



Sustainability Measured: Gauging the Energy Efficiency of European Warehouses

By Simon Cox and Lisa Graham

Overview

Until recently, prospective European buyers or lessees had no way to assess the energy efficiency of warehouses that they were interested in occupying. But by 2006, most EU member states had implemented the European Energy Performance for Buildings Directive (EPBD) that requires compulsory energy ratings for residential, commercial and public buildings in an effort to reduce greenhouse gas emissions. Today, throughout Europe, supply chain professionals have come to regard sustainable or “green” warehouses as a “best practice” within their industry.

The EPBD established minimum compliance standards for energy consumption in all buildings — standards which vary by type of building as well as by country. Additionally, the EPBD developed a common methodology for how to calibrate the integrated energy performances of existing and new buildings. Based on the results of these calculations, each building is awarded an Energy Performance Certificate (EPC) that indicates how the building’s energy performance compares to the minimum standards incorporated into the appropriate baseline.

Going forward, companies operating in Europe can use the building EPCs to guide them in choosing the most energy efficient buildings and also in managing their carbon footprints. These are two concrete measures that European corporations can take to fulfill the EU’s obligations under the EPBD and under the Kyoto Protocol. Moreover, the potential cost savings created through sustainable building features can be substantial, amounting to as much as £230,000-to-335,000 a year in the UK.

European Energy Performance for Buildings Directive (EPBD)

Legislation continues to drive change toward the use of sustainable properties with smaller carbon footprints. Within the Kyoto Protocol, the EU agreed to reduce its greenhouse gas emissions by 8% from the 1990 emission

levels. Europe’s buildings account for about 40% of its total energy consumption, so they will have to play a prominent role in any plan designed to reduce greenhouse gases and fulfill the Kyoto objective.

Toward this end, the EU adopted directive 2002/91/EC — the so-called European Energy Performance for Buildings Directive (EPBD) — requiring property owners to obtain certifications of the energy performances of their buildings:

“Member States shall ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available to the owner or by the owner to the prospective buyer or tenant, as the case might be. The validity of the certificate shall not exceed 10 years... The energy performance certificate for buildings shall include reference values such as current legal standards and benchmarks in order to make it possible for consumers to compare and assess the energy performance of the building. The certificate shall be accompanied by recommendations for the cost-efficient improvement of the energy performance.”

Sustainability and Energy Savings

Surveys and case studies have provided some insight into the energy savings and reduced carbon footprints associated with sustainable development technology. Initiatives specific to the logistics property sector have targeted the two biggest sources of energy consumption and waste in operating European warehouse facilities — electricity and gas. Sustainable solutions that address lighting, air tightness and thermal insulation are designed to yield significant reductions in energy consumption in warehouse operations.

In the case of lighting, for example, the use of non-sustainable technologies and practices can end up increasing a warehouse’s annual electricity consumption for lighting by as much as 70%. Reliance on natural lighting, instal-



lation of daylight intensity and motion sensors, and high efficient lighting can save between 30-70% on electricity consumption for lighting. Simply changing the light bulbs to the same florescent lights used for decades in office buildings can reduce electricity consumption for lighting by as much as 40%.

Measuring the cost savings created through air tightness and thermal insulation is more difficult to quantify. We know of no studies that have attempted to quantify these benefits. Surely, however, a warehouse will require much less energy, especially in a cold climate, to maintain a comfortable indoor temperature if the dock doors are insulated and kept unexposed to outdoor weather conditions, as trucks back into and then retreat from the dock doors.

Energy Performance Certificates (EPCs)

Energy Performance Certificates (EPCs), as stipulated under the EPBD, are designed to measure a building’s estimated energy usage. The EPBD’s measurement standards employ an integrated approach that takes into account all aspects of a building that impact its energy efficiency. However, those sustainability practices used in the construction of the building and in its site design are more difficult to measure and therefore not included in the EPC calculations. As mentioned above, building features such as natural lighting, daylight intensity and movement sensors, high efficiency lighting, air tightness and thermal insulation together can produce the most significant short and long-term savings in energy consumption and operating costs.

Across Europe, the EPBD’s measurement standards have had to vary in response to the climate differences. In the UK, warehouses are typically not heated so there is a higher reliance on air tightness and thermal insulation. In Southern Europe where warehouses run the risk of overheating during summer months, natural light enters through windows placed on either roof slants or north-facing walls.

Owing to these climactic differences, the EPBD has given each member country the responsibility to establish its own EPC minimum standards against which each building is to be rated. This “baseline” building represents a warehouse that is constructed to meet (a) all of the local planning codes and (b) the minimum sustainability standards established by each member state. Any existing or new warehouses for sale or rent are assessed against this baseline using the country-specific EPC measurement standards. Hence, for a given building, the EPC rating

indicates the potential energy savings or excess usage relative to the baseline.

Under the EPBD, EPCs must be made available when buildings are constructed, sold or rented. Prospective lessees or buyers in any EU member state can, and should, ask for the EPC ratings on the buildings that are under consideration.

