

## Action plan for increasing the number of nearly zero-energy buildings

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## 1. **Introduction**

The activity of the building sector, whether it entails the construction of new buildings or the renovation of existing stock, is primarily governed by the planning act for the implementation of the decisions taken at the Grenelle Round Table on the Environment (Statute No 2009-697 of 3 August 2009, commonly known as the First Grenelle Act).

All aspects of environmental protection are relevant, particularly energy management, since buildings account for more than 40% of total energy consumption and 25% of greenhouse-gas emissions.

Accordingly, the defined objectives are as follows:

- to make the construction of low-consumption buildings the norm by 2012 and to make the construction of energy-plus houses the norm by 2020;
- to reduce total energy consumption of the existing building stock by at least 38% by 2020 and, to that end,
- to assist and encourage construction specialists in their efforts to meet the challenges that arise in terms of recruitment, training, skills and development of industrial supply chains.

The Grenelle process has established a set of tools for the reduction of energy consumption in both new and existing buildings. The National Environmental Commitment Act (Statute No 2010-788 of 12 July 2010, commonly known as the Second Grenelle Act), complements the planning act and provides that toolkit for the fulfilment of the Grenelle commitments.

At an environmental conference held on 14 and 15 September 2012, the President of the Republic set the target of an annual increase of one million in the number of homes meeting energy-efficiency standards, to be achieved by increases in the number of new builds and of major refurbishments.

## 2. **Definition**

Buildings consuming virtually no energy are known in France as ‘low-consumption buildings’ (*bâtiments basse consommation* or BBC).

### 2.1 **New buildings**

New residential buildings are now designed and constructed to consume less than 50 kWh of primary energy per square metre of floor area per year; this figure encompasses the energy needed for heating, refrigeration, domestic hot water, lighting and ancillary system elements.

To be classed as low-consumption buildings, detached or semi-detached houses must be shown to use renewables from a range of options.

As for office buildings, they must be designed and constructed to consume no more than 70 kWh of primary energy per square metre per year in the case of buildings without air conditioning and 110 kWh if they have air conditioning.

### 2.2 **Renovated buildings**

To qualify as low-consumption buildings, residential buildings that have undergone renovation must consume less than 80 kWh of primary energy per square metre per year; this figure encompasses the energy needed for heating, refrigeration, domestic hot water, lighting and ancillary system elements.

As for office buildings, the target is 40% less energy than the same buildings consumed when equipped

with the reference insulation materials and energy systems.

The required consumption levels are subject to variations, depending at least on geographical areas and altitudes.

### **3. Measures designed to ensure that all new builds are low-consumption buildings**

#### **3.1 New thermal regulations prescribing nearly zero-energy building (nZEB) standard**

The Thermal Regulations 2012 are the result of a huge concerted effort that began in September 2008. The sequence of the work, performed under the direction of the Directorate-General for Planning, Housing and Nature at the Ministry of Ecology, Sustainable Development and Energy, was as follows:

- Twelve thematic working groups, including a group specialising in energy mixes, a group representing bodies responsible for applying the Thermal Regulations and a group representing housing builders, began their deliberations in April 2009 with the aims of revising the calculation model and setting new regulatory requirements.
- A Scientific Committee coordinating the activities of the various working groups analysed their findings.
- Guidelines and a progress report on the activities of the working groups were presented at consultative conferences attended by 120 representatives of the building trades and of the five governing panels of the Grenelle process, in the framework of an *ad hoc* working party and at bilateral meetings of specialists drawn from various sectors to address specific difficulties encountered in particular types of public-service building, such as airport buildings.

Once the consultation process had been completed, the Directorate of Housing, Urban Planning and the Countryside, in liaison with the General Directorate for Energy and the Climate, finalised the applicable statutory instruments which were then signed before being promulgated in the Official Journal of the French Republic on 27 October 2010:

- a Council of State decree amending Article R. 111-20 of the Construction and Housing Code;
- a statutory order describing the main principles and requirements for new buildings to which the Thermal Regulations 2012 apply;
- a statutory order describing the applicable calculation method (Th-B-C-E 2012) and the main conventions to observe when applying that method, which was defined in the Official Bulletin of the Ministry of Ecology, Sustainable Development, Transport and Housing on 10 August 2011.

The instruments that have been promulgated to date relate solely to buildings used for residential purposes – detached or semi-detached houses, apartment buildings, young workers' hostels and university halls of residence – and to offices, primary and secondary schools and pre-school childcare establishments.

The most recent decree is now before the Council of State, and its implementing order is being

finalised. The decree is designed to cover public-service buildings that are constructed in small numbers in France, such as courthouses and airport terminals.

Completing the regulatory mechanism, another decree (No 2011-544 of 18 May 2011) defines the conditions governing the production of certificates of compliance with thermal regulations for submission with applications for planning permission and on completion of construction work on new buildings. This decree also defines the conditions governing the conduct of the feasibility study on energy supply arrangements that must be submitted in support of any application for planning permission.

The implementation of these Thermal Regulations 2012 will result in a great improvement in the energy performance of new buildings, since conventional consumption levels will be cut by a factor of two to four. This improvement will also be reflected in better ecological design, enhanced insulation and in the widespread introduction of best building practices.

In economic terms, lower energy bills will generate significant purchasing power, given that additional construction costs will be kept in check and will be in the region of 5% to 8% in 2013.

Moreover, a broad raft of technical equipping solutions will be available to ensure compliance with the prescribed annual ceiling of 50 kWh of primary energy consumption per square metre at a similar cost, which will automatically stimulate competition and quickly bring down prices. The Thermal Regulations 2012 were drawn up with the aim of ensuring a technological and economic balance between the various energy sources.

The Th-B-C-E 2012 calculation method serves to describe the calculation of coefficients *Bbio* (energy requirement of the building), *Cep* (primary energy consumption) and *Tic* (indoor temperature) for the purpose of applying the Thermal Regulations 2012. It is therefore based on the principle of describing every component of the building, both the envelope and the systems. Although this method is far more comprehensive than the Th-C-E calculation method prescribed by the 2005 version of the Thermal Regulations, it is not inherently capable of anticipating the development of new energy systems.

### 3.2 Establishment of a specific procedure, known as the Title V Committee procedure, to encourage the development of innovative solutions

So that the thermal regulations do not act as a deterrent to innovation, a Title V Committee was established while the Thermal Regulations 2005 were in force and has been retained under the 2012 version.

This committee, overseen by the administration, may be approached with the following three types of application:

- a Title V application relating to a single building operation, known as a ‘Title V (Operation)’; this type of application is generally made by the client of a building operation the specific features of which are not covered by the applicable prescribed calculation method; in such cases the requested approval relates only to the operation in question;
- a Title V application relating to an energy product or system, known as a ‘Title V (System)’; this type of application is generally made by a manufacturer or group of manufacturers who wish to obtain approval of their innovative products or systems the specific features of which are not covered by the prescribed Th-B-C-E 2012 calculation method; once approval has been granted, it is valid for the given energy product or

system, regardless of the envisaged operation to which the application related;

- a Title V application relating to a heating or cooling network, known as a ‘Title V (Network)’; this type of application is generally made by the administrator of a heating or cooling network that is not covered by the statutory order of 15 September 2006 regarding energy performance testing of existing buildings offered for sale in metropolitan France.

### 3.3 Revision of the calculation method to take account of ecological design, including orientation, solar gain and sun protection, as well as thermal inertia in summer

The Thermal Regulations 2012, which are intended to make low energy consumption the norm for all new buildings, are the most ambitious rules in the European Union, in that they set a level of energy performance for all new builds in the form of an annual consumption ceiling of 50 kWh per square metre, which must not be exceeded, compared with the current annual ceiling of 150 kWh under the Thermal Regulations 2005.

