Assessing Green value: A key to investment in sustainable buildings

Article paru et présenté été 2011

Jean CARASSUS[1], David ERNEST[2], Lionel PANCRAZIO[3], Jean-François LE TENO[4], Adrien BULLIER[5], Thomas SANCHEZ[6,7]

Dans ce premier article notre groupe de travail, 'Green value in use' ou « Valeur Verte en Pratique », a cherché à démontrer la performance environnementale des bâtiments à partir de la qualité intrinsèque, de la contribution de plusieurs acteurs et de relations interdépendantes. Par la suite nous avons recherché les pistes pour relier les performances théoriques et réelles avant de nous intéresser aux évolutions nécessaires des métiers aux pratiques émergentes et aux attentes prévisibles.

Introduction

Sustainable buildings entail additional costs, but do not always generate additional incomes for investors. Massive investments in sustainable buildings, especially in retrofitting the building stock, will not be implemented as long investors cannot count on the "green value" of a property, i.e. the additional net value generated by the environmental performance of a property. Assessing green value is essential in order for sustainable buildings to become a sustainable business model, in new build and even more in retrofitting.

Property valuers have not yet taken into account environmental performance in estimating the value of properties. However, in markets like U.S. office buildings and Swiss individual houses, where hundreds of "green" certified buildings have been delivered, occupied, leased, and in some cases sold, green value emerges in the form of higher rents, occupancy rates and resale price than for comparable not certified properties[8]. Although real estate markets differ between countries and market segments, our assumption is that the financial and operational practices we present will progressively spread to other market segments[9].

Green value raises three major questions, which we address in this paper. The first question is theoretical: how is green value generated, and how can it be taken into account in property valuation? Corporate investments in real estate are based on financial approaches such as discounted cash flows. They do not take into account green value, in particular because historical data is not yet available on European markets. In order to overcome this "chicken and egg" situation, we analyse the structural factors that will create green value in the coming years, and how they impact financial models.

The second question we address is: how is this taken into account by major market actors? Sustainable buildings will increase the risks of obsolescence vis-à-vis (future) regulations and market demands, entailing a faster devaluation of existing buildings. Major market actors anticipate this trend and adapt their practices faster than property valuers who are bound to look backwards. This leads to new management indicators and labels among investment managers in major commercial buildings[10] worldwide. In the French institutional housing sector, we show how green value is concretely integrated in financial analyses.

---

1 Directeur du Mastère Immobilier et Bâtiments Durables, École des Ponts ParisTech.
2 Directeur Innovation & Énergies, VINCI Facilities.
3 Enseignant – chercheur en durabilité.
4 Directeur des systèmes d'information, Axa Real Estate.
5 Directeur, Groupe Immobilière des Chemins de Fer.
6 Directeur, Caisse des dépôts et consignation.
7 Les opinions exprimées dans l'article n'engagent pas la société dans laquelle les auteurs exercent.
8 All arguments presented here only apply for buildings with similar qualities in all other aspects than environmental and energy performance. A badly located building with very good energy performance will still show lower value.
9 This paper is based on the professional practice of the authors who work on major European commercial buildings and on the French housing market.
10 Buildings over 5,000 m²

The third question we address is practical: how can green value be effectively guaranteed? The environmental performance of buildings is theoretical, and will actually generate green value only if real estate professionals master three dimensions: the intrinsic quality of buildings, the performance of their management and operation, and the quality of their use. We show how this can be done, thus enabling to secure green value and to take it fully into account in the valuation of properties and in investment decisions.

The value of properties at the dawn of a new era

Does “green” create “value” on the real estate market? In a first step, answering this requires analysing the current market in order to find evidence point at green value today. In a second step, this retrospective approach should be complemented with a prospective approach to identify the structural trends of public regulations and market demands in the coming years, and how they will impact property value to generate “green value” in the coming years.

First studies show evidence of a "green value"

The first international studies carried out show that environmentally performing buildings are better valued on the real estate market. Green buildings have shorter commercialisation period, reduced turnover of tenants while maintaining higher rents.

In 2005, analyses by the Royal Institution of Chartered Surveyors (RICS)[11] revealed the convergence that may exist between the value of the property market and general environmental concerns. RICS based those analyses on concrete case studies in Canada, the United States and United Kingdom. More recently, statistical studies comparing hundreds of Energy Star™ or LEED™ buildings in the United States[12] have showed that commercial buildings with environmental labelling have, in tendency and all things being equal, higher rents, occupancy rates and higher resale value than non-certified offices[13]. In Switzerland, a Minergie® house[14] is sold at 7% more than a comparable non-certified house; apartments are rented 7% higher[15].

A phenomenon bound to accelerate under environmental and regulatory pressure

A first link is currently appearing between the market value of a building and its environmental performance, at least on a few markets. As awareness of environmental issues is growing in Europe and worldwide, international, national and local authorities are strengthening regulations more and more quickly. In the coming years, this will increase the gap between the environmental performance of new or recently renovated buildings and that of older buildings.

Determinants of property value are impacted by environmental performance

The value of a property can be assessed by several methods, but schematically, market value can be defined as the ratio between net income and capitalisation rate, the latter representing the perceived risk of investing in real estate.

---

11 RICS, 2005

12 Energy Star is a label certifying an energy performance beyond legal requirements. LEED is a multi-criteria environmental certification, with energy as one component among others

13 See for example: Eichholtz Piet, Kok Nils, Quigley John, 2009; Fuerst Franz, McAllister Patrick, 2009; Miller Norm, Spivey Jay, Florance Andy, 2008.

