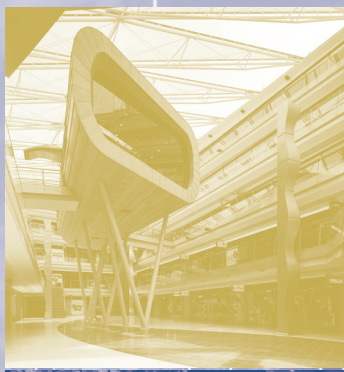
IVBN SCRIPTIEPRIJS 2014



Summary of the IVBN Scriptieprijs

The incorporation of sustainability into the real estate investment portfolio

Luc Baas

IVBN
Vereniging van
Institutionele Beleggers
in Vastgoed Nederland

JURY REPORT

The incorporation of sustainabilityinto the real estate investment portfolio

The thesis and the research on which the paper is based show a very strong scientific structure, founded on a truly enormous quantity of information and literature. The jury has noticed a very strong empirical research, too, very convincing, sophisticated and balanced. However, in its analysis of the literature, the paper might have been slightly more to the point.

The unique feature of this paper is that it surprisingly offers new results and insights, in spite of the enormous amount of research and literature about sustainability, already publiced.. Luc Baas did not just look at the energy label of office buildings but, using the actual consumption of energy, also carried out in-depth research into whether there is a demonstrable link between the sustainability of offices and rent levels. According to the jury this is right out innovation.. It is a pity that in Luc's paper the concept of sustainability is restricted to mere energy consumption of energy, nevertheless his approach provides investors with a very good insight into the extent to which investing in sustainability actually pays. Not at least because this paper also investigates twhat proportion of the value of the energy savings the tenant is willing to hand over to the investor.

Luc Baas arrives at very well thought-out, well-founded and plausible calculations for the rent for energy-efficient office buildings. Given the pressure of excess capacity on current office rents, this is exciting. The underlying research data were subjected to lucid and high-quality statistical analysis and translated into a very workable energy performance measurement methodology.

It does remain somewhat strange though that, in the statistic estimation of the effects on returns, Luc abstract s from effects on indirect returns because, according to him, they are so volatile. According to the yury, it might well be the case that sustainability actually has a damping effect on indirect returns, through a variety of influences. We would have appreciated this being demonstrated.

At the end of his thesis, which is very useful from an operational point of view, Luc points out, in a very well-founded manner, that the effect of sustainability should not be exaggerated. He argues that 85% of the total expenses of an office-based company are salary costs, 10% are rent costs and less than 1% are energy costs. One option might thus be to focus on the productivity of the 85% non-sustainability factors mentioned rather than on the efficiency of that sustainability one percent. This is not only a fair statement by Luc, as may be expected from a researcher, but also a useful contribution to discussions on sustainabilirty efficiency. In conclusion we feel that Luc has pointed at a win-win situation in a very convincing and very thorough manner.

Cor Worms
Voorzitter Jury

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1. INTRODUCTION

Institutional investors are struggling to find the appropriate tools to carry out environmental assessments. Benchmarking performance complies with current demand of real estate investors to evaluate their investment portfolios across the world compared to those of competitors. The first wave of high-performing, green buildings arose as a response to demand for energy and resource efficiency. Times have changed, and strengthened by the arrival of green rating tools, the industry now recognizes that green buildings deliver much more than energy efficiency alone (World Green Building Council, 2013).

Based on research of Nelson & Frankel (2012) there are five crucial drivers that influence the relative sustainable performance or attitude in the real estate market. These are respectively: enhanced operating efficiency, investor criteria, regulatory compliance and incentives, tenant demand, and competitive positioning. The literature provides a baseline towards the added value of green assets while reporting increases of rental prices and asset value.

Consequently, the conversation is now geared around how green buildings deliver on economic priorities such as return on investment and risk mitigation and on social priorities such as CSR-performance and employee productivity. Current knowledge of rating systems or benchmarks does not operationalize data on asset level, and does not provide the investor with the importance of sustainable variables. Especially at asset level it is important to discover which variables are significantly influential on financial performance. Sustainable assets are not likely to perform inferior compared to their inefficient peers, in most cases the green asset performs better. The central question that has been raised throughout the report is as follows:

Does sustainability influence the financial performance of office buildings in the Netherlands?

