

# The Investment Value of Sustainable Building Design

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**ABSTRACT:** The investment market and its economic rationale establish a reality that needs to be considered when assessing the context for sustainable building design (SBD) within commercial property markets. Investment decisions are always made on the basis of return maximisation and the minimisation of risks. Following this rationale, why should institutional investors consider SBD for their income producing properties? The objective of this paper is to present an analytical approach by means of which the likely impacts of SBD for income producing properties are assessed.

**Keywords:** Sustainable Building Design, Investment Value, Investment Risks

## 1. INTRODUCTION

The property development activity lies at the heart of the creation of the built environment being, thus, responsible for the shape of the modern city. The 'industry' is a major sector in any economy, but it also has great impact on the consumption of energy and natural resources. Consequentially, there is a need to shift the industry towards a new relation between economy and environment, based on the concept of sustainable development.

The majority of the studies regarding sustainability have focused on the implementation of sustainable principles and the benefits -environmental and social- of this undertaking, as well as on the benefits building occupiers might get from more efficient or environmentally friendly buildings. Furthermore, most business cases regarding cost effectiveness of SBD fall under the *built-to-suit* scenario, not comparable to the normal state and expectations of speculative commercial developments (*built-to-sell* or *built-to-hold*).

Little work has been undertaken, however, to determine why key market actors -like investors in commercial property- should consider SBD for their

income producing properties. Therefore, the objective of the present paper is to present an analytical framework by which the contribution of SBD to the property's investment value is assessed.

The paper focuses on the UK's property market and particularly the city of London, concentrating the analysis on the office sector.

## 3. PROPERTY INVESTMENT MARKET

There is misleading information on the relative importance of the investment market in the UK, in terms of size and value. According to Palmer and Robinson [1], around 55% of the commercial stock in the UK is investment property, with the remainder being owner occupied, predominantly by private companies. Ghanbari and Akhavan [2] suggest that only 10% of commercial buildings are owned by the occupier. Callender and Key [3] estimate that around 45% -by value- of the UK commercial and industrial property stock may be held by investors, of which about 24% is held by UK institutions.

Due to the particular nature of property, in terms of complexity and affordability, the major direct investors are financial

institutions. Again, there is misleading information on the share of the market institutional investors comprise. Ghanbari and Akhavan [2] suggest that investors *“currently own the largest proportion of commercial urban property in Britain.”* In the case of the city of London, research has shown that around 92% of the office stock (core and fringe) is owned by FIRE companies (Finance, Insurance and Real Estate) [4]. In terms of occupation, almost 60% is actually occupied by FIREs. Even more interesting, the study suggests that owner occupation makes just 13% of the stock. In addition, experts agree that those properties held by institutional investors are usually the best quality ‘prime’ property.

It is from this position that investment institutions exert an enormous influence on the property market as a whole. In other words, the overwhelming influence of institutional investors affects the kind of development that is undertaken and the way in which it is carried out. And since investment institutions operate under a balancing act between risk and returns, the supply of new property to the market is customized to the institutional requirements in terms of the performance that investment properties are expected to offer and the risks they represent.

### 3.1 Economic Rationale

Following the motivations and expectations of property investors, income producing properties are usually built or acquired with the prospect of a steady and reliable return on investment. In this sense an individual investment property represents a stock for the owner, in other words a financial asset. Therefore, it should be stressed that within a rational investment market, property represents just one vehicle of investment among a range of opportunities. For that reason the commercial property market is driven by the opportunity cost of the capital invested. This is an underlying principle that needs to be understood to comprehend how the

provision of resources is allocated, first across the various investment vehicles that are available in the market, and then within the property market itself.

The capital market rationale implies, for example, that the development of buildings does not only occur as a reaction to user demand. Furthermore, development will only take place if the profit criteria of the different actors and capital involved are met [5]. Thus, the capital market requires buildings to be produced at a profit and to perform. In other words, to deliver returns on investment. This is a fact that needs to be taken into account when evaluating the consideration of SBD within the industry.