14 Minergie certifies a theoretical energy consumption lower than 42 kWh/m².a.

15 Zurich Cantonal Bank, 2008

Through the detailed analysis of the determinants of property value, David Lorenz[16] has defined a framework to explain the potential link between the market value of a building and its environmental performance. The following formula summarizes this framework, which we have adapted.

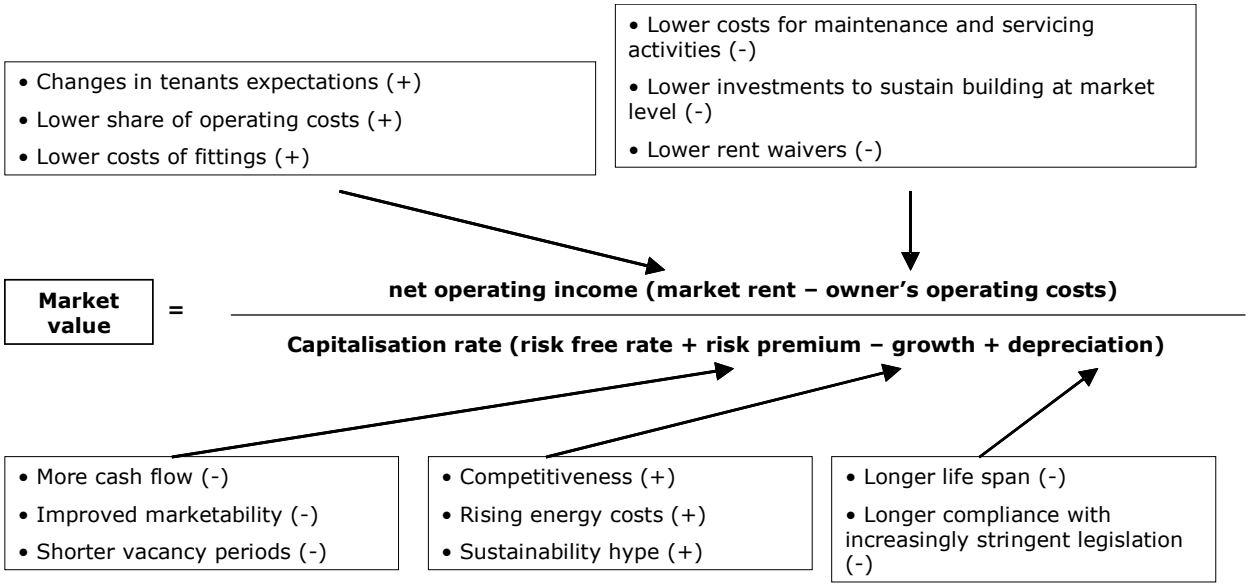


Figure 1: Components and potential environmental determinants of the market value of rental propert*y. Five groups of determinants impact on market value: market rent, owner expenses, risk premium, growth of owner income and depreciation of the property. For example, the risk premium is reduced (-) by higher cash flows, improved marketability and shorter vacancy periods; the growth of incomes is increased (+) because the property is more competitive, will be less affected by the rise of energy costs than standard buildings, and will benefit the positive image linked to green buildings; depreciation of the building is reduced (-) because it has a longer life span and will comply longer with regulations, leading to lower upgrading costs.*

Evaluating the impact of green value

As practitioners in the real estate market, we make our own evaluation of the impact of environmental performance on the determinants of the market value of properties. This is based on our practice and experience, and on the analysis of upcoming regulations, market demands and the expected earnings linked to environmental performance. The extent and nature of environmental risks vary between market segments and within each type of buildings, in particular according to the size and location. This analysis focuses on two market segments: institutional rental housing and rental office buildings, the latter of which should be split between "prime" and "standard" offices.

Table 1 details the components of market value (1st column) and how they are impacted (2nd column) by the environmental determinants (3rd column) identified in figure 1. We then assess the impact in the short term and in the medium term for the housing market and for rental offices. Some determinants such as rental charges are obvious and will be taken into account in the short term as a result of rising energy prices. Other determinants such as the health of occupants have a lesser impact, especially in housing, and will become important only in the medium term, due to the unavailability of reliable data.

Table 1 should be read as follow: lower rental charges (impacted determinant) will lead to higher market rents, which has a positive impact on market value. This impact will be significant for office buildings in the short term and important in the medium term.

16 Lorenz David, 2006

Table 1: The potential for positive differentiation in favour of "green buildings" in comparison to standard buildings

Components of market value (impact on value)	Impacted (+) Upward (–) Downward	Impacted by the following determinants:	Impact level			
			Rental Housing		Rental Offices	
			Short term	Medium term	Short term	Medium term
Market rent (+)	+	Sustainability expectations of demand	→	↗	↗	↑
	+	Lower rental charges	↗	↑	→	↗
	+	Less works for new tenants	→	→	→	→
	+	Health of occupants	→	↗	↗	↑
	+	Productivity of workers (offices only)	/	/	→	↑
Owner expenditures (+)	-	Major maintenance & repair	↗	↗	→	→
	-	Costs for upgrading and retrofitting	↗	↑	↗	↑
	-	Maintenance of performance	→	↗	→	↗
	-	Deductibles and rent discounts	/	/	↗	↑
Risk premium (–)	-	More cash flow	→	↗	↗	↑
	-	Faster commercialisation time	↗	↑	↑	↑
	-	Anticipated compliance with regulations	↗	↑	↗	↑
Growth of owner income (+)	+	Competitiveness, attractiveness	→	↗	→	↗
	+	Energy costs	↗	↑	→	↗
	+	"Sustainable" image	→	↗	→	↗
Depreciation (–)	-	Longer lifespan	↗	↑	↗	↑
	-	Longer compliance with regulations	↗	↑	↗	↑
	Key:	→ Little or no influence on the difference of property value				
		↗ Significant influence on the difference of property value				
		↑ Important influence on the difference of property value				
		/ Not relevant				

