



CONCERTED ACTION ENERGY PERFORMANCE OF BUILDINGS

EPBD implementation in France

Status in December 2016

AUTHORS

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NATIONAL WEBSITES

www.cohesion-territoires.gouv.fr, www.ecologie-solidaire.gouv.fr, www.rt-batiment.fr,
www.ademe.fr

1. Introduction

In France, the implementation of the EPBD has been the responsibility of the French Ministry for an ecological and solidary transition and the Ministry of territory cohesion. With as aim to replicate the successful transposition of Directive 91/2002/EC, France has been working on implementing Directive 2010/31/EU since 2010. Law 2010/788 of 12 July 2010¹ and the regulation that followed have significantly improved the energy performance certification process, while the implementation of the new thermal regulation, RT 2012², has brought energy efficiency of new buildings to NZEB level. Lastly, the Energy Transition for Green Growth Act (*LTECV*) of 17 August 2015³ provided also new tools, e.g., requirements for insulating envelope parts in case of restoration, aiming at increasing thermal renovation.

This report is giving an overview of the current status of the implementation of the EPBD, structured around four main topics:

- requirements on energy performance for new buildings;
- requirements on energy performance for existing buildings;
- EPCs and
- inspection for heating and AC systems.

Finally, one last additional part highlights the setting of the Energy plus Carbon minus (E+ C-) testing scheme, which serves a preparatory function for the future thermal regulation, considered in France a success.

2. Current Status of Implementation of the EPBD

2.1. Energy performance requirements: NEW BUILDINGS

2.1.i. Progress and current status of new buildings

The current thermal regulation in response to the EPBD is the *RT 2012 (Réglementation Thermique 2012)*⁴. It has been mandatory only for some public buildings since the end of 2011, and for all new buildings since 2013. This regulation is the result of a two year-long dialogue with all stakeholders, including seven consultative conferences, where the work in progress was presented. The next thermal regulation is planned for 2020 and it will contain even more ambitious objectives, since it will also include environmental requirements, most likely based on a life-cycle analysis. In order to anticipate this new regulation, a testing scheme called “E+C- (standing for Energy plus Carbon minus) was launched for volunteering contractors in late 2016.

2.1.ii. Format of national transposition and implementation of existing regulations

The structure of *RT 2012* is based on three performance requirements:

- The requirement for minimum energy efficiency of buildings, which imposes a limitation on energy demand (heating, cooling and lighting) based on the bioclimatic conception (B_{bio}) of the project, whereby the B_{bio} value has to be lower than a maximum value called $B_{bio\max}$.
- The requirement for primary energy consumption, which imposes a limitation on primary energy consumed (C_{pe}) for the combined use of heating, cooling, domestic hot water, lighting and auxiliaries (pumps and fans), whereby the C_{pe} has to be lower than a maximum value called $C_{pe\max}$.
- The requirement for summer comfort, where the ambient indoor temperature of the building, reached after the 5 hottest days of the year (T_{ic}), cannot exceed a reference level calculated for each project, whereby T_{ic} has to be lower than a maximum reference value called T_{icref} .

These three coefficients are calculated through TH-BCE⁵, a dynamic hourly methodology (calculations are run every hour of a full year), which describes each component of the building envelope, as well as its energy systems.

The values of $B_{bio\max}$ and $C_{pe\max}$ are absolute values, based on standard benchmarks depending on the building type (Table 1) and are modulated by local climate, altitude and immediate environment factors.

Additionally, in order to ensure that residential buildings are correctly built, qualified experts have to check that airtightness upon their completion does not exceed 0.6 m³/h/m² for single-family houses and 1 m³/h/m² for apartment buildings.

Finally, the *RT 2012* includes requirements for renewable energy use. It takes different forms depending on the energy type (for example a minimum of for solar panels), but it should amount to at least 5 kWh_{EP}/m².year.

Type of building		B_{biomax}	C_{pemax} (kWh/m ² .year)
Individual House	EC1	60	50
	EC2	80	60
Apartment building	EC1	60	90
	EC2	90	105
Office building	EC1	70	70
	EC2	140	110
Secondary education building (day time)	EC1	40	55
	EC2	50	70
Secondary education building (night time)	EC1	60	90
	EC2	90	105
Shop	EC1	140	320
	EC2	250	520
Catering 2 meals/day 6 days a week	EC1	75	110
	EC2	85	125
Hospital (day time)	EC1	230	270
	EC2	270	330
Hospital (night time)	EC1	120	130
	EC2	180	190
EC1: AC not required EC2: AC required			
B_{biomax} : Maximum bioclimatic need (without unity) C_{pemax} : Maximum primary energy consumption			

Table 1. B_{biomax} and C_{pemax} for various new buildings' typologies.

