nationwide rating tool.
Final Report for Existing House Energy Ratings Tools Study	Sustainable Built Environments and Energy Partners	September 2006	Analyzed several international residential home energy rating tools for implementation in New Zealand. Countries assessed included Australia, US, Canada, UK, and New Zealand.
Investigating Options for an Australian "Whole of House" Energy Rating System	Ian Swain, Building Energy Efficiency Branch, Australian Dept of Climate Change and Energy Efficiency	Not Listed	To enable policy development beyond the focus on building envelop, assessed 4 tools in detail with a focus on assessing their applicability to Australia's needs.
A comparative study of the implementation of the energy certification of residential properties in Malta	Alan Abela, Mike Hoxley, Paddy McGrath, and Steve Goodhew	2012	A comparison of building energy rating systems, as applied to certification of residential properties, in Malta to others in Europe.

Document describing building rating tool (single jurisdiction)

Title	Author	Date	Description
A Tale of Two Buildings: Are EPCs a true indicator of energy efficiency?	Jones Lang LaSalle	2012	Analyzed 200 buildings in London to assess how Energy Performance Certificates (EPCs) relate to Display Energy Certificates and how EPCs will not be sufficient to meet London's targets to de-carbonize its built environment.
Commercial Building Energy Asset Score: Program Overview and Technical Protocol	US Dept of Energy	December 2012	Detailed description of newly proposed asset rating for the US commercial and public buildings (including multi-family buildings). Discusses technical protocol used to generate the energy asset score.
Making Buildings part of the Solution by Overcoming Information Gaps through Benchmarking	Matt Cox, Marilyn Brown, and Xiaojing Sun, Georgia Tech University	2012	Analysis of the potential impact on energy consumption in various regions of the U.S. of benchmarking and disclosure policies using the Portfolio Manager tool.
Handbook for energy consultants: Energy Certification of Small Buildings	Danish Energy Authority	2006	Provides a detailed overview and approach to certifying small buildings in Denmark.

Documents comparing building rating schemes (which may include some discussion of the rating tool itself but also addresses broader policy and programmatic issues)

Title	Author	Date	Description
Comparing Building Performance Policies: How Can We All Speak the Same Language?	David Leipziger, Jayson Antonoff, Adam Hinge, Jens Laustsen	2013	Assess the key discrepancies and inconsistencies in the terminologies governing building performance. Paper discusses how new tools to facilitate comparison, will enable more effective best practice sharing.
Building Energy-Efficiency Best Practice Policies and Policy Packages	Mark Levine et. al., for GBPN	October 2012	Presents a comprehensive review of building energy efficiency policies, including building energy labeling, in four major regions of the world.
Research on International Residential Building Disclosure Schemes to Inform Residential Building Disclosure Policy in Australia	George Wilkenfeld and Associates, Winton Sustainable Research Strategies	June 2012	Detailed assessment of residential building rating and disclosure schemes, assessment tools, compliance, data collection, and scheme achievements in 14 jurisdictions.

Key findings & policy recommendations to improve effectiveness of EPCs and EPBD	Julia Backhaus, Casper Tigchelaar, and Marjolein de Best-Waldhober	2011	Presents the findings and policy recommendations of a three year project examining the effectiveness of EPCs in dwellings in the EU. Found significant opportunities for improving the presentation, availability and content of EPCs.
Energy Performance Certificates across Europe: From Design to Implementation	Building Performance Institute Europe (BIPE)	2010	Described the implementation of Energy Performance Certifications schemes in 12 EU member states, including providing an assessment of progress to date, barriers to implementation and key success factors.
Energy Performance Certification of Buildings: A Policy Tool to improve energy efficiency	International Energy Agency	2010	Policy recommendations for implementing an effective energy performance certification scheme based on best practices from other international jurisdictions, plus detailed case studies on Ireland and Portugal.
Monitoring and evaluation of energy certification in practice with a focus on Central European states	Germany's Federal Ministry of Transport, Building and Urban Development	2010	Assessment of overall implementation of building rating schemes in central European countries.
Implementation of EPBD Article 7.3 in Germany and the UK: Comparison of Methodologies and Procedures	R. Cohen, I. Therburg, W. Bordass, J. Field	2007	Comparison of methodologies of ratings under the building certification schemes in Germany and the U.K.

Documents describing building rating scheme in a single jurisdiction (which may include some discussion of the rating tool itself but also addresses broader policy and programmatic issues)

Title	Author	Date	Description
Building Energy Rating and Disclosure Policies – Update & Lessons from the Field	Northeast Energy Efficiency Partnerships	February 2013	Reviews experience and results to date from leading jurisdictions in the US with building energy rating and disclosure policies. Presents lessons learned based on case studies.
NABERS: Lessons from 12 Years of Performance Based Ratings in Australia	Paul Bannister	2012	Assessment of overall effectiveness of Australia's NABERS scheme

Data Trends: Benchmarking and energy savings	US EPA	2012	Analysis of Portfolio Manager data to assess impact that annual benchmarking has on reducing energy consumption
The Effectiveness of Energy Performance Certificates – Evidence from Germany	Hermann Amecke, Climate Policy Initiative Berlin	2011	Evaluates how effective EPCs have been in helping purchasers of dwellings in Germany to incorporate energy efficiency into their home purchasing decisions.
Development of a Single Residential Rating Tool for New Zealand	Joint Venture Partners for the NZ govt – EECA, MED, MfE	June 2009	Developed the case for a single rating tool for new and existing homes in New Zealand and lays out a draft rating tool framework developed by a joint industry/government working group.
Successful EPC schemes in two Member States: An eceee case study (Requires a login)	ECEEE	2009	Comparison on the structure and implementation of certification schemes in Portugal and Ireland.
Implementation of Energy Performance Certificates in the Domestic Sector	Nick Banks, UK Energy Research Centre	May 2008	Assessment of the UK's Energy Performance Certificate scheme applying to the residential property. Examined how the schemes had been implemented and made recommendations about improving the scheme.