Could some implementable sustainable features make the difference for an office portfolio to add value? Considering that real estate investment portfolios can be upgraded using benchmark data, the data enables a hedonic pricing model to calculate the additional gains of sustainable properties. Additionally it has been researched if the "green" premium in sustainable offices is less than the projected energy costs. If a tenant is confronted with a rental premium, will the energy savings make up for the difference in price? These outcomes could influence agreements between the investor and occupier, also known as the "split incentive". This report is intended as a triggering message towards the reader to look at the relative position of sustainability in the current real estate market.

2. LITERATURE REVIEW

The most consistent finding across all sustainability studies was the positive effect of Energy Star and LEED certification on rents and values. Although one could comment that the rent and value premiums for LEED and Energy Star may be a result of a bull market, which is indicative of short-term demand in an under-supplied market. Across almost all studies, location was identified as the major predictor affecting value, but there is truthful evidence to suggest there are relationships between sustainability, rents, and values. One could confidently argue that positive externalities and higher returns are indeed expected. Assuming the rationality of investors, the fact that numerous stakeholders undertake the necessary costs and risks to implement sustainability into commercial real estate, indicates one or two outcomes. Either sustainability in real estate is anticipated to be a self-fulfilling prophecy given its high intrinsic value; or it does indeed yield higher returns, which directly justify the investment. The table below indicates the quantitative and qualitative outcomes for an investor which allocates resources into sustainable offices.

Should the degree of sustainability be an asset selection criterion for office buildings?



Drivers	Asset-level	Portfolio-level	Macro-level
Operating efficiency	Reduced operating costs		Hedge against energy pricing
Investor criteria	Capital gain Rent premium Higher or stable occupancy rate	Risk mitigation Capital preservation Marketability	CSR-policy
Regulatory compliance		Hedge against regulations	Dependent on institutional context
Tenant demand	Productivity Eco-labels or ratings	Hedge against changing tenant demand Willingness-to-pay	Corporate image
Competitive positioning		Location/Transit oriented Availability of sustainable data	Age Level of human capital in the firm

Figure 1; Sustainable determinants investors-wise

One should not forget the actual implementation or even the decision to invest or allocate to sustainability. In the beginning it is more a management decision to implement or think about sustainable implementation. For sustainability to achieve results, it requires the commitment of senior management and dedicated individuals with fund teams (INREV, 2012).

Income and value evidence provides partially an answer to the question of an improved return profile. Risk of vacancy and below target returns is a better indicator regarding sustainability; consider an office building with a better green performance. The associated risk regarding vacancy and satisfaction is way lower compared to regular development. As such the landlord has the opportunity to engage with the tenant about green leases, energy use and specific preferences. That means that the landlord should anticipate on the motives of the potential occupier. The table below shows a short summary.

Why should an occupier be willing to pay a rental premium for a sustainable asset?

Organizational	Technical	Financial
Increased occupant health and productivity	Enhanced building quality	Less need for office space through New ways of working
Increased corporate image	Thermal comfort and air quality	Mitigation of future regulatory impact
Aesthetically pleasing	Reduced downtime	Lower service costs
Compliance with CSR requirements	Personal control over attributes	
Retention and attraction of employees		

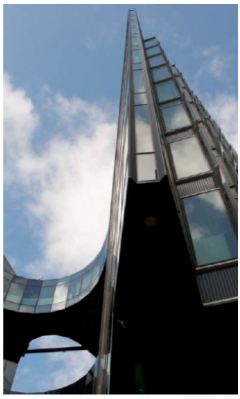


Figure 2; Sustainable determinants tenant-wise

Often in green buildings this understanding creates a better connection between the operational management (read: facility manager) and the upper management (read: allocation manager). Currently green buildings account for a more core investment style as occupancy rate and income remain higher and more stable. New evidence regarding the relationship between the degree of sustainability or sustainable features and financial performance on asset –or fund level is embraced. Opportunities to fill the gap between commercial demand and current information supply lie in front of us.

