ARE "GREEN" OFFICE BUILDINGS KEEPING THEIR PROMISES?

Actual performance, real estate value and "HQE® Exploitation" certification

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SUMMARY

The study provides the answers to five questions:

1/ What is the actual performance of certified office buildings?

Certified office buildings appear[1] to have on average actual performance above that of non certified buildings, but in a number of cases, the actual performance may be significantly lower than standard forecasts.

The gaps between conventional performance and actual performance may have three causes:

- The first may be a difference in the use by occupants with standard forecasts, in particular for the interior temperature and occupation duration

- The second may be due to difficulties in the management and control of the technical installation

- The third may be relating to the programming, the design or the development of the building, with for instance some unsuitable programming choices for management or equipment that does not perform as well as expected once in place.

2/ Is there a trend towards measuring actual performance?

The trend is towards the measurement of the actual environmental performance of buildings by:

- public authorities, despite a few ambiguities in the Grenelle Environment Forum

- and by real estate professional, in particular the users.

3/ What link is there between performance and real estate value?

In the American market, the only market where several hundreds of certified (Energy Star® or LEED®) office buildings have been rented, occupied and resold, "green" office buildings tend to be more expensive to rent, to have a higher rate of occupation and a higher resale price than "non green" buildings with similar characteristics.

The link between environmental performance and real estate value is probable, on the conditions that the "green" building respects the real estate fundamentals: quality of the location and public transport links, quality of use adapted to the demand.

This "green value" may take two forms:

- *Goodwill for "green" buildings, in the context of real estate markets set to increase.*

[1] We say 'appear to have' considering the low number of HQE® and BBC Effinergie®(BBC is corresponding to average energy consumption of 50 kWh – in primary energy - per square meter per year) certified office buildings currently in operation and given the absence of watchdog for the comparison of real performance for certified and non-certified office buildings.

- *A reduction in value for "non green" buildings, in the context of real estate markets set to decrease.*

This "green value" will appear more easily in non-stringent markets than in stringent real estate markets.

4/ What is the advantage of "HQE® Exploitation" certification?

The "HQE Exploitation" certification, in the "Operation and Use" version, where the user is involved, represents significant progress towards the consideration of the actual performance of buildings and implements the bases for a new cooperation between the owner/manager, user and operator.

5/ What transformations in the system of key players in building and real estate are necessary for management based on actual performance?

The design must consider the quality of use as the first characteristic of "green" office building. The temperature, air quality, lighting, ventilation, acoustics, visual comfort and olfactory comfort take part in the "green comfort". The occupant must be able to manage the immediate environment. The participation of the user, when known, to the design is desirable.

The design of a "green" building must integrate the maintenance operation dimension operationally. One way is to involve the operator in the design, in particular for the choice of equipment.

The intrinsic environmental performance of the "green" building, before operation and use, is fundamental. It would be logical for participants in the building or renovation act to be paid according to the intrinsic environmental performance. A guarantee of performance, certified by a third party and based on an assurance, could be added.

The jobs of owner/manager, user and operator are evolving with the emergence of the notion of the actual environmental performance of buildings. The "HQE® Exploitation" certification is highly complimentary to the implementation of the green appendix in leases and energy performance contracts.

Eleven recommendations have been formulated for building and real estate professionals as well as certifiers.

INTRODUCTION

Real estate represents in France 45% of energy consumption and 20%[2] of greenhouse gas emissions. High energy-environment performance "green" real estate is developing strongly, in particular in the form of certified buildings. These certifications address the programming, design and development of buildings before operation and use. It is therefore a conventional performance, based on the technical characteristics of buildings and equipment, hypotheses for the external temperature and future use of buildings (interior temperature, occupation duration, etc.).

But what is the actual performance? Is the actual performance of "green" certified buildings in compliance with forecasts? In other terms, do "green" buildings keep their promises? Is there not a link between energy and environmental performance and the value of buildings? And if the actual performance is not as expected, is the value of buildings less than hoped for?

To answer these questions, the CSTB and CERTIVEA, subsidiary of the CSTB, "HQE®" certifier for tertiary real estate, have commissioned us to carry out this study, centred around the "HQE® Exploitation" certified offices, a certification which applies not only to the intrinsic environmental quality of buildings, but also to the environmental quality of the management-operation and use[3].

The study proposes to provide elements to answer five questions:

- *What is the actual performance of certified office buildings?*
- *Is there a trend towards measuring actual performance?*
- *What link is there between performance and real estate value?*
- *What is the advantage of "HQE® Exploitation" certification?*
- *What transformations in the system of key players in building and real estate are necessary for management based on actual performance?*

The method used to answer these five questions has two aspects: the analysis of several French and foreign studies and research and the interviews of eleven top managers

[2] On average, 36% within the European Union and 40% in the United States. The percentage is not as high in France due to the fact that close to 80% of electricity comes from decarbonated nuclear energy.

[3] The complete name for this certification is "NF Bâtiments Tertiaires en Exploitation Démarche HQE®" [French Standard for Tertiary Buildings in Operation HQE® Procedure] The name of the certification that applies to the programming, design and development of offices is "NF Bâtiments Tertiaires Démarche HQE®" [French Standard for Tertiary Buildings HQE® Procedure]. In the remainder of the text, we will use the abbreviations "HQE® Exploitation" and "HQE®".

of six real estate key players in the tertiary sector: two investors, two users and two operators[4].

The studies and research used are either statistical analyses or real case studies.

The same of persons interviewed is of course not statistically representative either by their number or by the methods of selection. The number indicates a qualitative analysis method that aims to listen to arguments developed by a limited number of key players concerned by the questions asked. The criteria for selecting the key players was the existence of the practice of the operation of "HQE® Exploitation" certified buildings by these professionals, or buildings for which certification was in progress.

The key players interviewed have environmental practices significantly greater than the average for real estate professionals. The interesting feature is that, on one hand their practices represent concrete solutions to the questions asked in the current debate, and on the other hand they offer new avenues to be progressively followed by all professionals.

1/ WHAT IS THE ACTUAL PERFORMANCE OF CERTIFIED OFFICE BUILDINGS?

A statistical analysis of LEED certified buildings

Newsham, Mancini and Birt (2009)[5] begin by analysing some research based on a small number of case studies of LEED certified buildings in the United States, before proceeding with a statistical analysis.

The authors compare the energy performance of a hundred LEED certified tertiary buildings (offices and public buildings) with 2,907 comparable buildings from the CBECS (Commercial Building Energy Consumption Survey) database, and compare the level of energy performance of certified buildings with the number of energy credits of the LEED rating.

On average, the LEED buildings have an energy consumption of less than 18 to 39% according to the comparison parameters to those of comparable non certified buildings in the housing stock. However 28 to 35% of LEED buildings, according to the comparison parameters, have a consumption that is greater than that of non certified comparable buildings. Furthermore, there is no regular link between the level of performance and the number of energy credits obtained in the LEED rating.

[4] See the list of persons interviewed in appendix 1.

[5] See references in appendix 4.

The authors note that their research presents a limit, i.e. that in the sample data may concern the first year of use, which is always a year of 'running in', and which is consequently not representative of a standard use of buildings.

The authors indicate that according to the case studies they mention, three causes may explain the differences between forecasts and reality:

- The construction of buildings: development different from the initial design, technologies not as high-performance as expected
- The management of buildings, with in particular a badly managed 'relay' between the builder and the manager-operator
- A use that is different to that which was provided for in the use convention described in simulations, in particular the occupation duration of the building.

Three case studies of certified office buildings with HQE® certification

Catarina et Illouz (2009) detail three case studies of offices. They are the very first HQE® certified operations of offices in France.

The Building 270, developed by ICADE in Aubervilliers, with a surface area of 9 400 m² TNFA, delivered in October 2005, had a target of 120 KWhef/m²/year[6] for regulatory uses (heating/cooling, ventilation, hot water, lighting and auxiliaries). Its actual consumption in 2007 was 170 KWhef/m²/year.

The main cause for the gap is the fact that one of the tenants (a newspaper), instead of occupying the building in a normal manner, is occupying it 7 days a week, 24 hours a day. If the use had been compliant with a usual occupation (5 days a week, 10h a day), the regulatory consumption would have been in the order of 120 KWhef/m²/year, i.e. a performance in compliance with the forecasts.

Furthermore, it was planned that the average temperature would be 19°C in winter and that the air conditioning would be triggered when the temperature reached 26°C. In fact the temperature is 22°C in summer and winter.

The gap therefore mainly comes from the use and in particular the exceptional duration of occupation of the building. This gap would have been less if the operation

[6] The unit used should always be precisely indicated. We will use the KWhef /m²/year or the KWhep/m²/year according to whether it is final energy (fe) or primary energy (pe). Except where specified otherwise, it is TNFA (total net floor area). Strictly speaking, in order to be compared with the planned consumptions, the real consumptions must be corrected by degree days (DD) as provisional simulations are based on the technical characteristics of the building and installations, on external temperature hypotheses and on hypotheses for behaviour and use (interior temperature and occupation duration in particular).

programme had provided for the management to be isolated floor by floor, which it is true, comes at a cost. The building was programmed with an air treatment installation that imposes an overall operation whatever the number of floors occupied.

