ARENE

Agence régionale de l'environnement et des nouvelles énergies

Ile-de-France

HQE (ECO BUILDING)

HQE CHALLENGES FOR 2010 IN THE ILE-DE-FRANCE REGION

KEY FIGURES

The following figures demonstrate the potential savings to be achieved if the HQE (high environmental quality or "eco-building") approach were generalised to all new or refurbished buildings by 2010:

- ✔ **30% energy savings in the residential and tertiary sectors,**
- ✔ **16% drinking water savings for the sectors surveyed,**
- ✔ **40% dof the target for reduction of national greenhouse gas emissions,**
- ✔ **40,000 direct or indirect jobs generated.**

Over the last four years, ARENE (Regional Agency for the Environment and New Energies) has assisted the Ile-de-France Region in refurbishing and building about ten lycées (high schools – last three years of schooling up to the baccalaureate) to HQE standards. It wanted to know what the potential impacts would be of this eco-building approach spreading to all new and refurbished buildings by 2010. The survey aims firstly to assess the possible environmental and economic savings with a view to sustainable development, and secondly to assess the conditions under which the approach could be generalised.

The contribution from the HQE approach to implementing sustainable development for Ile-de-France can be appreciated in particular through the reduction in greenhouse gas emissions, through the preservation of natural and energy resources, and also through taking account of the economic and sociological impacts related to harmonious and lasting regional development.

THE 14 TARGETS OF ENVIRONMENTAL QUALITY FOR BUILDINGS

Keeping the impacts on the outdoor environment under control

Eco - construction :

1 buildings blend in harmoniously with their immediate environment;
2 integrated choice of building materials and products;
3 low-noise and low-pollution building site.

Eco - management :

4 energy management;
5 water management;
6 industrial waste management;
7 cleaning and maintenance management.

Creating an indoor environment that is satisfactory

Confort :

8 hygrometric comfort;
9 acoustic comfort;
10 visual comfort;
11 olfactory comfort.

Health :

12 health conditions;
13 air quality;
14 water quality

Two development scenarios

- an approach driven by strong political will: 100 % of the new construction or refurbishment operations between 1999 and 2010; and
- a more gradual "going with the flow" approach taking account of the commitments already made, and of the growing awareness of the players, with the following hypotheses:

- of the new and refurbished "lycées" (high schools/sixth form colleges) by 2006;
- 70 to 80% of new or refurbished secondary schools and indoor swimming pools, and of new primary and infant/nursery schools by 2010;
- 20% to 40% of new or refurbished sports establishments and social housing, and of refurbished primary and infant/nursery schools by 2010; and
- 3 to 15% for new or refurbished offices, individual and collective private housing, healthcare establishments, and canteens by 2010.

It should be recalled that the aim of the HQE approach is to improve the quality of construction and the quality of use of the buildings, from an environmental point of view, but without neglecting economic and social aspects.

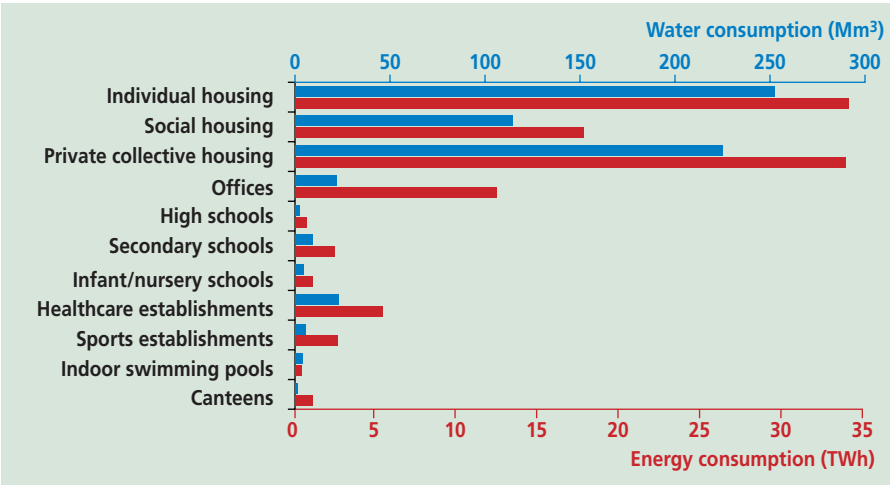
For this purpose, 11 sectors and 7 environmental themes were examined both for new building and for refurbishment:

Sectors	Themes	Aspects considered
Housing: Individual housing Social housing Private collective housing **Tertiary:** Offices High schools Secondary schools Infant/nursery schools Health Gymnasiums Swimming pools Canteens	Energy	Consumption (heating, hot water, lighting, specific electricity) Contribution to reducing the greenhouse effect
	Water	Consumption of drinking water, Rainwater harvesting
	Maintenance	Cost of operating the building
	Building site	Building waste Noise pollution generated by the building site Occupational accidents
	Noise and confort	Acoustic comfort
	Materials	Wood - material
	Overall cost of operation	Costs of HQE investment, saving on the operating costs, etc.

As regards methodology, the survey firstly calculated energy and water consumption, and maintenance costs per major sector of buildings for 1999 in the Ile-de-France Region.
Private collective housing represents the leading sector for expenditure, with nearly 3,81 billion €), i. e. 1 783,65 € per dwelling and per year, followed by the individual housing sector.
Secondly, working hypotheses were adopted concerning the unit consumption and spending for a building of the eco-building (HQE) type, compared with a conventional reference building.
To date, the examples of eco-building projects have been supported essentially by the French Ministry of Infrastructure, Housing, and Transport (Ministère de l'Equipement, du Logement, et des Transports) through the Town Planning, Construction, and Architecture Plan ("Plan Urbanisme Construction et Architecture" or "PUCA") through experimental projects in new social (subsidised low-rent) housing, by the Regions through building or refurbishing lycées, and by partnerships between the Local Municipality, the Region, and the French State for some new public facilities (swimming pool, media library, headquarters).
Then, for each of the sectors and themes surveyed, the possible savings to be achieved through an HQE operation that goes beyond the regulations or the state of the art were estimated.
In addition, the scenarios of the Commissariat Général du Plan (General Commission for Economic Planning) and of INSEE (French Office of Statistics and Economic Surveys) served as references for assessing, for the period to 2010, the progress in the amount of new and refurbished housing, and of new and old office space, the economic growth rate, and the breakdown and progress of the prices of the various energy sources.

Using this database, the survey was then able to explore two types of results:
- the total cost of an HQE operation with the cost per metric ton of carbon avoided, as calculated for each standard building of each of the sectors; and
- the consolidated impacts of generalising the HQE approach throughout Ile-de-France in 2010 in terms of overall savings in energy, in water, and in site management…

Water and Energy consumption by sectors in 1999



The impacts of HQE (eco-building) for the Ile-de-France Region in 2010 using the will-driven scenario

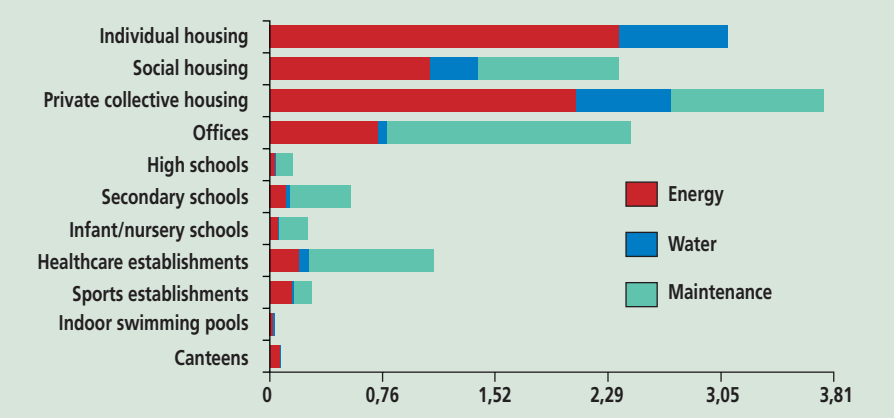
- 30% energy savings in the residential and tertiary sectors;
- ∑ 40% of the target for reduction of national greenhouse gas emissions, converted to regional level, i.e. 1.6 mil-

lion tons of carbon avoided;

