REPORTS

Directorate General
for Energy and Climate

Climate and Energy
Efficiency Service

Energy efficiency action plan for France - 2014

Pursuant to article 24 of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency

Ministry of Ecology, Sustainable Development and Energy

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Ministère de l'Écologie, du Développement durable et de l'Énergie

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I. SUMMARY

France has set itself two objectives, pursuant to article 3 of Directive 2012/27/EU on energy efficiency (EED), to reduce its final energy consumption to 131.4 Mtep and its primary energy consumption to 236.3 Mtep in 2020 (excluding international air transport). Moreover, France is on track to achieve its objective of 12 Mtep of energy savings in 2016, set by Directive 2006/32/EC on energy services (ESD) with around 6.3 Mtep of energy savings between 2007 and 2011 and 9 Mtep of energy savings between 2007 and 2012 (excluding the tertiary sector).

Today the main policies and measures implemented to achieve these existing objectives are described sector by sector.

The building sector, representing 44.5% of France's final energy consumption in 2012, constitutes a major challenge for energy efficiency policies. The 2012 thermal regulations aim to improve the energy performance of new buildings and should generate energy savings in the order of 1.15 Mtep in 2020. The housing energy efficiency improvement plan (Le plan de rénovation énergétique de l'habitat - PREH) aims to accelerate the renovation of existing housing stock, relying in particular on the network of Renovation Information Service Points (Points Rénovation Information Services - PRIS) and to achieve a better articulation of existing systems (sustainable development tax credit, interest-free eco-loan…). The battle against energy poverty is fought in particular through the actions of the French National Housing Agency (l'agence nationale de l'habitat-ANAH) and its "Habiter mieux – Living better" programme.

The transport sector represents 31.9% of France's final energy consumption in 2012. The implementation of the measures in this sector mainly aims to support a modal shift and improvement of the energy efficiency of the means of transport used. In 2013, the ecological bonus-malus scheme allowed France to become one of the new vehicle markets with the lowest CO_2 emissions in Europe (in the order of 117g CO_2/km). The implementation of performance improvement measures of new vehicles will enable a saving of around 2.2 Mtep in 2020.

In the industry sector, French policies on energy efficiency are based, in particular, on the European Directive 2003/87/EC establishing a scheme for greenhouse gas emission trading within the European Union, as well as financial incentives, regulatory measures (including mandatory energy audits introduced by article 8 of the EED), support for normalisation procedures and for the development of more efficient technologies, in particular through future investments.

The agricultural sector also implements a number of energy-efficiency improvement measures,including the Energy Performance Plan for agricultural holdings (energy savings and conversion to renewable energies) and a modernisation plan for livestock buildings.

The exemplary actions of the State and the territorial authorities in part focus on the renovation of public buildings. Certain actions are also dedicated to public procurement and a territorial distribution of energy and climate policies through Territorial Climate-Energy Plans and Regional Climate, Air and Energy Schemes.

Finally, important measures allow multi-sectorial energy savings. In particular, this is the case of Energy Savings Certificates (ESC), for which the third period was announced pursuant to article 7 of the EED. Eco-design or waste prevention measures also have a greater impact on reductions in energy consumption. The French market for energy efficiency services is growing and was estimated at around EUR 7.2 billion in 2013 Issues relating to metering, billing or even the development of networks are equally important sources for the improvement of energy efficiency.

II. ENERGY EFFICIENCY ACTION PLAN FOR FRANCE

The directive 2012/27/EU on energy efficiency (EED) establishes a common framework of measures for the promotion of energy efficiency within the European Union. This contributes to reaching the 20% target on energy efficiency for 2020 and paves the way for further energy efficiency improvements beyond that date.

The Member States have set a target in terms of an absolute level of primary energy consumption and final energy consumptions by 2020 (article 3)[1]. The energy savings target of 9% for 2016, set by the previous directive 2006/32/EC on energy services (called ESD), still remains valid (article 27 of the EED).

The objective of this report is to describe the policies and measures implemented in order to achieve these various objectives pursuant to article 24 of the EED. The achievement of the volumes of energy savings set within the framework of the ESD and EED directives will be described in detail.

1. Continual improvement of energy efficiency…

France has a final energy intensity[2] among the weakest of the European Union. This Figure 1 represents France's position among the countries of the European Union in terms of final energy intensity in 2011.

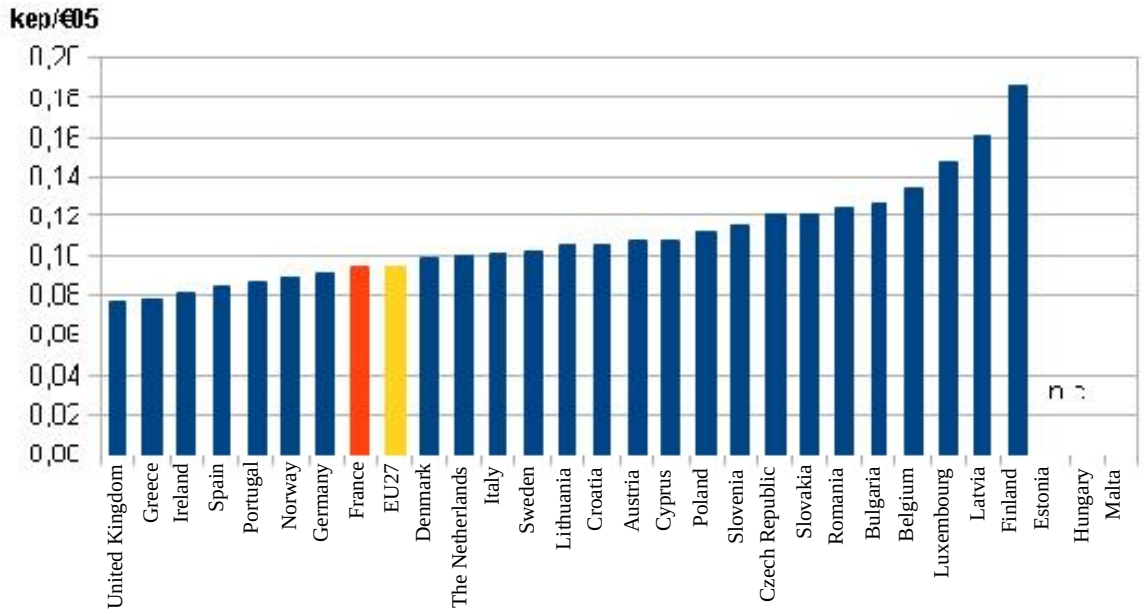


Figure 1. Ranking of the countries in the European Union by final energy intensity in 2011 (source : Odyssée)

Number Figure 2 summarises the evolution of France's final energy consumption between 1970 and 2012 sector by sector. After two decades of growth, France's final energy consumption (adjusted for climatic difference) was virtually stable between 2001 and 2008 at around 160 Mtep per year, reflecting the efficiency of public policies in favour of the improvement of France's energy efficiency. Since 2009, this consumption has decreased to a level of around 155 Mtep, reflecting the effect of energy efficiency policies but also of the concomitant effect of the economic crisis.

1 Objectives fixed for France in its first annual report published in 2013, available for consultation at the website http://www.developpement-durable.gouv.fr/Directive-efficacite-energetique.html

2 Energy intensity is the relationship between energy consumption and gross domestic product (GDP)

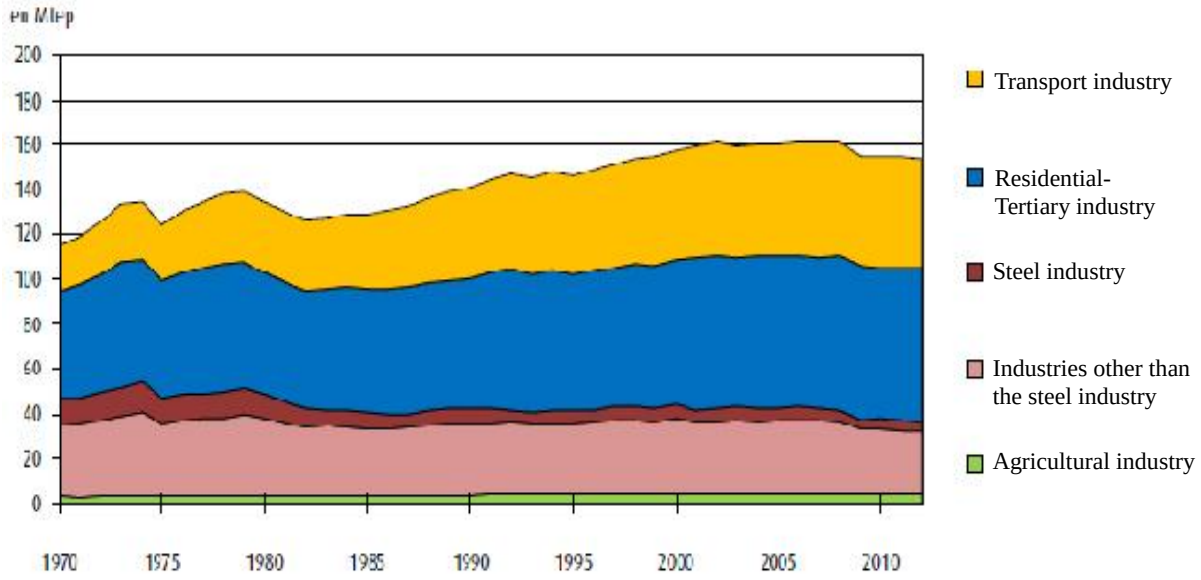


Figure 2: Evolution of France's final energy consumption between 1970 and 2012, adjusted for climatic differences, sector by sector (source : SOeS, 2012 energy balance)

The annual report (see Annex 2) gives a detailed description of the evolution of energy consumptions sector by sector.

2. …supported by an ambitious energy strategy

2.1. A long-term vision

The guidelines of the energy policy appear under article L.100-1 of the Energy Code:

- Ensure security of supply;
- Maintain competitive energy prices;
- Safeguard human health and the environment, in particular by fighting a worsening of the greenhouse effect;
- Guarantee social and territorial cohesion by ensuring that everyone has access to energy.

These are long-term objectives, which set a cap for energy policy actions for the next 30 years. To achieve them, four major areas have been defined:

- Managing energy demand;
- Diversifying the energy mix;
- Developing research and innovation in the energy sector;
- Ensuring means of transport and storage adapted to requirements.

2.2. France's commitments with regards to energy efficiency

a Objectives pursuant to the European ESD and EED directives

In order to meet the requirements of the ESD directive, France has set itself an indicative target to achieve in 2016 of a final volume of energy savings of around 12 Mtep[3]. The intermediate target for 2010, set during the first National Energy Efficiency Action Plan (NEEAP) in France in 2008, was around 5 Mtep.

Moreover, pursuant to article 3 of the EED, France has set itself the objectives presented in table 1 below on energy consumption in 2020 (excluding international aviation).

	Target
Final energy consumption in 2020 (in Mtep)	131.4
Primary energy consumption in 2020 (in Mtep)	236.3

Table 1. France's objectives under article 3 of the EED

b Sectorial objectives

Extremely ambitious objectives for all economic sectors were fixed by law No. 2009-967 of 3 August 2009, in particular (see section on buildings and transport):

- Energy-demand management in buildings through technology breakthrough programmes in new buildings and radical work to improve energy efficiency in existing buildings. Among new buildings, the number of low-energy buildings has grown since 2012 and positive energy buildings will be the norm from 2020. In existing buildings, an objective to reduce consumptions by 38% by 2020 has been fixed;
- Rapid development of non-road and non-air modes of transport. A set of measures has been implemented to encourage a shift towards modes of transport which produce the least greenhouse gas emissions and atmospheric pollutants and to improve the efficiency of the modes of transport used.

3. Assessment of energy savings

3.1. Estimation of energy consumption levels in 2020

In 2013, the Ministry of Ecology, Sustainable Development and Energy (Le Ministère de l'Ecologie, du Développement Durable et de l'Energie- MEDDE) updated the *"Prospective scenarios"* driven by the Directorate General for Energy and Climate (Direction Générale de l'Energie du Climat-DGEC), the General Commission for Sustainable Development (Commissariat Général au Développement Durable-CGDD) and the French Environment and Energy Management Agency (l'Agence de l'Environnement et de Maîtrise de l'Energie-ADEME). A reminder of the methodology used appears in Annex 3.

These scenarios allow to consolidate the target fixed by France under article 3 of the EED. Table 2 below, based on modelling work, describes the sectorial distribution of the final energy consumption in 2020 (in Mtep).

3 This figure corresponds to 9% of France's average final energy consumption, net of aviation, international marine bunkers and consumers of final energy subject to the SCEQE directive (The EU Emissions Trading System – EU-ETS). The uncertainty created by this last term means that the target of 12 Mtep for 2016 is an overestimate of the indicative target as defined by the ESD Directive.

Sector		Consumption (Mtep)
Final energy	Residential sector	31.9
	Tertiary sector	16.8
	Transport sector[4]	42.5
	Industry sector	35.9
	Agricultural sector	4.3
	Subtotal	**131.4**
Energy consumption	Refining	2.83
	Thermal power generation	0.72
	National usage	5.20
	Losses and adjustments	79.72
	Subtotal	**88.5**
Final non-energy consumption		**16.4**
Total primary energy consumption		**236.3**

Table 2. Sectorial distribution of energy consumption in 2020 (Mtep) (source: MEDDE)

The actual achievement of these ambitious objectives depends on dealing adequately with several vigilance points and in particular:

- The actual rate for the total period of renovation of the existing building stock. As far as public buildings are concerned, the context of the reduction in public expenditure is likely to increase this risk;
- Maintaining for the whole period the incentives supporting this rate of innovation;
- Strengthening of a modal shift of freight transport: an extremely ambitious objective has been set to achieve a partial shift of 25% towards non-road and non-air transport by the end of 2022 (against currently 12.4%). Its achievement will require great efforts;
- The actual adaptive capacity of industries and sectors (innovation and breakthrough technologies, etc.);
- The level of involvement of all players and the efficiency of complementary measures (training, changes in behaviour);

3.2. Assessment of energy savings pursuant to the ESD directive

a Methodology

In order to assess progress with reference to the targets fixed by the ESD directive (amount of energy savings to be achieved in 2010 and 2016), indicators have been calculated based on top-down methods recommended by the European Commission. With only 2011 data being available for all economic sectors, progress in the achievement of the ESD target was calculated between 2007 and 2011. Nevertheless, the

4 Excluding international aviation estimated at 5.8 Mtep in 2020

volume of energy savings could be calculated between 2007 and 2012 excluding, however, the tertiary sector for which data was not available at the moment calculations were made. All the data used in the framework for this assessment is available in Annex 3.