The performance for the quality of interior air (level of dust, CO2 level, level of bio-contamination) is significantly greater than that of the three non certified buildings close by.

Moreover, the technical operation was more complex than planned. The automatic devices (temperature, lighting and blinds) and the impossibility of opening the windows were not very much appreciated by users. No or little information of the HQE® character of the building was given by the renting companies to their employees.

In order to better control the management-operation and use, the owner then had the building "HQE® Exploitation" certified.

The building Millénaire 1, also developed by ICADE, with a surface area of 31,700 m² TNFA, delivered in 2006 in the 19th arrondissement of Paris, had a target of 92 KWhef/m²/year for regulatory use. Its actual consumption in 2008 was 155 KWhef/m²/year. The heating is compliant with forecasts (48 KWhef/m²/year). The gap comes from the air conditioning/ventilation, lighting and domestic hot water (107 KWhef/m²/year instead of 44).

The analysis showed that the causes for the gap were due to:

- The methods of operation: operating time for the heating and air conditioning not optimised for the occupation, simultaneous consumption of heating and air conditioning, excessive air flow rates, car park lit 24 hours a day.
- The use: the interior temperature in winter was greater than 22°C, the air conditioning was started from 23°C.

An action plan was implemented to reduce the gap.

As for the Building 270, in order to better control the management-operation and use, the owner has since had the building "HQE® Exploitation" certified.

The third building studied, a building by INERIS, delivered in 2005 in Verneuil en Halatte, has a smaller surface area: 1,500 m² TNFA. Its planned energy performance was 106 KWhef/m²/year for regulatory uses and 174 KWhef/m²/year for inclusive office use. The actual consumption in 2008 with offices, was 162 KWhef/m²/year, i.e. a better performance than expected by 7%.

The thermal comfort, in winter and in summer, was not deemed completely satisfactory by users.

The sources of information in France on the actual consumptions of "HQE®" office buildings compared with comparable non-HQE® buildings do not exist. In a presentation by the IPD in June 2010, figures indicated that in the sample studied, in the "HQE®" buildings, compared with non-HQE® buildings, per occupant, the energy consumption is 17% less, the water consumption is 43% less and the waste is 56% less. But the author then adds that "considering the limited sample of "HQE®" buildings, the results must be analysed with caution[7]".

Certified buildings appear to have actual performance levels that are on average significantly higher than that of non-certified buildings, but in a number of cases, actual performance may be less than that forecast[8]. It is essential that a system for knowing actual consumptions in "HQE®" and non "HQE®" buildings be implemented in France.

The three causes of gaps between conventional performance and actual performance

Three main causes can explain the difference between forecasts and reality. The first is of course a difference between the standard behaviour of users defined to establish forecasts and the actual behaviour of users. More often than not, the theoretical performance of buildings in terms of energy are estimated according to DD (Degree Days) which define the external temperature, with the hypotheses of an interior temperature in winter of 19°C, a triggering of air conditioning from 26°C in summer and an occupation duration of 5 days a week, 10 hours a day.

We have thus observed that the Building 270 of ICADE, in appearance with a low level of performance, does in fact perform as planned when an occupation in line with forecasts is simulated.

Furthermore, the first year following the delivery of the building or after renovation works is often a 'running in' year, during which, in some cases, the drying of the building implies a provisional over-consumption and the operation and behaviour of users is adjusted.

[7] "The IPD 2010 indicators of the operation real estate. Environmental performance". François Jussaume. 24 June 2010

[8] Any gap between forecast performance and real performance does not only concern tertiary buildings. It also concerns housing. See the research relating to the operation of Minergie® certified housing close to Geneva: Zgraggen et alii (2006).

In order to measure the performance of a "green" building, it is necessary to:

- *Measure its performance the second year following delivery, as the first year is often a 'running-in' year for the operator and users, and in some cases, a year for the drying of the building.*
- *Take account of the external temperature, through the method of DD (Degree Days)*
- *Consider the differences between the expected standard behaviour of users and their actual behaviour, in particular concerning the interior temperatures adopted in winter and in summer, the number of persons present, the office consumption per workstation and the duration of occupation of premises in the year.*

The second cause for gaps between forecasts and reality may be due to difficulties in the management and control of the technical installation. The strong cut-off which exists between key players in construction and those in management-operation must be called into question. The latter may be associated with the choices in the design phase and a balance must be found between the efficiency of the installation and management facilities.

The third possible cause may concern the programming, design and development of the building. Once installed, equipment may not perform as expected. A programming may be unsuitable for the management, as we have noted in the case of Building 270 where the programme did not provide for a separate management per floor, even though the building had been rented through independent floors.

We will cover in the fourth and fifth parts these important questions by using in particular the CSTB-ICADE research which defines conclusions from the relations between performance and use, jobs, relations between key players and tools[9].

To summarise, the gaps between theoretical performance and actual performance may have three causes:

- The first may be a difference in the use by occupants with standard forecasts, in particular for the interior and external temperature, the number of persons present, the office consumption per workstation and the occupation duration

- The second may be due to difficulties in the management and control of the technical installation

- The third may be relating to the design or the development of the building, with for instance some unsuitable design choices for management or equipment that does not perform as well as expected once in place.

2/ IS THERE A TREND TOWARDS MEASURING ACTUAL PERFORMANCE?

[9] The conclusions of the CSTB-ICADE study are included in appendix 2.

The ambiguities of the Grenelle Environment Forum

Public authorities on three levels, international, national and local adopt plans to reduce energy consumptions and CO2 emissions with measured and dated targets.

In order to meet the targets set by the European Union, the Grenelle 1 law no. 2009-967 of 3 August 2009 set for new buildings a target for decreasing by 50% the energy consumption between the 2005 regulations and those of 2012. For the existing housing stock, the target is of less than 38& on average for the 3.5 billion m² of stock between 2009 and 2020.

Every region, department, commune or group of communes of over 50,000 inhabitants will set targets to reduce energy consumption and greenhouse gas emissions in their Territorial Climate Energy Plans.

How will the targets of the Grenelle Environment Forum be met? Although the Diagnostics for Energy Performance (DEP), centralised by the ADEME, constitute the basis for monitoring, the response is mixed; some DEPs are standard calculations based on the estimation method known as 3CL and other DEPs are calculated based on actual consumption.

For the tertiary sector, the Grenelle Building Plan group led by Serge Grzybowski, President of ICADE, in its report of 27 October 2009 proposed that "the law imposes on the user the measurement of overall actual consumption of final energy, a standardised annual calculation and its communication by the owners to the independent authority which would centralise consumptions." The legislator did not adopt this proposal.

According to one of the interviewed investors, the implementing provisions for the green appendix to leases, provided for by article 8 of the Grenelle law 2 no. 2010-788 of 12 July 2010 should apply to actual consumption. In fact, the "Green value" workgroup of the Grenelle Building Plan, led by Méka Brunel, Europe General Director of the SITQ (Caisse de Dépôt et Placement du Québec), which we will discuss later, recommends that the transmission of actual consumption from the tenant to the owner be made mandatory in the tertiary sector.

The implementing provisions for the obligation of works in the tertiary could also apply to changes in actual consumption before and after works.

Despite some ambiguities at the start, the trend of the Environmental Grenelle is towards the monitoring of actual consumption, at least for the tertiary.

Let us also note that the call for projects from regional councils, in relation with ADEME and the PREBAT, for low energy consumption construction and renovation operations include a monitoring of actual consumption for two years after the delivery of buildings.

The British approach

In the United Kingdom, the Carbon Reduction Commitment (CRC) requires, since April 2010, that the 5,000 biggest non-industrial electricity consumers send their energy consumption invoices to a public agency. This concerns banks, real estate companies, transport operators, ministries, local authorities, etc. who consume over 6,000 MWh of electricity per year.

The government will publish every year the ranking of participants according to their carbon performance measured from their actual consumption. Depending on their rank, the participants will receive a benefit or will pay a penalty. In 2011, the non performing entities will pay a penalty of 12 pounds per tonne of CO2 emitted beyond a certain level of performance. In 2013, a market to negotiate and exchange CO2 emission credits will enable non performing entities to purchase credits from performing organisations. The non compliance with the obligations of the CRC will be subject to criminal offences[10].

Users are interested in actual performance

Together with pubic authorities, some investors and users are also interested in actual performance.

One of the investors interviewed for this study decided three years ago to assess the actual energy consumption of all of his actual estate holding, with a rating for each building and an estimation of the cost for upgrades according to the thermal regulations for existing buildings of 2007, itself based on the new thermal regulations of 2005. The cost of the assessment with rating and estimate is €5 to 10,000 per building.