The Thermal Regulations 2012 pursue an entirely new approach, based on performance requirements in terms of energy consumption and summer comfort, requirements that vary in accordance with the geographical locations, the characteristics and the uses of buildings. The performance rating reflects the overall performance of the building and is calculated on the basis of occupation scenarios defined by the regulations for each of the possible uses of a building. Accordingly, it cannot easily be connected with real consumption, which obviously depends on other factors too, such as the residents’ form of tenure and the external climate.

Unlike previous sets of rules, which merely set minimum requirements for each element – windows and solid walls, for example – the new regulations also lay down an overall minimum quality requirement for the building.

These regulations therefore give architects and engineers greater freedom when they design buildings. They effectively encourage ecological design based on solar gain and sun protection or on thermal inertia in summer. Engineers and architects are thus encouraged to work together from the planning-application process.

Lastly, the new regulations prescribe the use of energy from renewable sources in detached/semi-detached houses, thereby helping to put more solar heating panels on the market.

Above all, the Thermal Regulations 2012 are about the pursuit of targets. They lay down:

- three outcome requirements:
  - a minimum level of energy efficiency for buildings, measured as *Bbio*, the residual energy need that is not offset by ecological design, *Bbio max* being the maximum permissible residual energy need; this standard entails simultaneous limitation of the energy needed for each purpose – heating, cooling and lighting;
  - a maximum permissible conventional consumption of primary energy, *Cep<sub>max</sub>*; the *Cep* coefficient relates only to **conventional consumption of energy for heating, cooling, lighting, domestic hot water and auxiliary devices (pumps and ventilators)**; this requirement is expressed in terms of primary energy, in accordance with the objectives set out in European Directive 2010/31/EU on the energy performance of buildings. The conversion factors for final energy to primary energy are as follows:
    - 1 for fossil fuels,
    - 2.58 for electricity;

- the level of comfort in summer is measured as  $T_{ic}$ , the indoor temperature,  $T_{ic_{ref}}$  being the permissible maximum; the Thermal Regulations 2012 define the building categories in which it is possible to provide for a good level of comfort in summer without having to resort to an active cooling system;
- a few procedural requirements, limited to a strict minimum, reflect the desire to ensure that particular practices, such as consumption display, become quite widely established.

The annual ceiling of 50 kWh/m<sup>2</sup> is subject to adjustment, based on volumes of greenhouse gas emitted by the utilised energy sources, the purposes for which buildings are used and their characteristics and geographical locations.

The Thermal Regulations 2012 are applicable:

- with effect from 28 October 2011 for public buildings, service buildings and residential buildings constructed under the National Urban Renewal Programme;
- with effect from 1 January 2013 for all other residential buildings.

#### 3.4 A desire to incorporate renewables

The use of renewable energy sources is one of the objectives of the Thermal Regulations 2012.

First of all, a renewable energy source must be used for residential buildings and is to be chosen from a list of options set out in the statutory order. Foremost among these options are:

- using solar heating panels to produce domestic hot water,
- connecting to a heating network with an energy input comprising at least 50% renewables or recovered heat;
- demonstrating that the contribution of renewables to the annual conventional consumption of primary energy equals or exceeds 5 kWh/m<sup>2</sup>.

Provision is also made for adjustments to maximum permissible consumption levels in the case of connection to a heating or cooling system on the basis of the volume of CO<sub>2</sub> emitted by the system and in where fuel wood is used. Such adjustments may amount to as much as 30%.

#### 3.5 Establishment of certificates for individuals, accompanied by financial support

Certificates attesting to high energy performance, which are drawn up by the Ministry of Ecology, Sustainable Development and Energy, serve not only to establish diverse forms of public aid, awarded by central government or local authorities, thereby encouraging operators to exceed statutory performance requirements in their building projects, but also to promote the assessment of options for further energy-efficiency gains within the construction trades.

This principle will continue to be applied for the purpose of framing guidelines for future regulatory measures in the lead-up to 2020.

#### **Certificates based on the Thermal Regulations 2005: HPE, HPE EnR, THPE, THPE EnR and BBC**

As part of the effort to combat global warming and, more specifically, to promote the use of renewable energy sources in construction, the certification principle that had been adhered to since the 1980s was

reapplied in the Thermal Regulations 2005.

A statutory order of 3 May 2007, published in the Official Journal of the French Republic on 15 May 2007, defines the contents of such certificates and the conditions of award.

In order to obtain a certificate, a building must not only be thermally efficient but must also meet certification criteria relating to the safety, sustainability and operating conditions of the heating, hot-water, air-conditioning and lighting installations as well as to the overall quality of the building.

These certificates of high energy performance are issued by private bodies that have concluded a special agreement with the government ministry responsible for building.

The certificate of high energy performance attests to the fact that the building achieves an overall level of energy performance in excess of the statutory requirement and that a minimum set of checks has been conducted to verify this performance level.

There are five levels of certification:

1. HPE (high energy performance) 2005, for constructions with conventional consumption at least 10% below the requirements of the Thermal Regulations 2005;
2. HPE EnR (high energy performance based on renewables) 2005, which comprises the HPE 2005 standards plus requirements regarding the installation of equipment for energy generation from renewable sources: heating, and possibly the production of domestic hot water, is provided by a boiler fuelled by biomass, or else the building is connected to a heating network with at least 60% wood or biomass fuelling; this scheme responds to the efforts made by local authorities to use renewables for heat generation;
3. THPE (very high energy performance) 2005, for constructions with conventional consumption at least 20% below the requirements of the Thermal Regulations 2005;
4. THPE EnR (very high energy performance based on renewables) 2005, for constructions with conventional consumption at least 30% below the requirements of the Thermal Regulations 2005 plus requirements regarding the use of equipment for energy generation from renewable sources, namely solar thermal collectors, photovoltaic collectors or wind turbines, or very high-performance heat pumps;
5. BBC (low energy-consumption building) 2005; this level is based on the findings of a study conducted by Effinergie, an environmental association with numerous member bodies, regional authorities and companies, in the framework of Prébat, the Research and Experimentation Platform on Energy in Buildings, with funding from the French Environment and Energy Management Agency (ADEME); this level of certification is intended for buildings consuming a very considerably lower volume of energy than the regulatory ceiling with:
  - maximum annual consumption for residential properties set at 50 kWh of primary energy per m<sup>2</sup> for the five energy uses covered by the Thermal Regulations 2005, namely heating, cooling, domestic hot water, ventilation and lighting, with differentiations for particular climate zones and altitudes;
  - energy performance at least 50% better than that required by the Thermal Regulations 2005 for public-service buildings;

this certification level takes special account of renewable energy sources, particularly by encouraging the use of fuel wood, thanks to the application of a conversion factor to primary fuel consumption of 0.6, compared with the factors of 1 for fossil fuels and 2.58 for electricity;

it is based on stricter criteria than *Passivhaus* certification in Germany and *Minergie* in



Switzerland (the Passivhaus requirement of 40 kWh/m<sup>2</sup> per annum relates to final energy consumption for three uses) and also imposes special requirements and technical specifications for each climate zone of French territory.

Building developers thus have a wide range of certification schemes at their disposal to match their objectives and their technical and financial capacities, showing them the way to low-consumption and even energy-plus buildings. Given the objectives of the Grenelle package of environmental legislation with regard to new buildings, the aim was to roll out these certification schemes as quickly and as widely as possible, particularly the BBC scheme, so that this type of construction could become the benchmark of the Thermal Regulations 2012.