Assessing the environmental impact on the value: a multicriteria approach

The environmental performance of a building depends on many criteria related to different environmental issues, which do not always converge. Measuring and rating the performance of a building on these criteria is the purpose of all buildings assessment tools and / or environmental certifications. Labels and certifications of the environmental performance of buildings, in Europe and worldwide, focus on six key criteria:

- energy consumption,
- greenhouse gas emissions (CO2),
- health and environmental quality of indoor spaces (comfort, air quality, humidity, quality of natural lighting)
- water consumption,
- waste generation
- accessibility by ecological transportation modes (public transportation, car sharing, cycling)

Each of these criteria requires an evaluation through specific indicators such as kWh per m², distance to public transportation or quantity of waste produced each year. Not all indicators have the same degree of maturity, recognition, and availability. For example, indicators for indoor air quality are mature but not available for most buildings. As a result, environmental criteria are taken into account differently by the market. Most environmental assessments focus on the energy, CO2 and health performance of buildings.

The impact levels presented in Table 1 are justified in Table 2 by the analysis of the environmental factors that impact on each determinant of property value. It should be read as follows:

- the sustainability expectations of the market in office buildings are heavily dependent (++) on energy, and dependent (+) on CO2 emissions and health; whereas in housing the expectations of households focus mainly

on energy. As a complement, Table 1 shows that the sustainability expectations of demand have little or no impact on housing in the short term, but will have a significant impact in the medium term.

- Indoor air quality affects the health and productivity of occupants, which is has a higher impact on market rents for offices than for households.
- The risk premium is much reduced for offices with a global environmental performance (HQE, BREEAM, LEED) because it guarantees a fester commercialisation; in housing, only energy has an impact in that respect.

In a first analysis, issues which are already heavily regulated (i.e. mainly energy) have a greater impact on value. One obvious result in Table 2 is that energy is the heaviest criterion for most determinants, both on the housing and office markets. This is due to several factors among which: the cost of energy, whereas other criteria have either no cost or underestimated costs. It also appears clearly that the office market is more open to other environmental criteria than the housing market. Environmental certifications also address some topics which are less directly related to the environment, such as the durability of materials, transformation of spaces or convenience of operation; these topics may also have an impact on value.

Table 2: Potential impact of environmental criteria on the components of the value of buildings.

Components of market value (impact on value)	Impacted (+) Upward (-) Downward	Impacted by the following determinants:	Market segment	Criteria impacting on value						
				Energy	CO2	Health	Water	Waste	Transportation	Other
Market rent (+)	+	Sustainability expectations of demand	Offices	+	+	+				
			Housing	+						
	+	Lower rental charges	Offices	+		+		+		
			Housing	++			+	+		
	+	Less works for new tenants	Offices							+
			Housing							
	+	Health of occupants	Offices			++				
			Housing			+				
	+	Productivity of workers (offices only)	Offices			+			+	
			Housing							
Owner expenditures (+)	-	Major maintenance & repair	Offices							+
			Housing							+
	-	Costs for upgrading and refurbishment	Offices	++						
			Housing	++						
	-	Maintenance of performance	Offices							+
			Housing							+
	-	Deductibles and rent discounts	Offices	++						
			Housing							
Risk premium (-)	-	More cash flow	Offices							
			Housing							
	-	Faster commercialisation time	Offices	+	+	+	+	+		+
			Housing	++						
	-	Anticipated compliance with regulations	Offices	++	++	+				
			Housing	++	++					
Growth of owner income (+)	+	Competitiveness, attractiveness	Offices	++	++	+				
			Housing	++	++					
	+	Energy costs	Offices	++						
			Housing	++						
	+	"Sustainable" image	Offices	++	++	+	+	+	++	+
			Housing	++	++			+		
Depreciation (-)	-	Longer lifespan	Offices	+						+
			Housing	+						+
	-	Longer compliance with regulations	Offices	++	++	+				
			Housing	++	++					

Towards new valuation models

Some first evidences point to the emergence of green value on the market today; we have shown how environmental determinants will increasingly impact all components of property value in the coming years, as a result of regulatory pressure and changes in market demands.

How do market actors react to these changes and take into account green value? While most actors still d not know how to deal with green value, we present innovating practices among some major actors, which may soon spread to a larger share of the market. International investment managers mostly answer the demands of investors to guarantee the value and liquidity of their assets. The institutional housing sector in France has a long-term approach to property value in which energy costs have a major impact on property value, leading to new financial hypotheses.

A new paradigm for all actors

Investors, developers, asset managers, operators, building users and property valuers are facing a paradigm shift in property valuation. During the transition phase, the collective representations of market actors are in discrepancy with the emerging and future reality of the market. These representations are embedded in the hypotheses of financial models, which are used to evaluate cash flows for a period of 10 to 50 years. The lack of understanding of the current market and societal trends by financial experts and property valuers makes it very difficult for them to revise their models in order to integrate green value.

Depending on their role, influence and strategy, stakeholders in the real estate market are adapting their methods and practices. In view of the changes expected by public authorities, the time of pioneers is now clearly over. However, the transition is far from complete and strong differences appear between actors. Some actors strongly modify their practices (operators, users, some investors), while others seem to show a greater resistance to change (asset managers, property valuers).