The assessment is not limited to regulatory consumptions but covers all consumptions with starting situations from 400 to 800 KWhep/m²/year excluding car parks. This investor decided that a significant proportion of his holdings (over a quarter) would be "HQE® Exploitation" certified.

A French property and real estate company measures every year the actual consumption of its corporate real estate holdings, logistics, health, hotels, and on this basis,

[10] See appendix 1 on the British CRC in the "Report on the obligation to establish an assessment of greenhouse gas emissions provided for by article 26 of the bill providing a National Commitment to the Environment", established by Michel HAVARD. French document. December 2009.

has set itself the ambitious target of reducing by 40% between 2008 and 2016 its consumptions measured in KWhep/m²/year, with an intermediate target of 23% less by 2012.

The other investor interviewed insists on the necessity to measure actual energy performance, and not only those of regulatory uses. He notes on this topic a change in the behaviour of users.

According to him, the "green" notion is not limited to energy, but also concerns water, waste, the comfort of occupants and their transport. This investor set himself a target to reduce his Carbon Footprint between 2007 and 2011 by 10%.

The two users interviewed in the context of this study set themselves objectives to measure and reduced actual consumption.

In his "HQE Exploitation" head office, one of them first invested €140,000 in sub-meters. The return on investment time, at the current energy price is of 2.5 years.

He then set himself the targets for a real reduction between 2009 and 2010 of 10% for electricity, 5% for hot water production, 5% for iced water production, 5% for water consumption and 8.5% of CO2 emissions. These targets should all be reached and exceeded for water consumption.

The other user set himself the target within his head office, also "HQE® Exploitation" certified, of a real reduction for regulatory consumption of 127 KWhef/m²/year in 2009 and 92KWhef/m²/year in 2010 then of 80 KWhef/m²/year in 2011. The following stage will include all consumptions including offices.

The same user decided on a short-term action plan to reduce actual consumption in five regional branches. The financial rule selected was a time for return on investment of less than 3.5 years with the current energy prices. In another agency, where the building was correctly built, directed and managed, the short return time clearly exceeded the maximum set. In the other four agencies, the actual saving in consumptions was on average less 29% after works, with an average return on investment time of 3.1 years.

In brief, the trend is towards the measurement of the actual environmental performance of buildings by:
- public authorities, despite a few ambiguities in the Grenelle Environment Forum
- and by real estate professional, in particular the users.

3/ WHAT LINK IS THERE BETWEEN PERFORMANCE AND REAL ESTATE VALUE?

The question of performance is even more important insofar as beginnings of a proof of a link between performance and building value are appearing, essentially in the American office market. In this market, hundreds of Energy Star or LEED certified buildings have been rented, occupied and resold[11].

Energy Star and LEED certifications and real estate value

An issue with the method must be highlighted from the start: it is necessary to compare certified and non certified buildings that are as comparable as possible.

When in the first part of their article Miller, Spivey and Florance (2008) indicate a rent difference of 36% between LEED certified buildings and non certified buildings and a sale price difference of 64%, these figures, as is noted by Muldavin (2008), are false. The authors simply define the category of building studied as: category A building (quality), of more than 200,000 square metres, of at least 5 floors, built after 1970, with multi-units.

In this highly heterogeneous category, the high rental and price difference is very likely to come from the fact that LEED buildings are more recent, better located and more comfortable than non LEED buildings. These figures cannot be used.

To compare comparable buildings, the method known as that of hedonic pricing must be used, which tends to neutralise the characteristics, other than certification, which influence the rental and price: location, age, comfort, state of the market, with a formula of the type:

$$P = \alpha + \beta_1 C_1 + \beta_2 C_2 + \ldots + \beta_e C_e + \beta_i C_i + \ldots + \beta_n C_n + \varepsilon$$

where P is the rent or the resale price per m², α is a constant, β_i is the regression coefficient for every characteristic i, C_i is the characteristic i, C_e is the energy environment characteristic, often defined in the United States by the presence of an Energy Star and/or LEED certification, and ε is the error term or residual.

[11] There also exist in the housing sector several studies by the Zurich Cantonal Bank on the goodwill resulting from the Swiss Minergie label, several thousands of certified buildings having been rented, occupied and resold in Switzerland: see Zurich Cantonal Bank "Minergie macht sich bezahlt", 2008.

Four research papers use the American database CoStar. Eichholtz, Kok, Quigley (2009) study three variables: rent, occupation rate, resale price of Energy Star and LEED certified buildings compared with non certified buildings with comparable characteristics.

The studied sample covers, during the period 2004-2007, 694 certified rented buildings compared with 7,488 non certified buildings and 199 resold certified buildings compared with 1,617 non certified resold buildings.

The certified buildings have on average a 3% higher rent[12], a 6% higher rental revenue (rent multiplied by the occupation rent) and a 16% higher resale price. Note that according to this research, this differences only concern Energy Star certified buildings. There is no difference between LEED certified buildings and non certified buildings.

In a second research paper (Eichholtz, Kok, Quigley (2010)), the authors analysed the change in the difference between certified and non certified comparable buildings during the real estate crisis, comparing the situation in September 2007 and October 2009.

In their sample, the rents decreased in two years on average by 5.4%. Certified buildings resist more and maintain an advantage compared with comparable non certified buildings but the difference is reduced: it is of 1.2% for rents and 2.4% for rental revenues. For resale prices, the difference is on average 13% in favour of certified buildings.

The analysis by Fuerst and McAllister (2009) covers around 200 LEED buildings, a thousand Energy Star buildings and 16,000 non certified buildings, present in the CoStar database at the start of 2009. With definitions of characteristics which are not the same, Fuerst and McAllister find a higher difference in rent, equal to 6%, but unlike Eichholtz, Kok, Quigley, the greater rent characterises Energy Star buildings as much as LEED buildings.

Their figures are even more surprising for resale values: over 31% for Energy Star buildings, over 35% for LEED buildings.

In the second part of their previously mentioned article, Miller, Spivey and Florance use the hedonic price method with a smaller sample over the period 2005-early 2008: around twenty LEED buildings, 600 Energy Star buildings and 2,000 non certified buildings. They only analyse the resale price and end up with a more reasonable difference than that mentioned in the first part of their article: over 6% for Energy Star, plus 10% for LEED.

Pyvo and Fisher (2009) use the hedonic price method but with another database, the NCREIF (National Council of Real Estate Investment Fiduciaries) database. Their research

[12] The rent subsidy given to "green" buildings is even stronger in the United States, rents are often defined with bills included, the user therefore does not benefit from savings generated by the "green" building.

covers 203 Energy Star buildings compared with 4,257 non certified buildings analysed between 1998 and 2008. The data is richer from a financial point of view than in the three previously mentioned research papers.

The net revenue per square foot is on average greater by 5.9% for Energy Star buildings. This difference is explained by a 4.8% higher rent, a 0.9% higher occupation rate and a 9.8% lower fluid expense. The market value is greater by 13.5%.

The capitalisation rate is 0.5% less. The capitalisation rate is the ratio between rent and value, a lower rate is a positive sign for Energy Star as it means that the investor thinks the risk is lower with an Energy Star building than a non certified building.

The change over time of the market value of Energy Star buildings is not greater than that of non certified buildings. Investors have stored the Energy Star benefit from the start with a higher rent and market value. Their asset is then not put to work more than the others.

The overall efficiency (revenues and sale price capital gain) is comparable for Energy Star buildings and non certified buildings.

The general conclusion of these research papers is as follows: generally, in the American market, "green" office buildings tend to be more expensive to rent, to have a higher rate of occupation and a higher resale price than "non green" buildings with similar characteristics.

The differences between the figures in the various research papers may be surprising, in particular between the three using the same database. This is explained by the fact that the various definitions of characteristics (which must always be quantified) are only more or less successful approximations of the complexity of the market mechanisms which defines the rents and resale price of an office building.

In France, we will have to wait for several hundreds of buildings labelled High Energy Performance, Effinergie® Low Consumption Building, High Environmental Quality® to be delivered, rented and resold to produce the same research.

Researchers must also face a great difficulty: the strong opacity of the market of French offices compared with the transparency of the American market. In the latter, it is possible to know the actual rents, unlike the French market where the headline rent is often far from the actual rent.

The approaches of the Green Value Group of the Grenelle Building Plan and of the "Green Value in Practice" Group

The report by the Green Value Group of the Grenelle Building Plan, led by Meka Brunel, previously mentioned, covers the sector of offices.