Energy savings were calculated in the same way as the 2011 NEEAP, with the same calculation options privileging so-called "preferred" indicators. In compliance with the recommendations of the European Commission[5], only positive indicators translating the result of the efforts made in terms of energy efficiency are recognised.

These indicators were calculated with the help of the teams from the Odyssée-Mure (ADEME and Enerdata) project and of the MEDDE's statistical services (SOeS- Observation and Statistics Office).

b Results: Progress with reference to the ESD target for 2016

Energy savings between 2007 and 2011 (see details below) are estimated at **6.293 Mtep**. Energy savings between 2007 and 2012 are estimated at **9.039 Mtep** (excluding the tertiary sector). Taking into account the intermediate target for 2010 set at 5 Mtep and the target for 2016 set at 12 Mtep, it appears that France is ahead of schedule with reference to the achievement of the target set under the ESD directive.

Details of energy savings are described by sector in table 3 below.

The calculation of these indicators requires some methodological clarifications:

- Regarding the residential sector, the P2 indicator (air-conditioning) cannot be calculated in the absence of data on the energy consumption of air-conditioning and the number of hot days.
- In the tertiary sector, the P7 indicator relative to electricity consumption did not show any energy savings.
- In the transport sector, with regard to the energy consumption of trucks and commercial vehicles, two indicators are suggested in the recommended methods:
  - The P9 indicator (energy consumption of trucks and commercial vehicles reduced to tonnes-kilometres). This indicator is markedly negative. P9 = -0.870 Mtep
  - The alternative A2 indicator (energy consumption of trucks and commercial vehicles by vehicle). This indicator is markedly positive: A2 = 1.280 Mtep

  This incoherence between the P2 and A2 indicators shows a lack of robustness when taking into account the economic crisis (generally more efficient vehicles, but travelling without being loaded in the best possible way, due to the decline in business). In order to consider under the best light the impact of the economic crisis, energy savings have been divided between trucks and commercial vehicles as seen in the Odyssée project framework. For trucks, a specific consumption indicator per tonne-kilometre is used, as they are responsible for most freight traffic (calculation of the P9 indicator exclusively for lorries). For commercial vehicles, a specific consumption indicator (in tep/vehicle) is calculated; it did not show any energy savings.
- In the transport sector, the P10 (energy consumption in rail passenger transport), P11 (energy consumption in rail freight transport), P12 (market share for public passenger transport), P13 (market share of rail and waterway freight) and M7 (energy consumption of waterway transport) indicators are negative.
- In the industry sector, the estimate of the EU-ETS sector share (excluding the ESD directive) sector by sector is based on expert opinion.
- Each sectorial subtotal was calculated according to the a) methods recommended by the European Commission

5 The reply of the NEEAP HELPDESK of 15 April 2011

Sector	Indicator	Energy savings between 2007 and 2011	Energy savings between 2007 and 2012
Residential sector	P1 indicator (heating)	3.801 Mtep	5.801 Mtep
	P3 Indicator (hot water)	0.241 Mtep	0.310 Mtep
	P4 indicator (household appliances)	0.155 Mtep	0.201 Mtep
	P5 Indicator (lighting)	0.178 Mtep	0.249 Mtep
	Subtotal	**4.377 Mtep**	**6.581 Mtep**
Tertiary sector	P6 indicator (non-electricity consumption)	0.127 Mtep	Not available
	Subtotal	**0.127 Mtep**	**Not available**
Transport sector	P8 indicator (energy consumption of light-duty vehicles reduced to passenger kilometres)	0.418 Mtep	0.682 Mtep
	P9 indicator (relative to the energy consumption of trucks)	0.364 Mtep	0.493 Mtep
	Subtotal	**0.782 Mtep**	**1.175 Mtep**
Industry sector	P14 indicator (energy consumption per production unit) - Chemistry	0.395 Mtep	0.336 Mtep
	P14 Indicator – mining industry	0.001 Mtep	-
	P14 indicator – steel industry	0.009 Mtep	-
	P14 indicator – timber industry	-	0.277 Mtep
	P14 indicator – paper industry	0.057 Mtep	-
	P14 indicator – Food industry	0.302 Mtep	0.328 Mtep
	P14 indicator – Textile industry	0.025 Mtep	0.009 Mtep
	P14 indicator – Transport equipment	0.098 Mtep	0.013 Mtep
	P14 indicator – Construction industry	0.116 Mtep	0.083 Mtep
	P14 indicator – Other industries	-	0.233 Mtep
	Subtotal	**1.004 Mtep**	**1.282 Mtep**
All sectors	**Grand total**	**6.293 Mtep**	**9.039 Mtep**

Table 3. Distribution of sectorial energy savings achieved between 2007 and 2011 (source: ADEME/Enerdata, the Odyssée-Mure project)

3.3. Assessment of key measures

In order to provide a decision-making tool and to be in a position to evaluate to what extent the proposed policies will participate in achieving the objectives of a reduction of France's greenhouse gas emissions, the MEDDE has developed a tool to quantify the reduction of greenhouse gas emissions allowing an evaluation of the impact of each individual main policy and measure. The aim of this tool, called SceGES[6] that stands for Scénarisation des Emissions de Gaz à Effet de Serre – Scenarios of Green House Gas Emissions, is to favour a homogenization and methodological consistency of evaluations in the long-term, by giving the State a set of unique parameters and by supplying calculation outputs in compliance with the format required by European and International organisations.

This tool also allows to obtain an output calculation of the final energy savings resulting from the evaluated measure. SceGES has been used to estimate the impact of both key policies and measures in terms of final energy savings within the scope of the current action plan and in terms of reduction of greenhouse gas emissions within the context of the report on surveillance mechanisms[7]. The bottom-up methodology used is described in Annex 3.

The following measures were evaluated thanks to this tool:

- Buildings: 2012 thermal regulations, interest-free eco-loan (Eco-PTZ), sustainable development tax credit, social housing eco-loan (Eco-PLS);
- Transport: measures regarding the performance of new vehicles (bonus-malus scheme, European regulations), eco-tax on trucks;
- Agriculture: implementation of mobile test centres for the regulation of tractors[8].
- Energy: regulation of the Eco-design directive on light bulbs (ban of incandescent bulbs), domestic tax on the consumption of energy products.

The results of each assessment are presented at the end of the description of each measure in chapter III of the plan in the form of text-boxes.

A specific bottom-up assessment method was used to estimate the impact of the energy saving certificate system (ESC) in terms of final energy savings. The ex-post assessment of the final energy savings resulting from the actions implemented by the 31st November 2013 is based on the analysis of the ESC in the context of the main standardised operations carried out. It is completed with an ex-ante assessment of the third and fourth period of the system (2015-2017 and 2018-2020) based on the hypothesis of the same objective of 220 TWhcumac/year. Details of the methodology and assumptions used are presented in Annex 3.

A specific method was also used to assess the energy savings resulting from waste recycling (see "Energy " section).

It must be underlined that key measures were evaluated individually. France's energy efficiency strategy is based on a set of measures targeting the same sector while also addressing various limitations (investment aid, information and consumer mobilisation, regulations, …). Therefore, the same energy saving action[9] could be generated from several measures at the same time (interest-free eco-loan, ESC, tax credit, support from Energy Information Centres, …) that cannot be aggregated without double-counting. These overlaps were very difficult to assess. The assessment of the individual measures presented in the plan shall be considered separately. The analysis of the impact of each program of measures, targeting each economic

6 The SceGES tool was developed under the guidance of the Directorate General for Energy and Climate (DGEC) of the MEDDE by a group of specialised external consultants (Centre Energétique des Procédés - Armines, Energy Domain, CITEPA-Interprofessional Technical Centre for Studies on Atmospheric Pollution, INRA-National Institute For Agricultural Research and Solagro).

7 Pursuant to paragraph 2 of article 3 of Commission Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004.

8 The objective of this measure is to carry out a direct bottom-up evaluation without using the SceGES tool, the methodology of which is presented in the same chapter (see Annex 3).

9 For example, replacement of heating equipment with more energy efficient equipment.

sector, was carried out via the prospective “Energy-Climate-Air ” scenarios described previously.

Measure		Proportion	Final energy savings			
			2010	2013	2016	2020
2012 Thermal regulations:		Residential-Tertiary sectors	-	-	0.41 Mtep	1.15 Mtep
CIDD (inter-ministerial committee for sustainable development)		Residential-Tertiary sectors	-	0.78 Mtep	0.93 Mtep	1.08 Mtep
Eco-PTZ – interest-free eco loans		Residential-Tertiary sectors	-	0.18 Mtep	0.19 Mtep	0.19 Mtep
Eco-PLS – social-housing loans		Residential-Tertiary sectors	-	0.35 Mtep	0.65 Mtep	1.03 Mtep
Eco-tax on trucks		Transport	-	-	0.165 Mtep	0.168 Mtep
Improvement of the performance of new vehicles		Transport	0.1 Mtep	-	1.1 Mtep	2.2 Mtep
Mobile engine test centres		Agricultural sector	3.5 ktep	-	23.2 ktep	36 ktep
ESC		Energy	-	2.5 Mtep	5.17 Mtep	9.29 Mtep
Eco-design (light-bulbs)		Energy	-	0.46 Mtep	0.76 Mtep	0.75 Mtep
Eco-design (televisions)		Energy	-	-	-	0.3 Mtep
Waste prevention		Energy	2.53 Mtep	-	-	-
TICPE – Taxe Intérieure de Consommation sur les Produits Energétiques - domestic consumption tax on energy products	GAS OIL	Energy	-	4.9 Mtep	4.3 Mtep	4.1 Mtep
	Petrol		-	0.5 Mtep	0.4 Mtep	0.3 Mtep

Table 4. Assessment of the energy savings generated by the main key measures (source: MEDDE).

III. POLICIES AND MEASURES IMPLEMENTED BY FRANCE

1. The residential-tertiary sector

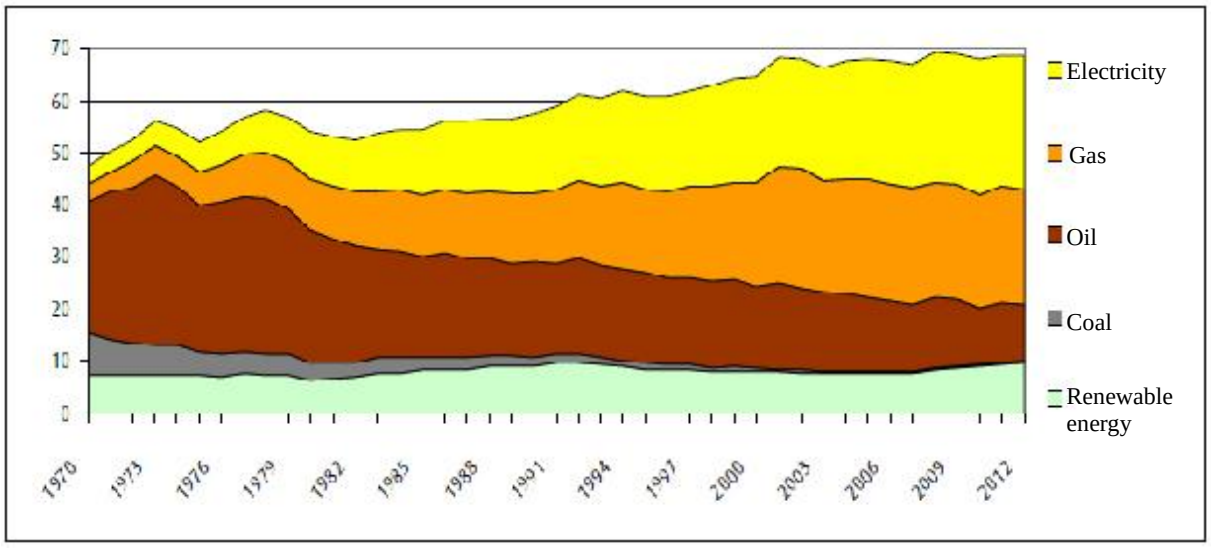
1.1. Current situation

The residential-tertiary sector represented 44.5% of the final energy consumption of France in 2012, the equivalent of 68.7 Mtep. This is the main consumer sector of final energy, ahead of the transport and industry sectors.

The energy mix of the residential and tertiary sectors are rather different. Renewable energies represent 20% of the final residential energy consumption, mainly of wood, but only 4% in the tertiary sector. The proportion of electricity is far more significant in the tertiary sector (53%) than in the residential one (30%), due to an intensive use of electronic office systems and air-conditioning.

The evolution of the final energy consumption of the residential-tertiary sector between 1970 and 2012, according to type of energy is presented in Figure 3. The energy mix of the residential-tertiary sector has significantly been transformed since the 70s. The use of coal has almost disappeared; petrol products are steadily declining. The consumption of natural gas and electricity has highly developed.

Final energy consumption of the residential and tertiary sectors
data adjusted for climatic differences, expressed in Mtep



SOeS calculations, according to data on energy

Figure 3. Final energy consumption in the residential and tertiary sectors adjusted for climatic differences, expressed in Mtep, between 1970 and 2012 (source: SOeS, 2012 energy balance)

Compared to 2011, the consumption of petrol products in 2012 fell by -7.0% in the residential sector and by -7.9% in the tertiary sector confirming the steady decline in petrol products since the beginning of the 80s. Increases in 2011 (+3.2% in the residential sector and particularly in the tertiary sector +9.4%) largely due to the consumption of storable energy (fuel oil, coal, GPL), were addressed in the energy procurement balance without adjustments for stocks variations between the beginning and the end of the period. Economic agents can advance or delay their purchases, according to the state of their stocks and their needs and their expectations for future price changes. With price volatility being high just like in weather forecasting, purchases can significantly fluctuate from one year to the other, and this makes an interpretation of annual fluctuations difficult. Nevertheless, there is no doubt that in the long-term, there is a reduction in the

consumption of petrol products: on average -3.1% per year between 2007 and 2012.