This aim has been largely achieved, for the number of new dwellings which have obtained BBC certification or for which an application for BBC certification is pending has been rising sharply since 2007. Their number rose from 900 in 2007 to 2 600 in 2008, to 20 000 in 2008 and to 85 000 in 2010 before reaching 160 000 in 2011.

Future certification schemes based on the Thermal Regulations 2012

Deliberations have been initiated, though focused only on the residential market so far, with a view to defining sustainable certification levels for the various players in the field.

The most stringent level of certification, a role currently performed by the BBC certificate, will have to:

- anticipate the next stage in the development of building regulations, namely the energy-plus building, in other words a building that produces more energy than it consumes, albeit in terms of theoretical consumption;
- set out a requirement expressed in grams of CO<sub>2</sub>.

At the same time, exploratory study is being devoted to the feasibility of a certificate that would extend the scope of energy performance to encompass life cycles too.

This new type of certification would necessitate prior in-depth study of factors such as the life cycle of components and the CO<sub>2</sub> content of electricity and could not be achieved in the short term.

In the meantime, there is a need to define a more stringent certification level than the regulatory standard, particularly as a basis for awards of financial aid to underpin housing policy.

In order to set this level of certification, working meetings with the various stakeholders, particularly builders' clients and non-governmental organisations, were held in the course of 2011.

As was only to be expected, since the annual level of 50 kWh/m<sup>2</sup> set by the Thermal Regulations 2012 is rigorous and based on the current best technical and economic options, and since the expected learning effect has not had time to materialise, it is necessary to carry out technical and economic simulations before setting a definitive level.

It is, in fact, important to have diverse industrial solutions that can attain the prescribed certification level so as to avoid creating a monopoly and hence generating unaffordable extra costs.

#### 4. **Measures designed to ensure that all existing buildings become low-consumption buildings**

The Thermal Regulations for existing buildings apply to existing residential and public-service buildings when the contracting authority for such buildings makes arrangements for renovation works. The overarching aim of the Regulations is to ensure that the energy performance of an existing building is significantly improved whenever a client undertakes operations with the potential to bring about such an improvement.

- For buildings with floor space of more than 1 000 m<sup>2</sup> that were built in 1948 or later and for which the renovation costs amount to at least 25% of the value of the building, the average target annual consumption level is 120 kWh/m<sup>2</sup>.
- For other renovation works, only equipment with high energy performance may be used, and this rule impacts directly on the market in compliant equipment.

Following the completion of thermal rehabilitation work on existing buildings with a net usable floor area in excess of 1 000 square metres, where such work is subject to planning permission, the client provides the competent authority that issued the planning permission with a document certifying compliance with the Thermal Regulations. The decree prescribing these rules is currently awaiting signature.

##### 4.1 The overall Thermal Regulations

The overall Thermal Regulations apply to residential and public-service buildings that meet all three of the following criteria:

- their net usable floor area exceeds 1 000 m<sup>2</sup>;
- the completion date of the building was after 1 January 1948;
- the cost of the renovation measures arranged by the client to improve the thermal properties of the building is at least 25% of the value of the building, excluding land, which corresponds today to €355 excluding tax per square metre for dwellings and €275 excluding tax per square metre for non-residential buildings after application of the construction cost index.

In view of the scale of such refurbishment operations, the principles underlying the Regulations are similar to those of the Thermal Regulations 2005 that apply to new builds:

- The initial conventional energy consumption of the building is estimated by means of the *Th-C-E ex* calculation method defined by statutory order. That method serves to assess the initial performance of the building, to guide renovation choices and to estimate how much of the previous consumption of conventional energy can be cut as a result of the renovation work.
- After the renovation work, conventional energy consumption in the building for heating, hot-water and cooling appliances, auxiliary devices and lighting must be lower than the reference consumption for the building in question. The reference consumption of a building corresponds to the consumption that would be recorded if its component structures and equipment performed to the levels imposed by law – in this case the performance levels fixed by statutory order.

- The conventional internal temperature reached in summer must be lower than a reference temperature.
- Minimum post-renovation performance levels are prescribed for a number of components, such as insulation, ventilation and the heating system.

The three coefficients – initial primary energy consumption ( $Cep_{initial}$ ), post-renovation consumption ( $Cep_{après\ travaux}$ ) and indoor temperature ( $Tic$ ) – on which the requirements of the overall Thermal Regulations are based are calculated by means of the *Th-C-E ex* method. Like the calculation method prescribed by the Thermal Regulations 2012, the purpose of this method is not to calculate actual consumption on the basis of a set of conventional assumptions.

#### 4.2 The Thermal Regulations by element

Existing residential and non-residential buildings are covered by these provisions, with the exception of those that are subject to measures relating to major renovations. The obligations under the Thermal Regulations apply:

- to buildings with a net usable floor area of less than 1 000 m<sup>2</sup>, regardless of the scale of thermal refurbishment operations;
- to buildings with a net usable floor area of less than 1 000 m<sup>2</sup> that are undergoing minor renovation operations, in other words operations which do not encompass all of the appliances with the potential to improve energy performance.

The Thermal Regulations also apply to all buildings constructed before 1948.

If a client decides to replace an insulation element, heating equipment, an appliance for hot-water production, cooling or ventilation or – in public-service buildings only – lighting equipment, he must install products that deliver better performance than the minimum characteristics referred to in the statutory order of 3 May 2007. The requirements are designed to target the use of efficient technology while taking account of constraints on occupiers by encouraging them to renew enough individual elements to make significant improvements to the energy performance of the building as a whole.

#### 4.3 Quality certificates

To go beyond the required minimum, a certificate known as the BBCR 2009 (low-consumption building after renovation, 2009) was established for the most enterprising renovations; certification is subject to compliance with an annual consumption ceiling of 80 kWh of primary energy per square metre.

The certificate of high energy performance for renovated buildings testifies to the voluntary action of clients in implementing refurbishment measures that resulted in a high or even very high standard of energy performance. Its use by clients enables them to anticipate the targets of the Grenelle package of environmental legislation for 2020.

A statutory order of 29 September 2009, promulgated in the Official Journal of the French Republic on 1 October 2009, defines the content of this certificate and the conditions of award.

The certificate of high energy performance for renovated buildings applies solely to buildings completed after 1 January 1948. It certifies that the building meets a high standard of energy performance as well as a prescribed minimum level of comfort in summer; compliance with these

standards is verified by means of inspection procedures defined in the statutory order.

The certificate is issued as part of a certification process that also covers the overall quality of the building by private certification bodies that have concluded a special agreement with the ministry responsible for construction, which authorises them to issue the certificate.

It represents the attainment of an **extremely ambitious** level of performance for residential buildings, namely **80 kWh/m<sup>2</sup> per annum**.

- **BBC (Renovation) for residential buildings**

For renovated residential buildings, there are two levels of low-consumption building (BBC) certification:

- a high energy performance certificate for renovated buildings (*HPE rénovation 2009*), which testifies to compliance with a maximum annual consumption of primary energy of 150 kWh/m<sup>2</sup>, with variations for particular climate zones and altitudes;
- a low energy consumption certificate for renovated buildings (*BBC rénovation 2009*), which requires a higher level of energy efficiency, namely a maximum annual consumption of primary energy of 80 kWh/m<sup>2</sup>, with variations for particular climate zones and altitudes.

- **BBC (Renovation) for non-residential buildings**

In the case of non-residential buildings, this certificate comprises a single level – *BBC rénovation 2009* – which corresponds to a consumption rate that is 40% lower than the reference consumption level for existing buildings laid down in the overall Thermal Regulations.