### 3.2 Questions of Value

Properties may embody a variety of values depending on the perspective from which those values are being assessed, i.e. investor, developer, occupier, etc. For instance, investment value does not necessarily equate to market value, nor does it to development costs. In fact, market value might diverge from investment value, allowing astute investors to exploit such ‘market inefficiencies’[6].

The market value on one hand is the actual observable exchange price in the open market and it would usually be the outcome of a valuation. This value is created by the interplay of market forces, namely the supply and demand for similar properties -in terms of location and quality- determining market price [7]. The investment value on the other hand, is the net monetary worth of a specific investment opportunity to a specific investor at a stated date, and it will usually be the outcome of an investment appraisal or calculation of worth. It is based on investor’s specific inputs, which may differ to a great extent from market consensus.

Therefore, from the perspective of this paper, more relevant than reflecting the benefits of sustainability on the property’s market value is the realization, on behalf of investors, of the investment potential of

SBD. In other words, and following the capital market rationale, the benefits of sustainable properties need to become visible to investors in terms of returns and risks, based on their future income flows and their variability.

#### 4. RISK OR UNCERTAINTY?

Investors strive to avoid and diminish uncertainties related to buying, selling and developing commercial properties. The lack of information and data regarding the influence of SBD on property's economic performance creates conditions of uncertainty that deter investors from considering it for income properties.

As mentioned before, investors commit resources today with the expectation of future return. But, as future outcomes depend heavily on uncontrolled events, actual rates of return could diverge from the expected rates of return. Therefore, it is argued that all investment decisions usually contain a certain degree of risk. When talking about expected future outcomes and events that could affect returns, there is an intrinsic tendency to emphasize the question of 'possibility'. According to French and French [8], *"Risk is therefore the same as probability in this situation, and risk assessment is therefore the same as probability evaluation"*. Hargitay and Yu [9] concur with this and argue that risk can be defined and quantified *"as the amount of potential variability of future rate of return about its mean or expected value."* However, before establishing the foundations for a risk sensitive investment appraisal model, it is necessary to clarify if the risks associated with the decision to invest in SBD are quantifiable.

There are two interrelated considerations regarding the issue of sustainability in relation to its impact on the variability of outcomes. (1) The availability of historical market data and (2) the extent to which the 'sustainability case', following the spectrum

of uncertainty [9], can rationally be defined as risky, as opposed to uncertain, through the construction of meaningful probability distributions. The extent to which the decision of considering SBD could be described as "risky" instead of "uncertain", will shape the way in which to treat this issue in an investment appraisal model.

In the case of sustainable properties there is not sufficient information available regarding their economical performance. However, it is not always necessary to have large and complete data sets from empirical sources to undertake a risk analysis. Furthermore, as historical market data does not exist, it is not possible to use a conventional investment appraisal method. Moreover, two arguments call for the utilisation of a different approach. (1) Evidence from the literature suggests that normative models of decision-making are common in the property market, but they are rarely put into practice [10]. In other words, the final decision is often affected by a decision-maker's value judgment. (2) The high dependency on historical trends neglects the ability to anticipate changes in market conditions, as well as occupier and investor requirements. Therefore, an approach that employs a normative model as guidance but that allows for the accountancy of value judgment is required.

Thus, as in this case probabilities cannot be assessed objectively, the attempt is to use expert opinion as risk estimates, expressed as subjective probability distributions. Probability distributions can be constructed on the basis of assumptions and expectations elicited from 'market' experts.

#### 5. INVESTMENT APPRAISAL MODEL

With the purpose of evaluating and comparing the risk-return balance of different investment alternatives whilst considering the potential benefits of a Sustainable office building in relation to other 'building products', i.e. Conventional

and Energy-Efficient office building, a hypothetical business case has been formulated together with a questionnaire that collects the views of experts on specific variables that affect investment values. The three building alternatives that are marketed accordingly are defined in Table 1.

| Building Option                   | Definition                                                                                                                                                                       |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard Office Building          | Standard prime quality office building, usually air-conditioned, that meets the basic Energy Performance Requirements of new Part L document (April 2006).                       |
| Energy-Efficient Office Building  | Prime quality office building that exceeds the basic Energy Performance Requirements (new Part L) achieving a high rank in the upcoming Energy Performance Certification scheme. |
| Sustainable/Green Office Building | Prime quality office building that goes beyond Energy Performance Requirements by achieving the BREEAM Office Certificate for its overall environmental performance.             |