The consumption of natural gas evolved in parallel in the two sectors: -1.7% in 2012, then in 2011, +4.4% in the residential sector and +4.2% in the tertiary sector. In 2012 the decreases recorded for the years previous to 2011 continued.

In 2012, the electric consumption of both the residential and tertiary sectors started to rise again: +4.0% in the residential sector and +1.1% in the tertiary sector being +2.6% for both the residential and tertiary sectors considered together. It had decreased in 2011 for the first time since 1970, year in which the series of energy balance sheets started. This rebound falls within the long-term trend: on average +2.3% per year between 1997 and 2012. In part, this can be attributed to a hotter summer than the one in 2011, which favoured the use of air-conditioning especially in the tertiary sector. Adjustment for climatic differences does not neutralise this effect, as it currently only concerns the effects of cold temperatures on energy consumption.

Renewable energies continued to grow in 2012: +4.6% in the residential sector and +9.3% in the tertiary sector. Consumption of wood, which represents 80% of renewable energies in the residential sector, grew marginally due to the success of new high-performance wood-burning appliances. The development of heat pumps continued: these reached 12% of household consumption of renewable energy. These strong developments of renewable energies are in line with previous years: Since 2007 an annual average rise of +4.5% in the residential sector and + 6.7% in the tertiary sector.

1.2. Policies and measures

Improvement of the energy performance of buildings is essential in order to achieve the fixed objectives in terms of energy efficiency, reduction of greenhouse gases and development of renewable energies. Therefore, France has set extremely ambitious objectives:

- **Increase the number of low-energy buildings** (LEB) in 2013 with new constructions and positive-energy buildings by 2020;
- **Renovate 500.000 old dwellings** per year by 2017.

If the potential reductions in energy consumption and emissions are high, this is mainly due to diffuse emissions and therefore, to deposits that are more difficult to mobilise. Therefore, in order to achieve these objectives, France has mobilised a series of diversified tools: regulations, financial incentives (budgetary and fiscal incentives), and training, information and awareness campaigns.

1.2.1. Ambitious regulations for new buildings through support measures

The energy performance level required for new buildings is regulated by the gradual introduction of thermal regulations. These are accompanied by the training of operators from the construction industry through the previous introduction of quality labels for which incentives are provided.

Therefore, **the RT 2012 thermal regulations** [10]have strengthened requirements regarding the thermal performance of new buildings, specifically all buildings for which a building permit was applied for after 1 January 2013. These buildings must have a primary energy consumption below a threshold of 50 kWhep/m2/year on average for the 5 regulatory uses (heating, domestic hot water, lighting, cooling and auxiliary systems). This obligation has been applied by anticipation since 28 October 2011 for office buildings, primary and secondary schools and for childcare facilities, whereas those dwellings built in the ANRU (agence nationale pour la rénovation urbaine: National Urban Renewal Agency) area[11] are subject to this obligation if the building permit or previous declaration were applied for after 1 March 2012. Moreover, the 50kWhep/m²/year requirement is adjusted based on geographical location, altitude, building use, average surface area of the dwellings. Buildings using wood-energy and low CO_2 emission district heating networks also benefit from an adjustment of the primary energy consumption threshold, limited to a maximum of 30%.

Moreover, in order to ensure strengthened implementation of this new thermal regulation, the property

10 Decree No 2010-1269 of 26 October 2010 relative to the thermal characteristics and energy performance of constructions and the decree of the 26 October 2010 relative to the thermal characteristics and energy performance requirements of new buildings and new building extensions.

11 Dwellings built in areas reserved to low income home-buyers benefit from a VAT rate of 7% instead of 19.6% (ANRU: agence nationale pour la rénovation urbaine: National Urban Renewal Agency).

developer must :

- Produce a document certifying that thermal regulations have been taken into account and that a feasibility study on energy supply was carried out before applying for a building permit;
- Forward to the examining board, together with the declaration of completion of works, a document certifying compliance of the building with thermal regulations.

Moreover, new buildings must be subjected to a feasibility study **of the various energy supply solutions**, and in particular, the possible use of renewable energies and more high-performance systems.

Before the 2012 thermal regulations came into force, those buildings whose building permit had been applied for after 1 September 2006 had to respect the **2005 thermal regulations**. The 2012 thermal regulations were prepared in order to give property developers wishing to construct new, more energy-efficient buildings than those allowed in the 2005 thermal regulations, the possibility of receiving an **energy label**.

In particular, the low-energy building (LEB) label has enabled the preparation for the introduction of the 2012 Thermal Regulations. Those buildings respecting these regulations **could benefit from various types of financial aid**:

- Adjustment of the controlled interest-free loan (PTZ+), which is for people who wish to purchase their first new main residence, was strengthened in 2011 and 2012. The 2012 Finance Act states that the achievement of the base rate depends on energy performance (2012 Thermal regulations or LEB) from 1 January 2013.
- Exemption from property tax on developed properties (TFPB: taxe foncière sur les propriétés bâties) amounts to 50 or 100% for new buildings completed by the 1 January 2009 whose high level of overall energy performance, determined under conditions that shall be fixed by decree, is higher than that imposed by the legislation in force[12].

In the same way, labels will be created in order to gradually prepare for the introduction of the future Thermal Regulations that will enable the diffusion of positive energy buildings by 2020.

Finally, if an individual investor were to purchase or have a new building built between 1 January 2013 and the 31 December 2016, he will be able to benefit from a reduction on income tax that has been increased to 18% of the purchase price of the dwelling (within the limit of EUR 300 000 and with a purchasing limit set at 5 500 €/m2), spread over nine years. The benefit of this tax reduction is subject to the respect of certain conditions:

- The dwelling shall have to be rented for a minimum period of 9 years.
- The applied rent shall be capped and around 20% lower than the going market price,
- Lessees shall present a capped level of resources,
- The energy performance of the new building shall be in possession of the LEB label or respect the 2012 Thermal regulations

Implementation of the 2012 thermal regulations shall enable a reduction of the annual final energy consumptions of 0.41 Mtep in 2016 and of 1.15 Mtep in 2020[13] ; this assessment relates exclusively to the residential sector, without taking into account gains in the tertiary sector.

Specific regulations for French overseas territories

In Guyana, Martinique and in Réunion, all new dwellings for which building permits or previous declarations were applied for after 1 May 2010 must be compliant with the Thermal, Acoustic and Aeration regulations in force for the French Overseas Departments (RTTA- Réglementation Thermique, Acoustique et Aération applicable DOM), a set of three new specific thermal, acoustic and aeration regulations. The design of these dwellings, among other things, shall permit limited energy consumptions privileging a bioclimatic design and limiting the use of air-conditioning, in particular thanks to solar protective devices and to the use

12 Article 1383-0 B bis of the Tax Code
13 Source: SceGES assessment (see Annex 3)

of natural ventilation. Moreover, these dwellings shall be equipped with a system producing domestic hot water from solar energy covering a minimum of 50% of requirements. In Guyana, the use of domestic hot water is not mandatory. On the other hand, if the property developer chooses to install hot water, it must be produced from solar energy.

Since 21 May 2011, in Guadeloupe, the Guadeloupe thermal regulations have been applied (GTR). The GTR aim to improve the energy efficiency of buildings taking into account specific local conditions. They are articulated around four key points that are the construction of the building with requirements in terms of the building's overall energy performance, Energy Performance Diagnosis, equipment performance and a feasibility study of energy supply.

In Réunion, since 1 July 2010, the "French Overseas Departments Habitat & Environment certification " created by the certifying body Cerqual (a subsidiary of the company Qualitel), must respond to environmental quality criteria allowing property developers of social rented housing who respect certain reference profiles, to obtain a prolonged 5-year exemption from the property tax on developed buildings, like with the "Habitat & Environment" LEB certification that has been valid in France since 2009.

1.2.2. Improvement of the energy performance of existing buildings

The housing energy efficiency improvement plan (PREH) announced on 21 March 2013 reflects the commitment of the President of the Republic to renovate 500.000 dwellings per year by 2017. This plan includes numerous measures that involve all aspects of renovation: decision-making (points of single contact, thermal renovation ambassadors), funding (sustainable development tax credit, interest-free eco-loans and social housing eco-loans, energy saving certificates, extraordinary bonuses, implementation of third party financing) and development of a network capable of correctly and efficiently responding to enquiries (training and qualification of professionals).

Moreover, the building renovation strategy created in compliance with article 4 of the Energy Efficiency Directive represents more broadly the general framework within which the policies and measures described in detail below fall. This strategy in particular includes:

- A presentation of the national building stock;
- The identification of cost-effective renovation approaches;
- A detailed description of the PREH, as well as a summary of other implemented measures;
- A description of measures to raise awareness among industrials and professionals;
- An outline of available funding.

a Regulatory measures

The energy performance of existing buildings

The **thermal regulations of existing buildings** aim to ensure a significant improvement of the energy performance of the existing building when property developers start work likely to lead to such an improvement. The applicable measures, the overall Thermal Regulations and the thermal regulations point by point, vary according to the entity of the work undertaken.

For extensive renovation work[14] to buildings larger than 1 000 m², **the overall thermal regulations**[15] set an overall energy performance target for renovated buildings with the exception of buildings built before 1948. For dwellings, the regulations introduce a maximum level of consumption: the energy consumption of a renovated building for heating, cooling and domestic hot water must be below the limit value, which depends on the type of heating and climate. This maximum energy consumption is between 80 and 195 kWhep/m²/year depending on the case. For non-residential buildings, work must lead to a 30% saving on the energy consumption compared to its previous level.

For buildings smaller than 1 000 m² or for buildings larger than 1 000 m² undergoing minor renovation work, the **thermal regulations point by point**[16]set a minimum performance for replaced or installed elements: in

14 Renovation costing more than 25% of the value of the building excluding land, defined by regulations.
15 The Decree of 13 June 2008 relative to the energy performance of existing buildings larger than 1 000 m² when subject to major renovation work.
16 Order of 3 May 2007 relative to the thermal characteristics and to the energy performance of existing buildings.

particular, it focuses on insulation, heating, hot water, cooling and ventilation equipment.

An amendment to the existing thermal regulations is in progress in order to make the acknowledgement of energy performance mandatory when major work is carried out on the building (for example, facade refurbishment).

A **"high energy performance renovation"**[17]**label has also been introduced.** It includes two levels for residential buildings: the "high energy performance renovation, HEP 2009" label for buildings that achieve a primary energy consumption of less than 150 kWhep/m² year for the 5 regulatory uses (heating, domestic hot water, lighting, cooling and auxiliary utilities) and a "low-energy consumption building renovation, LEB 2009" for those buildings that achieve a primary energy consumption lower than 80 kWh_{ep}/m2/year for the same uses. This label also includes another level for non-residential buildings. As of 1 January 2013, it has become obligatory to present a document certifying that the thermal regulations have been taken into account by one of the following four professional figures: architect, house surveyor, control office, certifying bodies if the building is subject to certification. The certificate is an integral part of the declaration stating completion and conformity of the work carried out (article R.462-4-2 of the Urban Planning Code).

Finally, since 1 January 2008[18], all buildings larger than 1 000 m² undergoing major renovation work must undergo a **feasibility study of energy supply**, in order to encourage the property developer to use renewable energy or an extremely high-performance system.

For public buildings, pursuant to article 5 of Directive 2012/27/EU on energy efficiency, France has opted to adopt an alternative approach in order to reduce the energy consumption of public buildings (see section on " Exemplary role of the State and authorities").

Moreover, the **obligation to carry out by 2020 work for the improvement of the energy performance** of existing tertiary buildings or in those buildings where public services are offered has been introduced[19]. The implementation instruments of these measures defining implementation modalities shall be published in 2014. In order to initiate the process, on 31 October 2013, the **Charter for the energy efficiency of tertiary buildings** was elaborated and signed by 30 public and private companies who committed to work towards reducing the energy consumption of these buildings.

Switching off illuminated signs and billboards during the night

Since 1 July 2012, new **illuminated signs and billboards** must be switched off between 1 a.m. and 6 a.m. in the morning[20]. This new regulation shall progressively be applied to all existing installations by 2018. The implementation of this measure represents a subsequent source of energy savings and will allow a saving of around 800 GWh each year for signs and more than 200 GWh for billboards.

On 1 July 2013, a Decree regulating how long certain lighting installations can remain switched on came into force in order to prevent a waste of energy and to reduce light pollution[21]. The Decree set a general switching off rule that is applied in various ways depending on the type of lighting considered:

- the interior lighting of professional buildings must be switched off one hour after the premises has been vacated;
- illumination of the facade of buildings must be switched off at the latest at 1 a.m.;
- shop window lights or window display lighting shall be switched of at the latest at 1 a.m. or one hour after the premises have been vacated whichever occurs later.

The rules regulating the times in which these lights can be switched back on are also described in detail:

- Shop window lights or window display lighting can be switched back on from 7 a.m. or one hour before the start of working hours whichever occurs earlier;

17 The Decree of 29 September 2009 introduced a "high energy performance renovation" label for certain existing buildings and the Decree of 29 September 2009 relative to the content and attribution conditions of the "high energy performance renovation" label.
18 Article L.111-9 of the Code on Construction and Housing introduced by the law dated 13 July 2005
19 Article 3 of law No 2010-788 of 12 July 2010 focuses on the National commitment to the environment
20 Decree No. 2012-118 of 30 January 2012
21 The Decree of 25 January 2013 relative to the night lighting of non-residential buildings in order to limit light pollution and energy consumption

- illumination of the facades of buildings cannot be switched on before sunset.

According to the ADEME, expected energy savings represent 2 TWh per year, which is the equivalent of the annual electricity consumption of around 750 000 households (excluding heating and hot water). This provision also allows to avoid each year a CO_2 emission of 250 000 tonnes.