2.1.iii. Action plan for progression to NZEB for new buildings

In France, the title "Low Consumption Energy Buildings" (*Bâtiments Basse Consommation* - BBC) is used to describe buildings with very low energy consumption (NZEB), and in the case of individual residences also includes a great proportion of RES. Since 2013, all new buildings, including public buildings are mandatorily NZEB, since requirements for Low Consumption Energy Buildings are the same as in RT2012. Therefore, the cost-optimal level for NZEB has been evaluated along with the RT2012 one. The future regulation, based on the E+C- testing scheme will bring energy performance for new buildings one step further towards NZEB.

Three hundred thirty five thousand (335,000) new houses (300,000 apartments and 35,000 individual houses) were certified NZEB before the RT 2012 enforcement. In addition, there have been approximately 900,000 new houses certified since the enforcement of RT 2012. Hence, the current number of new NZEB houses can be estimated to be approximately 1.2 million.

2.1.iv. Requirements for systems and / or building components for new buildings

As explained before, the thermal regulation for new buildings sets general performance objectives. Therefore, it does not include any requirements on systems efficiency nor on building components. However, the requirements on B_{bio} entail a minimum performance of the envelope, which is different for every construction project. Indeed, B_{bio} is a modulated combination of the energy needs of the envelope for heating, cooling and lighting.

2.II. ENERGY PERFORMANCE Requirements EXISTING BUILDINGS

2.II.i. Progress and current status of existing buildings

There are two thermal regulations for existing buildings. The first one, called “RT par élément” (Regulation by Building Component), was published in late 2007 and the second one, called “RT globale” (Global Thermal Regulation), in April 2008. Figure 1 shows how to determine the necessary regulation, depending on the renovation type (major or minor). Both regulations were reviewed in 2016 and the new requirements are set to come into force in 2018, followed by supplementary requirements in 2023 for envelope components.

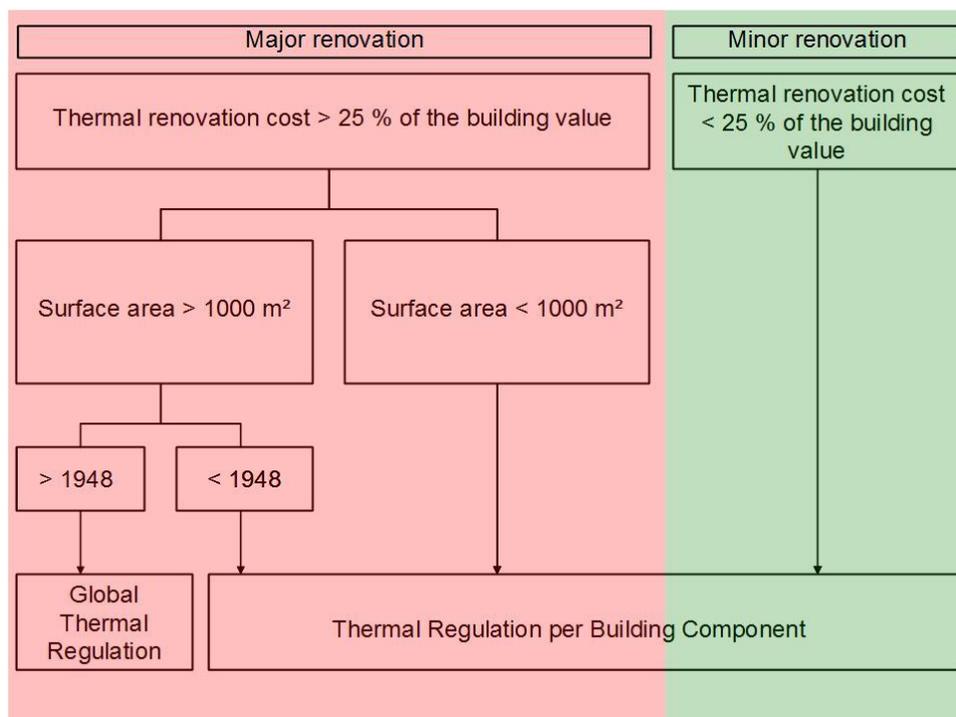


Figure 1. Thermal Regulations for existing buildings.