It provides a diagnostic for a potentially higher profitability and some advantages of a "green" building due to the possibility of:

- *A higher rent*
- *Lower bills*
- *A higher resale price*
- *A higher "renting liquidity" (faster commercialisation[13], lower vacancy)*
- *From a higher "sale liquidity" (faster sale, fewer upgrade works)*
- *Easier financing (lower risk, fewer upgrade works)*
- *A potentially higher productivity of employees*
- *A corporate communication on "green" real estate.*

The group inserts its thinking into the current situation and defines two scenarios:

- *If the real estate cycle is on the rise, there is a possibility of benefits (rent, resale price) for "green" buildings*
- *If the real estate cycle does not go up again, there is a high risk of reduction in value of non "green" buildings, "green" buildings becoming the new market reference.*

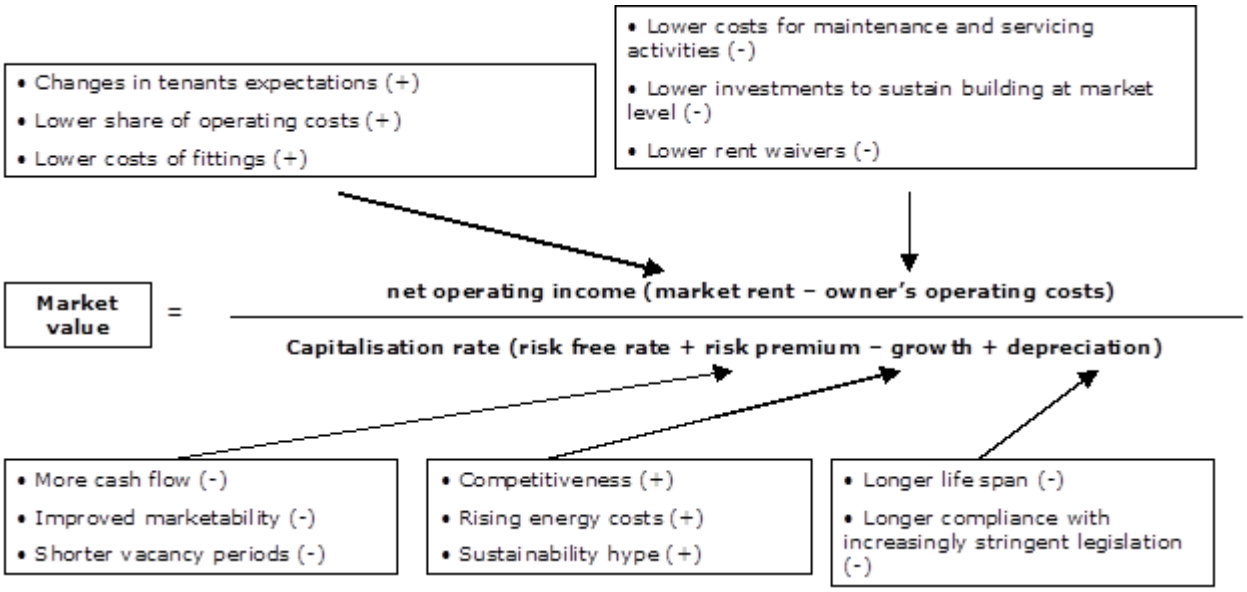
In any case, the range of works in the existing stock to reach the targets of the Grenelle Environmental Forum is such that the group proposes legal and tax measures to facilitate these works and finance them.

We would add that the green value will appear more in non-stringent real estate markets than in stringent markets, where the pressure of the demand is such that the environmental performance will be less discriminating than in a non-stringent market.

A reflection group on the "Green value in practice", of which we are a part, has also produced an analysis on housing and offices owned by corporate owners (Bouteloup et alii, 2010).

The group starts with the definition of real estate value, rent ratio less owner outlay on the capitalisation rate, and the potential influence of environmental performance on the determining factors of the value of a building:

[13] See Jones Lang LaSalle. "Sustainable real estate crib sheet". November 2009, page 8.



Source: David Lorentz in Bouteloup et alii (2010).

The group assesses as experts, the short and medium-term impact of the influence of the energy-environment-health performance on the five factors that determine value: rent, owner outlay, risk bonus, growth in owner revenues, depreciation of the building (see table on next page).

Based on the hypothesis of a link between a real energy-environment-health performance and real estate value, it suggests that in order to ensure the "green" value, the actual performance must be ensured. It indicates that such a guarantee requires a deep transformation of the relations between three key players: the owner, responsible for the intrinsic environmental quality of the building, the user, responsible for the environmental quality of the use and the operator, responsible for the environmental quality of the operation.

This includes new contractual relations between the three key players: performance contracts, lease green appendix, three-party contract.

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

Source: Bouteloup et alii (2010).

Investment, theoretical performance, actual performance

The two interviewed investors share the idea of a high risk of reduction in value of non "green" buildings.

One of them reiterates that the obligation to perform energy renovation works as provided for by article 3 of the Grenelle 2 law no. 2010-788 of 12 July 2010 leads to a high risk for buildings that need a lot of work.

He reiterates that the HQE® certification by itself cannot prevent the risk of reduction in value. The questions of quality of location, in particular public transport links and the quality of use, considering the needs, in terms of IT in particular, and the habits of users (presence of suspended ceilings and raised floors in particular) are two determining factors.

HQE® buildings with insufficient public transport links present a higher risk of vacancy in some locations.

The other investor notes that a HQE® building, generally, is rented faster, is rented better (better user signatures) and fosters tenant loyalty better.

When the usual formula for real estate value previously mentioned is used (rent minus capex[14] for capitalisation rate), "green enters via the capex". Previously, provisional expenses for upgrade works were assessed in a standard manner. They are now subject to in-depth analyses in anticipation of the 2012 and 2020 thermal regulations, based on a new relation between financial analysts and technical management. Financing is difficult when the building has not yet been amortized.

This investor prefers, in terms of green value, to speak of "green comfort" rather than energy performance. Three elements play a significant role in this "green comfort": lighting, air renewal (which must avoid air movements) and air conditioning. According to him, the comfort must be the main preoccupation of an HQE® office building.

In terms of value, let us not that one of the interviewed users indicated that the owner had decided on a significant increase in the headline rent, arguing in particular for the rise in value provided by the "HQE® Exploitation" certification.

[14] Capex means Capital Expenditure, this means the works to upgrade a building.

The first cited research paper by Eichholtz, Kok, Quigley which shows a premium only for Energy Star-certified buildings and not for LEED ones, would appear to indicate that during the period studied, American investors had tended to assign a premium to energy efficiency more so than environmental performance, as this energy efficiency is the actual performance.

This is because Energy Star, for commercial buildings, is issued based on an analysis of the building's actual consumption compared to that of the sample measured yearly as part of a large survey conducted under the authority of the U.S. Department of Energy. Depending on the climate zone and the building's characteristics, the building is rated from 0 to 100, and gets certified if its rating is greater than or equal to 75. An Energy Star commercial building is therefore in the top 25% of such buildings nationwide.

Quite differently, LEED certification, like HQE® certification, is based on standard consumption.

However, the research by Fuerst and Miller indicates that a premium is assigned to both Energy Star and LEED buildings.

It may be hypothesized that, first, the added value may be based on performances which could either be standard or actual, with the selling point for the investor being that it is certified by an independent organization.

Second, it is conceivable that given changes in regulation (Carbon Reduction Commitment, green lease annexes, etc.) and the interest that users and, increasingly, investors have for actual performance, a link will be established between real estate value and actual performance.

To summarize, the link between environmental performance and real estate value is likely, provided that the "green" building abides by the fundamentals of real estate: a quality location and quality access to public transport, and good usage quality.

This "green value" may take two forms:

- **An added value for "green" buildings, in upward-trending real estate markets,**
- **A discount for non-"green" buildings in downward-trending markets.**

The "green value" will be more readily apparent in low-activity real estate markets than in high-activity markets.

4/ WHAT IS THE ADVANTAGE OF "HQE® EXPLOITATION" CERTIFICATION?

The content of "HQE® Exploitation" certification

"HQE® Exploitation" certification represents a major change in the building certification system. For the first time in Europe[15], a certification does not just ratify the theoretical potential of a building when it is delivered, but also includes the operation and usage of the buildings.

"HQE® Exploitation" applies to both buildings certified and not certified as "HQE®" at the time of production.

The certification technical scheme is divided into three technical schemes:

- the Usage Management System,
- the Environmental Quality of Buildings in Use,
- the Environmental Quality of Practices.

The *Usage Management System (SMEx)* relies at the outset on an initial inventory (documentation, the structure's property and accessories, diagnosis of requirements related to the structure's Intrinsic Environmental Quality) and on the commitment by the certification-holder, whether that happens to be the owner, user, or operator.

It defines the implementation, operation, and management of usage: planning, responsibilities, skills, contracts, communication, documentation, emergency situation management, surveillance, assessing the buildings' environment equality, and practices.

The *Environmental Quality of Buildings in Use (QEBE) technical scheme* for each of the 14 targets of the HQE® method[16] defines:

- the intrinsic environmental quality of the building, before operation and use,
- the environmental quality of the usage,
- the 3 levels of performance: basic, performing, and high-performing[17].