3. METHODOLOGY

The relationship between financial performance and sustainable indicators can be described by a hedonic pricing model. The dependent variable which relates to financial performance is rental income. Independent variables are related to several areas, but can be summarized as market, location, asset and sustainability characteristics. The expectation supported by hypotheses state that the level of rental income of offices can be predicted by factors which are distributed over all four groups and by a certain residual value (ε_i). This rudimentary description can be written down in a statistical form:

$$\text{Rental income} = \beta 0 + \text{Market characteristics}_i\ \beta 1 + \text{Location characteristics}_i\ \beta 2 + \text{Asset–specific characteristics}_i\ \beta 3 + \text{Sustainability characteristics}_i\ \beta 4 + \varepsilon_i \quad (1)$$

Where i = 1,…, n and n is the number of office buildings presented in the dataset behind this study. Based on the amount of cases the coefficients of the explanatory variables are β_0 (constant), β_1 (macro-economic trends), β_2 (location quality), β_3 (asset-specific information), and β_4 (sustainable performance), all of them are unknown parameters. ε_i is the final term; it represents the unexplained part of the model.

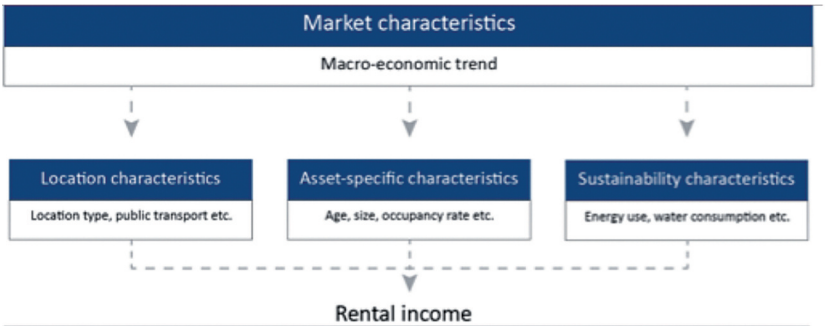


Figure 3; Model specification

The large number of independent variables makes the model complex; especially because the variables can be distinguished in roughly four categories.

- Macroeconomics; there should be a correction for the economic circumstances during the timeframe of research. This is done through the use of dummies for each transaction year.
- Location characteristics based on geographical trends; these variables are selected on location type and proximity to local, national and international facilities.

- Asset-specific; these are variables which relate to the asset quality and are hugely interrelated with the variable "value". It implies spatial dimensions, specific construction period and occupier information.
- Sustainability; these variables are related to the sustainable performance of an office. It is important to isolate these features in as separates to assess their influence.

Rental premium of sustainable offices

The model is perfected through the addition of each individual category, respectively macroeconomics, location characteristics, asset-specific and sustainability. The final hedonic pricing model that is used to add the energy performance index has been appended in the table below (Adj. R-squared of 0,68). When taking a first glance at the coefficient of energy performance, one can immediately notice that the variable Energy Performance Index is both influential and relatively significant.

Model 4	R Square	Adj R square	SS	df	MS	F	Sig.
Regression	0,709	0,679	30,685	35	0,877	23,288	0,000
Residual			12,574	334	0,038		
Total			43,258	369			

Model 4	C/N	B	Std. Error	Beta	t	Sig	Partial	Part
(Constant)		4,978	0,209		23,835	0,000		
LOC_NL; Location Amsterdam	N	0,432	0,078	0,503	5,558	0,000	0,291	0,164
LOC_NL; Location Utrecht	N	0,230	0,082	0,215	2,788	0,006	0,151	0,082
LOC_NL; Location Randstad area	N	0,134	0,073	0,186	1,847	0,066	0,101	0,054
LOC_TYP; Central Business District	N	0,221	0,028	0,301	7,940	0,000	0,398	0,234
PUBL_TRAIN; Train Station within 500m	N	0,026	0,024	0,038	1,082	0,280	0,059	0,032
PROX_HIGH; Distance to highway exit	C	-0,049	0,019	-0,095	-2,527	0,012	-0,137	-0,075
PROX_SCHIP; Schiphol within 50 km	N	0,124	0,027	0,172	4,648	0,000	0,246	0,137
AGE_NEW; effective age	C	-0,083	0,018	-0,189	-4,575	0,000	-0,243	-0,135
Asset size	C	0,023	0,012	0,067	1,900	0,058	0,103	0,056
Opening hours; 7 days, 24 hours	N	0,303	0,119	0,079	2,534	0,012	0,137	0,075
User intensity 20-30m2 GFA per fte	N	-0,049	0,030	-0,056	-1,618	0,107	-0,088	-0,048
User intensity >30m2 GFA per fte	N	-0,189	0,060	-0,109	-3,164	0,002	-0,171	-0,093
Energy Performance Index	**C**	**-0,095**	**0,049**	**-0,074**	**-1,933**	**0,054**	**-0,105**	**-0,057**

Table 1; Final hedonic pricing model

For the influence of energy performance, all possible relationships have been researched. The variable LN_E_INDEX proved to have both the highest significance and influence on rental levels. The logarithmic function implies that indeed the A-certified properties have a substantial higher rent compared to the other categories and the rent flattens out when the energy performance index increases. The logarithmic function is displayed on the following page.