The Global Thermal Regulation is based on the overall consumption with minimum requirements for each component of the building (envelope and technical systems). Energy performance is assessed using a complex hourly methodology, called TH-CE ex⁶, based on the new buildings' methodology. The TH-CE-ex methodology is currently under review, the main purpose being to make it consistent with the Th-BCE methodology for new buildings.

2.II.ii. Plans to improve the existing building stock

Although regulations for the renovation of existing buildings are quite ambitious, they are still below NZEB requirements, so that renovated buildings do not systematically reach the NZEB level. The French Government has therefore developed several quality seals in order to encourage owners to go beyond the regulation requirements.

For existing residential buildings there are two quality seals: "High Performance Energy 2009" (HPE 2009), demanding a level of 150 kWh/m².year, and "Low Energy Consumption Renovation 2009" (BBCR 2009), demanding a level of 80 kWh/m².year.

For existing non-residential buildings there is only one quality seal also called "Low Energy Consumption Renovation 2009" (BBCR 2009). It certifies that the consumption of energy of the renovated building is at least 40% less than the reference building (the same building, with specified envelope and systems).

By the end of 2016, 56,000 residential buildings and about 1.35 million renovated m² of non-residential buildings were given the "Low Energy Consumption Renovation 2009" quality seal.

Furthermore, in 2013, the National Plan for Housing Thermal Renovation⁷ was launched. It is based on 3 pillars:

- assisting private individuals with free of charge independent advice;
- improving financing by optimised grants based on households incomes;
- raising the skills in the construction sector to handle the cost and quality of renovations.

Concurrently with this national plan, local authorities made more than 80 project proposals in order to work closer with both private and public landlords. The best projects have been nationally promoted as good examples of local work.

Regarding non-residential buildings, a charter⁸ has been signed by the French Government and major companies, showing a commitment for energy efficiency by everyone involved.

To encourage professionals to build-up their skills, there is some financial support to owners whose renovations are made by certified workers. This certification, called *RGE*⁹ (standing for recognised environmental guarantor), is proof that workers are fully qualified to carry out renovation work.

Finally, in order to provide motive for investments, a fund will be established, which will serve as guarantee of loans with higher risk and will reimburse banks in case of non-payment.

In order to implement Article 5 of the EED, France has chosen an alternative option. Indeed, in the "*Grenelle de l' Environnement*" laws (voted in 2009 and 2010), there is a goal for a 40% primary energy reduction by 2020 for all the buildings owned by the French Government. Based on the results of energy

audits on a representative sample of the relevant building stock, this would represent 10,131 GWh (primary energy) saved. In comparison, the 3% renovation proposed in the EED would lead to only 2,477 GWh (primary energy) saved.

Three types of action will help to reach this ambitious goal:

- renovation carried out by French authorities;
- a better use of the buildings;
- selling the unused buildings in order to have them renovated by a private landlord.

2.II.iii. Regulation of system performance, distinct from whole building performance

As previously described, there are two regulations for existing buildings. The appropriate regulation to be implemented is determined by the building size and the extent of the renovation (see Figure 1, where the Regulation by Building Component is based on minimum requirements for the different components of the building (envelope and systems)). Table 2 shows current and future maximum U-values for envelope elements.

Component	Climatic zone	Maximum U-Value (W/m ² .K)		
		2016	2018	2023
External opaque walls	H1, H2	U = 0.44	U = 0.35	U = 0.31
	H3	U = 0.5	U = 0.45	U = 0.45
Terrace roof	H1	U=0.4	U=0.3	U=0.22
	H2	U=0.4	U=0.3	U=0.23
	H3	U=0.4	U=0.3	U=0.25
Attic floor	H1, H2, H3	U=0.22	U=0.21	U=0.19
Roof	H1	U=0.25	U=0.22	U=0.19
	H2	U=0.25	U=0.23	U=0.22
	H3	U=0.25	U=0.25	U=0.25
Windows	H1, H2, H3	U _w =2.6	U _w =1.9	U _w =1.9

France is divided in 3 climatic zones from the coldest H1, to the warmest H3

Table 2. Current and future maximum U-values for envelope elements in the Regulation by Building Components.

These two regulations have some rules in common, especially regarding domestic hot water, setting maximum heat loss depending on the boiler size, and giving European Norms 89 and 26 as a reference for some systems' performance.