The crucial role of property valuers

Property valuers especially are critical players who slow down the recognition of green value by the market. Property valuation is essential for major investments in sustainable buildings in the office market, as it is the basis on which banks assess the feasibility and risk level of a project; it is less usual in the housing market. The expertise of valuers requires that it be based on proven tools and data, which are necessarily retrospective and not prospective. Anticipating trends or evolutions is difficult for that profession. However, valuers are bound to change their evaluation tools and methods; otherwise their analyses will be increasingly inadequate to the reality of the market.

The need for long-term public policies

Public authorities can accelerate the evolution of practices in the real estate market by giving medium and long-term visibility about regulatory requirements. This is the case with the 2002 European Energy Performance of Buildings Directive and its 2010 recast. The same is true in France with the "Grenelle de l'Environment" which has launched defined ambitious goals for new and existing buildings. Many countries and major cities are increasing environmental requirements, thus making the future clear for real estate actors.

Like energy performance, the other key environmental issues for buildings would need a long-term policy framework at the European and national levels, in order for actors to modify their demands and adapt their technical and financial practices.

Strategies on the commercial office market

In the world of commercial office investment, awareness is accelerating rapidly throughout Europe and the world. The policies of investment managers[17] combine both defensive and offensive strategies.

- On the one hand, a defensive strategy aims to preserve the value of existing property against the risk of depreciation entailed by regulations regarding energy performance, and by the clear preference of majors companies to rent green buildings. This results in the multiplication of approaches aiming to analyse and audit the energy performance of buildings in order to assess the investment costs for upgrading them to the new market standards, i.e. certified green buildings (LEED, BREEAM, HQE…). Such an approach is becoming part of the advice obligations (fiduciary duties) of real estate portfolio managers vis-à-vis final investors.
- On the other hand, an offensive strategy in the area of new construction. It has now become obvious to the investor community that one can no longer speak of "prime buildings" without incorporating an environmental

17 Investment managers such as Axa Real Estate manage investment funds which they invest on major office buildings world wide.

certification recognized by local but also international actors. This strategy in some cases enables the investor to obtain a financial outperformance by offering a building which can meet the future requirements of public authorities and future market demands. For example, an increasing number of offices in the Paris business district (La Défense) combine the French certifications (HQE and BBC Effinergie) with the American (LEED) and British (BREEAM) labels, in order to answer the needs of international investors.

Liquidity and property value: the two concerns of investors

The cost for upgrading a building is now seen as an important determinant of the value and even the liquidity of a property. Due to pressure from some investors and public authorities, actors are becoming more aware and knowledgeable on the subject, even if the lack of agreed and understandable indicators remains an obstacle. The market is beginning to anticipate that a building whose energy performance does not comply with market standards will only find a client at a discounted rent, or may even remain vacant. This will result in a loss of profitability of such buildings.

The need for a convergence of environmental labels and certifications

In the past ten years, energy and environmental certifications of buildings have boomed in Europe, North America, Japan and Australia. Yet investors, in particular international, need the different national systems to converge in order to allow better readability of the environmental performance of their assets. The Sustainable Alliance initiative[18] marks a decisive step forward which was expected by market actors for a long time.

Investors increasingly need to monitor the environmental performance of their portfolios. The technical complexity of defining, measuring and rating environmental performance, together with the differences between national practices, are becoming an obstacle for international investors. They call for simplified and homogeneous assessment tools at the European or international level, which they could apply to their whole portfolios. This is why several major players in property investment in Europe have created the "Green Rating[19]" assessment system. Even though they represent a small part of the market, such investors set the standards for the market which progressively spread to all actors in a trickle down effect.

Environmental due diligence and actual performance

Investment procedures are also changing. "Due diligence", which is an essential phase of the investment process, now includes for major international investors an assessment of the environmental performance of the property. Tools such as “Green Rating” can be used before buying a property, both to ensure that it does not exceed a certain threshold of energy consumptions and/or to assess the costs for upgrading the asset and its potential for improvement. Institutional investors, such as pension funds, pay specifically attention to this point.

Beyond theoretical performance, the search for actual performance is increasingly emerging and fosters demand for new contractual relationships such as green leases and performance guarantee, as we will see further.

Institutional investors and the housing market

Our analysis of green value in the housing sector focuses on institutional actors managing rental housing as opposed to housing owned or leased by a private landlord or a homeowner. Institutional housing can be social housing (i.e. targeted at low-income households), intermediate housing (middle classes), sheltered housing (elderly, homeless people), public housing (for all households, as is the case in Sweden). The institutional sector is different by the higher level of competence and higher consideration for property value, both in financial terms or in terms of image. It is also more targeted by public regulations due to its nature, missions, and sources of funding.

Although we focus on the French example, it should be noted that the French legal and economic framework for institutional housing shows strong similarities in the UK, Netherlands, Austria, Sweden and to a lesser extent Germany.

Regulation is the main driver for the housing sector

European policies and their national transpositions result in strong requirements on new build in terms of energy performance: nearly zero energy buildings in 2020, with many countries anticipating this through low energy standards. More generally, European policies aim to reduce greenhouse gas emissions by 80-95% by 2050[20], which will soon be transposed to national regulations and policies. In France, the “Grenelle de l’Environnement” states that

18 International association aiming at a convergence of the indicators of environmental performance of buildings.

19 www.green-rating.com

20 European Commission, 2011a and 2011b

800,000 social housing units in energy classes E, F and G (20% of the stock) will be retrofitted by 2020 to reach class C, a jump from 230 kWh/m².a[21] or more to less than 150 kWh/m².a.

Such regulations will gradually change the value of real estate assets. Energy performance is becoming a negative differentiating factor for existing homes. Highly energy consuming buildings become less attractive and profitable, in particular in France where, since January 2011, housing advertisements have to display the energy certificate, which informs on the energy costs of a dwelling.