[15] The British BREEAM certification has since created the "BREEAM In Use" version, whose approach is similar to "HQE® Exploitation".

[16] - Eco-construction: the building's relationship with its immediate environment, the coordinated choice of the products, systems, and construction methods, low environmental impact worksite,
- Eco-management: managing energy, water, business waste, and sustained maintenance of environmental performance,
- Comfort: hygrothermic, acoustic, visual, and olfactory comfort,
- Health: health quality of space, air, and water.

[17] In order to be certified, the high-performing level must be reached for at least 3 targets, performing for 4 targets, and basic for 7 targets.

The technical scheme also defines *four numerical indicators*: nonrenewable energy resource consumption (in kWh of primary energy), CO_2 emissions (in Kg of CO2-eq), water consumption (in m3), and waste production (in Kg).

The *Environmental Quality of Practices (QEP) technical scheme* defines the evaluation of owner, operator, and user practices in three fields: communication, space management, and purchasing.

"HQE® Exploitation" certification may be divided into four versions:

- *NF Commercial Buildings in Use* if the building's intrinsic environmental quality level is not met,
- *NF Commercial Buildings in Use HQE® Approach Operational Commitment Phase,* if the recent or recently renovated building has had less than 20% of its private surface areas occupied for longer than a year,
- *Operational Phase* if more than 20% of the private surface areas have been occupied for longer than a year,
- *Operational and Usage Phase* if more than 50% of the private surface areas have been occupied for longer than a year, with the commitment of the users.

In the first three cases, there is no commitment from the user.

As of February 23, 2011, 28 office operations are certified, all by the HQE® approach: seven in the Operational Commitment phase, twelve in the Operational Phase, and nine in the Operational and Usage phase[18].

Opinions of interviewed companies

The interviewed companies are favorable to "HQE® Exploitation" certification, but also express criticisms and make suggestions.

Some are convinced that this sort of certification is very useful. One investor indicates that a significant part of his portfolio (at least a quarter) must be "HQE® Exploitation"-certified. One operator is heavily investing in the approach by taking part in more than ten operations that are certified or undergoing certification.

The use of the Operational Management System technical scheme is particularly touted by some. One user says: *"We went from a situation in which the building was being managed with a lot of waste to a situation where it is being managed responsibly".* Another user indicates that the Management technical scheme is a good basis for the operator to

[18] See the list of operations, with the performance levels per target, in Appendix 3.

work from. As one investor colorfully stated, certification requires high-quality operation unlike some old practices which were said to be "oil-rag" work.

One user decided to apply "HQE® Exploitation" Certification and the ISO 14001 and EN 16001 standards to his building[19]. An important added value of "HQE® Exploitation" compared to the two standards that were used is the incorporation of comfort certified by a third party. This is important, particularly in relations with organized labor.

One operator appreciates the flexibility of "HQE® Exploitation" which makes it possible to temporarily certify an empty building (during the Operational Commitment phase, which becomes the Operational phase once 20% of the private surface areas have been occupied for longer than a year).

One investor feels that "HQE® Exploitation" certification contributes to increasing the building's value.

Another investor feels that "HQE® Exploitation" is in perfect keeping with the green lease annex, soon to be imposed by the Grenelle 2 law for all office and retail buildings larger than 2000 m². We will come back to this important comment later.

The interviewed stakeholders also issued criticisms. One investor finds the procedure to be burdensome and expensive. Its cost incorporates not just the cost of certification itself, but also the studies, the time spent, and the servicing needed to upgrade the building and manage it. He cites an amount of €100,000 for a 9,000 m² building. Another investor notes that the difficulty of the application depends on the building's management quality. The procedure is not complicated for a well-managed building. According to this investor, the cost of the procedure, work, and related service included is about €60,000 to €80,000 for an office building in the greater Paris region (Ile-de-France), half of which may be assumed by the user[20].

One question raised by investors, users, and operators alike is the cost of refurbishing buildings constructed before the 2000 thermal regulation. One investor indicates that the British "BREEAM In Use" certification is considerably less demanding regarding the building's intrinsic quality than "HQE® Exploitation".

[19] The ISO 14001 standard is an environmental management standard, while the EN 16001 standard is an energy management standard. The building that was mentioned is the first case of EN 16001 certification in France.

[20] The cost of certification alone is about 25 to €30,000 spread out over five years.

One user feels that target 9 regarding acoustic comfort is difficult to achieve in some cases.

The people we spoke to feel that the fact that the "HQE® Exploitation" procedure includes a "NF Commercial Buildings in Use" version without requirements for the building's intrinsic quality does not constitute a response to the question that was raised, since all of the stakeholders in question, including investors, users, and operators, are fully committed to receiving the "HQE®" label.

One investor believes that the user must take an active role in the process, since the "HQE® Exploitation" procedure includes an Operational version without the user's cooperation.

One sharp criticism made by a user and both operators is the absence of any incremental levels in the certification[21]. As one user indicates, *"there aren't any benchmarks; we are being compared to ourselves, but we would like to be compared to others, including for comfort and health."*

Suggestions made by professionals

The stakeholders also made suggestions. One user would like much closer communication regarding the "HQE® Exploitation" certification, which he feels is not widely known enough. He would also like "HQE®" to be better-known abroad and that the "Sustainable Building Alliance"[22] proceed quickly with its work on the harmonization and comparability of the various certifications on an international level.

One investor would like for "HQE®" to place greater importance on users' transportation, with an indicator for distance from public transport.

One operator describes four steps to progress:

- *The "HQE® " certification, for new or renovated buildings, defines the requirements regarding the building's intrinsic quality,* meaning the building's potential performance before operation and use,
- *The "HQE® Exploitation" certification, in the "Operational" version alone, allows the measurement of actual performance,*

[21] Unlike BREEAM certification which defines four levels (path, good, very good, excellent), HQE® certification is issued, as has been mentioned, with at least three high-performing targets, four performing targets, and seven basic targets, without any increments overall.

[22] See www.sballiance.org

- *"HQE® Exploitation" certification, in the "Operation and Usage" version,* associates the user with the tracking of performance and *organizes, a* de facto *opening of dialogue between the owner, user, and operator.*
- *It would now be suitable to go further by joining "HQE® Operation and Usage" with a three-part system made up of the owner, user, and operator, which would include an energy efficiency contract, with performance goals*, *and the green lease add-on.*

In the following section, we will return to this analysis, which combines the observation of the investor who desires a strong synergy between the "HQE® Exploitation" and the green lease appendix.

"HQE® Exploitation" certification, in its "Operation and Usage" version, represents a major advance in taking into account the actual performance of buildings, and lays the foundations for groundbreaking cooperation between owner/manager, user, and operator.

5/ WHAT TRANSFORMATIONS TO THE SYSTEM OF CONSTRUCTION AND REAL ESTATE STAKEHOLDERS ARE NEEDED FOR MANAGEMENT BASED ON ACTUAL PERFORMANCES?

We can only give part-answers to such an ambitious question. They will particularly take into account the content of the interviews conducted during this study, the PREBAT "Feedback on HQE®-certified office buildings" research, and the article "Assessing and guaranteeing green value."

Quality of usage, maintenance, operation, and design

The interviewed users are clear on this point: one feels that the occupants' "comfort, well-being, and health" are important, while for the other "comfort and working conditions" are. As we have noted, comfort and health are a major added value of "HQE®" certification compared to approaches such as ISO 14001 and EN 16001.

Temperature is an important element. The French regulation limiting temperature to 19°C[23] is difficult to apply. However, a change is possible. One user started by setting the temperature in his "HQE® Exploitation"-certified headquarters to 23°C, + or – 1.5°C,

[23] Article R 131-20 of the French Construction and Housing Code indicates "In premises used for housing, education, offices, or admitting the public and in all other premises, except for those which are indicated in articles R. 131-22 and R. 131-23, the upper limits of the heating temperature are, outside of the vacancy periods defined in article R. 131-20, set on average to 19° C:
- for all rooms of a home;
- for all premises devoted to usage other than housing and contained within the same building."

maintaining this temperature in the summer time. After allowing some time for awareness and negotiation, the temperature was lowered to 20°C, + or – 1.5°C, within an increase in summer to 25°C, + or – 1.5°C.

Besides temperature, components of comfort for a user are air quality, acoustics, olfactory, and visual. Ventilation is an essential component. One investor wishes to eliminate air currents and avoid using unit ventilators. Lighting is also an important component.

In short, *a "green" building's quality of usage is a key value.* One investor emphasized the notion of "green comfort". As Orlando Catarina and Sébastien Illouz put it in their research on HQE® feedback, *"energy efficiency must dissolve into quality of use".*

Designers must therefore have the comfort and well-being of the occupants as their first priority.

The way in which this comfort is managed is essential. Keeping everything on "autopilot" has serious limits. Occupants want to control their immediate environment themselves. One user noted the interest in individual remote controls which he had made available to each employee. This way, everyone can influence the temperature, fan speed, brightness of lights, and even the color of the lighting, with the option of a dominant orange or blue depending on the time of day.