The Regulation by Building Component sets a minimum efficiency around 90% for boilers and a coefficient of performance of 3.2 for heat pumps on heating mode. For AC units below 12 kW the energy efficiency rating should be at least 3.0. For other AC systems the efficiency should be between 2.6 and 3.0. Ventilation unit consumption should not exceed 0.25 Wh/m³ for residential buildings, and 0.3 Wh/m³ for non-residential buildings. These requirements are set for systems with nominal power not covered by the Ecodesign Directive 2009/125/EC.

2.II.iv. Encouragement of intelligent metering

Intelligent meters for both electricity ("*Linky*") and gas ("*Gazpar*") are being widely deployed, with a target of full national coverage by 2021. The deployment is carried out by the Electricity Network of France (*Enedis*) and the Gas Network of France (*GRDF*). There are no requirements for intelligent metering for individual technical building systems.

Wide installation of these meters has started in mid-2015 and by the end of 2016, 2,7 million meters were installed. *Enedis* set a target of 7 million meters installed by the end of 2017.

2.II.v. Financial instruments and incentives for existing buildings

The energy transition credit tax (*CITE*)¹⁰ is a tax benefit following the purchase of the most efficient materials and equipment in terms of energy saving and reduction of greenhouse gas emissions. The amount of the credit depends on the system type and its price (deduction of 30% of the price). The only proof needed to get the tax benefit is the sales receipt, provided it has been installed by an installer holding the required qualification/certifications (*RGE*).

In response to Article 7 of the EED energy suppliers have to promote and support energy savings among consumers (Energy Saving Certificates Scheme). These Energy Saving Certificates can be awarded for complying with the energy saving standards, or they can be more specific, and often imply heating system based action, e.g., financing of a heating system refurbishment.

Since 2009, the 0% Eco-Loans (loans with a 0% interest rate) have enabled financing of building renovations, in particular to improve heating systems. In order to access the 0% Eco-Loans, the renovation must be substantial (roof or wall insulation, replacement of at least half of the windows, installation of a high-performing HVAC system, RES heating or domestic hot water system), or achieve a minimum energy performance of the building. These loans are designed for property-owning individuals to finance major renovation works. The maximum amount is 30,000 € over a 15-year period.

In addition to that, financial support provided by the National Agency for Housing Improvement (*Anah*)¹¹ is helping low-income households to finance renovation works if they reduce their energy consumption by at least 25%. The level of financial support varies depending on the income of the beneficiaries (35% - 60% of the investment can be funded), with a maximum amount of 20,000 € (50,000 € for deep renovations).

Finally, a reduced VAT (5.5%) applies for renovation works in residential buildings. To take advantage of this VAT reduction, materials used must respect technical characteristics adopted by a ministerial order¹².

2.II.vi. Information campaigns / complementary policies

For all new regulation or financial incentives, the ministry and the *ADEME* (the French Energy Agency) publish guides which aim either at providing information about financial schemes or at facilitating the understanding of the regulation. There is also a support network of “regional energy renovation platforms” covering the whole country, aiming at supporting households carrying out renovation works.

As a complementary policy, there is an obligation to insulate the roof or the facade whenever other restoration works are undertaken. This obligation aims at lowering the cost of a thermal renovation by including it in a package of planned renovation work. However, this obligation does not apply in case of light restoration (such as cleaning), or when the façade is of remarkable architectural or patrimonial value.