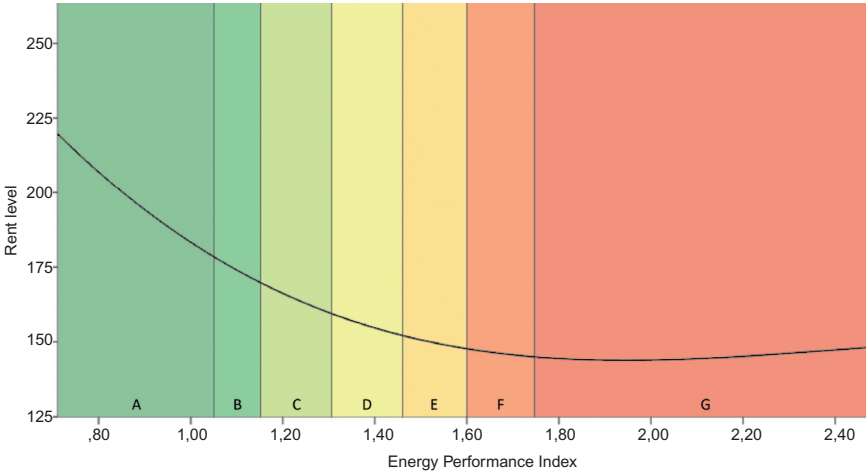


Figure 4; Rental income versus Energy Performance Index

GREEN/NON-GREEN index

When the dummy variable GREEN_NONGREEN (a split into two categories A-C and D-G) has been added to the hedonic pricing model instead of E_INDEX we can look deeper into the actual gains of going green, e.g. in terms of rent levels. There is a clear sign regarding a rental premium of 0,107, which accounts for a rental increase of approximately 11%. This effect is higher comparing this with earlier evidence of Kok & Jennen (2012) which estimate a "green premium" of 6,5%. In the graduation report of van der Erve (2011), there was no clear sign of a green premium. This result indicates that indeed green certificates obtain a higher rent compared to others. Note that the data went back in time until 1990 and the amount of transactions were rather small (372) to state a totally trustworthy outcome.

Analysis of the energy performance model

The Energy Performance Index is theoretically right about the general consumption profile of the asset, the tenant will (in most cases) determine the actual energy consumption of an office. In the following section the relationship between theoretical energy consumption and actual energy consumption will be subject of research (reported in GJ/m2). The theoretical energy consumption is based on the intrinsic energy use of the object itself. The actual energy consumption defers from this definition with only one element. E.g. the influence of the office user. The actual energy consumption therefore is:

$$ENERGY = ENERGYTHEORY + TENANTCONSUMPTION + \varepsilon_i$$

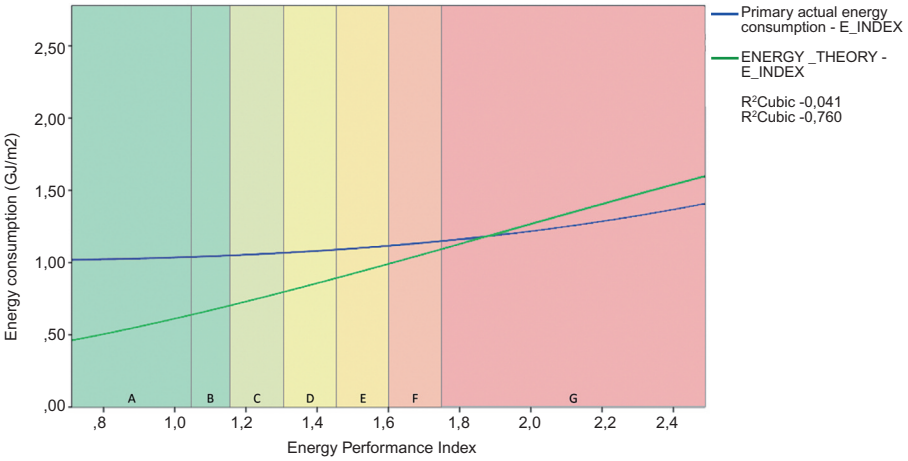


Figure 5; Relationship actual and theoretical energy consumption

It is rather hard to actually fit a line which indicates a relationship with an R^2 of 0,041. This indicates an important preliminary finding; the energy consumption does not follow a specific path within a close range. This could mean that an A-certified object performs just as a more regular D-rated asset. It can simply be concluded that there is not much of a relation between the actual energy consumption and the energy performance index (and not in the least with rental income).

The comparability of the data could increase while filtering on selective variables, such as the occupancy rate. The adjacent table shows an interesting picture of the division between occupancy rates and their relative influence on energy consumption. When considering the division of energy certificates between different categories, a clear distinction is necessary to objectively report energy consumption. Otherwise an F-certified asset in the 25-50% category can be compared with a particular asset out of the 75-100% category.

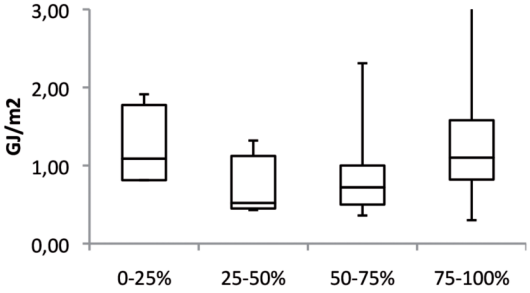


Figure 6; Overview occupancy rate and actual energy consumptions

Evidently when the energy consumption data is corrected for occupancy rate, there will be more reliable and accurate evidence of actual energy consumption. The scatterplot below gives us an indication of this correction, the blue line represent actual energy consumption, whilst the green line indicates theoretical use:

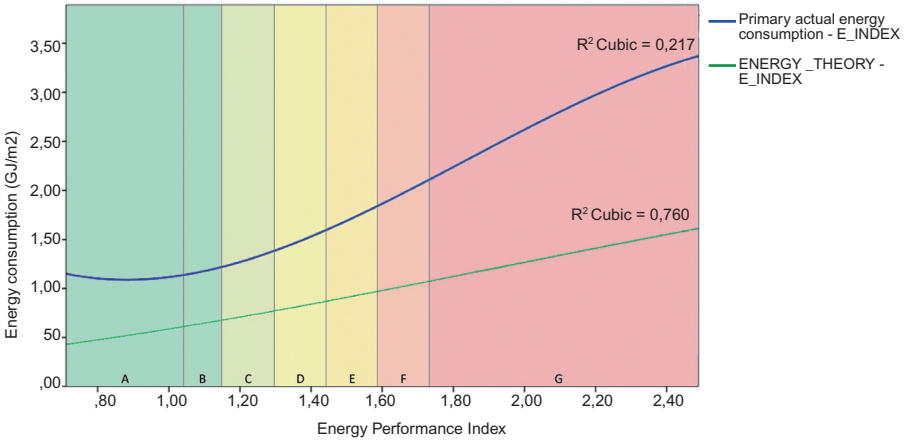
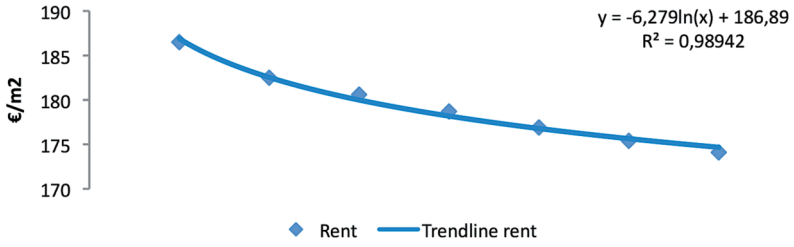


Figure 7; Actual energy consumption filtered by occupancy rate: 75-100%

The findings are very interesting; this indicates that indeed greener buildings consume less energy. The green line indicates the theoretical energy consumption based on the performance of the asset itself. The blue line (with a R^2 of 0,217) indicates the actual energy consumption among different categories. Consider the difference with the preceding plot between actual and theoretical energy consumption with an improved of factor 5 (current R-squared 0,217).