**Table 1:** Building options and definitions

In this case, estimates for the main variables that affect risk and return will represent a quantification of the subjective views and perceptions of key market players. This requires the expert's forecast of variables which are explicitly considered in the model. This are: (1) expected rental value, (2) rental growth, (3) vacancy rate, (4) target rate of return and (5) terminal capitalisation rate. The data feeds an investment appraisal model based on a discounted cash flow approach, whereby holding periods of 5 and 10 years are tested.

Participants were asked for a range of possible values (low to high) -as opposed to conventional single values- for each variable, which allows the undertaking of a probability analysis. From those data points and the associated likelihood of occurrence, a probability distribution can be constructed, first for the variables in question, and then for the investment problem as a whole.

With the purpose of simplifying the collection of data, triangular distributions were used and figures for the variables of the Standard office case were specified from the start to facilitate comparisons. The triangular distributions were drawn from the range of low and high values given by the experts for each variable, while 'most

likely' values, were assumed to be the mean between low and high values.

In order to implement the probability analysis a Monte Carlo approach was used. The process involves the substitution of single point values by randomly selected figures from the distributions. After an appropriate number of iterations, 10.000 in this case, the simulations result in mean figures for Present Values (PVs) of future cash flows and their associated probability distributions. (Spreadsheets and graphics are not shown due to space constrains).

| Case 1                   |          |        |             |
|--------------------------|----------|--------|-------------|
| 5 years                  | Standard | EE     | Sustainable |
| Number of Inputs         | 1        | 4      | 4           |
| Mean                     | 40,099   | 38,464 | 38,465      |
| Standard Deviation       | 0,941    | 3,302  | 3,283       |
| Coefficient of Variation | 0,023    | 0,085  | 0,085       |
| 10 years                 | Standard | EE     | Sustainable |
| Number of Inputs         | 3        | 6      | 6           |
| Mean                     | 49,076   | 45,387 | 45,322      |
| Standard Deviation       | 1,757    | 3,495  | 3,528       |
| Coefficient of Variation | 0,035    | 0,077  | 0,077       |

**Table 2:** Simulation results for case 1

Case 1 shows a negative impact on the PVs when considering energy efficiency or sustainability for both scenarios, 5 and 10 years holding periods. The risks associated are also much higher, showing no benefits.

| Case 2                   |          |        |             |
|--------------------------|----------|--------|-------------|
| 5 years                  | Standard | EE     | Sustainable |
| Number of Inputs         | 1        | 2      | 2           |
| Mean                     | 47,485   | 44,747 | 46,343      |
| Standard Deviation       | 1,376    | 2,146  | 2,820       |
| Coefficient of Variation | 0,028    | 0,047  | 0,060       |
| 10 years                 | Standard | EE     | Sustainable |
| Number of Inputs         | 3        | 4      | 4           |
| Mean                     | 47,904   | 49,580 | 56,430      |
| Standard Deviation       | 2,166    | 3,708  | 6,342       |
| Coefficient of Variation | 0,045    | 0,074  | 0,112       |

**Table 3:** Simulation results for case 2

In case 2, there is no difference in the 5 years scenario, whereas there is a 3,5% and 17,8% increase in PVs for the EE and Sustainable alternative respectively in the 10 years scenario. There is also a 65% probability that the EE option achieves the mean value of the Standard case, whereas the Sustainable option has an 85%.

| Case 3                   |          |        |             |
|--------------------------|----------|--------|-------------|
| 5 years                  | Standard | EE     | Sustainable |
| Number of Inputs         | 1        | 3      | 3           |
| Mean                     | 50,098   | 56,990 | 56,803      |
| Standard Deviation       | 0,812    | 1,734  | 1,734       |
| Coefficient of Variation | 0,016    | 0,030  | 0,030       |
| 10 years                 | Standard | EE     | Sustainable |
| Number of Inputs         | 2        | 4      | 4           |
| Mean                     | 56,694   | 63,652 | 65,162      |
| Standard Deviation       | 0,830    | 1,867  | 1,768       |
| Coefficient of Variation | 0,014    | 0,029  | 0,027       |