- 16% drinking water savings for the sectors surveyed (100 million cubic metres per year);
- a saving of 228 € per year and per capita on the operating costs and maintenance costs for the buildings of the 11 sectors in the survey, i.e. as much as the annual budget of the Regional Council of Ile-de-France;
- savings on building waste management through sorting and selective demolition;
- greater use of recyclable materials and of renewable raw materials, such as wood;
- a reduction in the noise levels in housing, with 60,000 fewer people complaining about noise;
- a reduction in occupational accidents on building sites through quality approaches;
- 40,000 direct or indirect jobs generated for the building work and the infrastructure and fittings work, the average extra cost of HQE investment being 49 € per square metre built or refurbished;
- average savings (net of depreciation) of 2.3 to 4.6 € per year and per square metre built or refurbished; and
- overall, net savings (5% updated) of 8.2 billion € over 15 years for an HQE investment for the period 2001-2010 of 17.5 billion €.

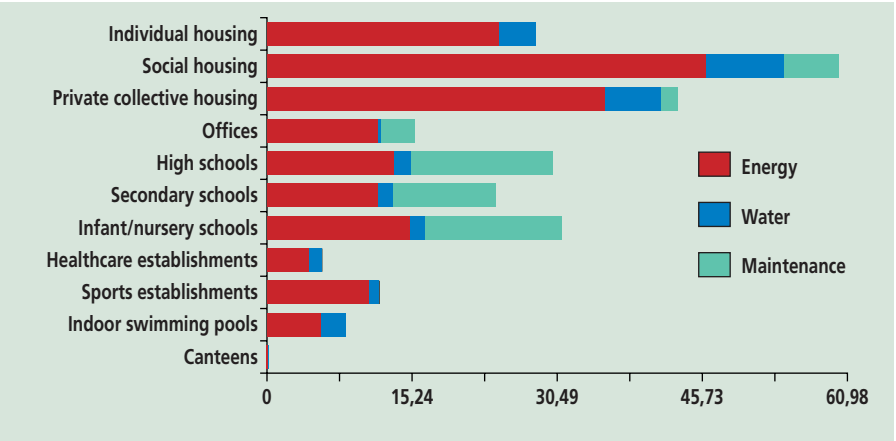
Regional spending by sectors in 1999

in billions of €



Will-driven scenario : total savings in million euros in 2010

in billions of €



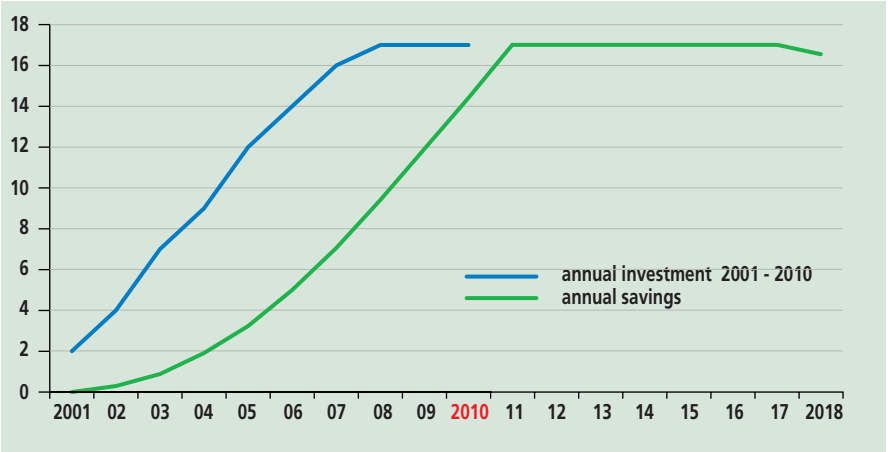
The gradual "going with the flow" approach would make it possible to achieve only 10% of these potential savings. The largest percentage savings can be expected from teaching establishments, but in terms of volume, housing is the most promising sector for overall savings.

Overall, HQE operations can achieve from 25% to 60% savings in energy, by means of:

- judicious building designs: exposure (directions in which the buildings face), shape, through homes, bioclimatic architecture, optimising natural lighting, and glazed walls (see-through buildings), etc.;
- high-performance construction technologies: low-emission glazing, reinforced facade insulation, insulating shutters, solar protection, night-time super-ventilation, etc.;
- use of renewable energies: wood, straw, solar-powered water heater, geothermics ("hot rocks"), direct solar floor, etc.;
- high-performance equipment: high-efficiency or condensation boiler, small-scale co-generation, low-consumption bulbs, electronic ballasts, thermostats and thermostatic taps (faucets), low power consumption household equipment, variable-speed motors, etc.; and
- efficient methods of energy management: individual metering, automated technical management, etc.