To date, a total of 40 000 dwellings have been the subject of applications for *BBC rénovation 2009* certification, and 11 000 certificates have already been awarded. As far as public-service buildings are concerned, applications for certification of the top performance level have been made in respect of one million square metres of floor space, and certificates have been issued for a total floor area of 50 000 m<sup>2</sup>.

## 5. **The EPC: an effective communication tool**

The Energy Performance Certificate (EPC) is a document that informs, raises awareness and encourages. It provides information on the energy performance of a dwelling or building by assessing its energy consumption and its environmental impact in terms of greenhouse-gas emissions.

This instrument is one of a set of measures designed to limit the impact of rising energy costs on people's purchasing power in France and to protect the environment.

The content of the EPC and the procedures for producing it are prescribed by regulations.

It indicates, as appropriate, either the volume of energy actually consumed, which is based on invoices, or the estimated energy consumption for normal use of the building or dwelling, defined on the basis of standardised figures.

The readability of the EPC is enhanced by two rating charts, each with seven bands labelled A to G, A being the best performance rating and G the worst:

- the energy-efficiency chart shows the consumption of primary energy;

- the environmental-impact chart shows the volume of greenhouse-gas emissions.

These two charts are a huge step forward in the provision of information to energy users.

The EPC also contains recommendations to purchasers, owners, landlords and tenants as to how they can best save energy. The recommended measures are not compulsory, for the EPC is intended as an incentive to improve the energy performance of a building, not as an enforcement instrument.

Unless otherwise provided, an EPC must be produced in the following circumstances:

- when a residential or other property is sold; this requirement has been in force since 1 November 2006;
- when a lease is signed for a dwelling or residential building; this requirement has applied since 1 July 2007;
- when a commercial lease is signed; this requirement has applied since the entry into force of the Second Grenelle Act;
- when a new building is handed over to the client, if the application for planning permission was submitted after 1 July 2007.

In addition to the communication campaigns that have been conducted to draw attention to all the financial and environmental benefits of energy saving, the Energy Performance Certificate (EPC) is an excellent means of raising awareness. In fact, the energy-efficiency chart from the EPC is omnipresent, having featured in deeds of sale and leases since 2006 and in property advertisements since 1 January 2011. This latter measure has also spread knowledge of the certificate among the general public, who now pay special attention to the energy performance of any property they acquire. Studies are currently being conducted with a view to measuring the impact of the energy-efficiency rating that is displayed on documents relating to property transactions.

Since the start of 2012, the owners of all parts of a building have been under an obligation to obtain an EPC for their property if the building is equipped with a common boiler for heating purposes; this requirement serves to make larger numbers of people aware of the issue of energy saving and the associated financial mechanisms.

It is estimated that five million EPCs have been produced since 2007; the distribution of ratings has been as follows:

- A: 0%
- B: 2%
- C: 19%
- D: 31%
- E: 26%
- F: 14%
- G: 8%

## 6. **Financial mechanisms**

### 6.1 For the renovation of existing buildings

#### 6.1.1 Interest-free eco-loans (Eco-PTZ)

Available since 1 April 2009, interest-free eco-loans are intended for individual owner-occupiers or landlords to finance major renovation works.

##### 6.1.1.1 Loan beneficiaries

Interest-free eco-loans are for any person who is the owner of a dwelling built before 1 January 1990 which is occupied by the owner or his tenant as their main residence.

##### 6.1.1.2 Eligible operations

There are three options, two of which relate more especially to energy renovations:

- the implementation of a ‘work package’, that is to say a combination of at least two of the measures listed below:
  - efficient thermal insulation of roof voids;
  - efficient thermal insulation of external walls;
  - efficient thermal insulation of glazed surfaces and external doors;
  - installation, regulation or replacement of heating systems, which may be connected with economical and efficient ventilation systems or efficient systems for the production of domestic hot water;
  - installation of heating systems using a renewable energy source;
  - installation of systems for the production of domestic hot water that use a renewable energy source;
- the achievement of a minimum level of overall energy performance in a building; for buildings constructed after 1 January 1948, it is possible to have a thermal assessment conducted, which serves to identify the work that could most suitably be undertaken on the building in question; it is carried out by a consultancy firm, which will calculate the current consumption for the dwelling and recommend a number of works that will serve to improve its overall energy performance;
- operations defined in the framework of a thermal-efficiency study that should serve to lower the energy consumption of a dwelling to:
  - an annual total of less than 150 kWh/m<sup>2</sup> of primary energy (the level of the high energy performance (HPE) certificate for renovated properties) if the dwelling consumed more than 180 kWh/m<sup>2</sup> per annum prior to the renovation work;
  - an annual total of less than 80 kWh/m<sup>2</sup> of primary energy (the level of the low-consumption building (BBC) certificate for renovated properties) if the dwelling consumed less than 180 kWh/m<sup>2</sup> per annum prior to the renovation work.

These values are adjusted in accordance with the climate zone and altitude of the place where the dwelling is located.

In the option that focuses on a minimum level of overall energy performance, the interest-free eco-loan is thus a directly usable form of funding and a highly motivating mean of transforming an existing

dwelling into nearly zero-energy housing.

The Initial Finance Act for 2012 strengthened the link between this loan and the tax credit for sustainable development (see next section) by rebalancing public support in favour of major renovations that are essential to the achievement of the Grenelle objectives. This reform of the two mechanisms has thus served to extend the interest-free eco-loan to cover major renovations for a term of up to 15 years and to adjust the length of the term to match the scale of the work, to introduce a top-up to the sustainable-development tax credit in cases where two or more works are being carried out and to reintroduce the possibility of drawing the two forms of aid concurrently, subject to means testing (see next section).

All of this clearly demonstrates the desire of the public authorities to prioritise major renovation work and to provide people with an incentive to initiate such work.

This will serve to promote the renovation of dwellings to the standard of nearly zero-energy buildings, which should be reflected in the increasing number of such buildings.

#### 6.1.1.3 Amount of the loan

This loan funds up to EUR 30 000-worth of work to improve the energy efficiency of a dwelling over a period of ten years, which may be extended by the bank, up to a maximum of 15 years, although in that case the bank would not receive any tax credit in respect of unrealised interest between the tenth and the fifteenth year.

	Work package		Overall energy performance
	two renovation operations	three renovation operations	
Eco-loan ceiling	€20 000	€30 000	€30 000

#### 6.1.1.4 Implementation of the loan scheme

Once the choice of renovation works has been made, the interested party must approach a banking institution with an estimates form, accompanied by estimates for the selected operation.

When the loan has been granted, its beneficiary has two years to complete the envisaged works and return to the banking institution with an invoices form, accompanied by the receipted invoices.

These forms are obtainable from a local Energy Information Centre (*Espace Info Énergie*) or can be downloaded from the website of the ministry responsible for housing.

#### 6.1.1.5 Impact

The number of eco-loans granted up to 31 December 2010 is estimated at EUR 150 000, the average expenditure on renovation work being EUR 19 200. In 2011, the number of loans granted in each quarter came to approximately 11 000. Government fiscal expenditure on the loan scheme is assessed at €70m. for 2011 and €5m. for 2012.

### 6.1.2 Sustainable-development tax credit

This scheme was established in 2005 by the Energy Policy Objectives Act of 13 July 2005 (Statute No 2005-781). This tax credit is a fiscal mechanism enabling individuals to deduct from their income-tax liability part of their expenditure on particular improvement work designed to improve the energy

performance of their main residence.

Its purpose is to encourage households to make improvements to the energy performance of their dwelling while supporting the most efficient of the emerging technologies in terms of sustainable development and helping to drive up performance standards in the various markets.