**Table 4:** Simulation results for case 3

In this case, for the 5 years holding period scenario, there are benefits -13,8% increase- with respect to the standard option, although there is no difference between the EE and the Sustainable option. There is a 100% probability that the EE and the Sustainable option achieve the mean value of the Standard case. In the 10 years scenario there is a 12,3% and 15% increase in PVs for the EE and Sustainable alternative respectively. There is also a 100% probability that the EE and the Sustainable option achieve the mean value for the Standard case.

| Case 4                   |          |        |             |
|--------------------------|----------|--------|-------------|
| 5 years                  | Standard | EE     | Sustainable |
| Number of Inputs         | 1        | 4      | 4           |
| Mean (PV)                | 53,582   | 69,381 | 72,178      |
| Standard Deviation       | 2,519    | 9,605  | 9,951       |
| Coefficient of Variation | 0,047    | 0,138  | 0,137       |
| 10 years                 | Standard | EE     | Sustainable |
| Number of Inputs         | 3        | 6      | 6           |
| Mean (PV)                | 64,864   | 82,217 | 85,385      |
| Standard Deviation       | 5,195    | 12,404 | 12,831      |
| Coefficient of Variation | 0,080    | 0,150  | 0,150       |

**Table 5:** Simulation results for case 4

In case 4, for the 5 years scenario, the EE and Sustainable option show and increase of 29,5% and 34,7% respectively. The variability is very high, however in both cases there is a 95% probability of achieving the mean value of the Standard option. For the 10 years scenario, the benefits of the EE and Sustainable option increase a 26,8% and 31,6% respectively. Although the risks appear much higher, the EE option has 90% probability of achieving the mean value of the Standard option, whilst the Sustainable option has a 95% chance.

| Case 5                   |          |        |             |
|--------------------------|----------|--------|-------------|
| 5 years                  | Standard | EE     | Sustainable |
| Number of Inputs         | 1        | 1      | 1           |
| Mean                     | 43,723   | 43,691 | 43,709      |
| Standard Deviation       | 1,260    | 1,260  | 1,257       |
| Coefficient of Variation | 0,028    | 0,028  | 0,028       |
| 10 years                 | Standard | EE     | Sustainable |
| Number of Inputs         | 1        | 1      | 1           |
| Mean                     | 40,453   | 42,600 | 42,590      |
| Standard Deviation       | 0,716    | 0,803  | 0,802       |
| Coefficient of Variation | 0,017    | 0,018  | 0,018       |

**Table 6:** Simulation results for case 5

In the 5 years scenario there is no difference among the alternatives. In the 10 years scenario, there are benefits -5,3% increase- with respect to the standard option, although there is no difference between the EE and the Sustainable option. There is a 55% probability that the EE and the Sustainable option achieve the mean value of the Standard case.

| Case 6                   |          |        |             |
|--------------------------|----------|--------|-------------|
| 5 years                  | Standard | EE     | Sustainable |
| Number of Inputs         | 1        | 2      | 2           |
| Mean                     | 53,677   | 53,773 | 53,814      |
| Standard Deviation       | 3,545    | 4,819  | 4,759       |
| Coefficient of Variation | 0,066    | 0,089  | 0,088       |
| 10 years                 | Standard | EE     | Sustainable |
| Number of Inputs         | 3        | 4      | 4           |
| Mean                     | 59,552   | 62,161 | 62,205      |
| Standard Deviation       | 4,088    | 5,823  | 5,825       |
| Coefficient of Variation | 0,068    | 0,093  | 0,093       |

**Table 7:** Simulation results for case 6

Case 6 shows in the 5 years scenario no difference among the alternatives. In the 10 years scenario, there are benefits -4,5% increase- with respect to the Standard option, although there is no difference between the EE and the Sustainable option. There is a 65% probability that the EE and the Sustainable option achieve the mean value of the Standard case.