Lifting of limitations on renovation work or on virtuous uses of dwellings.

Several provisions have been implemented in order to **lift certain limitations**[22] on the renovation of dwellings or on the adoption of advantageous uses:

Amendments to the rules regulating decisions concerning work that could be binding in the case of co-owners, in the Construction and Housing Code:

1. A majority vote of co-owners for the execution of work of common interest in the private areas at the expense of the co-owner involved;
2. A majority vote of the co-owners for the installation of heat meters or heat cost allocators;
3. Mandatory addition to the agenda of the general assembly of co-owners of an energy saving action plan or an energy performance contract, following the establishment of an Energy Performance Diagnosis or where appropriate an energy audit, for all buildings equipped with collective central heating or cooling systems.

- Identification of heating costs[23]: since 1974[24], all properties equipped with collective central heating must be equipped with devices allowing the identification of heating costs. Decree No 2012-545 of 23 April 2012 amended the Construction and Housing Code in order to favour the implementation of this obligation by redefining the technical impossibilities of installing measuring systems and reviewing the conditions of the economic viability of the measure.
- Financial contribution of the tenant after the owner has carried out energy saving work in order to establish a " win-win " situation between the landlords, who bear the cost of the works and the tenants, who benefit from the energy savings achieved: Act No 2009-323 on Mobilisation for Housing and the Fight against Exclusion voted on 25 March 2009 provides that the owner could ask the tenant to participate to up to half of the achieved cost savings. This participation is included in the rent receipt under a new heading, which will continue for a duration of 15 years. Nevertheless, this participation is possible only if the landlord carries out a series of performance works involving a minimum of two interventions or permitting the achievement of a minimal performance level[25] and has consulted his tenant.

Improving the performance of boilers and air-conditioning systems

- *Boilers between 4 and 400kW*

Pursuant to Directive 2002/91/EC on the energy performance of buildings, France has implemented **the obligation of annual boiler servicing**[26]. This involves all boilers (gas, fuel oil, biomass, multi-fuel) with an output of between 4 and 400 kW. Servicing shall be carried out every year and a boiler service certificate shall be issued to the client, at the latest 15 days after the intervention and shall be kept for 2 years by the client who commissioned the servicing to be presented in the case of controls. This certificate informs the client who commissioned the servicing on the state of his boiler and of his heating system. Servicing shall be carried out by a qualified professional.

Moreover, in order to explain the new regulations to the general public, a guide for individuals, prepared jointly by the Ministry and by the ADEME, was published in December 2009[27]. Professionals from the industry have also worked together to prepare a guide of technical sheets for professionals in order to ensure

22 Article 19 of the Energy Efficiency Directive.
23 Article 9 of the Energy Efficiency Directive.
24 Law No74-908 of 29 October 1974 (Article 4).
25 Act No 2009-323 and Decrees 2009-1438 and 2009-1439 of 23 November 2009.
26 Decree No 2009-649 of 9 June 2009 on the annual servicing of boilers with a nominal output between 4 and 400 kilowatts, Article L.111-9 of the Construction and Housing Code introduced by the law of 13 July 2005 and the Order of 15 September 2009 on the annual servicing of boilers with a nominal output between 4 and 400 kilowatts.
27 Downloadable from the ADEME and ministry websites: www.ademe.fr or www.developpement-durable.gouv.fr

the correct application of regulations[28].

Finally, boilers and water heaters are subject to regulations 813/2013 and 814/2013 within the framework of the Eco-design directive (see Energy section).

- *Boilers between 400kW and 20MW*

Boilers with an output of between 400 kW and 20 MW must meet **minimum energy performance requirements**[29]. The operator also has the obligation to install control devices and devices measuring performance and combustion efficiency.

Moreover, they are subject to mandatory controls, at least twice a year, to ensure that they meet minimum performance regulations and that operators carry out the control and adjustment operations to which they are subjected.

- *Air conditioning systems*

Directive 2002/91/EC also provided for Member States to implement **regular inspections of air-conditioning systems** with a nominal output greater than 12 kilowatts. In France, this obligation has been transposed into the framework of a decree dated 31 March 2010[30]. This Decree defines the major inspection stages: inspection of documentation, assessment of the system's performance, system sizing compared with the building's cooling requirements, supply of the necessary recommendations focusing on the correct use of the installed system, possible installation improvements, possible interest in replacing the system and other foreseeable solutions. Inspection shall take place every 5 years. This involves 300 000 installations in France (10% of the stock of installations). At the end of 2013, four organisations accredited by COFRAC certified around 300 inspectors.

b Support measures

In the private residential sector, numerous incentive schemes for homeowners have been implemented in order to improve the energy performance of dwellings:

- **Sustainable development tax credit (CIDD- Le crédit d'impôt développement durable)**: since 2005, homeowners can benefit from tax credit for the purchase and installation of high-performance material or equipment in terms of energy savings (exclusively in existing buildings) or for the production of renewable energy (in new buildings built until 31 December 2012 and in existing buildings). This scheme has been extended until the end of 2015. Since its creation, the list of equipment eligible for CIDD, as well as the rates of which one benefits are regularly reviewed in order to accelerate the rate of thermal renovations in steps and to favour the use of more high-performance technologies. From 2005 to 2011[31], more than 9 million works were declared as eligible for the CIDD in mainland France out of a total of 27 million dwellings used as a main residence. More than 7 million dwellings have been renovated thanks to this incentive. The tax expenditure for this same period increased to EUR 13 billion for EUR 46 billion of declared household expenditure. In 2012, 1.23 million households benefited from tax credit increasing on average to EUR 1 107 for an average total declared amount of EUR 549 .

  Within the framework of the Housing Energy Renovation Plan, the decision was made to simplify the CIDD by maintaining only two applicable rates and by reorienting towards major renovation works. From 1 January 2014 the rates are the following :

  - A 15% rate in cases of a means-tested single intervention;
  - A 25% rate in cases of several works without means-testing.

  Moreover, the requirement for installers to have qualifications will be introduced from 1 January 2015 as part of the extension of the EGR Charter (see below)

28 Available on the website http://www.energies-avenir.fr/.
29 Articles R.224-20 – R. 224-30 of the Environmental Code
30 Decree No 2010-349 of 31 March 2010 relative to the inspection of air-conditioning systems and reversible heat pumps, completed by the Decree of 16 April 2010 relative to routine inspections of air-conditioning systems and of reversible heat pumps of which the cooling capacity is greater than 12 kWz and the Decree of 16 April 2010 defining the certification criteria of the competences of the individuals carrying out the routine inspection of the air-conditioning systems and the reversible heat pumps of which the cooling capacity is greater than 12 kW and the accreditation criteria of the certifying bodies.
31 The years cited correspond to the years in which works were carried out; tax deduction was applied the following year.

Implementation of the CIDD for the period 2009-2012 allows a reduction in the annual final energy consumption of 0.78 Mtep in 2013, 0.93 Mtep in 2016 and of 1.08 Mtep in 2020[32].

The interest-free eco-loan (eco-PTZ)[33]: available since 1 April 2009, is destined to those home-owners or landlords for the funding of major renovation works. It has three options:

1. implementation of " mixed works ";
2. achievement of a minimum " overall energy performance " of the dwelling;
3. introduction of an individual sanitising system using a system that does not consume energy.

This loan finances up to EUR 30 000 for carrying out work for the improvement of the energy performance of a dwelling over a period of 10 years (which can be extended to 15 years by the bank, which does not benefit from tax credit of accrued interests between the twelfth and fifteenth year). Since 2012, it can be once again accumulated with the sustainable development tax credit, provided the ceiling on resources if respected. The initial Finance Act for 2012 implemented the possibility of extending the repayable period to 15 years for more extensive renovation works (the accumulation of at least three different works or the option of a minimum overall energy performance).

In parallel, Credit Institutions have prepared information documents for homeowners and building professionals in order to improve the technical quality of loan applications and facilitate their understanding.

Finally, in order to facilitate the carrying out of work on co-owned properties, the rectified Finance Act for 2011 dated 28 December 2011 provided for the opening of the interest-free eco loan to property owner associations. The so-called " Warsmann " law of 22 March 2012 relative to the simplification of law and to the lifting of administrative limitations, and its application Decree (Decree No 2013-205 of 13 March 2013) have allowed to define the judicial framework for the application for a bank loan for the funding of work in the name of the property owner association. Decree No 2013-1297 of 27 December 2013 defines the modalities of the collective interest-free eco-loan.

Since June 2011, a mix of work eligible for an interest-free eco-loan, as well as overall energy performance requirements have been adjusted for French Overseas Territories. The interest-free eco-loan also allows to fund a part of the renovation works carried out in Guadeloupe, Martinique, Réunion, Guyana and in St. Martin.

Overall, the number of interest-free eco-loans issued since its introduction has been estimated at more than 235 000 as of 30 September 2013 for an average expenditure for works amounting to EUR 19 200 . The cost of this measure for the State is estimated at EUR 75 million for the period 2009-2011.

Implementation of the interest-free eco- loan has allowed a reduction in the annual final energy consumption of 0.18 Mtep in 2013 and of 0.19 Mtep in 2016 and in 2020.[34]

The energy savings certification system (ESC) (see the Energy section) aims to create a source of energy savings, in particular in those sectors where it is more common, such as the building sector. As of 30 November 2013, 90% of the ESC issued came from interventions carried out in the building sector.

Exemption of building property tax: the rectified Finance Act for 2006 introduced the possibility for collective buildings to be exempted from the property tax for 5 years with an exemption rate of 50 or 100%, for constructions completed before 1 January 1989 for which major work eligible for CIDD was carried out. This possibility has since been extended to all constructions completed before 31 December 2008. The construction of new dwellings completed since 1 January 2009 can also benefit if they are in possession of the LEB label.

32 Source: SceGES assessment (see Annex 3)
33 See Article 99 of the Finance Act for 2009 and the application decrees of 30 March 2009 relative to interest-free repayable advances destined to the funding of renovation work in order to improve the energy performance of old dwellings.
34 Source: SceGES assessment (see Annex 3)

The reduced VAT rate for renovation work[35]: since 1 January 2014[36]energy renovation work on dwellings older than 2 years benefit from a reduced VAT rate (5.5%). This includes works eligible for sustainable development tax credit as well as, work associated and inextricably connected to the main works. This includes indispensable associated works (for example, installation of radiators or laying of floors) following actual energy efficiency works. Subsequently, it does not target neither other renovation work nor aesthetic work (for example, installation of a fireplace, wallpapering).

The sustainable development booklet (LDD- livret de développement durable): since 1 January 2007, the CODEVI (compte pour le développement industriel : industrial development accounts) has been replaced by the sustainable development booklet (LDD) increasing the scope of its application. It was previously limited to the financing of small and medium companies but now allows the granting of advantageous rate loans for the financing of energy savings works carried out on dwellings built more than 2 years before. Works that can be financed are the same as those eligible for CIDD. Its tax cap was extended to EUR 12 000 as of 1 October 2012 .

Within the **framework of future investment plans**, a support program of EUR 500 million for the energy renovation of buildings for low-income homeowners, entitled " Habiter mieux – Living better" was implemented (refer to paragraph on the battle against energy poverty).

1.2.3. Renovation of the social housing park

In the social housing park, a target of renovating 800 000 of the most energy-hungry social dwellings has been set for 2020[37]. The achievement of this target relies on the following measures:

- **The social housing eco-loan** is a fixed interest-rate subsidised loan granted by the Caisse des Dépôts et Consignations since 2009. The first version of this loan distributed between 2009 and June 2011 was at a fixed interest rate of 1.9% over 15 years and 2.35% over 20 years. It has permitted the renovation of 100 000 social housing units and has represented an envelope of EUR 1.2 billion.

  The social housing eco-loan system has now been extended to the end of 2020 and its target is the renovation of 70 000 social housing units/year. On 4 May of 2012, a convention was signed by the State and the Caisse des dépôts. The loan that is currently being distributed is at a variable interest rate, based on the Livret A rates, and its maximum duration has been extended to 25 years. The loan's interest rate depends on its duration in order to have an a grant equivalent regardless of its duration:

  - at a Livret A rate, on a duration of 5 to 15 years;
  - at a Livret A + 0.15% rate on a duration of 16 to 20 years;
  - at a Livret A + 0.25% rate on a duration of 21 to 25 years.

  Regarding eligibility conditions, borrowing institutions must now commit to a 5-year intervention programme containing a maximum of 70% of energy Class D dwellings. In particular, low-income housing organisations (HLM- Habitation à Loyer Modéré), SEM (semi-public estate companies) or municipalities owning or managing social housing units within the scope of the energy renovation of " energy-hungry " dwellings can access this programme: the loan finances energy saving work allowing a dwelling to go from a primary energy consumption greater than 230 kWhep/m2/year to a consumption lower than 150kWhep/m2/year. Dwellings completed before 1 January 1948 are subject to an alternative regime. They can benefit from the loan when they are classified as energy classes E, F or G in the energy performance diagnosis (DPE) and when a combination of energy performance improvement actions of the characteristics defined in the work plan is implemented. Dwellings classed as energy class D can also benefit under certain conditions, since September 2010 with a limit of 14 000 dwellings per year from 2012.

  On 1 January 2013, 23 000 dwellings had been involved in a social housing eco-loan application. Since

35 Article 279-0 bis of the general Tax Code.
36 Article 9 of the Finance Act for 2014
37 Decree No 2009-967 of 3 August 2009 (Article 5)

the announcement on 21 March 2013 by the President of the Republic on the measures constituting the housing energy renovation plan, improvements have been made in order to achieve the annual rate of energy renovation of 120 000 social housing units by 2017:

- A reduction in interest-rates equal to the Livret A rate reduced by 75 base points for a period of 15 years or less (with a similar interest-rate in terms of a grant equivalent over 20 and 25 years);
- Flexibility of the eligibility conditions of Class D authorising a national quota of 50 000 class D dwellings per year. Moreover, the 5-year renovation programmes will no longer have to guarantee a minimum of 30% of class E, F or G dwellings.
- The eligibility criteria techniques remain unvaried.