Analysis of rental premium and projected energy savings

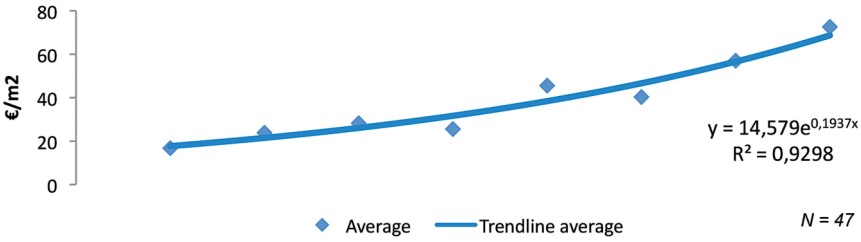
To assess the balance between predicted rent and energy savings, both information sources should be combined into a comprehensive sample. This is done by using a specific case in the dataset, which can be described by the developed hedonic pricing model and the projected energy savings. The case indicates if the extra rent can be expected to reimburse through energy savings.



Certificate	A	B	C	D	E	F	G
Predicted	186,5	182,5	180,6	178,7	176,9	175,4	174,1
Trend line	186,9	182,5	180,0	178,2	176,8	175,6	174,7
%	107,0%	104,5%	103,0%	102,0%	101,2%	100,6%	100.0%
Premium	2,4%	1,4%	1,0%	0,8%	0,7%	0,6%	

Figure 8; Rental premium sample case

What about the actual energy savings when assets are more "sustainable" through greener certifications? This data is based on the sample set of 47 assets which are filtered on occupancy rate and therefore can be regarded as "equals". The average trend of energy cost versus the costs in case of certification has been plotted in the figure below.



Energy costs	A+	A	B	C	D	E	F	G
Predicted	16,8	23,8	28,2	25,5	45,5	40,3	57,0	72,6
Trend line	17,7	21,5	26,1	31,6	38,4	46,6	56,6	68,7
%	26%	31%	38%	46%	56%	68%	82%	100%

Figure 9; Energy savings sample case

Does the rental premium make up for the energy savings, or does the tenant simply pays too much? The table below indicates the certification, the energy costs and the rental premium. The results are being compared with previous academics that did similar research in the field of sustainability and willingness-to-pay. They suggested that tenants were not willing to pay extra to a full extent. Snoei (2008) suggested that the willingness-to-pay by tenants is about 76% of the energy costs savings. Basically, the investor needs to make the investment to obtain an A-certified property, while the tenant receives the benefit, in the shape of lower energy costs (also known as "split incentive"). Visser (2010) found that tenants are only willing to pay 32% of their energy savings back to the investor in a rent premium. The columns with preceding authors are besides the columns of respectively energy costs and rent/premium. Both assumptions hold as the premiums are consequently lower than 32% of the energy savings which indicates that green assets are proving to be more energy efficient while the energy savings are significantly bigger than the rental premium.

Certificate	Energy costs	Visser: 32% (2010)	Snoei 76% (2008)	Rent	Premium	Van der Erve (2011)
A	€ 21,5	€15,1	€ 35,9	€ 186,9	€ **12,2**	€ 16,0
B	€ 26,1	€13,6	€ 32,4	€ 182,5	€ **7,9**	€ 6,4
C	€ 31,6	€11,8	€ 28,1	€ 180,0	€ **5,3**	€ 3,1
D	€ 38,4	€ 9,7	€ 23,0	€ 178,2	€ **3,5**	€ 0,4
E	€ 46,6	€ 7,1	€ 16,8	€ 176,8	€ **2,1**	€ 0,2
F	€ 56,6	€ 3,9	€ 9,2	€ 175,6	€ **1,0**	-
G	€ 68,7	€ -	€ -	€ 174,7	€ **-**	

Figure 10; Comparing preceding academic evidence

5. DISCUSSION AND RECOMMENDATIONS

During the process of writing this report and the preceding research it became clear that the incorporation of sustainability into the real estate investment portfolio is harder than it seems. A lot of remarks can be made on various fields of knowledge ranging from pure financially orientated investment decisions to qualitative productivity benefits.