| Case 7                   |          |        |             |
|--------------------------|----------|--------|-------------|
| 5 years                  | Standard | EE     | Sustainable |
| Number of Inputs         | 0        | 3      | 4           |
| Mean                     | 46,278   | 48,502 | 51,851      |
| Standard Deviation       | 0        | 1,206  | 1,884       |
| Coefficient of Variation | 0        | 0,024  | 0,036       |
| 10 years                 | Standard | EE     | Sustainable |
| Number of Inputs         | 0        | 3      | 6           |
| Mean                     | 54,991   | 62,262 | 67,456      |
| Standard Deviation       | 0        | 2,189  | 2,884       |
| Coefficient of Variation | 0        | 0,035  | 0,042       |

**Table 8:** Simulation results for case 7

In case 7, for the 5 years scenario, the EE and Sustainable option show and increase of 4,8% and 12% respectively. There is a 95% probability that the EE option achieve the mean value of the Standard case, whereas the Sustainable alternative has a 100% probability. In the 10 years scenario, the EE and Sustainable option show and increase of 13,2% and 22,7% respectively. There is a 100% probability that the EE and the Sustainable option achieve the mean value of the Standard case.

## 6. CONCLUSIONS

The UK's property market, and specially London's, is very much influenced by developers and investors, and due to its role as a 'global city' it is subject to far more vigorous market forces than any other European city [11]. This affects what is build and to what design. Thus, the purpose of this study was to analyse the potential contribution of SBD on the investment value of income producing properties.

The results show that for the medium term -5 years scenario- the benefits are not significant (see figure 1).

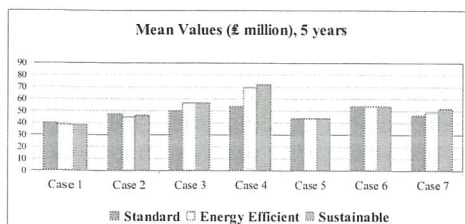


**Figure 1:** PVs for 5 year holding period.

The EE and Sustainable option show an average increase in relation to the Standard option of 6,2% and 8,2% respectively. In the long term -10 years scenario- the benefits become more visible (see figure 2). The EE and Sustainable option show an average increase in relation to the Standard option of 9,2% and 13,65% respectively.

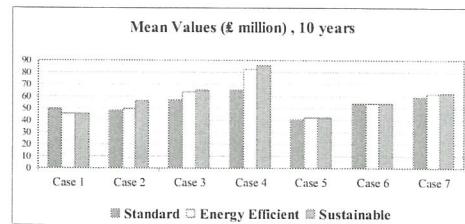


**Figure 2:** PVs for 10 years holding period.

The decision whether the benefits of SBD are high enough to compensate for the risks involved is on the hands of investment manager and alike.

## 7. REFERENCES

- [1] S. Palmer, and B. Robinson, Understanding commercial property investment. Investment Property Forum, 2003.
- [2] A.R. Ghanbari Parsa, and M. Akhavan Farshchi, Environmental regulations and the real estate industry. Property Management 14 (1996) .
- [3] M. Callender, and T. Key, The total value of commercial property in the UK, Cutting Edge Property Research Conference, RICS, 1996.
- [4] C. Lizieri, M. Oughton, and A. Baum, Who Owns the City 2001? The University of Reading, 2001.
- [5] A. MacLaren, (Ed.), Making Space: Property development and urban planning, Edward Arnold, London, 2003.
- [6] N. Hutchison, and N. Nanthakumaran, The calculation of investment worth. Journal of Property Investment & Finance 18 (2000) .
- [7] S. Morley, The financial appraisal of development projects. in: S. Guy, and J. Henneberry, (Eds.), Development & Developers, Blackwell Science, 2002.
- [8] N. French, and S. French, Decision theory and real estate investment. Journal of Property Valuation and Investment 15 (1997).
- [9] S.E. Hargitay, and S.-M. Yu, Property investment decisions: A quantitative approach, E & FN Spon, London, 1993.
- [10] N. French, Decision theory and real estate investment. Managerial and Decision Economics 22 (2001).
- [11] J. van Meel, The European Office, 010 Publishers, Rotterdam, 2000.