This mechanism was reformed in the framework of the Finance Act for 2012 with a view to encouraging large-scale refurbishments. In the revised scheme, if two or more improvement works are arranged in the form of a work package, the rate that can be claimed for each job is topped up.

#### 6.1.2.1 Beneficiaries of the tax credit

The purposes covered by this scheme are as follows:

- in main residences that have been completed for more than two years, the acquisition of condenser boilers, gas-fired micro-CHP boilers, thermal-insulation materials and regulation devices for heating systems;
- in new or old dwellings serving as main residences, the acquisition of energy-production equipment using a renewable energy source and of heat pumps the essential purpose of which is to generate heat.

#### 6.1.2.2 Eligible operations

This scheme relates to expenditure on the acquisition of certain items of equipment which are supplied by the companies that have undertaken the renovation work and which are the subject of an invoice. The eligible operations may be categorised as follows:

- heating equipment,
- insulation materials,
- regulation devices for heating systems,
- equipment using a renewable energy source,
- heat pumps (other than air-to-air types) the essential purpose of which is to generate heat or produce domestic hot water,
- equipment for connection to certain heating networks fuelled by renewable energy sources or cogeneration installations,
- gas-fired micro-CHP boilers.

Such equipment and materials must meet certain performance criteria, which are regularly tightened to take account of technological developments and to promote their emergence and dissemination.

#### 6.1.2.3 Amount of the tax credit

The amount of expenditure that can be covered by a tax credit for an individual, taxpayer and a single dwelling is capped at €8 000. This limit may be increased on the basis of family circumstances and is set at €16 000 for a couple with no children. Since 1 January 2012, it has been possible to combine the sustainable-development tax credit with the interest-free eco-loan, subject to means testing, that is to say the reference taxable income of the loan beneficiary's household for taxation purposes must not have exceeded €30 000 in the penultimate year prior to the loan award.

Similarly, for expenditure made on or after 1 January 2012, the rates of the tax credit are increased if, for a single dwelling that has been completed for more than two years, the taxpayer has spent money on at least two of the following within a single year:



- the acquisition of thermal-insulation material for glazed surfaces;
- the acquisition and installation of insulation material for non-glazed surfaces for the purpose of insulating external walls;
- the acquisition and installation of insulation material for non-glazed surfaces for the purpose of insulating roof voids;
- the acquisition of boilers or of other equipment for heating or the production of domestic hot water which use wood or other biomass fuels;
- the acquisition of equipment for the production of domestic hot water which uses a renewable energy source;
- the acquisition of condensation boilers, gas-fired micro-CHP boilers and energy-production equipment (other than the boilers and equipment referred to in the two preceding indents) which use a renewable energy source, of heat pumps and of equipment using solar radiation energy to generate electricity.

These measures have been adopted for the purpose of focusing refurbishment work on major renovations that lead to an improvement in the overall performance of buildings, bringing them close to or even attaining near-zero-energy standard.

#### 6.1.2.4 Implementation of the tax-credit scheme

The tax-credit scheme is operated by the tax administration. Individuals need only complete a line in their tax return and retain the invoice issued by the company performing the renovation work.

#### 6.1.2.5 Impact

From 2005 to 2010, almost 7.9 million renovation works were declared for tax-credit purposes in metropolitan France, where a total of 27 million dwellings are used as main residences. The number of major renovations came to some 1.7 million. Fiscal expenditure on the scheme over that same period amounted to EUR 12 billion, the total declared household expenditure being EUR 40 billion.

The implementation of the tax-credit scheme since 2005 has resulted in annual reductions in final energy consumption of 0.32 Mtoe in 2009 and of 0.57 Mtoe in 2010; estimated future reductions are 1.28 Mtoe in 2016 and 1.43 Mtoe in 2020.

### 6.1.3 Energy Savings Credits

The Energy Saving Credits (Certificats d'économies d'énergie – CEE) scheme, established by Articles 14 to 17 of the Energy Policy Objectives Act of 13 July 2005, known as the POPE Act (statute No 2005-781), is one of the flagship instruments of government policy for the management of energy demand.

#### 6.1.3.1 Principle

The CEE scheme is based on an obligation imposed by the public authorities on energy providers – sellers of electricity, gas, heat, refrigeration and domestic heating oil – to make energy savings. A three-year savings target is defined and is distributed among the operators on the basis of their sales volumes. There is also a penalty of two euro cents per kWh for energy providers that fail to meet their obligations within the prescribed time limit. Energy Savings Credits are awarded, subject to certain conditions, to operators that take energy-saving measures. Energy providers can discharge their obligations:

- by holding credits corresponding to the amount of their savings target;
- by means of credits obtained as a result of measures taken by operators themselves;

- by purchasing credits from other operators that have taken such measures.

Besides controlling demand for energy, the credits scheme also contributes to the development of renewable sources of heating energy. To this end, provision has been made for credits to be awarded for the installation of equipment that serves to replace a non-renewable energy source with a renewable source for the production of heat in premises used for residential, agricultural or public-service purposes.

#### 6.1.3.2 Implementation

Energy Savings Credits are awarded, subject to certain conditions, by the relevant department of the ministry responsible for energy to eligible operators – providers subject to compulsory participation but also other corporate entities – which make energy savings. The qualifying measures may be taken in any area of activity – housing, the service sector, industry, agriculture, transport, etc. – on the property of eligible operators or of third parties encouraged by eligible operators to make energy savings. Compulsory participants also have the option of purchasing Energy Savings Credits from other players that have taken energy-saving measures, particularly from eligible non-compulsory participants.

Standardised operation sheets, defined by statutory orders, have been produced to facilitate the initiation of energy-saving measures. They are categorised by sector – housing, services, industry, agriculture, transport and networks – and define flat-rate volumes of energy savings, expressed in cumulative discounted kWh, for the most commonplace operations. There are now 269 such operation sheets.

Special procedures apply to energy savings resulting from measures other than the standardised operations.

#### 6.1.3.3 Impact

As well as serving to reduce energy consumption, this scheme has the advantage of putting very little pressure on the public purse, because the costs it generates are confined to the processing of CEE applications.

The target for the initial period – 54 terawatt-hours from 1 July 2006 to 30 June 2009 – was comfortably exceeded. By 1 July 2009, credits had been awarded for a total volume of 65 TWh. Most of the credited operations related to residential or public-service buildings (87% and 4% respectively) or to the industrial sector (7%). This initial period served to generate investments worth almost EUR 3.9 billion in works designed to save energy and would reduce consumers' energy bills by EUR 4.3 billion over the lifetime of the new equipment and works.

If we add the period from 1 July 2009 to 31 December 2010, a transitional period when, although there were no energy-saving obligations, operators could continue to take energy-saving measures and accumulate credits, the Energy Savings Credits scheme resulted in:

- 173,7 cumulative discounted terawatt-hours supplied, representing a reduction of 12.3 TWh in final energy consumption (21% through lower electricity consumption and 79% through lower fuel consumption), which is equivalent to 1.5% of the annual energy consumption for residential and public-service buildings;
- the avoidance of 3.1 megatonnes of CO<sub>2</sub> emissions, representing 3.2% of the annual total emissions from residential and public-service buildings;
- the generation of 1.3 TWh of heat from renewable sources by 850 000 boilers;
- 362 000 renewables installations: 167 000 heat pumps, 143 000 individual biomass systems and 52 000 solar water-heating systems;

- 570 000 insulation operations: 450 000 door/window installations and 120 000 installations on opaque surfaces.

Following this success, the Energy Savings Credits scheme entered a new phase of maturity and acceleration on 1 January 2011 with a target of 345 TWh for the period from 2011 to 2013, which is more than six times as ambitious as the target for the first period. The fact that such an ambitious energy-saving target has been set should encourage prudent behaviour patterns and develop the market in energy-saving services.