Implementation of the social housing eco-loans allows the reduction of the annual final energy consumption of 0.35 Mtep in 2013, 0.65 Mtep in 2016 and 1.03 Mtep in 2020[38].

- Since 2005, low-income social housing organisations or SEMs (semi-public estate companies) that must carry out energy saving work in compliance with the thermal regulations in force, can benefit from **a reduction of the property tax on residential properties** (TFPB) equal to a quarter of the expenses incurred during the year previous to that for which the tax is due[39]. This reduction is on the TFPB due for the building subject to the work in question but at the same time also for all other buildings belonging to the same social lessor of the same town or in other towns when they all depend on the same tax office[40].

Since 10 June 2009, **investments made in energy efficiency and renewable energies in the housing sector are eligible for European Regional Development Funds (ERDF).** The total amount available for energy rehabilitation works is 4% of the national envelope of ERDF, which corresponds to around EUR 230 million for mainland France and EUR 90 million for the French Overseas Departments for the whole 2007-2013 period and without a ceiling on annual expenditures.

A circular note was published on 22 June 2009 in order to give regional management authorities recommendations on the use of these funds: these recommendations focus mainly on ensuring coherence with current financial measures in favour of energy saving works. Moreover, it has been recommended to model the conditions for granting the subsidy on those eligible for eco-social housing loan. In the French Overseas Departments, it is recommended that interventions aiming to improve comfort in the summer or to use renewable energies can be funded by the ERDF as long as they are innovative or have such a cost to justify the need of additional sources of funding. Funds must be dedicated to structural operations involving a significant number of dwellings aiming for exemplary energy performance in order to give visibility to the intervention of European Credit for these measures. Since August 2012, the Region Prefects have been authorised to decap the interest rates by 4% at each regional level, provided that the interest rate of 4% is not exceeded at a national level.

At a European level, for the period 2014-2020, the new ERDF regulations[41], under Article 4, provide for the obligation of a concentration of funds for the Thematic Objective 4 (TO4): " *Support the shift towards a low-carbon emissions economy in all sectors ".* In particular, this objective includes energy efficiency and the use of renewable energies in public infrastructures and in the housing sector. This thematic concentration on TO4 is divided as follows, by regional category:

- In the most developed regions: at least 20% of resources at a national level
- Among those regions in the transition phase: at least 15% of resources at a national level
- In the least developed regions: at least 12% of resources at a national level

On a national scale, the investment priorities of structural and investment European funds (thus the EDRF) are established in the Partnership Agreement[42]. This document, elaborated after broad discussion, was forwarded to the European Commission on 31 December 2013 and will be the object of negotiations between France and the Commission that will have to be finalised by Spring 2014. At this stage, as far as

38 Source: SceGES assessment (see Annex 3)
39 See POPE law
40 Decree No 2009-323 of 25 March 2009,
41 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0289:0302:FR:PDF
42 http://www.europe-en-france.gouv.fr/Centre-de-ressources/Etudes-rapports-et-documentation/Accord-de-partenariat-2014-2020

TO4 is concerned, among other things, it insists on the energy efficiency of buildings that " *constitutes […] the action priority in view of a change towards a low carbon economy*", focusing on the residential and public tertiary sector.

At a regional level, in its current version, the Partnership Agreement provides that each regional EDRF programme apply the thematic concentration rules mentioned above. On an interim basis, it relates to a total indicative support to the priorities of the thematic objective 4 of:

- EUR 1 703 million for ERDF
- EUR 343 million for the European Agricultural Fund for Rural Development (EAFRD)

It must be noted that the regional programmes have not yet been finalised, this division does not bind either the member state or the management authorities. Moreover, the Partnership Agreement also provides that " *all operational programmes (ERDF, ESF, ERDF/ESF) shall contribute to the achievement of the objectives of the Union for the reduction of greenhouse gas emissions in all sectors and be assessed in this sense* "

1.2.4. The fight against energy poverty

France intends to reinforce its **fight against energy poverty** through specific actions.

The Article of law No 2010-788 of 12 July 2010 focusing on the National commitment to the environment introduced a judicial definition of energy poverty " *pursuant to this law, energy poverty is a situation in which a person has particular difficulty in accessing the necessary energy supply to satisfy his primary needs owing to his inadequate resources or living conditions ".*

An **energy poverty monitoring centre** was set up in March 2011 in order to better measure situations of energy poverty and ensure the correct use of public and private financial benefits granted to disadvantaged households, as well as the correct application of actions and local or national initiatives, in order to measure their impact and share experiences.

The French National Housing Agency (Anah)) helps owner-occupiers, under a resources ceiling, and landlords carry out work to improve housing, as well as property owner associations to carry out work on common areas and common equipment. Anah funds allow to finance extensive work on dwellings completed more than 15 years ago. The thermal renovation and improvement of housing are at the centre of Anah's interventions focusing largely on dealing with indecent living conditions and the adaptation of the dwellings of people with reduced autonomy. Anah also supplies funds for monitoring works.

The actions carried out by Anah focus on the most critical situations. Over the period 2007-2009, the funds provided by the agency allowed the rehabilitation of 45 945 indecent or extremely run down dwellings on the whole territory.

Since 2013, Anah's budget has received contributions from the revenue from auctioning within the framework of the EU ETS scheme that covers the energy and industry sectors (see Energy section) within the limit of EUR 590 million per year).

The **"Habiter mieux- Living better"** programme, managed by Anah, can dispose of EUR 1.35 billion for the period 2010-2017, of which EUR 500 million from the State through future investments (see Energy section), EUR 600 million from Anah and EUR 250 million from energy suppliers within the framework of the energy saving certification system**.** The " Habiter mieux-Living better " programme will allow by 2017 to renovate 300 000 dwellings improving their energy performance by at least 25%.

As of 30 November 2013, 39 638 households had been involved in a thermal renovation project on their dwelling thanks to the " Habiter mieux-Living better " programme. The average conventional energy gain obtained as a result of the work is of 38% for an average amount of work of EUR 17 000 .

Within the framework of the Housing Energy Renovation Plan, announced by the President of the Republic on 21 March 2013, measures were presented in order to fight energy poverty:

- The " Habiter mieux – Living better" programme has been modified in order to accelerate an increase in the capacity of this system. It is now available for property owner-occupiers with greater resources (around EUR 26 000 for a couple living in the province), landlords and co-owners of deteriorated co-owned properties. The supplementary grant of the programme has been increased: it has gone from EUR 1 600 to EUR 3 000 .
- Energy renovation ambassadors will be recruited in order to help disadvantaged households to begin

the renovation of their dwelling. 1 000 ambassadors will have to be recruited by 2015 in particular, through the creation of future jobs. On 20 February 2013, a convention was signed by the State and the Anah with the aim of creating 800 future jobs. The main tasks of these ambassadors will be to identify disadvantaged households, raise awareness on energy savings and orient them towards existing aid.

- On 13 March 2013, the Anah's Board of Directors voted for amendments to be made to the aid regime that will be applied to all applications made from 1 June 2013. First, these deliberations provide a broadening of the people eligible to these funds: the number of property owner-occupiers involved will also double and landlords will be able to access funds exclusively for thermal renovation work provided there is the agreement to then rent the property. Moreover, the total funds allocated to the lower income property owner-occupants will be increased. Thermal diagnosis shall be carried out for all dwellings benefiting from the Anah funds. The last point is dedicated to supervision of major work.

Other programmes fighting energy poverty could be adopted within the scope of energy saving certificates and contribute also to the funding of actions depending on other intervention modalities in favour of other members of the public. In particular it involves:

- The "**Toits d'abord – roofs first**" programme: supported by the Abbé Pierre Foundation, this programme aims to increase " very social " renting offers destined to extremely disadvantaged households through the construction and renovation of 600 to 700 dwellings per year.
- The " **Energy Solidarity Pact**" programme: the CertiNergy company supports this programme. The objective is to improve by the end of 2013 the energy performance of more than 1 000 dwellings in which the occupants, who may be owners or tenants, are in a situation of energy poverty.
- The "**Renovation Solidarity – Bordeaux**" programme: with this programme, the city of Bordeaux has set itself the objective of supporting every year during the period 2012-2014 work to improve the energy saving of the dwellings of 50 property owner-occupiers living in the city centre in situations of energy poverty.
- The "**SLIME- Services Locaux d'Intervention pour la Maîtrise de l'Énergie - Local energy management agencies**" programme supported by CLER (réseau pour la transition énergétique – resources for energy transition), aims to detect and contact households in order to suggest sustainable options to exit the situation of energy poverty. This personalised advice, offered *on site*, will create the opportunity of supplying small high-performance equipment and possibly orient towards more extensive renovation work plans adapted to the household.

1.2.5. Information, raising awareness, training

a 'one-stop' approach and PRIS (Renovation Information Service Points)

The aim of the housing energy renovation plan is to help owners make decisions through the implementation of a National one-stop approach and of a local network for the energy renovation of private dwellings, a genuine local public service for energy renovation with 450 Renovation Information Service Points (PRIS), present on the whole territory**.**

The national one-stop approach has a national toll-free number, 0810 140 240, and a website (http://www.renovation-info-service.gouv.fr/). Its mission is to guide property owners based on their profile and their location and suggest local information centres, local counselling centres and provide basic information.

The PRIS's mission is to provide technical, financial, fiscal and regulatory information, to give advice, free of charge and objectively, to the enquiring home-owner on the design of the energy renovation project for his dwelling. They are public and independent and are intended for all property owners (owners, co-owners, public building owners in situations of energy poverty). They rely:

- for the people eligible for Anah funds: on the Anah network (DDT(directions départementales des territoires/et de la mer- territories and seas regional authorities), delegated authorities, ADIL (Agence départementale d'information sur le lodgement-Departmental agency for information on housing)) ;
- for other people: on the Espace Info-Energie (EIE) (Energy Information Centres) network co-funded

by the ADEME, regional councils and certain general and collective councils, as well as on structures built for the public (excluding EIE). Set up in 2001, initiated by the ADEME, its purpose is to advise homeowners on energy efficiency and renewable energies. In 2012, 507 000 people were informed by EIE and 121 000 received personalised advice from 453 network advisors that led to the realisation of work of up to more than EUR 520 million (55% of the advised people went on to carry out work). The latest assessment of the direct environmental impact of EIE was carried out in 2011 by the ADEME and led to a reduction of greenhouse gas emissions of 134 000 teq CO_2.

In order to inform people of the existence of these PRIS, the **" j'éco-rénove, j'économise (by renovating, I save) "** awareness campaign launched in September 2013 by the Ministry of Housing and Territorial Equality and the Ministry of Ecology, Sustainable development and Energy, aims to encourage property owners to carry out energy renovation work on their dwellings and assist them in their work.

This campaign relies on a partnership between the ADEME (French Agency for Environment and Energy Management), the Anah (National Housing Agency) and Anil (National Agency for housing Information), as well as on the actions already implemented on the territory by local authorities. The campaign was carried out in three phases:

- A TV advert broadcast from 21 October to 8 November 2013 on terrestrial and digital channels;
- A national radio campaign that ran from 4 to 20 November 2013;
- A version for the web online until the end of 2013;
- A press campaign from November 2013 to February 2014.

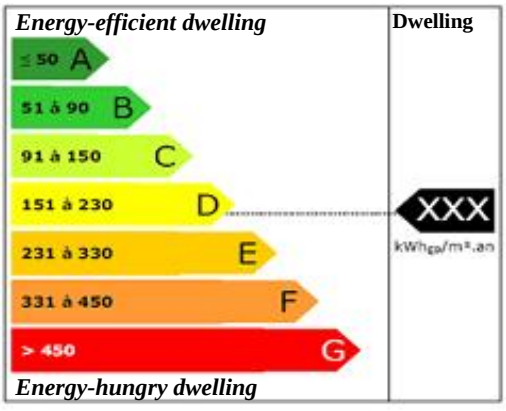
The first available assessment elements show that more than 60 000 enquiries were received between September 2013 and the end of November 2013 via the national phone number. Most of these enquiries (93%) were made by property-owners. The website received around 700 000 visits. In the same period, almost 60 000 people consulted the Espace Info Energie network showing a 78% increase compared to the same period of the previous year.

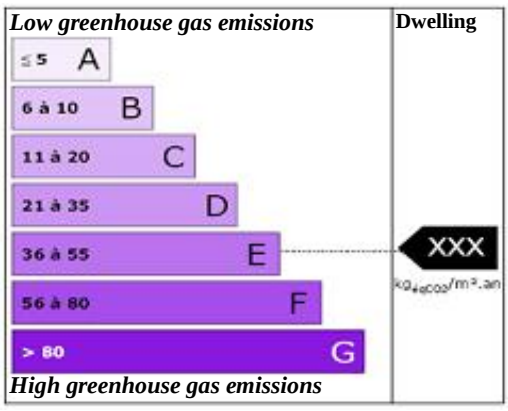
As far as the information campaign for the general public is concerned via television/radio/the Internet, it reached 44% of the French public thanks to an effective media strategy. In particular, 4 French people out of 10 declared they remembered the advert and 92% of them judged it in a positive way.

Finally, at the end of the second environmental conference of 21 September 2013, the Prime Minister announced the creation of a "renovation passport" in order to facilitate assistance to households during audit activities and their work projects.

b Other information measures

Within the framework of the Directive on the energy performance of buildings (EPBD), **the energy performance diagnosis** (DPE) has become mandatory for all buildings rented from 1 July 2007 or sold from the 1 November 2006. The results must be kept available for the sale or renting of the property, for all purchasing or renting candidates who make an application for the sale or renting of a building or of part of the building. Since 1 January 2011, it has become mandatory to include the dwelling's energy Class in all advertisements publicising the sale or renting of an asset.





In order to give further information to property owners and tenants on the energy performance of their

building and possible energy savings, Act No 2010-788 of 12 July 2010 addressing the National commitment to the environment requires the completion of an energy performance diagnosis of the installation of a collective heating or air-conditioning system before 1 January 2017. Moreover, since 1 April 2013, auditors are obliged to forward the Energy Performance Diagnosis they have carried out to the ADEME in order to create a common database: this information shall allow to improve the knowledge of the energy performance of the building stock.