On the institutional housing market, most environmental issues apart from energy act only as potential risk factors and not as proper factors of value creation. Energy performance appears as the major factor likely to create additional value today for a property, due to current and future regulations and to the economic value of energy. Demand is still not very sensitive to other environmental arguments, which are not sufficient to justify a higher cost of housing. Regulation is the main driver, as opposed to major office buildings where demand anticipates regulations.

The impact of energy performance on the profitability of housing

One can consider that, other things being equal, poor energy performance will impact negatively the profitability of a construction project and, even more clearly, a refurbishment project. In a long-term perspective, the following parameters of profitability will be affected:

- Projected rates of non payment and rental vacancy: homes with high energy costs will run a higher vacancy risk than others. Fuel poverty is also an important phenomenon, leading to defaults in rent payments.
- Loss of value applied to the sale of the property; in the coming years, minimum energy performance requirements are likely to be imposed on housing transactions, so that the cost of energy retrofitting will be deducted from the resale price.
- Lifespan of investments: a highly energy consuming building will need to be refurbished more quickly due to pressure from tenants and public authorities, and will require greater investments.
- Evolution rate of fiscal costs, linked to the likely introduction of energy criteria in the property tax and residence tax.
- Yearly rent increases: the owner of a highly energy consuming building is unlikely to apply every year the maximum increases allowed by law, so that they will progressively lose potential incomes.

Adapted financial simulations in the social housing sector: The experience of ICF

Rental social housing[22] has strong specificities in the real estate sector, linked to an important level of regulation, and the fact that social landlords manage property with a low rental yield in a long-term horizon (50 years).

In most European countries, the improvement of comfort in social housing can lead to a rent increase in the limit of the official rent cap, although the increase potential is rarely more than 20%. Energy retrofit (10 to 25,000 Euros per unit) adds to the standard refurbishment costs, but it is not compensated by any additional rent, although tenant's expenses are reduced[23].

Besides, energy costs for social housing tenants weigh more in the occupancy cost than in private housing, due to lower rents and housing benefits; energy performance has therefore a stronger impact on the attractiveness of a dwelling. Paradoxically, green value is more noticeable in a sector less affected by market demands.

ICF Group, a subsidiary of the French railway company SNCF, manages 100,000 housing units with social and intermediate rents. Since 2007, it has a systematic policy of environmental certification in construction and rehabilitation, and an energy strategy aiming to divide greenhouse gas emissions by 4 in 2050 through the retrofit of its housing stock. This strategy is based on an assessment of economic risks associated with poor energy performance of dwellings, which we present below.

Economic impact of energy prices on tenants' occupancy costs

Occupancy costs are the sum of energy costs, other charges for housing services (custodian, cleaning…), and rent minus housing benefits (which cover in average 40% of the rents[24]).

21 All energy consumptions referred to in the French context are in primary energy with a 2.58 transformation coefficient for electricity

22 i.e. rental housing for low-income households. Depending on the countries, it is provided by different types of operators, but regulations are quite similar.

23 Exceptions have recently been introduced in France and the Netherlands; in Sweden, rents usually include heating

24 This is an average value, as housing benefits can cover up to 90% of the rent in some districts with very poor households. The rate of housing benefits has a major impact on theses analyses: the higher it is, the higher the share of energy in occupancy costs

Figure 2 shows the evolution of occupancy costs for a standard building in social housing, with an initial energy consumption of 240 kWh/m².a[25], according to 5 scenarios: no action, standard refurbishment generating small energy savings leading to 227 kWh/m².a, energy retrofit leading to 130 kWh/m².a, low energy retrofit standard at 80 kWh/m².a, and a comparison with low energy construction.

For different levels of energy performance, the occupancy cost varies on year 1 after retrofit, although not significantly because the initial rent is only 4% inferior to the legal rent ceiling. New low energy construction shows a higher occupancy cost, due to the higher rent caps in new build than in existing housing. We project these costs 25 years after retrofit, with a general inflation at 2% per annum impacting rents and other charges. For energy costs, we make 2 scenarios with 5%/a and 10%/a (i.e. 3% and 8% above general inflation). The 5% scenario is a basic scenario for energy prices, while 10% is a high scenario evidencing the sensibility of occupancy cost to energy. The business as usual scenario in year 1 is taken as a base 100.

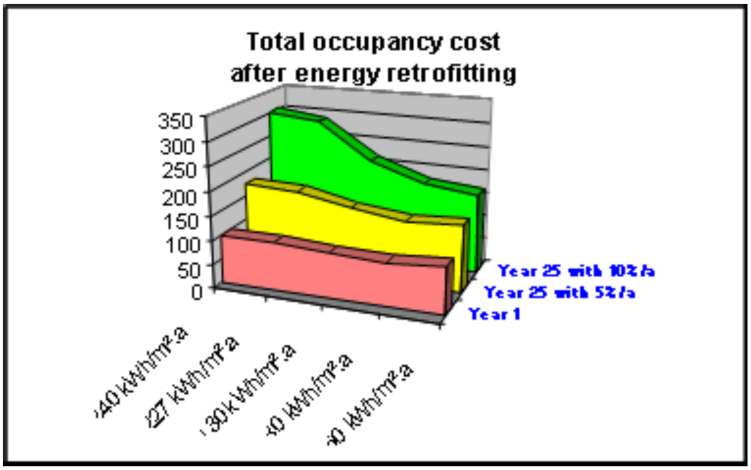


Figure 2: Total occupancy costs in social housing, based on different energy consumption scenarios. *The 240 kWh/m².a scenario ("no action") year 1 is taken as base 100.*

Provided current policies at the French and European level remain constant over the next 25 years, ICF assumes that all new construction (1%/year) is at low energy standard (50 kWh/m².a) from 2012 onwards; by 2020 more or less all housing above 230 kWh/m².a has been retrofitted to less than 150 kWh/m².a, with an increasing number reaching the low energy retrofit standard (80 kWh/m².a). As a result, the low energy retrofit standard should be the market standard in 25 years.