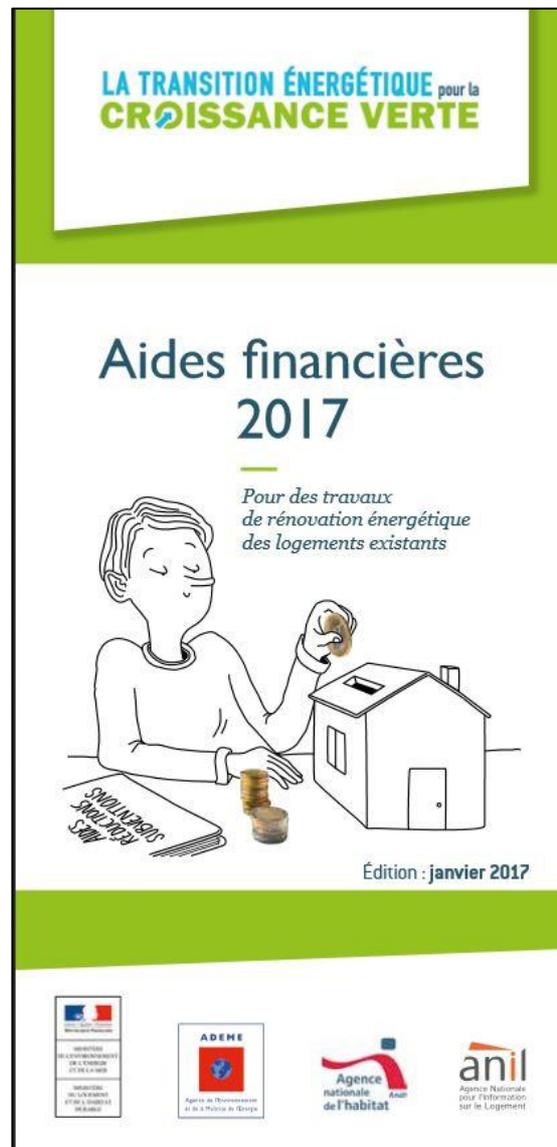


Figure 2. Example of information guide about financial incentives.

2.III. Energy performance certificate requirements

2.III.i. Progress and current status on sale or rental of buildings and EPCs

The French EPC, called “*Diagnostic de Performance Energétique*” (DPE), was introduced in 2006 and is issued by a qualified expert. Issuing an EPC for both existing and new buildings requires the qualified expert to assess the thermal efficiency of the building following an on-site visit, by inspecting the envelope, HVAC and domestic hot water systems. Once issued, the EPC is automatically sent to the EPC national database (mandatory since 2013), and is valid for 10 years. The energy performance can either be estimated (using a calculation methodology) or measured (using energy bills), depending on the building’s type.

	Residential building					Non-residential building
	EPC for the whole building or house		Flat with collective heating system when there already is an EPC for the whole building	EPC not concerning the whole building		
	Building built before 1948	Building built after 1948		Flat with individual heating system	Flat with collective heating system	
			Building built before 1948	Building built after 1948		
Performance assessed		X	EPC for the whole building		X	
Performance measured	X			X		X

Table 3. Methods used for assessing compliance with EPC standards.

Type of Building	Individual House	Flat	Apartment Building	Non Residential	Total
Number of EPCs issued since 2013	1,655,379	1,771,271	215,091	132,483	3,774,224
New building	239,711	422,841	37,239	5,296	705,087
Existing building	1,415,668	1,348,430	177,852	127,187	3,069,137
Public buildings	-	-	-	10,000	

Table 4. Total number of EPCs issued since 2013.

The precise number of EPCs issued as of April 2013 can be determined based on the data provided by the national EPC database. Table 4 shows a total of nearly 3.8 million EPCs registered on the database. The number of EPCs before 2013 can only be estimated.

The total figure (before and after 2013) is estimated to circa 9 million EPCs for all building types, which represents nearly a third of the national building stock.

2.III.ii. Quality assessment of EPCs

According to a regulatory requirement, the work of each qualified expert must be checked on a continuous basis. New experts are checked 4 times during the first year, and 4 more times in the following 4 years. Following this first cycle of certification, experts are checked 4 times every 5 years. Table 5 shows the type and number of checks performed on each expert by its certifying body.

The certifying body must verify that each point of the regulation is abided by and it can withdraw the expert's certification temporarily or permanently in case some fields in the EPC are not properly filled.

The EPC database is also a useful tool for landlords, allowing them to check the accuracy of their EPC.

Finally, there is a directory of qualified experts available, so landlords can assure that the qualified expert is certified.

	First certification cycle		Re-certification cycle
Number of EPC reports checked	4 (during the first year)	4 (between the second and the fourth year)	4
Number of EPCs checked on-site	1	1	

Table 5. Number and types of checks on each expert.

2.III.iii. Progress and current status of EPCs on public and large buildings visited by the public

Since 2007, all buildings over 1,000 m² occupied by public authorities and frequently visited by the public must have a valid EPC. The threshold was successively lowered to 500 m² in 2013 and to 250 m² in 2015. Once issued, the EPC must be displayed near the entrance point of the building clearly visible by the public.

As for the general activity level, the exact number of EPCs issued for each type of building since April 2013 is determinable (Table 4). Since August 2015, a 1,500 € fine can be imposed to non-compliant building administrators.