Given its importance within the context of the reduction of the building's energy consumption, the government has started a reliability plan. The key points of this plan involve:

- The level of competencies of professionals, in particular:
  - The obligatory prerequisite of basic training of bac+2 (secondary school education + two years of college) and a further 3 days of training;
  - Introduction of two " individual " certification levels for detached houses, apartments and tertiary lots assigned to buildings for residential use, as well as declarations that thermal regulations have been taken into account and "all types of buildings" for apartment buildings and for non-residential buildings in addition to the missions of the previous;
- Improvement of the quality of diagnosis: clarification that on-site visits are mandatory, introduction of a technical sheet listing entry data, extra explanations of the differences between estimated and actual consumption and the possibility to deduct the part of renewable energy from the overall consumption.

Decree No 2013-695 of 30 July 2013 regulates the display of the Energy Performance Diagnosis certificate in buildings occupied by public authorities or public establishments that host public-access buildings (ERP) larger than 500 m². All buildings occupied by local authorities or public establishments fulfilling this criteria shall undergo an energy performance diagnosis before 1 January 2015, unless it has already been carried out and is still valid; for all ERPs larger than 500m^2 undergoing an energy performance diagnosis during construction, or for the sale or renting of the property, this diagnosis shall be displayed for its entire period of validity, visible to the public near the main entrance or in the reception area of the building. Moreover, pursuant to the requirements of Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings, it also introduces a reduction of the threshold to 250 m² from 1 January 2015.

For co-owners, act No. 788-2010 of 12 July 2010 introduced new regulatory obligations with the objective of supplying co-owners with the complete technical-economical elements necessary to decide whether to carry out energy renovation work. In particular, **buildings used as a main residence with a co-ownership of 50 lots or more,** equipped with collective heating or cooling systems and for which the application for the building permit was made before 1 June 2001 must undergo **an energy audit by the end of 2016**. Such energy audit will allow to raise awareness among co-owners regarding energy savings and involve them in the energy renovation of their asset by proposing suitable renovation scenarios[43]. Decree No. 2012-111 of 27 January 2012 and Decree of 28 February 2013 clarify the way in which the energy audit must be carried out, the information that must be included and also the list of supporting documents to be provided by the person carrying out the energy audit in order to determine the suitability between the competencies of this person and the task to be carried out.

Moreover, scoring and realisation modalities for the energy performance diagnosis in the case of co-ownership buildings other than those undergoing audit, are specified in Decrees No.1342-2012 of 3 December 2012. This text also gives clarifications on the way in which the obligation of including in the agenda of the co-ownership assembly, the development of a work plan or the termination of an energy performance contract, must be dealt with.

Regarding the tertiary sector, it too must undergo mandatory audit pursuant to Article 8 of the Directive on energy efficiency (see section on Industry) excluding small and medium sized companies, SMEs.

c Awareness raising measures and training of professionals.

The Charter for the commitment to guaranteeing environmental recognition (RGE), related to the qualifications necessary within the domain of the energy performance works for property owners was signed by the State and the main qualification organisms as well as by trade associations. The Charter commitments on the one hand, lead the qualification organisms, trade associations and the State to promote

43 Second paragraph of Article L.134-4-1 of the Construction and Housing Code.

certified quality increasing reliability. This Charter was signed on 9 November 2011 for a duration of 2 years and was renewed on 4 November 2013 for an extra two years[44]. On the other hand, the commitment to issue the CIDD and the interest-free eco-loan provided the work be carried out by a professional in possession of RGE quality certificate.

This Charter groups together the following initiatives:

- The Qualit'EnR association offers qualifications (QualiPAC, QualiBois, Qualisol, QualiPV, ..) to installers of renewable energy equipment. A specific qualification is being developed for vertical geothermal probe drilling and for well drilling; this will replace the old Qualiforge label.
- The QUALIBAT organism has implemented new " renewable energy " and " Energy renovation " certificates, as well as the already mentioned " energy efficiency " certificate that now accompany the qualifications related to the technical envelope and equipment.
- The QUALIFELEC association has brought changes to its " Electrical installation " and " Heating, ventilation, air-conditioning " qualifications, as well as to the Energy saving and Photovoltaic Solar energy balances.
- The ECO Artisan qualification, developed by the CAPEB (Confederation of artisans and small building companies) and given by QUALIBAT, identifies artisans specialised in the overall energy rehabilitation of buildings.
- Finally, the "Pros of the energy performance" qualification, developed by the FBB (Fédération Française du Bâtiment-French Building Federation), identifies those companies in possession of the QUALIBAT or QUALIFELEC professional certification with an " energy saving " certificate being a QUALIBAT or Certibat certificate for the overall energy renovation offer.

It must also be noted that the RGE principle must be extended to intellectual services related to project management after the signing by the main organisms of this sector of a Charter on 4 November 2013[45].

A list of qualified providers will soon be available on the company website pursuant to article 18 of the EED.

Decree No. 2010-788 of 12 July 2010 addressing the National commitment to the environment introduced the possibility of issuing energy saving certificates within the context of carrying out information, training and innovation programmes. The achievement of these certificates is limited to a certain percentage of the national energy saving obligations: in other words, by Decree for the period 2011-2014 it established that the number of certificates issued within the context of the information, training and innovation programmes in favour of energy management and demand cannot exceed 33 TWhcumac, which is 7.2% of the national target. Among the first actions that have benefited from this provision, one can cite:

- The " FEEBAT " (Formation aux Economies d'Energie des entreprises et artisans du BATiment - training in energy saving for building companies and artisans) training provision has been in force since the beginning of 2008 and by the end of 2013 had allowed to train more than 66 000 trainees.
- The " 2012 Grenelle Environment Roundtable Rule of the art " programme that aims to elaborate technical documents destined to guide companies and artisans in the building sector in the renovation, maintenance and construction of buildings compliant with energy objectives.

Finally, **the housing improvement club** has implemented a training system dedicated to the basics of building renovation trades: this is an on-line apprenticeship platform destined to building professionals[46]. Around 17 000 trainees (taking into account active users) have benefited from this. It was funded between 2008 and 2010 mainly by the ADEME with the initial contribution of the Anah.

The ADEME also supports other programmes that aim to develop resource centres for the training of building professionals:

- Within the context to the PRAXIBAT programme, the ADEME helps regional councils invest in practical work platforms in order to give training centres the necessary equipment to implement thermal solar energy, photovoltaic energy, wood heaters, heat pumps as well as lighting, ventilation and the energy performance of opaque walls.

44 http://www.territoires.gouv.fr/IMG/pdf/01_avenant_charte_rge_travaux.pdf
45 http://www.territoires.gouv.fr/IMG/pdf/02_charte_rge_etudes.pdf
46 www.energiebat.fr

- The BEEP network (Bati Environnment – Espace Pro): since 2006, this network aims to share experience and expertise in order to facilitate access to relevant and valid information, as well as to concrete examples. It groups together regional and national resource centres such as the Effinergie, ResoBAT association or HQE association.

1.2.6. Research and demonstration

Following the first **research and experimental programme for the energy of buildings** (PREBAT – see box), the PREBAT2 was launched in 2010 for the period 2012-2015. It is a national coordination system supporting public research on energy in buildings, that addresses the actions carried out by the Ministries in charge of sustainable development, energy, construction, research, industry and their respective agencies: the ADEME, the ANR, the Anah, the BPI France and the ANRU. The PREBAT2 is a service with two objectives: the rehabilitation of the stock to the best possible energy performance level and the planning of future new buildings.

PREBAT1 (2005-2009)

The objectives of the PREBAT1 are to develop research, the transfer of technologies and experimentation depending on various strategic points: sustainable modernisation of existing buildings, planning of future new buildings and of positive energy buildings. The concrete expression of these three important PREBAT objectives has required the concentration of efforts on three complementary areas of action: the acquisition and diffusion of knowledge (studies, professional training, spreading of knowledge, …), technological research and experimentation.

More than EUR 100 million of public funding over the period 2005-2009 was mobilised within the PREBAT1 framework. A significant part of research has gone into technological building bricks. PREBAT1 has also allowed the implementation of two series of experiments of various size with a programme of exemplary operations carried out by the ADEME and research, research action and experimentation projects, carried out by the PUCA (Plan Urbanisme Construction Architecture- Urban construction architecture Plan).

Certain emblematic PREBAT1 actions

- An international comparison was carried out between 2005-2007 allowing to analyse foreign best practices (both in terms of research and operational implementation) for new and renovated high energy performance buildings;
- The ADEME support system to exemplary operations in the building sector has used most of its credit (EUR 9 million/year) to support the realisation of a number of new and rehabilitated high-energy performance exemplary buildings, in order to demonstrate their feasibility. It has allowed the construction of almost 3.000 exemplary buildings over the period 2007-2013 selected following invitations to regional projects (65% of operations on new buildings, 55% of operations in the residential sector), of which 49 operations in “ Positive energy ”;
- Launched by the PUCA, this REHA experimentation programme promotes an innovative technical and architectural offer allowing the sustainable requalification of collective buildings in the public and private sector. The first buildings constructed under the “ REHA ” label started in 2011.

The energy building foundation was set up in 2005 for four of the major players of the building and energy sectors: Arcelor-Mittal, EDF, GDF-Suez et Lafarge. In parallel to the research programmes supported by the State, the objective of this foundation is to financially support for at least five years, research operations as well as the funding of the evaluation of the work carried out and its promotion. Upon its creation, it had an envelope of EUR 8 million of which half was provided by the State.

Moreover, **low environmental impact buildings have been identified as one of the main sectors for green growth and in the fight against climate change subject to a “ green sector ” approach (refer to the section on Energy).**

Finally, within the framework of the demonstrators of the future investments programme, the project steering committee of demonstrator funds for research on new energy technologies drafted a roadmap for positive energy buildings and plots and a minimum carbon balance for autumn 2010. Following two calls for expressions of interest (AMI- appels à manifestations d’intérêt), the first, in 2011, was organised in two

phases and the second was closed on 25 September 2012. These expressions of interest fall within the framework of the programme of EUR 1 350 million managed by the ADEME for the funding of demonstrators in the field of renewable energies and green chemistry. By the end of 2013, within the AMI " high performance buildings and plots " framework, 9 innovative projects were selected representing a total amount of EUR 30.7 million:

- CIMEP: Centre Informatique Modulaire Energétiquement Performant – Information Centre for High Energy Performance Systems. The objective is to develop a new type of data centre using natural ventilation as the main cooling system.
- RUPELLE REHA: The objective is to demonstrate the feasibility of a renovation to high-energy performance on three typical apartment buildings built between 1960 and 1975 using the technology already available.
- TIPEE (Technological & Innovative Platform for Environmental Efficiency): The objective is to create a national technological platform dedicated to building renovation. This platform will include testing laboratories dedicated to the development of new technologies, a training and demonstration centre and business incubators.
- CRIBA (Construction et Rénovation Industrialisées bois acier - Industrialised timber and steel construction and renovation): The objective of this project is to develop an industrial technical renovation solution for apartment buildings based on the reinforcement of insulation and on the improvement of the architecture through the application of an exterior wood-steel frame on the existing building.
- COMEPOS (Conception et Construction Optimisées de Maisonsà Energie POSitive - Optimised design and construction of positive energy houses): The objective of this project is to develop the possibility of offering positive energy detached, multifunctional houses (regulatory uses and so-called non-regulatory " properties ") managing costs. This project is part of a logic preparing the way for an evolution of regulations by 2020.
- IBIS (solants biosourcés destinés au bâti ancien - bio sourced insulation for old buildings); the objective of this project is to produce on an industrial scale hemp-based mortar (the central and moist part of the hemp stalk obtained by mechanical defibration) thanks to the development of a specific binding agent. The target market is mainly the market for the rehabilitation of detached houses built before 1950.
- SMARTLIGHT: intelligent high energy efficiency lighting for tertiary and industrial buildings; this project aims to develop a range of smart " plug and play " lighting systems in replacement of old existing solutions. The developed lighting systems will all be equipped with presence detectors, daylight sensors, remote control and embedded intelligence.
- VIPER: interior high performance insulation for housing and tertiary buildings in the urban area ; this project aims to launch on the market interior thermal insulation solutions, combining significant thermal performance and reduced thickness compared to current solutions, thanks to vacuum lever insulation.
- WOOD'ITE: renovation solutions in wood for collective housing; this project aims to develop exterior thermal insulation solutions using wood, which will be prefabricated in the workshop and will integrate joinery and technical equipment. This solution allows to combine the rehabilitation of existing buildings with an increase in the living space through the adding of storeys in wood.

Moreover, within the PREBAT2 framework, the ADEME has relaunched a call for annual research projects on the topic of improving energy and environmental performance of buildings. The objective of the first edition (closed on 14 January 2014) " moving towards responsible buildings by 2020 " was to economically support viable and ecologically sustainable studies, methodologies and new technological or organizational solutions characterised by:

- Diffusion of energy renovation of the building stock;
- Measurement of energy consumption and environmental impact;
- Self-supply and energy sharing;
- Dealing with the comfort of users;
- The lifting of social-economic limitations limiting today's diffusion of the renovation of the building

stock and the ecological transition in the building sector.

2. Transport sector

2.1. Current situation

Transport represents 31.9% of France's final energy consumption with 49.2 Mtep consumed in 2012 slightly decreased compared to 2011 (-0.8%). After a period of significant growth between 1985 and 2002 (+2.4% annual average), the final energy consumption of this sector later gradually decreased on average by -0.1% per year between 2003 and 2012.