By 30 June 2012, credits for a total of 293.2 cumulative discounted TWh had been issued and entered in the national register of Energy Savings Credits. More than 90% of the registered operations were carried out in residential and public-service properties, which are the priority target of the scheme. Moreover, 22.43% of the operations related to the building envelope, while 64.21% related to thermal equipment.

#### 6.1.4 Eco-loans for social housing

Eco-loans for social housing is a scheme introduced by the Grenelle environmental package for the rehabilitation of the social-housing stock with the highest levels of energy consumption – ‘fuel-hungry homes’.

##### 6.1.4.1 Target housing stock

The First Grenelle Act established a programme of thermal rehabilitation covering the period from 2009 to 2020, providing for the renovation of 100 000 social dwellings in 2009-2010 and then renovations at the rate of 70 000 homes a year from 2011.

In this context, 800 000 ‘fuel-hungry homes’ have been identified within the stock of rented social housing and are to undergo thermal refurbishment before 2020. In terms of the Energy Performance Certificate (EPC), this corresponds to the renovation of properties with E, F and G ratings. Since 17 September 2010, however, the first version of the loan has also been open to dwellings with a D-rated EPC, with the proviso that these should not account for more than 20 000 of the 100 000 renovated properties.

The inclusion of D-rated homes was maintained in the new version of the loan that was established in December 2011, subject to an annual ceiling of 14 000 dwellings. In addition, to qualify for the loan, the borrowing body must commit itself to a renovation programme in which at least 30% of the homes scheduled for renovation have an E, F or G energy-performance rating.

##### 6.1.4.2 Financing and development of the scheme

The Government and the Caisse des Dépôts et Consignations (Deposits and Consignments Fund) have coordinated their efforts to offer a loan at an appealing rate. To this end, a loan facility worth a total of €1.2bn was made available in the first instance, repayable at 1.9% over 15 years or 2.35% over 20 years, at the discretion of the borrowing body, for the rehabilitation of the first 100 000 social dwellings. This facility was used up completely by 1 June 2011.

In order to maintain the momentum generated by this eco-loan scheme for the renovation of social housing, a decision was taken to perpetuate it, and a new lending envelope was made available with effect from 1 December 2011 to fund 70 000 renovations a year until 2020, as envisaged in the First Grenelle Act. An agreement devoted specifically to this new loan was concluded by the Government and the Caisse des Dépôts et Consignations on 4 May 2012 to specify the conditions of eligibility and

the requirements applying to renovation work and energy consumption. Spread over a maximum period of 25 years, the eco-loan for social housing is now granted at a variable rate which is based on that of the *Livret A* savings account and depends on the term of the loan; this brings it into line with the range of loans provided by the Caisse des dépôts for social landlords.

Term of loan	Rate of interest
5 to 15 years	<i>Livret A</i> rate
16 to 20 years	<i>Livret A</i> rate + 0.15%
21 to 25 years	<i>Livret A</i> rate + 0.25%

#### 6.1.4.3 Amount of the loan

The amount of the loan ranges from € 000 to €16 000 per dwelling; it is available to low-income housing providers, to semi-public companies and to local authorities with social-housing stock.

The amount borrowed may be topped up by € 000 per dwelling if the work undertaken qualifies the dwelling for a compliant Energy Performance Certificate, which creates a strong incentive for social landlords to achieve nearly zero-energy standard for their properties.

#### 6.1.4.4 Eligible operations

Since the method laid down by the Thermal Regulations does not apply to buildings constructed before 1 January 1948, landlords of such properties will be able to avail themselves of a predefined list of qualifying operations; in other words, their obligation is based on measures taken.

In the case of buildings completed after 1 January 1948, the obligation of social landlords is based on results, that is to say the energy performance of the dwelling on completion of the renovation work. The level of conventional energy consumption is measured by means of a regulated method that applies to existing buildings, namely the *Th-C-E ex* method. To benefit from an eco-loan for social housing, homes with an E, F or G energy-performance rating prior to renovation work must fulfil the following two conditions:

- The annual conventional consumption of primary energy by the building before the renovation work must be at least 230 kWh/m<sup>2</sup>.
- The work must serve to achieve an annual conventional primary-energy consumption not exceeding 150 kWh/m<sup>2</sup>, a ceiling that is subject to variations for particular climate zones and altitudes.

Dwellings rated D prior to renovation work must fulfil the following conditions in order to be eligible for the loan:

- The annual conventional consumption of primary energy by the building before the renovation work must amount to between 151 and 230 kWh/m<sup>2</sup>.
- The work must serve to achieve a reduction in annual conventional primary-energy consumption of 85 kWh/m<sup>2</sup>, a requirement that is subject to variations for particular climate zones and altitudes, or to achieve a post-renovation level of conventional primary-energy consumption equivalent to that of the BBC (Renovation) 2009 certificate, that is to say 80 kWh/m<sup>2</sup> per annum, which is likewise subject to variations for particular climate zones and altitudes.

The ultimate condition set by this scheme, then, is that dwellings achieve either the level of energy performance corresponding to the high energy performance (HPE) certificate for thermal renovations in the case of 'fuel-hungry' homes or possibly that of the low-consumption buildings certificate *BBC rénovation 2009* for those with a D rating. This is also a measure that serves to promote and encourage the transformation of social housing into buildings with near-zero energy consumption.

#### 6.1.4.5 Impact

The first version of the eco-loan for social housing, in the form of a fixed-rate loan, made it possible to undertake the renovation of 100 000 social dwellings, 20,000 of which had a D rating for energy performance, and to part-fund renovation work worth EUR 2.7 billion with loans amounting to an average of €1 900 per dwelling.

The estimated cost of topping up this loan in the first version of the scheme was about €180m., distributed as follows:

- €70m. from funds belonging to the Caisse des Dépôts et Consignations
- €10m. from savings funds.

Since March 2012, loans have been issued at the rate of about 2 000 a month. It is estimated that the cost of the scheme for 2012 will be in the region of €38m.

#### 6.1.5 Site-ratio bonus

In the case of existing buildings, the site-ratio bonus scheme makes it possible to offer owners the option of an increase in their site ratio to the extent that they make their house energy efficient. In this way, it motivates owners to undertake work that incorporates an energy-performance dimension.

##### 6.1.5.1 The mechanism

In the case of construction operations for new buildings or extensions that entail an improvement in energy performance or the incorporation of equipment using renewable energy, a site-ratio bonus may be granted, up to a limit of 30% or, if the site is in a protected area, 20%. This clearly has to be undertaken in accordance with local development-planning rules. The work that is performed must meet clearly defined criteria.

##### 6.1.5.2 The criteria

In the case of the existing constructions, the criteria are as follows: ceilings below the unused roof void of the building and extension must be insulated to a thermal resistance (R-value) exceeding 5 m<sup>2</sup>.K/W.

In addition, a choice must be made from the following four options for the incorporation of energy from renewable sources:

- more than half of the energy consumed for heating purposes to be generated by wood-burning;
- annual generation of electricity from renewables to exceed 25 kWh/m<sup>2</sup> in primary energy, or else surface area of photovoltaic collectors to exceed 10% of net usable floor area;
- more than half of the consumption of domestic hot water to be covered by solar heating, or the surface area of solar collectors for hot-water supply to exceed 3m<sup>2</sup> per dwelling;

- building to be equipped with a heat pump with a coefficient of performance (COP) greater than 3.5.