2.III.iv. Implementation of mandatory advertising requirement - status

Since 1 January 2011, it is mandatory for real estate agencies to include some information provided by the EPC in their advertising. Every type of advertising is affected, but not in the same way. Advertisements published in newspapers should display at least the energy class letter, while advertisements published on the internet or at the real estate office must display the full energy label. The picture of the label should be at least 180 X180 pixels on the internet and should occupy at least 5% of the advertisement displayed at the real estate office.

In case of non-compliance there are two types of sanctions: based on the civil law, the client can demand the cancellation of the sale; based on the criminal law, the sale can be considered as fraudulent and can lead to a prison term of two years without remission and to a 37,500 € fine imposed by the “General Directorate of Competition, Consumption and Fraud Repression” (DGCCRF). Such penalties have not been applied so far. A simple call to order has always been enough to bring non-compliant parties to compliance. Yet, the DGCCRF estimates that in 15% of the real estate dealings the EPC is not displayed.

Location - Appartement - 1 pièce - 44 m² Montigny-le-Bretonneux (78180)

Studio au village ! - Coup de cœur



NOUVEAUTE GUY HOQUET ! Au coeur du Village, venez vite découvrir ce charmant studio sous les toits de 44 m² au sol (22 m² Carrez) comprenant une pièce principale, cuisine ouverte avec coin repas, pôle salle d'eau avec fenêtre, wc. Vous aimez le calme et le charme de l'ancien... Libre de suite ! Réf : 584.

750 €

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Diagnostic Énergétique

Consommations énergétiques

classe énergie	consommation (kWh/m ² /an)
A	< 50
B	51 à 90
C	91 à 150
D	151 à 230
E	231 à 330
F	331 à 450
G	> 450

Logement économe

Logement énergivore

Indice de mesure : kWhEP/m².an

Fiche Technique

- > Honoraires : 588,00 €
- > Nb Pièces : 1
- > Surface : 44,00 m²
- > Nb Étages : 2
- > Nb Wc : 1
- > Etage : 2
- > Cuisine : Equipée
- > Etat Intérieur : Bon
- > Etat Extérieur : Bon état
- > Nb Sde : 1

Figure 3. Example of property advertising on the internet including information provided by the EPC.

2.IV. Inspection requirements - heating systems, air conditioning

To transpose Article 15 of the EPBD about AC systems, France has chosen to adopt the default approach, which consists of a periodic inspection scheme for AC systems above 15 kW and reversible heat-pumps above 12 kW. The same approach has been chosen for boilers of more than 400 kW.

For boilers between 4 and 400 kW, alternative measures involving an annual maintenance visit have been taken according to Paragraph 4 of Article 14 of the EPBD.

	Boilers between 4 and 400 kW	Boilers of more than 400 KW	AC systems and reversible heat pumps of more than 12 kW
Periodicity	Annual maintenance visit	Inspection every two years	Inspection every five years

Table 6. Number and types of checks on each system.

2.IV.i. Report on equivalence of model A and B for Heating Systems

The alternative measures were chosen for boilers between 4 and 400 kW, after comparing the hypothetical inspection scheme (the reference scheme) and the annual maintenance visit (alternative scheme). The main differences between the two calculations were the following:

- The scope is larger for the alternative scheme (for the default approach, only boilers of more than 20 kW are targeted, while maintenance concerns boilers of more than 4 kW).
- Inspections will not systematically lead to renovation work and thus energy saving, whereas a maintenance visit would because the person in charge can act directly on the system.

The alternative measures applied in France allow more than twice the energy saving resulting from the implementation of a regular inspection scheme, as explained in the report submitted in the context of Article 14 of the EPBD.

2.IV.ii. Progress and current status on heating systems

Boilers between 400 kW and 20 MW: inspection scheme

Boilers between 400 kW and 20 MW are subjected to inspection at least every 2 years. During the inspection visit the qualified expert must check and measure the same elements as regard to boilers from 4 – 400 kW. But for boilers of more than 400 kW a “boiler-room handbook” has to be kept, recording all information about the system.

These requirements are listed in a ministerial order¹³ from 2009, and in articles R.224-21 to R.224-30 of the environment code¹⁴.

Boilers between 4 and 400 kW: alternative measures

Alternative measures that have been taken to improve the energy performance of heating systems under 400 kW, are the following:

- An annual maintenance visit by any professional in the field of maintenance. During the maintenance visit, the professional must check the boiler (clean and tune it if necessary), measure the concentration of CO, evaluate the energy performance of the boiler, provide advice on best use, improvement of the

boiler and of the heating system in place, and issue a certificate of maintenance within 15 days after the visit.