The theoretical framework indicates two preliminary outcomes. The first outcome is related to the added value of sustainable real estate in terms of risk and return profile. The second outcome has a more qualitative character with more "soft edges". This entails issues such as productivity, corporate image and the willingness-to-pay. More efficient buildings could have the ability to provide a hedge against all three factors (regulation, energy and demand). Note that individual green office buildings do add value through both direct and indirect returns, but the effect of multiple "green" offices could be suffering from a "neighborhood competition" as the supply of green-rated assets increases. It could be that these newly build or renovated sustainable offices "over-satisfy" demand and possibly not realize the same rental heights as compared to early adopters.

The hedonic pricing model estimates that a range of independent variables influences the rental income of specific properties, which included more categories than only energy use and locational features. Also asset-related and operational variables, such as effective age, user intensity and asset size show a pattern in the results. The diverse nature of the office user and the locational characteristics make it difficult to extract the right rental premium which reflects sustainable performance.

The evidence proves there are higher cash flow opportunities when a specific object has a better energy certificate with a rental premium of approximately 7,0%. When considering the influence of energy costs present-day, not much evidence has been reported on the balance between the rental premium and the likely energy savings. The results imply that green assets consume less energy compared to their inefficient peers and the rental premium can be stated as a (small) percentage of these savings.

Future value can be created through the service component towards the potential occupier. This service component can be provided through a green lease in which the two parties, the investor and the occupier make agreements on the financial benefits of performance which are beneficial for both parties. An article wrote by Seebus (2013) indicates the practical advantage of such an agreement. A green lease helps to improve the sustainable performance of the rented space by securing critical commitments. Additionally both the occupier and the investor are enabled by financial incentives while adopting green measures.

It seems that the energy performance certificate among others indeed is providing the real estate sector with some needed transparency. Although theoretically, the calculation framework seems to align with the energy performance index, the actual energy consumption deviates from the regulatory framework. When these consumption figures are being transferred to energy costs it becomes clear that the technical condition, the office space usage and the nature of the occupier are strongly influential.

Recommendations for further research

Productivity and employee absence
Any business owner can tell you that employee salaries and expenses make up the majority of operational costs associated with leasing an office. While approximately 85% of total workplace costs are spent on salaries and benefits only 10% is spent on rent and less than 1% on energy costs. Research suggests that by making even small improvements to factors such as productivity, health and wellbeing, businesses can experience greater financial benefit than they would from more efficient resource use in building operations (World Green Building Council, 2013).

Green finance
Sustainable real estate investments are currently a hot topic, but an even more interesting topic is the position of the major banks, which currently are not so eager to finance new construction or renovation projects. Shouldn't there be a discount for more energy-efficient properties? Nowadays only Triodos bank has sustainability integrated in their operational practice. The first meager evidence has been summarized in a recent report: Financing tools for a green building stock (Kok & Eichholtz, 2013). The report shows some first evidence on how other countries deal with sustainability and some very interesting examples are provided

6. EPILOGUE

It all started during a company's case which required to look for financial alternatives to solve structural vacancy and redundancy. While I was looking out the window, I stumbled upon the notion that the building across the highway was recently constructed and probably had a better energy label. Should I assume that this is an indication of a higher rent? From that point on the subject advanced into this report which cover the fragile balance between the sustainability premium and energy savings.

I would like to thank my parents, my girlfriend and the professional support from both the Technical University Delft and the Dutch Green Building Council. Numerous hours with on discussing specific financial topics and hedonic models with Philip Koppels, the truth about energy consumption and governmental regulations with Eric van den Ham and benchmarking with Dong Cao proved to be a great learning experience. They all made it possible to finish this research product within the rather short time limits. What should be mentioned is that sustainability is "not a walk in the park" as I personally found out myself.

Also the professionalism of the IVBN Scriptieprijs should be mentioned. At the beginning of January, the moment which I presented my thesis to the jury, we immediately had a lively discussion about the added value of sustainability and opportunities that lie in front of us. This is exactly what this report intends to do, raise questions, fuel discussions and put the subject of "sustainability" on agendas. Hopefully it will pave the road towards a more profitable and better future.

Luc Baas
Rotterdam, march 2014

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Vereniging van
Institutionele Beleggers
in Vastgoed Nederland

‘Huize Middenburg’
Westeinde 28
Postbus 620
2270 AP Voorburg

Tel. 070 - 300 03 71
Fax 070 - 369 43 79
info@ivbn.nl
www.ivbn.nl