Figure 3 shows the gap in occupancy costs between the different scenarios: after 25 years, the business as usual scenario (i.e. refurbishment without very little energy savings, 227 kWh/m².a) shows a cost difference to the market standard of 26%, and up to 63% if energy inflation is at 10%/a.

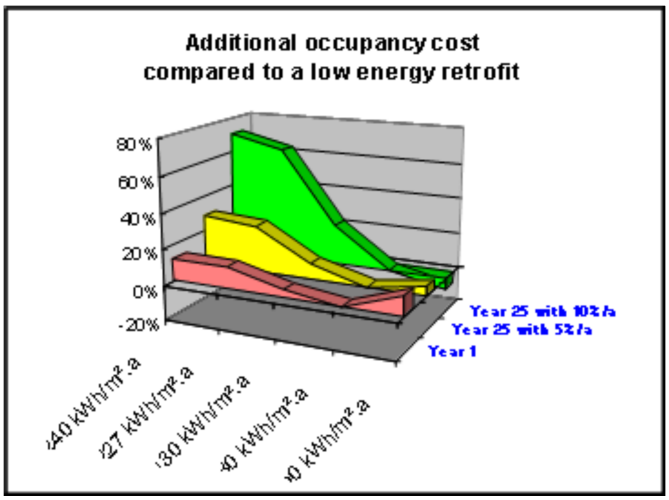


Figure 3: Additional occupancy cost in social housing compared to low energy retrofit (base 100)

and the sensibility to energy inflation.

25 The French regulation is based on primary energy and takes into account heating, domestic hot water, lighting and auxiliaries, related to gross surface.

Based on the same scenarios, we can see in figure 4 the distribution of occupancy costs paid by tenants between rent (remainder after housing benefits), energy costs and other charges for housing services (cleaning, maintenance, local staff). that the low the energy consumptions, the larger the proportion of occupancy costs for the landlord. In other terms, energy efficiency investments could be a way to reallocate some of the tenants' expenses from energy costs to social housing operators. Energy efficiency is crucial, as fuel poverty is a social problem and a source of non payments, and because it secures long term resources for social housing companies.

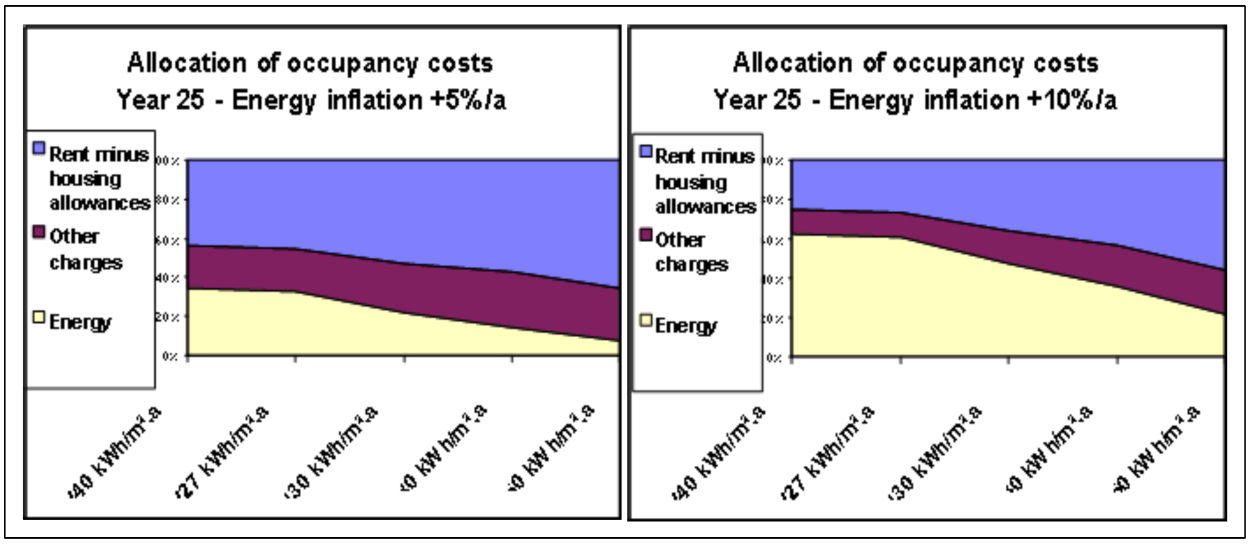


Figure 4: distribution of tenants occupancy costs based on different energy scenarios

Integration of green value in financial simulations

The above analyses clearly show the impact of energy risks on the housing business. Traditional financial models are totally unaware of these risks, as they only consider rents their expected incomes.