This measure thus serves to promote a holistic approach to energy efficiency by focusing efforts on both the performance properties of the structure and the incorporation of renewable energy sources to generate some of the energy consumed by the building. In this way it contributes to the drive to promote the renovation of buildings to nearly zero-energy standard by seeking to encourage major renovations and a focus on energy efficiency.

#### 6.1.5.3 Implementation

Local authorities wishing to introduce this scheme must seek a vote of approval from their Municipal Council. This will be followed by a more detailed study to identify target areas and assign a bonus rate to each.

Once everything is in place for the mechanism to be applied, any client wishing to benefit from it for his building project must attach to his application for planning permission an undertaking to install equipment for the generation of energy from renewable sources, accompanied by a document issued by an assessor authorised to produce energy performance certificates testifying to compliance with the prescribed conditions at the planning-permission stage.

### 6.2 For new builds

#### 6.2.1 Sustainable-development tax credit

The tax credits described in detail in subsection 2.1 above can be claimed in respect of new housing but only for the installation of the most efficient equipment for generating energy from renewable sources. This option, however, will disappear when the new Thermal Regulations (RT2012) enter into force on 1 January 2013.

#### 6.2.2 Energy Savings Credits

The Energy Savings Credits scheme described above is not confined to the renovation of existing buildings. In actual fact, it also applies to new buildings and is used for them.

There are two specific operation sheets with a particularly sharp focus on the overall energy performance of new buildings. They relate to overachievement of energy-efficiency standards for new buildings with high energy-performance certification; one sheet relates to residential buildings and the other to public-service buildings.

To benefit from this operation, a building must have been awarded one of the certificates of high energy performance, which serves to encourage the construction of nearly zero-energy buildings.

#### 6.2.3 Interest-free loan plus (PTZ+)

The PTZ+ is a state-aided interest-free loan that may be granted to persons who wish to acquire their first main home in metropolitan France or in a French overseas département.

##### 6.2.3.1 Loan beneficiaries

The PTZ+ is reserved for first-time home buyers. Since the scheme came into being 1 January 2012 – the date of issue of the first loan offer – prospective first-time buyers have been required to furnish proof that their total resources do not exceed a fixed ceiling, which varies in accordance with the

location of the dwelling and the composition of the borrower's household.

The loan is reserved for individuals who have not owned their own main residence at any time during the two years preceding the date of the loan application.

#### 6.2.3.2 Eligible operations

The PTZ+ may be granted to finance the following operations:

- the construction of a dwelling, including – where appropriate – the acquisition of building rights or of a plot of land for the construction of that dwelling;
- the acquisition of a dwelling with a view to being its first occupier;
- the conversion of non-residential premises for use as a dwelling;
- the acquisition of a dwelling under a rent-to-buy contract (governed by the Act of 12 July 1984), where the borrower will be the first occupier on the date on which the purchase option is exercised.

#### 6.2.3.3 Amount of the loan

The eligible cost of the operation in respect of a new building is subject to a ceiling based on the following two criteria:

- the location of the dwelling in one of four zones, defined on the basis of degrees of imbalance between housing supply and demand;
- the number of persons who will occupy the dwelling.

The amount of the loan corresponds to a proportion of the total cost of the operation or of a fixed ceiling, whichever is the lower. The percentage that is applied to determine the amount of the loan is based on the location of the dwelling and its overall energy performance rating.

The energy performance rating of a new dwelling is determined by whether or not it is in a certified low-consumption building (BBC 2005).

For loan offers issued on or after 1 January 2012, the proportion varies from 14% to 38%, with an average difference of 12 percentage points between dwellings that are in certified low-consumption buildings and those that are not.

This mechanism is therefore designed to promote the purchase of housing with near-zero net energy consumption and so serves to foster growth in the supply of energy-efficient housing

#### 6.2.3.4 Impact

Government fiscal expenditure on the implementation of this measure came to €1.1 bn in 2010 and €1.34 bn in 2012. The cost for 2013 is estimated at €1.37 bn.

#### 6.2.4 Exemption from the property tax on developed land

The local authority may decide to apply the exemption provision in order to increase the incentive to construct energy-efficient buildings. This measure is authorised by the Finance Act 2009, particularly

its Article 107.

#### 6.2.4.1 The mechanism

New dwellings which were completed on or after 1 January 2009 and which have low-consumption certification (BBC 2005) may be exempted from the property tax on developed land.

#### 6.2.4.2 Implementation

Exemption of 50% or 100% is granted on the basis of a decision taken by local authorities or by public establishments for cooperation between local authorities (EPCIs) with their own tax-raising powers; the exempting body also sets the exemption period, which must be at least five years.

Developers wishing to obtain this exemption must first find out from the local authority whether this provision applies and, if so, what procedures are to be followed. If it does apply, the next step is to complete a declaration and submit it to the Public Finance Centre or Property Valuation Office for the place where the property is located.

#### 6.2.4.3 Impact

Since these exemptions are granted by local authorities and are not the subject of compensatory payments from central government, it is difficult to obtain precise quantified returns on the implementation of this scheme.

### 6.2.5 The Scellier mechanism

From 1 January 2009 until 31 December 2012 inclusive, taxpayers making investments for the acquisition of dwellings that are new, for sale before completion or being self-built, of premises converted into a dwelling or of rehabilitated premises are eligible for income-tax relief.

The dwelling must be let unfurnished for use as the tenant's main residence.

The investor can choose between two options:

- the scheme established by the Scellier Act (the Scellier mechanism), whereby the tax relief is spread over nine years; in this case, the landlord undertakes not to charge more than the applicable maximum rent;
- the scheme known as the Scellier intermediate (or social) mechanism, whereby the tax relief is spread over nine, twelve or fifteen years, with an additional tax exemption for 30% of the rent income; in this case, the landlord undertakes to lease the dwelling to the tenants, subject to means testing, and undertakes not to charge more in rent than the applicable maximum, rent ceilings being lower than those prescribed for the Scellier mechanism.

#### 6.2.5.1 Eligible housing stock

The following housing stock is eligible for inclusion in this mechanism:

- new dwellings or dwellings for sale before completion which are purchased between 1 January 2009 and 31 December 2012 inclusive;
- dwellings which the taxpayer has had built and which have been the subject of an



application for planning permission, provided that the construction is completed no later than 31 December of the second year following the year of application;

- premises acquired between 1 January 2009 and 31 December 2012 with a designated purpose other than housing which were converted into dwellings, provided that the conversion work was completed no later than 31 December of the second year following the year of acquisition;
- acquired dwellings that are the subject of rehabilitation work undertaken by the seller;
- dwellings acquired between 1 January 2009 and 31 December 2012 that do not meet the decent housing standards defined by Decree No 2002-120 of 30 January 2002 on the characteristics of decent housing conditions and on which the purchaser is carrying out rehabilitation work as defined in the said Decree with a view to bringing the dwellings up to technical performance standards close to those of new housing.

#### 6.2.5.2 Tax reduction

The reduction is contingent on a commitment to let out the dwelling unfurnished for use as a main residence for a minimum period of nine years and is granted at the following rates:

- 25% for dwellings acquired or built in 2009 and in 2010;
- for dwellings acquired or built in 2011, the rate depends on the level of energy performance of the dwelling;
- 22% for dwellings in a certified low-consumption building (*bâtiment basse consommation* – BBC);
- 13% for dwellings without BBC certification.

For dwellings built in 2012, the reductions are as follows:

- 13% for energy-efficient dwellings acquired or built in 2012;
- 6% for those that do not meet the performance criteria in cases where the application for planning permission was submitted before 1 January 2012.

In the case of new builds, ‘energy-efficient dwellings’ means dwellings with a BBC 2005 low-consumption certificate; in the case of existing stock, it means dwellings with a BBC 2009 low-consumption certificate for renovated buildings, which is the French classification corresponding to nearly zero-energy buildings.