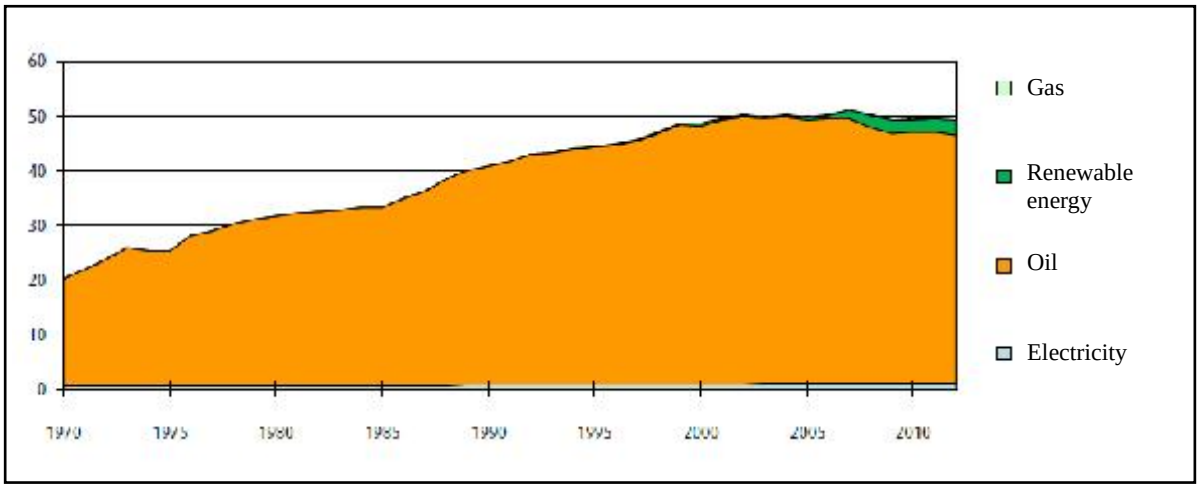
Figure 4 below shows the energy mix of the transport sector. In 2012, the consumption of fuel from petroleum sources (petrol, gas oil, GPL fuel, jet fuel excluding incorporated biofuel) decreased by 1.5%. In detail, the consumption of gas oil increased by +0.5% in 2012, mainly due to the increase in light-duty diesel vehicles. The consumption of petrol (including incorporated bioethanol) decreased by -5.4% continuing to suffer the combined effects of a drop in petrol vehicles and a reduction of -4.2% in average annual mileage. Gas oil (including incorporated biodiesel) represented 70% of road fuels consumed and the sale of new diesel cars represented 73% of the market in 2012.

The consumption of biofuels surged by +10.3% in 2012: the approved production of biofuel in France significantly increased in 2012, in particular that of EMHV (esters méthyliques d'huiles végétales - vegetable oil methyl esters) entering the composition of biofuel and the super fuel SP95-E10, with a high content in bioethanol, was very successful: it went from a supply of super fuel of 17% in 2011 to 24% in 2012.

Electricity consumption (rail and public transport) increased by 2.4%, whereas natural gas consumption increased by 1.3%.

In the end, the energy mix for the transport sector remained stable compared to 2011: 93% for petrol products, 5% for renewable energy and 2% for electricity. The consumption of natural gas by the transport sector remained extremely low at 0.2% of the energy mix.

Final energy consumption of the transport sector
Data adjusted for climatic differences expressed in Mtep



Source: SOeS calculations according to data on energy

Figure 4. Evolution of the final energy consumption of the transport sector between 1970 and 2012 expressed in Mtep (source: SOeS, 2012 energy balance)

Moreover, figure 5 shows the final energy consumption of each type of transport. In 2012, road transport represented 81.4% of this consumption.

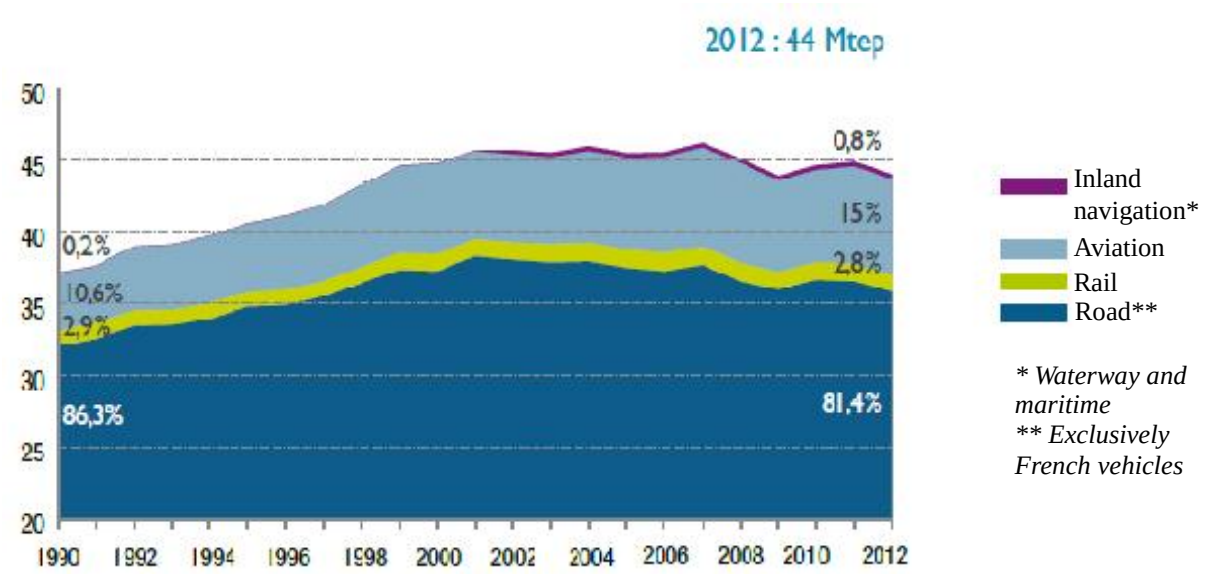


Figure 5. Final energy consumption per type of transport between 1990 and 2012 expressed in Mtep (source: ADEME, energy and climate, key figures, 2013 edition based on SOES data " France's 2012 energy balance & Transport Accounts ")

Inland transport of goods, measured in tonnes-kilometres, decreased by -5.4% in 2012. The recovery (+3.9% in 2010 and +2.4% in 2011) that followed the historical drop in 2009 (-13.5%) was therefore not confirmed. This decrease affected all means of transport. Road freight that dominated with 88% of tonnes-kilometres, decreased by -5.6%. Rail transport decreased by -4.8% after an exceptional growth of +14.1% in 2011. The fall in waterway transport was lower, at -1.6%. Non-road transport remained stable from 2009, after having halved over 20 years: it was 12.4% in 2012 and 23.5% in 1990.

Inland passenger transport continued to gradually increase. Measured in passengers-kilometres, it increased by +0.4% in 2012 after a +0.7% increase in 2011. This slight downturn was due to collective means of transport that increased by +0.8% in 2012 against +3.3% in 2011. In particular, long distance rail collective transport decreased (-1.4%). In contrast, circulation of passenger vehicles increased by +0.3% at a slightly higher rate than in 2011 (+0.2%). This last means of transport represented 83% of passenger transport in 2012.

Measured in vehicles-kilometres, road circulation did not increase that much in 2012 (-0.2%). In particular, circulation of light-duty vehicles remained stable: +0.3% for passenger vehicles and -0.2% for commercial vehicles. However, the circulation of trucks dropped by -7.1% in parallel to a decrease in road freight transport. In 2012, circulation of passenger vehicles grew less rapidly than in previous years (+0.8% in 2011 and +1.5% in 2010). This downturn can be explained by a more significant reduction in 2012 of the circulation of petrol vehicles (-7.6%), while the circulation of diesel vehicles continued to increase at the same rate (+3.3%) supported by a growth in diesel-powered vehicles.

2.2. Policies and measures

Act No. 2009-967 of 3 August 2009 enacted the accelerated development of non-road and non-air modes of transport. An ambitious objective was also set under article 10: **to reduce by 2020 the greenhouse gas emissions of the transport sector to the level recorded in 1990**. It should be underlined that if the objective set by France regarding the transport sector were based on the greenhouse gas emissions, its achievement would be possible in particular thanks to reductions in energy consumptions.

The reduction in atmospheric pollution also constitutes a major issue influencing the transport sector and its evolution.

The policies implemented to achieve this objective are mainly based on two points:

- Support low-emission means of transport (modal shift);
- Improvement of the efficiency of the means of transport used.

2.2.1. Encourage low-emission means of transport.

The " Mobilité 21" Commission was entrusted with the task of examining investments worth EUR 245 billion appearing in the project of the National Transport Infrastructures Scheme (SNIT-schéma national des infrastructures de transports) elaborated in 2011. The results of this project allowed to define in July 2013 the basis for the new transport policies that will be implemented over the next years. Priority will be given to the sustainable improvement of existing networks – road, rail and waterway networks – in order to ensure a better quality of these services, punctuality and comfort for all users and to allow all territories to benefit from efficient transport[47]. **The Mobilitè 21 report " for a national sustainable mobility scheme "** was submitted on 27 June 2013 to the Ministry of Transport. It presents more than 20 recommendations for more sustainable mobility articulated around four main points:

- Guarantee the quality of transport infrastructures;
- Increase the service quality of the transport system;
- Improve the overall performance of the railway system;
- Renovate funding and management systems of the transport system.

Following these proposals, the Ministry of Transport during the Council of Ministers held on 25 September 2013 confirmed the new orientations considered by politics on the subject of transport infrastructures:

- Give priority to the sustainable improvement of existing networks: in order to concretely put this priority into practice, a significant modernisation plan of the railway networks was prepared. This will allow the upgrading and modernisation of networks, investing currently EUR 2.5 billion per year concentrating on those routes where circulation is most intense and on those rail junctions with most traffic;
- Continue these big projects within a realistic and sustainable schedule from a financial point of view: the decision was made to continue all work in progress: extension of the KGV-est line to Strasbourg, construction of a new railway line between Tours and Bordeaux, Le Mans and Rennes and around Nîmes and Montpellier. On 23 October 2013, the Ministry of Transport interrupted a section of the railway connecting Bordeaux to Toulouse and another section between Bordeaux and Dax.

Moreover, the most ambitious scenario of the " Mobilité 21 " Commission is held as reference and provides for the use of EUR 30 billion for big projects by 2030.

Within this framework, studies will be carried out for a new line between Montpellier and Perpignan, as well as studies for the Paris –Normandy travel connection project.

Finally, national priorities shall be updated every five years to take into account all new territorial dynamics, such as the saturation of existing networks and in order to evaluate the consequences of the evolution of this economic context.

a Freight transport

In order to boost a new boom in rail freight, actions will be undertaken to increase connections with other means of transport, in order to serve ports and rolling motorway services.

In this respect, on 18 September 2013, the Minister of Transport announced the creation of the third rolling motorway between Lille and Bayonne.

As well as rail freight, other measures have the objective of favouring a modal shift of road freight transport towards cheaper and low emission means of transport:

- **Development of motorways of the sea**: these represent a transport possibility built around regular and frequent viable maritime connections. The State supports the development of new motorways of the sea on the French Atlantic and Mediterranean coasts in order to offer in particular alternatives for crossing the Pyrenees and the Alps. The objective is to allow a modal shift of 5 – 10% of the traffic concerned. A motorway of the sea connecting Nantes and Gijon (Spain) was inaugurated in September 2010. Along this route, traffic has significantly increased since the inauguration of this motorway of the sea. In 2013, it was in the order of 20 000 trucks.
- The **reform of ports** was achieved thanks to the creation of Big overseas ports: in Guadeloupe, in

47 http://www.developpement-durable.gouv.fr/Remise-du-rapport-Mobilite-21-pour.html

Martinique, in Guyana and in the Réunion. It includes the large hexagonal maritime ports model that takes into account the specific local situation.

- The **National Port Recovery Strategy** presented on 24 May 2013 by the Minister of Transport. It includes three important points: the construction of integrated logistics solutions, a reinforced industrial policy and an increased role of development and space managers. It must allow ports to design their hinterland at a European level and to start a collaboration with maritime or river structures.
- The State is continuing its 'magisterial' project to modernise its waterway network and the project is managed by **Voies Navigables de France (French Waterways)** (VNF). Since 1 January 2013, this institution directly manages personnel directly assigned to waterways.
- The **North Europe Seine canal** project consists in the creation of a new 106 km long waterway connecting Oise with the Dunkerque-Escaut waterway. In 2020, this project will allow a modal shift of 500.000 trucks towards the waterways of the involved watersheds, with a reduction in emissions between 220 and 280 kteq CO2 by 2020[48]. An analysis report and proposals addressing financial feasibility was requested by the General Environmental and Sustainable Development Council (Conseil Général de l'Environnement et du Développement Durable) and by the Inspectorate-General of Finance (IGF-l'Inspection Générale des Finances). The task of reconfigurating the project was then assigned to the MP Rémi PAUVROS. This highlights several points starting from which the Minister of Transport took concrete measures on 19 December 2013 in order for the project to continue: searching of funding, support operations in the Seine, Oise and North Calais pass watersheds, application to the European Union for funding, regulatory proceedings linked to the necessary changes made to the declaration of public use and of the Environmental Code.

Pursuant to the Finance Act for 2009, article 11 of Decree No. 2009-967 of 3 August 2009 introduced a **kilometre eco tax** on trucks. This allows to take into account the cost of using national public-managed road networks and territorial authority-managed routes likely to suffer an increase in traffic. The objective of this eco-tax will be to fund transport infrastructure projects: the proceeds of the taxation charged for the national road network will go to the Financing Agency for French Transport Infrastructure (AFITF- l'Agence de financement des infrastructures de transport de France). The State will give back to the territorial authorities the proceeds of the levies corresponding to the money received for the use of the road network of which they are the owners. It will have to generate in a full-year, a revenue in the order of EUR 800 million for the AFITF. The entry into force of this tax has been suspended. A parliamentary mission is still in progress.

Implementation of this eco-tax will allow annual final energy savings of 0.165 Mtep in 2016 and of 0.168 Mtep in 2020[49].

As in the previous article 41 of Decree No. 2013-431 of 28 May 2013 addressing various provisions on the topic of infrastructures and transport services, a national conference on logistics will be organised before 31 December 2014. This will gather all the players and equipment managers allowing to manage sector flows, as well as experts. Its objective will be to carry out an analysis of the French logistics offer, to determine requirements for the future and evaluate the possibility of implementing a national logistics direction scheme. This conference will also allow to identify investment and service priorities within a national action plan for logistic competitiveness in France.