- The Ministry of Energy together with the French Energy Agency (*ADEME*), have prepared a guide for the public¹⁵ in order to explain the new provisions regarding the annual maintenance of boilers. They also conduct publicity campaigns in relation to the most efficient heating systems and to financial support for replacement (see information website “Energy Info Sites”¹⁶).

Systems with high energy performance are financially supported by national and local programmes that are described in paragraph II.v. of this report.

2.IV.iii. Progress and current status on AC systems

The French regulation on AC systems (imposed by one decree¹⁷ and two ministerial orders) has been in force since 16 April 2010. France has chosen to implement Article 15 of the EPBD by inspecting of AC systems and reversible heat pumps with an output of 12 kW or more, at least every 5 years. The person responsible for the inspection is the owner or the manager of the building.

A report is issued within one month after the inspection with the results and advice on best use. Two ministerial orders have been published in December 2016, in order to improve the inspection scheme. The inspection should include:

- inspection of the AC handbook;
- assessment of system performance;
- assessment of the sizing of the system in relation to the cooling requirements of the building;
- provision of the necessary recommendations concerning proper use of the system in place, possible improvements to the installation as a whole, any benefit from its replacement and other potential solutions.

2.IV.iv. Enforcement and impact assessment of inspections

Enforcement and penalties

Penalties are set in the regulation (Art L.226-2 et L.226-8 of the environment code). Controls can be performed by officers of the General Directorate for Competition Policy, Consumer Affairs and Fraud Control. If the regulation has not been properly adhered to, the relevant authority can apply several types of measures:

- to carry out a new inspection of the AC system at the owner’s expense;
- to oblige the owner to deposit the equivalent of the inspection cost as a guarantee until compliance is achieved, whereby the sum is returned;
- to oblige the owner to pay a fine;
- to force the owner to stop the AC system.

Quality control of inspection reports

Experts are certified (for 5 years) by certifying bodies, which are accredited by [COFRAC](#)¹⁸ (French committee for accreditation) according to ISO standard 17024 “General requirements for bodies operating certification of persons”.

During this period the accredited body has to:

- check at least that the inspector establishes one report per year;
- check the quality of at least one report between the beginning of the 2nd year and the end of the 4th year of his certification;
- accompany the expert during at least one of his on-site inspections between the beginning of the 2nd year and the end of the 4th year of his certification.

The COFRAC checks if the accredited bodies meet the requirements of the standard. A total of 214 reports were controlled in 2015, for around 227 inspectors, and 3 accredited bodies.

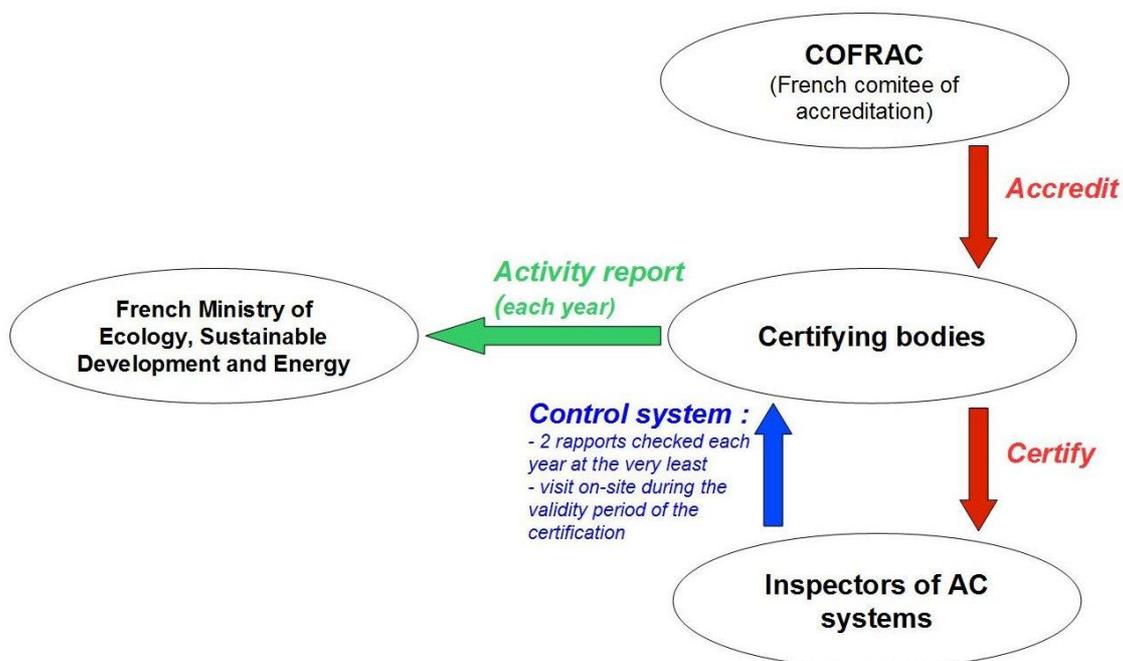


Figure 4. Schematic approach of the interaction of participants in the AC inspection scheme.

