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Errata

To: *Recipients of TR-728-RER/BOMA, Improving the Energy Performance of Buildings: Learning from the European Union and Australia*

From: RAND Corporation Publications Department

Date: November 2009

Re: Corrected pages (pp. 7, 19, and 22)

The authors identified errors in the originally published document:

- On p. 7, a bulleted list item read “Energy audits in big industrial insulations.” This has been corrected to “Energy audits in big industrial installations.”
- On p. 19, in the first paragraph, the ENERGY STAR system for buildings was incorrectly identified as being a program of the U.S. Department of Defense. The paragraph has been corrected to read “the EPA’s ENERGY STAR system for buildings.”
- On p. 22, in the third paragraph, “the Department of Energy’s ENERGY STAR appliance rating program” has been revised to “the EPA’s and Department of Energy’s ENERGY STAR appliance rating program.”

The posted document has been corrected. These errors do not affect the authors’ analysis or conclusions.

European Approaches

Early Approaches

Early European energy security efforts focused on increasing Europe's energy supply, not on moderating demand for energy (David, 2007). After Denmark joined the European Economic Community¹ in 1973, this focus began to change. Denmark brought with it a different set of ideas based on an energy policy of controlling demand (David, 2007). Prior to its first rotation as President of the Council of Ministers, Denmark began advocating a demand-based approach to European energy policy.

The first fruit of this approach was a proposal for a directive on a system for energy audits of EU buildings in 1987 (David, 2007). The proposal did not receive widespread support. It did, however, lead to the Specific Actions for Vigorous Energy Efficiency (SAVE) directive two years later, in 1989. This directive marked the beginning of a new era in which the European Commission was interested not only in energy policy but also in environmental policy (David, 2007). The version of SAVE finally implemented in 1993 introduced six ideas relevant to the buildings sector which would later become part of the EPBD:

- Energy certification of buildings
- Separate billing for heating, hot water, and air-conditioning, based on actual consumption
- Third-party financing for energy savings in the public sector
- The need for thermal insulation of buildings
- Inspection of boilers
- Energy audits in big industrial installations.

As concern over climate change and greenhouse-gas emissions mounted, the EU made a commitment at the United Nations Framework Convention on Climate Change in Kyoto to reduce its emissions of carbon dioxide by 8 percent from a 1990 baseline by 2010. This commitment sparked discussion over how Europe would meet its obligation, resulting in the Action Plan to Improve Energy Efficiency in the European Community, which was adopted in 2000 (a revised version was issued in 2006). The plan proposed reinforcing existing energy programs and implementing new ones. It suggested that a 1 percent reduction in energy use per year was possible (Commission of the European Communities, 2000).

¹ Pursuant to treaty changes, the institution was later renamed the European Community and now is the EU.

Key Issues in Buildings Energy Efficiency Programs

As we have seen, the EU and Australia have instituted significant new public policies to promote energy efficiency in the “built environment.” Many of these public policies were motivated by the same concerns that led to the pioneering voluntary initiatives of Green Building Councils (especially the LEED design certification program) and the EPA’s ENERGY STAR system for buildings.

However, policy initiatives on both continents are relatively new, have been recently modified, and are yet to be finalized. Further, in both Europe and Australia, there is wide variety in the transposition of the general approach at the national-government level (in the EU) or in state-level initiatives (in Australia). There has been little objective, peer-reviewed research to date on the effects of various approaches on energy efficiency.

Despite the diversity of detail, energy efficiency policy initiatives in Europe and Australia have been assembled from common building blocks:

- Building codes
- Energy design or use certificates
- Special minimum rating requirements or display obligations for public buildings
- Benchmarks or grading systems
- Qualified inspectors, including quality-assurance programs and standardized energy modeling software
- Incentives (including certificate trading systems).

Building Codes

Discussion

Building codes are effective in bringing about energy efficiency gains. They define standards that must be met in new building construction or major renovation, they are enforced consistently within jurisdictions, and they can set very specific minimum thermal efficiency standards for building envelopes; for heating, ventilating, and air-conditioning (HVAC); for boiler systems; or for other variables that make a difference in the energy efficiency of buildings.

Tightened building codes are generally considered responsible for significant improvements in the energy performance of buildings throughout the developed world between 1980 and 2000. For example, until Greece adopted a national building code based on Germany’s

of inadequate information, they also help market participants understand what the compiled information on energy design or use means in a broader context. The latter is the role of ratings, or benchmarks. The EU allows member states to decide whether the EPC required by the EPBD for building transactions involving more than 1,000 sq m of space is based on design or operational criteria.

The first design rating scheme in Europe was the UK's Building Research Establishment Environmental Assessment Method (BREEAM), which was launched in 1990. It was a voluntary program used primarily in the office sector, but many government projects now require a minimum BREEAM rating.⁸ More than half of the property investors surveyed in 2008 and 2007 reported that they consider BREEAM ratings "important" for investment decisions (GVA Grimley, 2008).

In the United States, a voluntary asset (design) rating system (the LEED system) was developed by the U.S. Green Building Council, and a voluntary operational ratings system was created by extension of the EPA's and Department of Energy's ENERGY STAR appliance rating program to office and residential buildings. Both are based on comparative benchmarks (LEED's platinum, gold, and silver certifications and ENERGY STAR ratings).

Europe and Australia now make wide use of both asset and operational ratings and, in various combinations, have made them mandatory for certain transactions.⁹ As with building codes, however, each country (and in some cases, each subnational jurisdiction) has selected its own benchmarking levels for ratings.

Both asset and operational ratings have advantages and disadvantages. An asset rating with benchmarks by building type facilitates building-to-building comparisons within the scope of a particular national or subnational scheme. An asset rating also emphasizes the energy efficiency *potential* of the building being rated. The best asset rating programs encourage design innovation to reach the highest energy rating at the lowest cost. Asset ratings based on design also sidestep the split-incentive problem in multitenant buildings, where building owners do not reap the economic benefits of energy cost savings when energy costs are paid by tenants. With a good asset rating, the owner should be able to recoup efficiency investments through higher rentals.¹⁰

The main disadvantages of asset ratings are that they can give a false impression of a building's actual energy performance and discourage making improvements in older buildings. It is well documented that most buildings' actual energy consumption tends to be considerably more than the consumption projected by the design rating, which is based on ideal management techniques. In some cases, the discrepancy is accounted for by tenant behavior or changes in use (e.g., addition of a data center in an office building). In other cases, the builder may not have completely followed the design. Another disadvantage of reliance on design ratings is that many older buildings cannot ever hope to qualify for top rankings, because of basic design characteristics. Under asset design ratings, owners of older buildings may be dis-

⁸ Email exchange with UK energy consultant, June 27, 2009.

⁹ As noted earlier, CEN, the EU's standards body, developed definitions for asset and operational ratings in European Standard EN 15603. The Australian rating scheme is NABERS.

¹⁰ One expert we interviewed suggested that only in those office sectors that are highly sensitive to reputation are higher ratings reliably translated into higher rents. In the retail sector, all that matters are "location and footfall" (interview with British trade association official, March 24, 2009). As noted below, the only econometric studies of the value of ratings thus far have been conducted in the office and residential real-estate markets.