Documents assessing impact of building energy ratings on building valuations

Title	Author	Date	Description
An Economic Perspective on Building Labeling Policies	Robert Stavins, Todd Schatzki, and Johnathan Borck	March 2013	Assessed mandatory building labeling policies to determine the potential impacts and benefits as well as the economic costs of such programs.
The Value of Green Labels in the California Housing Market	Nils Kok and Matthew Kahn	2012	Systematic evidence that "green" or "sustainable" homes affect consumer choice and earn a price premium in the U.S. market.
A Market Evaluation of Colorado's High-Performance Commercial Buildings	Stephanie Gripne, J.C. Martel, and Brian Lewandowski	2012	A survey and index were developed to assess the financial benefits from high performance commercial buildings, as well as the real estate's perspective on public policies, programs and market mechanisms.
The Value of Domestic Building Efficiency – Evidence From Ireland	Marie Hyland, Ronan C. Lyons, and Sean Lyons	June 2012	Analyzed the effect of energy efficiency ratings on the sale and rental prices of properties in Ireland.

The Impact of energy labels and accessibility on office rents	Nils Kok and Maarten Jennen	2012	Evaluated the financial implications of energy efficiency and sustainability in the market for commercial real estate.
Who Rents Green? Ecological Responsiveness and Corporate Real Estate	P. Eicholtz, N. Kok, J. Quigley	2012	How the decision of 11,000 commercial tenants reflected the value of greener, more energy-efficient office spaces.
Green Noise or Green Value? Measuring the Effects of Environmental Certification on Office Values	Franz Fuerst and Patrick McAllister in Real Estate Economics V39 1	2011	Study evaluated price effects of environmental certification on commercial real estate assets. Study assessed 197 LEED and 834 Energy Star buildings in the US and analyzed effect of certification on both rent and price.
Sustainability and Property Valuation – Systematisation of existing approaches and recommendations for future action	David Lorenz and Thomas Lutzkendorf	2011	Presents an overview of research undertaken to integrate sustainability considerations into the property valuation process. Suggests changes that are needed to improve valuation input parameters and analyses.
Capturing Sustainability-related information for property valuation	David Lorenz and Thomas Lutzkendorf	2011	Proposes a structure for information to enable valuation professionals to reach an improved and more systematic description of buildings for valuation purposes.
Building Better Returns: A Study of the Financial Performance of Green Office Buildings in Australia	Graeme Newell, John MacFarlane, and Nils Kok	Sept. 2011	Analyzed the financial performance buildings of green office buildings in Australia using NABERS and Green Start rating schemes. Assessed impact based on rent, price, outgoings, yield, and occupancy rate premiums.
The Value of Energy Labels in the European Office Market	Nils Kok and Maarten Jennen	May 2011	Analyzed 1,100 leasing transactions in commercial real estate in Europe to determine impacts on rents for more efficient buildings.
Green Cities 2011: Introducing the PCA/IPD Green Investment Index	IPD Australia	2011	Summary research on the asset value differential among sustainable office properties in Australia.
On the Economics of the EU Energy Label in the Housing Market	Dirk Brounen and Nils Kok, RICS	June 2010	Study based on data from the Netherlands to assess the market adoption and financial impact of energy performance certifications in residential units.
Is Sustainability Reflected in Commercial Property Prices: An analysis of the evidence base	S. Sayce, S. Sundberg, and B. Clements	2010	A summary of research and reports on the link between value and sustainability of commercial real estate in the U.K.

Green design and the market for commercial office space *(not free)*	J. Wiley and J. Benefield	2010	An economic analysis of the increased asset value of Energy Star- and LEED-certified Class A office buildings in the U.S.
Investment returns from responsible property investments	G. Pivo and J. Fisher	2010	Analyzing the financial performance on 1,199 Energy Star-certified office properties across the U.S.
New Evidence on the Green Building Rent and Price Premium	Franz Fuerst and Patrick McAllister	April 2009	Investigated the effect of voluntary certification on the rental and sales prices of US commercial properties. Assessed both LEED and Energy Start properties.
How Risky are Sustainable Real Estate Projects?	J. Jackson	2009	An assessment fo the relative investment risk factors proposed by LEED- and Energy Star-certified buildings.
Doing Well by Doing Good? Green Office Buildings	P. Eicholtz and N. Kok	2009	An economic analysis of the increased asset value of 694 Energy Star- and LEED-certified office buildings in various U.S. urban markets.
Energy Efficiency Rating and House Price in the ACT	Australian Government, Dept of the Environment	2008	Modeled the relationship of energy efficiency attributes compared to house prices in residential properties in the Australian Capital Territory in 2005 and 2006.