Impact assessment, costs and benefits

AC inspection reports are not collected in a central database so it is challenging to assess precisely the impact of the inspection scheme. The extent of energy saving may vary, it depends first on the decision of the owner to do something or not, and then on the extent of the work.

Concerning cost-effectiveness of the inspections, an expert needs one day to perform an inspection, which costs 600 €. Given that inspections occur every five years, this is equivalent to 120 €/year. Energy saving is closely linked to the actions of the owner after an inspection, making it very difficult to assess the impact and the cost-efficiency of the scheme.

3. A success story in EPBD implementation

France's success story lies in the manner the future regulation for new buildings is being planned. Following the *LTECV* (Energy Transition for Green Growth Act) and the Paris agreement, French authorities and stakeholders have been collectively building an ambitious new regulation based around two major points:

- wide spread of positive energy buildings, going further than NZEB;
- spread of low carbon buildings.

Yet, after the setting of the previous thermal regulation (RT 2012), stakeholders expressed mixed feelings towards an even more ambitious regulation, stating that the current one was already quite complicated and burdensome. Thus, there was a strong need to bring stakeholders together from the beginning. This led to the creation of a testing scheme called "E+ C-" (standing for Energy plus Carbon minus), for voluntary developers, which started in late 2016.

Developers will test the technical and financial feasibility of building construction in accordance with future regulations. In this respect, public developers intend to pave the way by integrating renewable electricity production systems into their buildings and by developing low-carbon construction processes. A test observatory will collect feedback and best practices to refine indicators and establish future regulatory thresholds.

To reward the first buildings constructed under the new regulations, the Government has introduced a new label that is awarded after the assessment of the technical and economic feasibility of the new requirements. Intended to distinguish positive energy buildings in the same way as low-carbon buildings, this label will incorporate several performance levels.

There are four different levels based on the energy consumption and two on the carbon footprint set by the scheme. The energy performance assessment relies on the currently used calculation methodology, with the first two levels corresponding to the energy performance expected by the RT 2012 but with a higher share of RES. The third level involves a higher energy performance than the current regulation and the fourth level matches the positive energy building (meaning that the energy performance is lower than zero).

The carbon footprint assessment is based on a complete life cycle analysis, from the manufacture of components to the recycling of rubble. The first level of the label is easy to reach and aims at having all the stakeholders involved in the construction to implement an overall reflexion on the environmental impacts of a building. The second level is however more challenging and requires a real decrease of the carbon emissions of the building.

The setting of the E+C- scheme has been a long-term endeavour that included numerous stakeholders working in a common direction. Having such a result is truly a success, since it ambitiously paves the road for the new regulation on two combined aspects. Firstly, it pushes the technical and environmental requirements further than ever. But, secondly, the testing scheme will enable the assurance that the future regulation requirements will be effectively attainable, which is considered as most important.

4. Conclusions, future plans

Even though the EPBD is fully transposed, France has the will to continue to position itself at the forefront of energy performance in buildings, and plans to make sustainable development the driving force of national growth. This will have been expressed by several measures that could be considered beyond the scope of the EPBD.

Preceding the Paris Agreement by a few months, the Energy Transition for a Green Growth Act was signed in August 2015, containing many provisions relating to energy and the environment, some of which concern buildings' performance. This act tackles the subject of energy performance, but also matters like electric mobility, fuel poverty, or even data collection in buildings.

Of course, the E+C- scheme will play a predominant role in defining the future of the French thermal regulation for new buildings. It is already set to be a major new step since it will combine energy performance and environmental requirements. There is also a continuous assessment of the tools and measures by the ministries with studies evaluating the reliability of the calculation, or through constant contact with professionals, with the goal to identify and correct any dysfunctional points in the EPBD implementation. This will lead in the near future to the revision of the thermal regulation for new buildings.

Endnotes

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 692447.

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