Using the 71 ProLogis-owned buildings with EPC-ratings, we were able to determine the weighted average improvements in warehouse energy efficiency relative to the country-specific baselines. (See table.) The percentages in column 3 of the table represent the average reductions in annual carbon emissions generated by the pool of ProLogis-owned properties in each country. For example, the EPC rating for one of the 17 UK buildings included in the table — a 37,353 square metre (m²) warehouse located in Kettering — indicates that it emits 54% fewer metric tonnes of CO₂ than the UK’s baseline or minimum standards for a newly constructed building — i.e., 298.82 metric tonnes of CO₂/annum versus the UK’s baseline of 646.21 metric tonnes.

Reductions in Annual Carbon Emissions from EPC-Rated Distribution Facilities*

Country	Buildings with EPC-Rating	Weighted Avg. Reductions in Carbon Emissions
Germany	34	41.7%
Hungary	5	34.8%
Poland	11	34.3%
Slovakia	4	58.5%
United Kingdom	17	39.5%

**ProLogis-owned facilities; reductions in emissions, calculated based on country-specific baselines.*

Source: ProLogis

EPCs and Operating Cost Savings

The fundamental reason why buildings with high EPC-ratings generate fewer carbon emissions is simply because, by design, they consume less energy than the lower-rated baselines. In turn, any savings in energy consumption translate directly into operating cost savings. Consider, for example, the same building cited above — the 37,353 m² UK building located in Kettering. According to its EPC rating, this building consumes 47% less energy than the UK’s baseline or minimum standard for a newly constructed building — i.e., 22.62 kWh/m²/annum [i.e., kilowatt hours



per square metre per year] versus the baseline of 43.08 kWh/m²/annum.

The net cost savings associated with this EPC rating in the UK will vary depending on the tenant's purchase price of energy. Based on prices of gas at 6.6 pence per kWh and of electricity at 9-to-12.5 pence per kWh, the expected annual operating cost savings would be £70,000-to-100,000 compared to the baseline for a newly built warehouse. However, when compared to warehouses built prior to 1995, the annual operating cost savings then increase to £230,000-to-335,000.

It is important to note that the operating cost savings associated with each country's EPC will vary based on the wide range of sustainable building features that are incorporated into each one's baseline and also on the differences in type and cost of energy sources available in each country.

Old versus New

While sustainable building features or technology are more easily incorporated during the construction phase, they also can be applied to existing warehouses. In fact, some property owners in Europe have begun to retrofit their warehouse facilities to incorporate various measures that enhance energy efficiency.

Using the EPCs, occupiers can compare the potential cost savings between an existing standard warehouse, an upgraded existing standard building and a brand new building. Other considerations include location and building use. Depending on market conditions, rental incentives can be more generous on an existing vacant warehouse than on a new or built-to-suit property. However, in some countries, occupiers of newly constructed "green" ware-

houses have been known to benefit from tax breaks and "fast-track" permitting processes.

For occupiers considering long-term leases, green warehouses typically incorporate the latest design principles so depreciation and obsolescence should have less of an impact than might be the case in a standard building. Traditional property appraisal methods across Europe do not yet recognize or incorporate sustainable technology into their valuation calculations. However, given that tenants or buyers are becoming increasingly concerned about the energy efficiency of buildings that they are considering occupying, it follows that this attribute should be considered in property evaluations.

Concluding Remarks

Arguably, the most tangible benefit of building specific sustainable technology is energy efficiency which translates into operating cost savings for occupiers. The EPC ratings provide a common tool for measuring and comparing energy efficiencies between buildings across Europe. And these country-specific ratings can also be used to estimate the amount of operating cost savings stemming from these efficiencies.

"Green" buildings are coming to be regarded as a best practice within the supply chain industry — and thus within Europe's logistics property sectors. These buildings have redefined "modern" investment-grade warehouses across Europe. The EPC rating system is also designed to educate occupiers so that they will increasingly choose to operate their businesses in energy efficient warehouses. While up to now, legislation has driven change for more sustainable properties, occupiers are now able to understand the real benefits of choosing "green," and it is this knowledge that will fuel change in the decision matrix going forward.

The Next Phase: Corporate Responsibility and Carbon Footprints

In board rooms and corporate executive offices, the term "sustainability" is quickly being replaced by "corporate responsibility". Beyond operating cost considerations, the occupation of property that is sensitive to the concept of sustainable development provides an ideal and tangible vehicle through which a company can exhibit its support of corporate responsibility. The benefits include improved reputation, brand loyalty and recognition — all leading ultimately to greater profitability.

By law, the EPC ratings that measure carbon emission savings must be made available to occupiers. Using these EPCs, corporations can demonstrate how energy efficient their business and distributions systems are run. EPCs provide a quantifiable illustration of a company's corporate responsibility.

Much of the occupier market is currently in its infancy regarding use of sustainable warehouses. However, given the EU's long-term objectives of reducing greenhouse gases, occupiers will be under increasing pressure to choose green warehouses. Looking ahead, corporate image and responsibility soon will be as much a priority as reducing operating costs.



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