Investment in and savings from the HQE approach

in billions of francs per year



They can generate from 25 to 30% drinking water savings, by means of:

- leak-reducing action: metering per network section, checking for leaks in private homes; and
- actions on the facilities: maintenance contract, pressure-reducing facilities,

mixers, water savers on taps, dual flushes, low flow rate household equipment, etc.;

Collecting rainwater can be considered for watering, cleaning common areas, or even supplying toilet flushes. A saving of from 10% to 20% on maintenance and management is possible through better access to facilities and technical services, installing building automation systems, designs facilitating access to equipment, adaptability of the building to changes in its use… Implementing "green" building sites also makes it possible to reduce the number of occupational accidents and to reduce noise and the cost of waste management (compared with the regulations as they stand in 2002).

In all, the operating or usage savings for a building can reach 6.1 to 9.15 € per square metre built or refurbished per year. Such savings represent, for example, 8 to 10% of the cost of a social (subsidised low-rent) dwelling (rent + service charges): HQE could offer its occupants one month's holiday from rent per year!

The key role of the Local Authorities in promoting HQE

- **Informing, and heightening awareness**
  The local authorities have a major role to play in making professionals and users aware of the economic and environmental issues of the HQE approach, in terms of comfort, quality, and savings. They must reinforce taking account of the long term in making investment choices, by associating the construction with the value of the use of the building. The HQE approach contributes to the emergence of more responsible behaviour and to environmental awareness among occupants: for example, in HQE lycées, vandalism has decreased, as has failure to keep up with the curriculum, and certain school refurbishment projects have been opportunities to conduct environment education actions among the students. In parallel, the local authorities can also make a useful contribution to disseminating the numerous "HQE technologies."

- **Making the administrations greener**
  The local authorities, as major commissioning authorities for building work, and as major property managers, must serve as examples and initiate pilot operations. Buildings should be built or refurbished using an HQE approach.

- **Planning**
  The local authorities play a role in planning and organising their areas spatially. Through the Local Town Planning Plan ("Plan Local d'Urbanisme" or "PLU"), the municipalities can include guidelines or recommendations that can work in favour of producing buildings with high environmental added value. The same applies in "Zone d'Aménagement Concerté (ZAC) projects for zones planned in consultation with the various players.

- **Urban regeneration projects**
  The HQE approach is indissociable from urban regeneration policy, which includes an overall think on how mixed urban activities should be, on the polarity of the local areas, travel and commuting, resource management and noise and pollution management, assigning land and space, the quality of building work, etc. The HQE approach can but enrich this think by contributing methods and practical experience in multi-player partnerships, in overall costing, etc.

- **Refurbishing**
  It represents 80% of the potential savings to be achieved through HQE: the "Opération Programmée d'Amélioration de l'Habitat" (OPAH) or "Programmed Operation for Housing Improvement" is a high-performance tool available to local authorities for renovating private buildings and for combating vacancy in city centres. An HQE OPAH whose extra cost would be 80% borne by public bodies would increase the funds granted only to 38% of investment, as against the usual 25%. Such an OPAH would offer gross annual savings of 7.47 €/m², i.e. over 457 € per year and per dwelling, with an estimated extra investment cost of 4 573 €) per dwelling. Any grant from the local authority is fully justified in this form of social redistribution.

Ten reasons for promoting the HQE eco-building approach

1. Savings for users and improved comfort (noise, health).
2. Overall costs that are lower for a usage value of the buildings that is higher.
3. Savings in non-renewable (resources (energy generated from fossil fuels, water, raw materials, …)
4. New or additional economic activity, and therefore jobs.
5. An increase in the qualification of companies through internal management effects.
6. A social redistribution policy: HQE in social housing will improve the quality of life and comfort of the least-privileged inhabitants, without increasing their rents.
7. The contribution to combating the greenhouse effect: from 2.7 to 5.3 kg of carbon per square metre built or refurbished.
8. In schools, a unique occasion for environment education, in particular for HQE refurbishment projects..
9. Increased partnership between the town/city and building professionals.
10. Integrating urban regeneration policies and environment policies into projects for refurbishing neighbourhoods or projects for urban redevelopment.

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Source

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