ICF has adapted its financial analysis models in order to reflect the risks associated with poor energy performance. It has introduced a correlation between the energy performance assessed through energy performance certificates (classes A to G), and three parameters of profitability:

- The rate of non-recovery of rent (vacancy and unpaid rents)
- The period before the following refurbishment
- The discount of the resale value of the property after 50 years

Table 3. Energy performance certificates and profitability: hypotheses used by ICF group

EPC[26]	Theoretical consumption	Rate of non-recovery of rents	Following refurbishment	Discount of the resale value after 50 years
A	0-50 kWh/m².a	1.00%	30 years	20%
B	51-90 kWh/m².a	1.50%	28 years	25%
C	91-150 kWh/m².a	2.00%	26 years	30%
D	151-250 kWh/m².a	2.50%	24 years	35%
E	251-350 kWh/m².a	3.00%	22 years	40%
F	351-450 kWh/m².a	3.50%	20 years	45%
G	> 450 kWh/m².a	4.00%	18 years	50%

After adjusting the assumptions of the financial model, investments in energy efficiency show an equal or higher profitability, whereas in a classical model they appear as extra costs without any return.

26 French energy performance certificates take into account heating and domestic hoot water related to living surface, unlike the thermal regulation.

Towards an effective guarantee of green value

We have presented how green value is progressively taken into account by market actors, based on prospective rather than retrospective approaches. Yet investors remain reluctant to integrate green value in their investments because environmental performance is theoretical and not always real. This risk is a major obstacle to investment in sustainable buildings.

How can green value be guaranteed? We present how effective green value can be guaranteed and maintained, and what technical and practical changes this requires.

Green value also depends on the management of the building

The idea that green buildings can benefit from a better valuation assumes that the intrinsic performance of buildings regarding energy, health and environment is naturally turned into actual performance in the operation phase.

Yet there is nothing obvious about that. Several recent studies[27] show that the results of certified office buildings (LEED, BREEAM, HQE or Minergie) are often below expectations, although they still have better environmental performance than non-certified buildings.

The main differences between theory and reality are particularly due to:

- choices in design and building use scenarios which are different from the actual use of premises (24/24 occupation, set temperatures, level of private consumption, etc.).
- differences between the chosen technical facilities and building management systems and the capacity of building managers to use them;
- a loss of information and knowledge between the construction and operation phases (no collaboration, bad commissioning process);

More generally, these studies show that environmental certification is no guarantee of actual performance. Building managers will increasingly have to commit to a performance level for a defined use of the building.

The result of separated processes

Energy, health and environment performance is not the simple result of the intrinsic quality of the building. The creation of green value depends on:

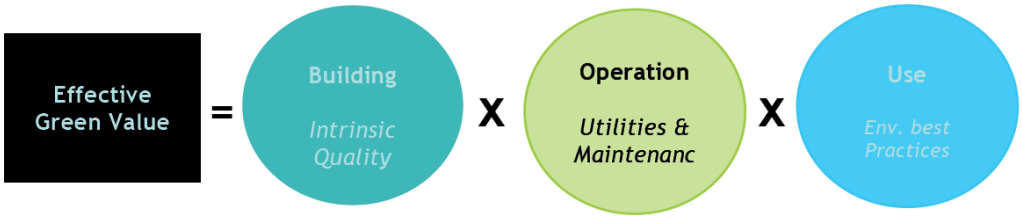
- the performance of buildings (the responsibility of which lies with the owner, investor or developer);
- the quality of operation (which largely depends on the facility manager);
- the conditions of use (which depend on tenants).

Figure 5: Contributors to effective green value

Depending on the concerned energy, health and environmental features, the respective responsibility of actors and their contribution to performance can vary. For example, indoor air quality depends as much on construction details as on the quality of maintenance and operation.

To make green value more tangible, two conditions seem necessary:

- going towards a guarantee on the environmental performance of buildings in operation ;
- revising the contractual relationships between actors.



27 See for example: Catarina Orlando, Illouz Sébastien, 2009; Newsham G.R., Mancini S., Birt B., 2009; Zgraggen et alii, 2006

In housing, energy performance guarantee is the priority

In the housing sector, it is difficult to force tenants to adopt specific behaviours in their own home, even if it benefits them. The guarantee of performance will therefore rely mainly on energy service companies, and will apply to energy performance.

Energy performance contracts in housing, which are currently under development[28], aim to guarantee tenants a stable volume of energy consumptions for heating, indexed on climate (heating degree-days), with a controlled service level. Energy consumptions for domestic hot water may either be guaranteed as a fix amount, or as a level of efficiency of boilers, since the volume of consumed hot water is extremely hard to control.

Unlike energy performance certificates, energy performance contracts will enable to prove the green value of a residential building. They are also a useful argument in order to negotiate with tenants the recoupment of part of the energy savings when it is allowed, as is the case for France since 2009. So far, this type of contract is limited to multifamily buildings with a collective heating (and domestic hot water) plant, as this is the only way to control energy consumptions.

Guaranteeing the environmental performance in office buildings

In office buildings, performance guarantee is progressively addressing all environmental aspects. This requires a new form of contract which involves the implementation of green leases binding owners and tenants[29], associated with energy and environmental performance contracting binding owners and operators. This tripartite organization, presented in figure 6, requires changes in the contractual logic around a set of reciprocal environmental commitments binding owner, tenant and operator.