Whenever the user is known, it is highly desirable for him or her to be involved in the design of the building.

The quality of use must be the main characteristic of a "green" building. The temperature, air quality, light, ventilation, acoustics, visual comfort, and olfactory comfort all take part in this "green comfort". The occupant must be able to control his or her immediate environment himself or herself. One way of improving the incorporation of quality of use is to have the future user, whenever he or she is known, involved in the design of the building.

Orlando Catarina and Sébastien Illouz quite rightly emphasize the need to mitigate the deep rift that exists between design-construction or renovation and maintenance operation.

They indicated that the document base is essential. The design documents intended for the operator can no longer be a byproduct of design; they should be operational records for an operator, kept regularly updated as living documents.

The issue of the quality of switching the building over from production to operation is essential. The practice of "commissioning" drawn from American experience is intended, by a quality system, to maintain performance in the sequence of scheduling, design, construction, and operation phases.

It is necessary to go further, to the point of having the operator take part in design. We are witnessing the first signs of this. One investor told us that in one of his operations, which is 15,000 m² in the region of Lyon, the future operator is involved in the design.

One operator highlighted the three best practices that he is starting to learn. The first is *his involvement as an operator in the pre-delivery and pre-acceptance of the building*, and then afterward participating in tracking the one-year full accomplishment warranty.

The second best practice is *his position as an assistant to the project owner (AMO) for choosing an operation's* accessories.

The third is *his participation, as an operator, in designing* a building, paid by engineering fees.

The design of a "green" building must operationally incorporate the maintenance operation dimension. One way is to get the operator involved in design, particularly when choosing accessories.

Towards guaranteeing the intrinsic environmental quality of buildings

Our study centered on "HQE® Exploitation" certification highlights the three factors which contribute to the buildings' actual performance: the building's intrinsic environmental quality, that of its management-operation, and that of its usage.

The actual performance is the result of articulation between two systems of stakeholders:

- *The project owner, lead contractor, contractor/industrial system leads to the building having theoretical intrinsic environmental quality and performance,*
- *The owner/manager, user, operator system leads to actual performance.*

It is important that the building's intrinsic environmental quality complies with the predictions. The "HQE®" scheduling-design-construction certification is oriented in this direction.

The system could go as far as to include a performance guarantee, supported by an insurer, based on which the owner/manager, user, operator system could achieve actual results.

One way to facilitate this theoretical performance is performance-based compensation. Later on we will highlight the practices of compensating occupants based on the energy consumption and CO2 emissions of the building in which they work. It would be reasonable for the earlier stakeholders, the operation installer, the contractor's team, and the company, to all be compensated based on the building's environmental performance.

The intrinsic environmental quality of the "green" building is fundamental. It would be reasonable for the participants in building or renovation to be compensated based on this intrinsic environmental quality. A performance bond, certified by a third party and founded on insurance, might strengthen the approach.

Change in owner/manager, user, and operator trades and their relationships

The investor sees his or her approach modified. One investor described for us *the outbreak of technical analysis in financial analysis*. We noted that the green value "was contributed by capex" (capital expenditure or renovation work). The investment's financial profitability, in particular for existing installations, now depends heavily on the cost of renovating the building. The cost of renovations needed to withstand obsolescence, particularly environmental obsolescence, caused by competition from performing buildings on the market, has become a strategic question.

The owner's management aspect is also undergoing changes. Though building management was once centered on maintenance, management is now founded on knowing how to measure, analyze, inform, and act. This will result in *a re-evaluation of the "property manager" profession", long neglected in favor of "asset managers."*

A user of office buildings seized his or her function change greatly with environmental building management. Faced with the dilution of responsibilities regarding environmental issues, it is desirable for an energy, environment and health manager to be named in each building or group of buildings.

Contrary to what is often stated, it is possible to change occupants' behavior. We have cited the user who managed to gradually lower the average temperature of the offices from 23°C to 20°C.

Another user told us about options for changing the sorting of waste. Once well-informed and aware, the occupants went from sorting 40% to 60% of their waste in two years.

One way of accelerating the change in behavior is to link wage incentives and consumption. An investor, acting as the building user, introduced *the calculation of a share of wage incentives based on actual energy, water, and paper consumption* into the offices where the occupants work three years ago. One user did the same with a share of incentives calculated based on actual CO_2 emissions and actual energy and water consumption. A portion of the building director's bonus is calculated on the same basis.

One investor complains that the users do not accept the increase in rent related to the improvement of their building's environmental performance. We believe that two things will change this behavior. The real estate market is cyclical and is currently tenant-friendly. It will become owner-friendly during the next phase of the cycle. In this predicted future, such rent increases will be easier to negotiate. Furthermore, the tenant needs a performance bond in order to accept such increases[24]. With these two components, rent increases for environmental performance should soon become easier to negotiate.

The profession of operators is undergoing changes. The traditional operator, called an "oil rag" by one investor, or ineptly imposing a 19°C temperature according to another investor, is becoming a company which *agrees on actual performance, with financial*

[24] Such practices are starting to appear. Thus, in a net-positive energy office building, in exchange for a rent whose face value greater than the market rate for rent, a real estate promoter guarantees the user all of his or her actual consumption for nine years if he or she abides by a predefined mode of occupation: open floor, working hours of 8 a.m. to 8 p.m., 13 m² per workstation, office rate of 12.6 KWhef/m²/year, etc. (Les Echos, January 13, 2011).

penalties if results are not achieved, *and sharing in the games with the owner if the expected savings are exceeded.*

The "HQE® Exploitation" certification, in its "Operation and Usage" version, contributes to creating new bonds between owner/manager, user, and operator.

This certification is closely linked, as one investor told us, to the major reform promoted by Article 8 of the Grenelle 2 law of July 12, 2010. This requires, for premises with more than 2 000 m² used for offices and retail, an environmental lease annex, for all leases agreed to or renewed beginning on January 1st, 2012, and by mid-2013 for current leases.

This green lease annex will greatly change relationships between the owner and the user. At the very least, it will organize regular meetings, the transmission of actual consumption data, the joint analysis of this consumption data, and an action plan for improving the results. For more ambitious owners and users, it will define minimum requirements for the accessories that are used and will set performances to achieve.

The harmony between "HQE® Exploitation" certification and the mandatory green lease appendix is very great. Certification "lays the groundwork" for the green appendix, in the fields of operation and usage. Its added value is having an independent entity certifying the improvements related to operation in usage, or even the performances achieved someday.

The "HQE® Exploitation" certification also complements performance contracts binding the operator with the user or owner. These contracts, which are either in the form of Energy Performance Contracts (CPE), or other forms of contracts with performances, commonly run up against two difficulties. The first is defining the baseline situation, which serves as the basis for defining the performance. The second is the sharing of performance responsibilities (or counter-performances) between manager, user, and operator.

One operator told us that a baseline situation defined by invoices from previous years and degree-days is highly subject to caution. On the other hand, a more accurate method such as the use of the IPMVP[25] measurement protocol developed in the United States under the responsibility of the Department of Energy and adaptable to France, makes it possible to better define both the baseline situation and the sharing of responsibilities between the manager, user, and operator.

These new relationships between stakeholders may go as far as including *a three-party agreement between owner/manager, user, and operator. One operator gave us a first example in a Parisian office building.* This contract defines as an absolute value the

[25] International Performance Measurement and Verification Protocol.

performances to achieve for power consumption for heating, air conditioning, lighting, and elevator use. Power consumption levels devoted to office software were observed.

The change in these relations between stakeholders centered on environmental performances should encourage *the extension of contracts' durations.* There is a major contradiction between environmental performances and the material and immaterial investments needed to achieve them on one hand, and normal practices for one-year contracts for Facilities Managers, Property Managers, and Asset Managers[26] on the other.

The change in relations between owner/manager, user, and operator regarding environmental performances represent a great economic and financial challenge, owing to the link between environmental performances and real estate value, as highlighted by the article "Evaluating and guaranteeing green real estate value" cited above.

The owner/manager, user, and operator professions are undergoing changes with the emergence of the notion of buildings' actual environmental performance. The "HQE® Exploitation" certification, which in its "Operation and Usage" version lays the foundations for groundbreaking to operation between owner/manager, user, and operator, is a strong complement for the enactment of the green lease annex and performance-based energy contracts.

ELEVEN RECOMMENDATIONS

Based on our analysis, we have made eleven recommendations, which are intended for professionals in the construction and real estate sectors and for certifiers. These recommendations particularly relate to offices.

1/ Set up a system for observing the actual consumption of the buildings, defining the conditions of use.

2/ Strengthen the notion of the buildings' actual environmental performance after operation and usage, by highlighting six measurable indicators: non-renewable energy

[26] To simplify, the Facilities Manager is in charge of daily service and managing utilities, the Property Manager is in charge of property management (leases, taxes, major repairs, etc.), and the Asset Manager is in charge of managing real estate as a financial asset.