The aim of this provision is certainly to promote nearly zero-energy buildings, particularly the construction of such buildings but also the refurbishment of buildings to near-zero-energy standard.

#### 6.2.5.3 Impact

In 2011, fiscal expenditure amounted to EUR 240 million on the Scellier mechanism and EUR 120 million on the Scellier social mechanism. Estimates for 2012 put expenditure levels at EUR 450 million for Scellier and EUR 225 for Scellier social.

## 6.2.6 Site-ratio bonus

In the same way as was described in detail in the section on renovation, enhanced planning permission may be granted for new buildings.

### 6.2.6.1 The mechanism

In the case of construction operations for new energy-efficient dwellings incorporating equipment using renewable energy, a site-ratio bonus may be granted, up to a limit of 30% or, if the site is in a protected area, 20%. This clearly has to be undertaken in accordance with local development-planning rules. The work that is performed must meet clearly defined criteria in the same way as refurbishment operations on existing building stock, but the requirements must be adapted in the context of new builds.

### 6.2.6.2 The criteria

In the case of the construction of new collective housing, groups of one-family houses or buildings for service provision, such new builds must meet the criteria for level THPE EnR (renewables-based very high energy performance) or for the BBC certificate, High Energy Performance class. This measure is thus a direct incentive to construct nearly zero-energy buildings.

For detached/semi-detached houses comprising no more than two dwellings, the conditions are somewhat different. If the owner built the house for his own use, he may exceed the site ratio if the house fulfils the criteria indicated above or if it satisfies the following conditions:

- compliance with the energy-performance requirements laid down by the Thermal Regulations 2005;
- energy consumption 20% below the reference level.

In addition, a choice must be made from the following options:

- more than half of the energy consumed for heating purposes to be generated by wood-burning;
- more than half of the consumption of domestic hot water to be covered by solar heating, or more than 3m<sup>2</sup> surface area of solar collectors for hot-water supply to be installed for each dwelling;
- building to be equipped with a heat pump with a coefficient of performance (COP) greater than 3.5.

### 6.2.6.3 Implementation

The procedure for implementation by local authorities is, of course, the same for both the renovation of existing buildings and new builds.

Once everything is in place for the mechanism to be applied, any client wishing to benefit from it for his building project must attach to his application for planning permission a document issued by a body authorised to award energy performance certificates testifying that the project complied at the planning-permission stage with the required performance criteria and that the applicant had undertaken to obtain the appropriate certification.

### 6.3 Public buildings

#### 6.3.1 Renovation of existing stock

The planning act of 3 August 2009 (statute No 2009-967) on the implementation of the Grenelle environmental package provides for measures to combat climate change, which will also be accompanied by progress in the realm of accessibility.

Article 5 of this First Grenelle Act specifies that the government is to set a target of reducing the total energy consumption of the present building stock by at least 38% by 2020.

The same article lays down that “All buildings of the state and its public establishments shall undergo an audit by 2010. On the basis of the findings thereby obtained, the objective is to initiate their renovation by 2012 with the treatment of their least energy-efficient surface areas. The purpose of this renovation shall be to achieve a reduction of at least 40% in the energy consumption of these buildings and at least 50% in their greenhouse-gas emissions within a period of eight years”.

In order to flesh out these objectives, the Government decided to launch a major renovation plan for state properties in 2008.

The objectives have subsequently been restated, particularly in the Prime Minister’s two circulars of 16 January 2009 on the implementation of government buildings policy, one addressed to cabinet ministers and the other to prefects.

##### 6.3.1.1 Description

The Prime Minister’s circulars of 16 January 2009 established the main principles for the reorganisation of the property-management function of the state. They are reflected in a three-stage plan that has come on stream. The three stages are as follows:

- a basic appraisal of the whole building stock;
- detailed audits conducted for the purpose of drawing up the work schedule;
- the works phase.

A total floor area of 120 million square metres is involved, with government buildings accounting for 50 million and the main public establishments for the other 70 million.

##### 6.3.1.2 Implementation

A campaign of detailed major repair and maintenance, energy and accessibility audits of government buildings was launched towards the end of 2009. To this end, the relevant audit contracts were concluded in late 2009, with the audit findings scheduled for presentation in the course of 2011.

##### 6.3.1.3 Impact

The cost of this renovation programme is estimated at EUR 24 billion, EUR 10 billion of which is for properties owned by the government itself.

An amount of EUR 50 million had been earmarked for the performance of these audits in the framework of the Economic Recovery Plan.

On the basis of the inventory taken at the start of 2010, it was estimated that audits would be required for a total floor space of about 22 million square metres, or 44% of the government building stock, comprising 19 million square metres belonging to decentralised departments or local operators, such as universities, and three million square metres held by the central administration or certain other operators. The actual cost of the audits is EUR 46 million.

## 7. Research

Prébat, the Research and Experimentation Platform on Energy in Buildings, is the national platform for the coordination and direction of research into energy matters relating to buildings. It focuses on the development of technology and services as well as of knowledge and decision-making tools for public policymakers.

The first Prébat programme, Prébat 1, was implemented from 2007 to 2012. The strands of Prébat 1 were as follows:

- Strand No 1: supporting and developing focused and targeted R&D;
- Strand No 2: promoting the implementation of experimental operations and demonstrations;
- Strand No 3: pursuing a specific policy for existing buildings;
- Strand No 4: relating Prébat measures to all the social and technical dimensions of building activity and buildings;
- Strand No 5: incorporating the economic and financial dimensions of sustainable development into research and innovation;
- Strand No 6: bringing research and innovation to bear on the other dimensions of the issue of energy efficiency in buildings;
- Strand No 7: tying the programme into a collaborative approach that includes the European dimension.

The second Prébat programme will run from 2011 to 2015. One of the Prébat 2 priority areas is existing buildings, and the other is new buildings.

As far as existing building stock is concerned, the aim is to study and propose, for each category of existing buildings:

- in the short term, conditions for the large-scale roll-out of existing technology;
- in the medium term, technical, economic and organisational conditions for the refurbishment of buildings to a performance standard as close as possible to that of new buildings.

With regard to new builds, the aim is to contribute to the development of energy-plus buildings, particularly by studying the conditions for the development of integrated renewables in the context of a construction project and even by means of technological breakthroughs. This effort will be based on support for technically, financially and architecturally efficient show houses that can be reproduced throughout the country. Research programmes are currently being implemented in the following fields

in the Prébat 2 framework:

- improvement of energy efficiency in condominiums;
- the *Energissime* programme, with the following objectives:
  - to motivate professionals and owners of detached or semi-detached houses to seek improvements in energy efficiency,
  - to organise encounters between professionals and individuals,
  - to train professionals;
- assessment and advancement of the environmental approach in scheduled housing-improvement operations;
- fuel poverty;
- refurbishing homes for high energy performance;
- demonstration buildings;
- energy-plus buildings, smart grids, territory and residents;
- the French industrial apparatus;
- designing housing for quality and energy efficiency.

With regard to the programme directed by ADAME on low-consumption demonstration buildings, assistance has been given to 1 100 building projects since 2006 for the purpose of achieving the following BBC performance levels:

- for residential properties (average figures): 50 kWh/m<sup>2</sup> per annum for new builds and 80 kWh/m<sup>2</sup> per annum for refurbishments;
- for public-service buildings: 50% less energy consumption than the statutory ceiling for new builds and 40% less for refurbished properties.

Of the demonstration buildings, 60% were residential and 40% were public-service buildings. Lastly, 80% of the projects were for new builds.