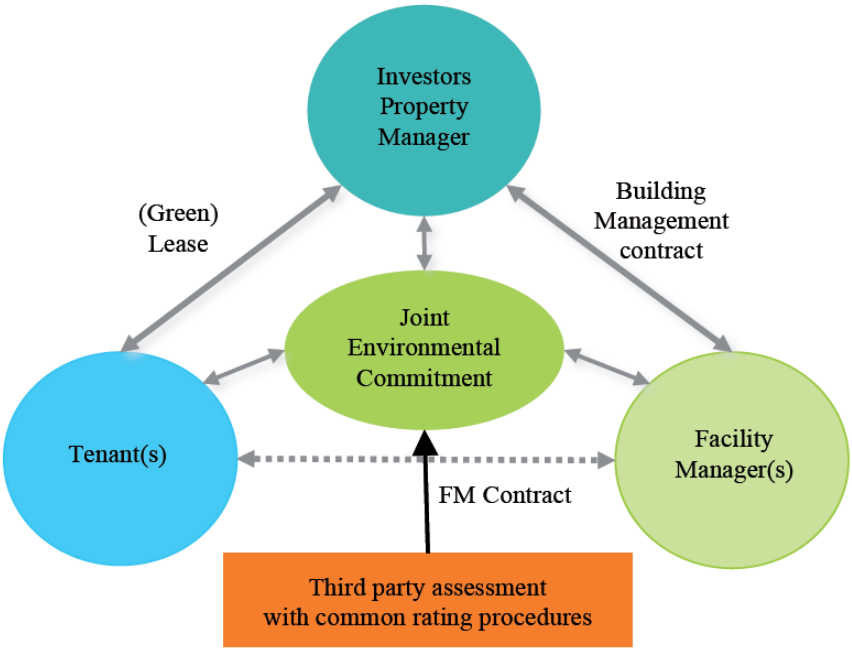
The current contractual arrangements need to be revised, in line with the emerging practices of "green leases", environmental certification in operation (BREEAM in use, HQE exploitation in France), and energy performance contracting.

Figure 6: New contractual relationships for environmental performance in office buildings

The joint environmental commitments should consist of three parts:

- Verified intrinsic features of the building and facilities
- Conditions of use of premises
- Performance commitments

Monitoring of commitments is provided by a third party on the basis of a common measurement protocol, in order to guarantee an objective evaluation.



28 See the work in progress in the FRESH project: www.fresh-project.eu

29 In France, leases for office buildings over 2,000 m² will have to integrate an environmental appendix from 2012 for new leases, and 2013 for all leases.

From obligation of means to obligation of results

Guaranteeing effective performance means to take the profession from a logic of means attributed to each profession, to a transversal approach of performance shared by all actors, who are both contributors and beneficiaries of green value:

- developers and owners need to define performance-oriented programs for construction and upgrading works, and to involve future users and operators as early as possible;
- users need to be able to select buildings and associated services based on their contributions to the performance of the company's core business, which goes beyond the mere mastering of occupancy costs;
- operators need to be able to offer their customers solutions that combine actions on the building envelope and plants, the operation and use of buildings, in order to reach performance.

Identifying, measuring and sharing the benefits of environmental performance of buildings

We have presented a series of arguments supporting the idea that sustainable buildings generate added value for investors, and that this phenomenon will increase in the coming years as environmental performance will become a differentiating criterion. Sustainable development entails a new paradigm in the building sector, which is well understood and progressively mastered in technical terms. Yet, it has not been seized properly by financial experts, which is an obstacle to massive investments in sustainable buildings.

The earnings generated by green value need to be fully recognized by market actors in order to change the approach of investment, risk and return on investment. In particular, property valuers need to operate a radical change in their practice, by adopting a prospective vision rather than retrospective. Financial simulations can also be revised to integrate environmental and energy performance as a major factor of risk and opportunity to create new value. Last but not least, the coordination between all actors in the value chain needs to be dramatically improved in order to be able to guarantee green value in the future.

The transition to this new paradigm is already to be seen in the emerging practices of some actors, although they are still marginal on the market. These practices will progressively spread to other market segments and national markets, as they are based on structural long-term trends. This transition could be accelerated by the harmonisation of environmental indicators, and the definition of a long-term policy framework on environmental performance issues, as it has been done for energy performance.

References

Catarina Orlando, Illouz Sébastien, 2009, ”Retour d'expérience de bâtiments certifiés HQE: Dynamiser l'efficacité énergétique des gestionnaires de patrimoine du secteur privé”, PREBAT-ADEME-ICADE-CSTB, Paris, France.

Eichholtz Piet, Kok Nils, Quigley John, 2009, "Doing Well by Doing Good? An Analysis of the Financial Performance of Green Office Buildings.", RICS Research, London, United Kingdom

European Commission, 2011a, “A Roadmap for moving to a competitive low carbon economy in 2050”, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011) 112 final, Brussels, Belgium

European Commission, 2011b, “Energy Efficiency Plan 2011”, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011) 109 final, Brussels, Belgium

Fuerst Franz, McAllister Patrick, 2009, “New Evidence on the Green Building Rent and Price Premium”, Paper presented at the Annual Meeting of the American Real Estate Society, Monterey, CA, USA.

Lorenz David, (2006), “The Application of the Sustainable Development Principles to the Theory and Practice of Property Valuation, Karlsruhe Schriften zur Bau-, Wohnungs- und Immobilienwirtschaft”, Karlsruhe, Germany.

Miller Norm, Spivey Jay, Florance Andy, 2008, “Does Green Pay Off?”, draft paper.

Newsham G.R.; Mancini, S.; Birt, B. 2009, “Do LEED-certified buildings save energy? Yes, but...” Institute for Research in Construction, Canada

Observatoire de la qualité de l’air intérieur, 2006, “Campagne nationale logements. Etat de la qualité de l’air dans les logements français. Rapport final”, Paris, France

RICS, 2005, ”Green Value, Green Building, Growing Assets”.

Zgraggen Jean-Marc, Barthassat Marcellin, Haefeli Peter, Lachal Bernard, Schmid Bruno, Weber Willi, 2006, “Case study of a low-energy (Minergie®) multifamily complex in Switzerland. First appraisal after two years of exploitation”, 23rd Conference on Passive and Low Energy Architecture, Geneva, Switzerland

Zurich Cantonal Bank, 2008, ” Der Minergie-Boom unter der Lupe”, Zurich, Switzerland.