(KWh of primary energy), CO2 (Kg of CO2-eq), water (m^3), waste (Kg), air quality[27], distance from public transport with its own lane (meters). Naming an actual environmental performance manager within the building or group of buildings.

3/ Widely publicize the "HQE® Exploitation" certification and extend it to all real estate segments[28].

4/ When designing buildings, prioritize the quality of usage, comfort, and well-being of the occupants. Placed particular emphasis on temperature, ventilation, lighting, acoustics, and air quality. Make sure the occupant can individually control his or her immediate environment. Whenever he or she is known, get the future user involved in designing the building.

5/ Integrate the building's future maintenance operation in its design. Strike a balance between environmental efficiency, robustness, cost, and ease of maintenance, without seeking the greatest theoretical effectiveness. Have an operator involved in the contractor team.

6/ Ensure the intrinsic environmental quality of the building by including a standard performance bond, secured by a third party and strengthened by an insurer.

7/ Combine the "HQE® Exploitation" certification with the environmental lease annex stipulated in Article 8 of Law #2010-788 known as Grenelle 2 of July 12, 2010, as this annex may set performance improvement objectives.

8/ Combine "HQE® Exploitation" certification and performance-based energy contracts such as an Energy Performance Contract or other formula with performances.

9/ Set up three-party environmental performance agreements between owner/manager, user and operator, setting performance goals.

10/ Incorporate, throughout the entire sequence of stakeholders, ways to compensate those who are involved depending on performance: operation installer, contractor team,

[27] The technical scheme of the "HQE® Exploitation" certification proposes tracking, for physical/chemical pollutants, of all or some of the following pollutants: CO, CO2, micro-particles, volatile organic compounds, and formaldehydes.

[28] In 2010, we conducted an exploratory study for CERQUAL on the housing certification project called "Home and Environment Operation". CERQUAL launched the production of the technical scheme in mid-2010.

enterprises, manager, operator, and user. Prioritize the institution of performance-based compensation for the contractor, manager, and operator.

11/ Integrate the energy-environment-health performance into the evaluation of the buildings' value.

ANNEXE 1

LES PERSONNES INTERVIEWEES

1/ INVESTISSEURS

- **GENERALI FRANCE IMMOBILIER**
  - Philippe BRION, Directeur Général Délégué, Directeur de la Gestion
  - Laurent CREPIN, Directeur Technique et du Développement Durable.
- **ICADE**
  - Denis BURCKEL, Directeur Audit, Risques et Développement Durable
  - Alain GUISNEL, Responsable Mission Développement Durable.

2/ UTILISATEURS

- **PHILIPS**
  - Joël MARIAS, Directeur Immobilier et Services Généraux
- **SCHNEIDER ELECTRIC**
  - Pascal PELLERIN, Directeur Performance Energétique Schneider Electric France
  - Patrick ZIELINSKI, Directeur d'Etablissement & des Sites de Paris, Direction Territoire France.

3/ EXPLOITANTS

- **DALKIA**
  - Jean-Philippe BUISSON, Directeur du Marché Tertiaire Ile de France
  - Pierre de MONTLIVAULT, Directeur des Nouvelles Offres Energétiques.
- **VINCI FACILITIES**
  - Julio DE ALMEIDA, Directeur Général FACEO France
  - David ERNEST, Directeur Expertises, Méthodes, Innovation.

ANNEXE 2

LISTE ET CARACTERISTIQUES DES OPERATIONS DE BUREAUX CERTIFIEES « HQE® EXPLOITATION » AU 23 FEVRIER 2011.

Source : CERTIVEA

Les tableaux qui suivent précisent le porteur de la certification, l'opération, la nature de la certification « HQE® Exploitation » : Engagement de l'exploitation, Exploitation, Exploitation et Utilisation, le numéro et la date de décision de certification, le niveau de performance par cible environnementale. Pour les certifications Exploitation et Utilisation, les deux tableaux en fin d'annexe précisent l'utilisateur attesté et le niveau de performance de son attestation.

Certificats NF Bâtiments Tertiaires en Exploitation - Démarche HQE® - Mise à jour du 23/02/2011

Porteur	Opération	Phase de Certification	Numéro de décision	Date de décision	Profil environnemental QEBE													
				Admission	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PROTERTIA FM 20, place de la Défense 92050 PARIS LA DEFENSE	TOUR EDF 20, place de la Défense 92050 PARIS LA DEFENSE	Exploitation	NF428/09/001	02/12/2009	TP	B	TP	TP	TP	TP	TP	TP	B	TP	P	TP	TP	TP
ICADE PÔLE FONCIERE TERTIAIRE Millénaire 1 - 35, rue de la Gare 75019 PARIS	BATIMENT 270 45, avenue Victor HUGO - Aubervilliers 93534 LA PLAINE SAINT-DENIS CEDEX	Exploitation	NF428/09/002	02/12/2009	TP	B	TP	B	P	TP	TP	TP	TP	TP	P	P	P	P
32 Hoche GIE 32, avenue Hoche 75008 PARIS	32 HOCHE 32, avenue Hoche 75008 PARIS	Exploitation et utilisation	NF428/09/003	02/12/2009	TP	B	P	P	P	TP	TP	TP	B	TP	TP	TP	TP	P
PHILIPS FRANCE 33, rue de Verdun BP 313 92156 SURESNES	BATIMENT VERDI 33, rue de Verdun BP 313 92156 SURESNES	Exploitation et utilisation	NF428/09/004 rév01	21/01/2011	TP	TP	B	P	TP	TP	TP	B	B	TP	TP	P	TP	TP
SAS HEART OF LA DEFENSE 110, Esplanade Général de Gaulle 92931 LA DEFENSE	CŒUR DEFENSE 110, Esplanade Général de Gaulle 92931 LA DEFENSE	Exploitation	NF428/09/005	02/12/2009	TP	B	B	TP	B	TP	TP	TP	B	TP	TP	P	TP	TP
BOUYGUES TELECOM ZAC de l'échangeur, ilôt 3, allée Pathé 18940 BOURGES	BOUYGUES TELECOM PRINTANIA ZAC de l'échangeur, ilôt 3, allée Pathé 18940 BOURGES	Exploitation et utilisation	NF428/09/006	02/12/2009	TP	B	B	B	P	TP	TP	TP	B	TP	P	P	P	P
OPTEOR IDF Tertiaire SAS 29, rue des Hautes Pâtures 92737 NANTERRE	MACIF 17/21, Place Etienne Pernet 75015 PARIS	Exploitation	NF428/09/007	02/12/2009	TP	B	TP	P	P	B	TP	B	B	TP	P	TP	TP	TP
GENERALI IMMOBILIER GESTION 7-9, boulevard Haussmann 75009 PARIS	TERRA NOVA 3 29-31, rue de Cuvier 93100 MONTREUIL	Exploitation	NF428/09/008	02/12/2009	B	B	TP	P	TP	P	TP	TP	B	TP	P	P	B	TP
SCI TOWER 21, boulevard de la Madeleine 75001 PARIS	Quai 33 33, quai de Dion Bouton 92800 PUTEAUX	Engagement de l'Exploitation	NF428/10/009	08/04/2010	TP	P	TP	P	TP	P	TP	TP	B	TP	P	P	B	TP
GECINA 16, rue des Capucines 75002 PARIS	PORTES DE LA DEFENSE 15-55, boulevard Charles de Gaulle 92700 COLOMBES	Exploitation	NF428/10/010 Rev00	10/09/2010	P	B	TP	B	P	TP	TP	TP	B	TP	P	P	P	P

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Porteur	Opération	Phase de Certification	Numéro de décision	Date de décision	Profil environnemental QEBE													
				Admission	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DANONE 150 Boulevard Victor HUGO 93400 SAINT OUEN	EUROCRYSTAL 150 Boulevard Victor HUGO 93400 SAINT OUEN	Exploitation et utilisation	NF428/10/011 Rev00	10/09/2010	TP	B	P	TP	B	TP	TP	TP	B	TP	P	P	P	P
ALLIANZ REAL ESTATE France SNC	TOUR OLIVIER DE SERRES	Engagement de l'Exploitation	NF428/10/012 Rev00	10/09/2010	P	B	TP	TP	TP	TP	TP	TP	B	TP	P	B	TP	P
HERVE THERMIQUE 47, rue Ampère 95303 CERGY PONTOISE	Agence Paris Ile de France Installation 47, rue Ampère 95303 CERGY PONTOISE	Exploitation et utilisation	NF428/10/013 Re00	10/09/2010	TP	TP	TP	TP	TP	TP	TP	TP	P	TP	TP	TP	TP	TP
LOCAPARIS 151, rue Saint-Honoré 75001 PARIS	103 GRENELLE 103, rue de Grenelle 75007 PARIS	Engagement de l'Exploitation	NF428/10/014 Rev00	23/09/2010	TP	B	P	P	P	P	TP	TP	B	P	P	P	B	P
IVG FRONT OFFICE ASNIERES , square Edouard VII 75009 PARIS	FRONT OFFICE 14, rue Sarah Bernhardt 92600 ASNIERES SUR SEINE	Engagement de l'Exploitation	NF428/10/015 Rev00	30/09/2010	TP	B	TP	P	P	TP	TP	TP	B	P	P	B	TP	TP
CEREP AULAGNIER 75, Boulevard Hausmann 75008 PARIS	O^2 2 à 8 rue Sarah Bernhardt 92600 ASNIERES SUR SEINE	Engagement de l'Exploitation	NF428/10/016 Rev00	23/09/2010	TP	B	B	P	B	P	TP	TP	B	B	TP	P	P	P
SCI BRP1 30, rue de Berri 75008 PARIS	RIVER OUEST 80, Quai Voltaire 95876 BEZONS	Engagement de l'Exploitation	NF428/10/017 Rév01	15/10/2010	TP	TP	TP	P	TP	TP	TP	TP	B	TP	TP	TP	TP	P
SCHNEIDER ELECTRIC 35, rue Joseph Monier 92500 RUEIL MALMAISON	LE HIVE 35, rue Joseph Monier 92500 RUEIL MALMAISON	Exploitation et utilisation	NF428/10/018 Rev00	23/09/2010	TP	B	P	TP	P	P	TP	TP	B	P	TP	P	P	P
Bristol-Myers Squibb 3, rue Joseph Monier 92500 RUEIL MALMAISON	Le CRISTALIA 3, rue Joseph Monier 92500 RUEIL MALMAISON	Exploitation	NF428/10/019 Rev00	28/10/2010	TP	TP	TP	P	TP	P	TP	TP	B	TP	TP	TP	TP	TP
AXA France SUPPORTS T3 – 2ème Arche 313 Terrasses de l'Arche 92727 NANTERRE CEDEX	AXA France 1, Place Victorien Sardou 78160 MARLY LE ROY	Exploitation et utilisation	NF428/10/020 Rev00	07/12/2010	TP	B	P	B	TP	B	B	TP	B	P	TP	P	TP	TP
SOCIETE GENERALE Direction de L'Immobilier du Groupe Espace 21-7 – 30 Place Ronde – Quartier Valmy 75886 PARIS LA DEFENSE Cedex 18	TOUR GRANITE Parvis Granite – 104, Passage Valmy 75886 Paris Cedex 18	Exploitation et utilisation	NF428/10/021 Rev00.	16/12/2010	TP	B	TP	TP	P	TP	TP	TP	B	TP	TP	P	TP	TP
PT MONDIAL SCI 8, rue de l'Hôtel de Ville 92200 NEUILLY SUR SEINE	LE MONDIAL 15/21, avenue Jules Rimet 93200 SAINT DENIS	Exploitation	NF428/10/022 Rev00.	16/12/2010	TP	P	TP	P	P	P	P	B	B	P	B	P	P	TP

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Porteur	Opération	Phase de Certification	Numéro de décision	Date de décision	Profil environnemental QEBE													
				Admission	1	2	3	4	5	6	7	8	9	10	11	12	13	14
LE DELAGE S.A 41, avenue de la Liberté L-1931 LUXEMBOURG	LE DELAGE 6, Henri Barbusse 92230 GENNEVILLIERS	Exploitation	NF428/10/023 Rev00	20/01/2011	TP	B	TP	B	B	TP	TP	TP	B	P	P	P	B	B
SU3 SAS 4, rue Marivaux 75002 PARIS	LE BLERIOT 1/3, Quai Marcel Dassault 92150 SURESNES	Exploitation	NF428/10/024 Rev00	20/01/2011	TP	P	TP	TP	P	B	TP	B	B	P	P	P	B	P
CEREP FRANKLIN SARL Tour Maine Montparnasse 33, avenue du Maine 75755 PARIS CEDEX 15	TOUR 9 3, rue Franklin 93100 MONTREUIL	Engagement de l'Exploitation	NF428/11/025 Rev00	20/01/2011	TP	P	TP	P	P	P	P	B	B	TP	P	P	P	TP
McDonald's France Services 1, rue Gustave Eiffel 78049 GUYANCOURT	Restaurant McDonald's Plaisance du Touch 32, route de Toulouse 31830 PLAISANCE DU TOUCH	Exploitation	NF428/10/026 Rev00	28/01/2011	B	B	TP	P	P	TP	B	B	B	TP	P	P	B	B
SDC CB20 Les Miroirs (Copropriétaires Compagnie de Saint-Gobain, Société Foncière Lyonnaise, Opéra Rendement (BNP Paribas REIM), représentés par leur Syndic Icade Property Management) 18, Avenue d'Alsace 92096 LA DEFENSE CEDEX	CB20 LES MIROIRS 18, avenue d'Alsace 92400 COURBEVOIE	Exploitation	NF428/10/027 Rev00	28/01/2011	B	B	P	P	B	B	TP	B	B	TP	P	B	P	TP
ICADE PÔLE FONCIERE TERTIAIRE Millénaire 1 35, rue de la Gare 75168 PARIS CEDEX 19	MILLENAIRE 1	Exploitation et utilisation	NF428/10/028 Rev00	04/02/2011	TP	B	B	B	P	TP	TP	B	B	TP	P	P	P	B

Attestations de la Qualité Environnementale d'Utilisation
Certification NF Bâtiments Tertiaires en Exploitation - Démarche HQE®
Mise à jour du 23/02/2011

utilisateur attesté	N°Attestation utilisateur	Opération	Phase de Certification	Rattaché au certificat NF Batiment Tertiaires en Exploitation N°	Date de décision	niveau d'attestation
BOUYGUES SA 32, avenue Hoche 75008 PARIS	2009/001	**32 HOCHE** 32, avenue Hoche 75008 PARIS	Exploitation et utilisation	NF428/09/003	02/12/2009	**TP**
PHILIPS FRANCE 33, rue de Verdun BP 313 92156 SURESNES	2009/002	**BATIMENT VERDI** 33, rue de Verdun BP 313 92156 SURESNES	Exploitation et utilisation	NF428/09/004 Rev01	20/01/2011	**TP**
BOUYGUES TELECOM ZAC de l'échangeur ilôt 3 - allée Pathé 18940 BOURGES	2009/003	**BOUYGUES TELECOM PRINTANIA** ZAC de l'échangeur - ilôt 3 - allée Pathé 18940 BOURGES	Exploitation et utilisation	NF428/09/006	02/12/2009	**TP**
DANONE 152 Boulevard Victor HUGO 93400 SAINT OUEN	2010/004	**EUROCRYSTAL** 152 Boulevard Victor HUGO 93400 SAINT OUEN	Exploitation et utilisation	NF428/10/011 Rev00	10/09/2010	**P**

Attestations de la Qualité Environnementale d'Utilisation
Certification NF Bâtiments Tertiaires en Exploitation - Démarche HQE®
Mise à jour du 23/02/2011

utilisateur attesté	N°Attestation utilisateur	Opération	Phase de Certification	Rattaché au certificat NF Batiment Tertiaires en Exploitation N°	Date de décision	niveau d'attestation
HERVE THERMIQUE 47, rue Ampère 95303 CERGY PONTOISE	2010/005	**Agence Paris Ile de France installation** 47, rue Ampère 95303 CERGY PONTOISE	Exploitation et utilisation	NF428/10/013 Rev00	10/09/2010	**TP**
SCHNEIDER ELECTRIC 35, rue Joseph Monier 92500 RUEIL MALMAISON	2010/006	**LE HIVE** 35, rue Joseph Monier 92500 RUEIL MALMAISON	Exploitation et utilisation	NF428/10/018 Rev00	23/09/2010	**P**
AXA FRANCE SUPPORTS T3 – 2ème Arche 313 Terrasses de l'Arche 92727 NANTERRE CEDEX	2010/007	**AXA FRANCE** 1, Place Victorien Sardou 78160 MARLY LE ROY	Exploitation et utilisation	NF428/10/020 Rev00	07/12/2010	**P**
SOCIETE GENERALE Direction de l'Immobilier du Groupe Espace 21-7 – 30 Place Ronde – Quartier Valmy 75886 PARIS LA DEFENSE Cedex 18	2010/008	**TOUR GRANITE** Parvis Granite – 104, Passage Valmy 75886 Paris Cedex 18	Exploitation et utilisation	NF428/10/021 Rev00	16/12/2010	**P**
ICADE Millénaire 1 35, rue de la Gare 75168 PARIS CEDEX 19	2011/009	**Millénaire 1** 35, rue de la Gare 75019 PARIS	Exploitation et utilisation	NF428/10/027 Rev00	04/02/2011	**P**

http://tinyurl.com/334f2z9

ANNEXE 4

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