48 Source: http://www.seine-nord-europe.com. By 2050, the shift could reach between 1.2 and 2 million trucks per year depending on forecast traffic scenarios.

49 Source: SceGES assessment (see Annex 3)

b Passenger transport

As previously mentioned, the high-speed railway development plan was defined by the Mobilité 21 Commission.

Regarding the **Reserved Public Transport Corridors Development Plan** (TCSP- programme de développement des transports en commun en site propre)[50], a first call for projects was launched, for which work started before the end of 2011. The State committed to co-funding 52 projects carried out by 37 authorities for a total of more than 400 km of new lines.

The second call for projects, which was launched in 2010 and the results of which were published on 9 February 2011, saw the selection of 78 projects representing 622 km of routes in 54 agglomerations.

A third call for projects was launched on 7 May 2013. The following could be funded:

- Underground, tramway, tram-train, high efficiency bus service, waterway or river shuttles, cable or rack and pinion transport projects;
- Investments in bicycles;
- Innovative actions in the field of sustainable mobility (specifically dedicated envelope).

In order to evaluate applications, the call for projects must consider in particular, the interest of the project in terms of sustainable development issues that affect living conditions, accessibility and air quality, a good management of spaces, energy transition and social cohesion. To this end, those projects contributing to an improvement of poor neighbourhoods benefit from a funding tax that can be increased by a further 10%.

On 17 September 2013, the Minister of Transport announced the approval of almost 120 projects representing a total of EUR 5 billion. Apart from classic infrastructure works, around twenty of these projects envisage multimodal information solutions or multimodal exchange centres. The selection of the approved projects will soon be communicated.

With regards to the Île-de-France, the Prime Minister announced a " New Grand Paris " project whose principals and calendar were presented on 6 March 2013. Within this framework, the " Grand Paris Express " shall be completed by 2030. This will translate into 200 km of underground lines and 72 new stations. Its cost is estimated at EUR 29.5 billion The " New Grand Paris " also takes into account the modernisation of existing resources. By 2017, EUR 6 billion will also be used to improve daily transport with the creation of new tramways, the extension of underground lines and the renovation of the RER (Réseau express régional - Regional Express Network).

Moreover, since 1 January 2009, businesses have had to pay half of the cost of public transport subscriptions. This measure, implemented in the 80s, was previously limited to Île -de-France.

Implementation of the Emergency Plan for air quality

In order to respond to national issues related to improvement of air quality, the Ministry of Internal Affairs, the Ministry of Ecology, Sustainable Development and Energy, and the Ministry of Transport, Sea and Fishing, implemented an Interministerial Air Quality Committee (CIQA- Comité Interministériel de la Qualité de l'Air) in September 2012.

The CIQA's mission is to elaborate, together with the local authorities involved, concrete and sustainable solutions in order to improve air quality in particular in the field of transport.

These solutions aim to support Atmospheric Protection Plans (PPA- plans de protection de l'atmosphère), mainly in those areas of European jurisdiction.

The CIQA has elaborated an air quality emergency plan (PUQA- plan d'urgence pour la qualité de l'air) that presents 38 measures around five priority actions:

- Favour the development of all forms of personal transport and mobility through incentive measures;

50 See Article 13 of Act No 2009-967 of 3 August 2009

- Regulate the flow of vehicles in those areas particularly affected by atmospheric pollution;
- Reduce emissions from industrial and individual combustion installations;
- Fiscally promote more efficient vehicles or mobility solutions in terms of air quality;
- Raise awareness and conduct communication actions to change behaviour.

The committee met on 30 April 2013 to give the signal for implementation of the PUQA. Most of the measures of this plan announced on 6 February were implemented in 2013. According to the report of 18 December 2013, 19 out of the 38 measures of the PUQA were achieved or are about to be achieved and 13 are well underway

2.2.2. Improve the efficiency of the means of transport used

a Road transport

Improve the performance of new vehicles

Regulation (EC) 443/2009 sets an objective for the reduction by 2020 of the average level of emissions for new vehicles. Since emissions were equal to 176g CO_2/km in 2007, Decree No. 2009-967 of 3 August 2009 set the objective of an average reduction of emissions of all French cars to 120g by 2020.

The atmospheric emissions of vehicles are regulated by European norms. For each category of vehicles, these fix emission values for nitrogen oxides, unburnt hydrocarbons, carbon monoxide or even particles that become more and more limiting over time.

Numerous measures have been implemented at a national and community level in order to encourage the purchase of new, more energy-efficient vehicles in terms of energy consumption, greenhouse gas emissions and pollutant emissions:

- Since 2006, the total **annual tax on business vehicles** has been established based on the vehicle's level of greenhouse gas emissions and no longer on the basis of its fiscal horsepower. Businesses are subject to this tax whatever vehicles they use in France, regardless of the State in which they are registered or regardless of whether they are registered in France provided these vehicles are registered in the category of passenger vehicles.

  The applicable rate ranges from EUR 2 per gram of CO_2 per kilometre for vehicles with emissions between 50 and 100g CO_2/km to EUR 27 per g CO_2/km for vehicles with emissions greater than 250g CO_2/km. The tax rates on company cars (TVS- taxe sur les véhicules de société) were tightened for high polluting vehicles for the tax period from the 1 October 2011 to 30 September 2012. With regards to the applicable rate according to the emission rate of carbon dioxide, vehicles involved in the rate increase are those vehicles that emit more than 120g CO_2/km. Tax exemption is now granted to those vehicles that emit up to 50g of CO_2/km (a condition met exclusively today by electric vehicles). The applicable rate based on the fiscal horsepower of vehicles has also been adjusted, each unit being lowered by one horse power (CV – cheval-vapeur).

  The temporary exemption that was granted to certain vehicles using exclusively or non-electric energy, natural gas vehicles (GNV), liquefied petrol gas (GPL) or superthanol E85, has been suppressed. A new temporary exemption has been implemented for hybrid vehicles combining electric energy and petrol or gas oil engines emitting less than 110 g CO_2/km.

  The Finance Act for 2014 has added an " air " component for company cars that takes into account the emissions of atmospheric pollutants (particles and nitrogen oxides).

- The " **environmental bonus-malus scheme** ": this scheme based on the CO_2 per kilometre emissions of new vehicles, rewards the purchase of low CO_2 emission vehicles and penalises the purchase of high emissions vehicles (refer to the box on the following page). This scheme has been a great success and has allowed the average emissions of registered vehicles in France to go from 149g CO_2/km in 2007 to 140 g CO_2/km in 2008 and 133 g CO_2/km in 2009. In 2010, 2011 and 2012, the average level of emissions of new registered vehicles further decreased respectively to 130, 128 and 124 g CO_2/km. The introduction of a bonus malus scheme therefore translated into an immediate reduction of average emissions of 7g CO_2/km and a continuation in the downward trend of 3.9 g CO_2/km/year against 1.5 gCO_2/km/year before the introduction of this scheme. In 2013, trends were confirmed. At the beginning of

2013, following a significant revalorisation of the malus scheme, a decrease in the average emissions of new vehicles by 5 g CO_2/km was reported. Based on data for the first eleven months of the year, the average emissions of CO_2 over 2013 should be in the order of 117g CO_2/km, and are among the lowest of Europe (see figure 6). In this field, only kilometre emissions of vehicles sold to Denmark and Portugal were lower with an average of around 114 g CO_2/km.

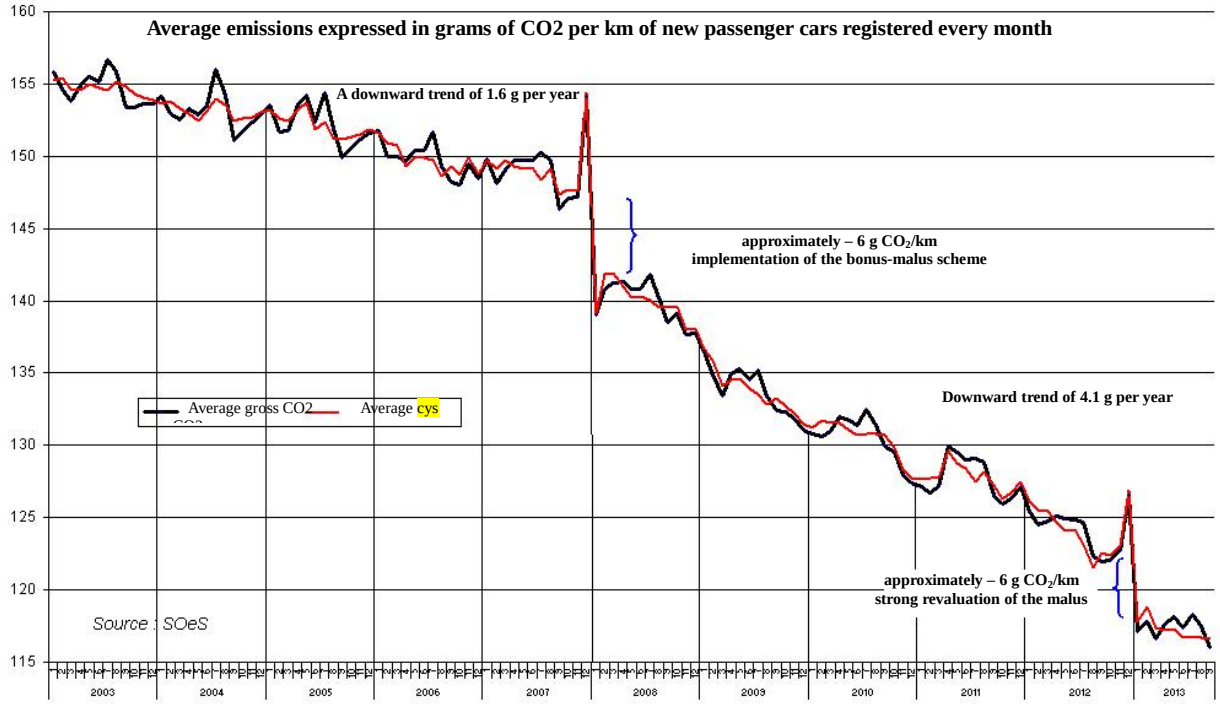


Figure 6. Evolution of average CO_2 emissions of new vehicles expressed in g CO2/km between 2003 and 2013 (source: MEDDE)

The General Commission for Sustainable Development (CGDD) published in April 2013 a study focusing on environmental benefit, evaluated for the total life-span (hypothesised at 15 years) of each cohort of vehicles registered between 2008 and 2012 and for an average annual mileage of 12 700 km. The improvement in terms of CO_2 derived from this system over five years is in the order of an avoided 14.6 $MtCO_2$. Valorised depending on the chronic price of CO_2 proposed by the Strategic Analysis Centre (being 32 €/tCO_2 growing at a rate of 5.8% until 2030), this saving in CO_2 in monetary terms amounted to EUR 527 million.

Automotive bonus-malus scheme: description of the scheme and its evolution.

The automotive bonus –malus scheme comprises three points:

- The first, fixed by Decree No. 2007-1873, consists in allocating a premium or " ***bonus*** " for all purchases or rentals of a new vehicle or van with low CO_2 emissions.
- The second point, also fixed by Decree No 2007-1873, consists in adding to the bonus a " ***super bonus*** " that aims to accelerate the rate of renewal of the vehicle stock and through this to reduce its average unit emissions. In 2008, a premium of EUR 300 was granted, subject to the purchase of a new vehicle with less than 130g CO_2/km emissions, for the scrapping of vehicles older than 15 years. Within the framework of the recovery plan, the super bonus was replaced in 2009 and 2010 by a scrapping scheme. Since 2011, the super bonus scheme has been reintroduced; however, it was modified in 2012: a total of EUR 200 is still today granted on top of the ecology bonus when the purchase of a new " bonused " vehicle is accompanied by the withdrawal from the circulation of a vehicle older than 15 years.
- Finally, the third point (articles 1011 bis and ter of the General Tax Code Code Général des Impôts – CGI) provides for an additional tax, a " ***malus "*** applicable to high polluting vehicles. A reduction of 20g of CO_2/km per dependent child was introduced for vehicles destined to large families and an exemption from the malus was implemented for handicapped people. A specific reduction was also introduced for vehicles designed to be powered with super ethanol E85. An annual tax of EUR 160 was also introduced (Article 1011 ter of the CGI) for high CO_2 emission vehicles registered after the 1 January 2009.

Supplied with the proceeds of the applied malus, excluding the first registration of the highest polluting vehicles, the funds helping the purchase of personal vehicles were insufficient for the period from 2008 to 2011 given a stronger than expected reaction of consumers from the implementation of the bonus-malus scheme: - EUR 214 million in 2008 (EUR 439.37 million of expenditure for EUR 225.37 million of receipts), - EUR 522.3 million in 2009 (EUR 724.56 million of expenditure for EUR 190.39 million of receipts), - EUR 516.6 million in 2010 (EUR 707.22 million of expenditure for EUR 202.25 million of receipts), - EUR 198.5 million in 2011 (EUR 396,32 million of expenditure for EUR 197.85 million of receipts). The accumulated deficit being EUR 1.45 billion for the first four years of existence of the scheme.

In 2012, the balance sheet of the scheme was stable.

In total, of the first eleven months of 2013, the scheme would have a loss of EUR 172.2 million. The segment of the market represented by low emission vehicles (i.e. belonging to one of the three segments with emissions lower than 61 g CO_2/km) was multiplied by 1.6 passing from 0.33% for the first eleven months of 2012 to 0.54% for the first eleven months of 2013. The total number of registrations of the 61-90gCO_2/km segment and the 91-105 g CO_2/km segment were also multiplied by 1.5 between 2012 and 2013, reaching 572 054 vehicles for the first eleven months of 2013. In total, the segments receiving bonuses in 2013 increased by 60% whilst maluses decreased by 35%. The neutral segment (106-135 g CO_2/km) decreased by 8.5%.

On a technological basis, registration of hybrid cars significantly increased: +85.9% for petrol hybrid cars and +50.4% for gas oil hybrid cars for the first eleven months of 2013 compared to the first eleven months of 2012, following a trend that had already started in the second half of 2012. The market of electric passenger cars almost doubled between 2012 and 2013 and presented numerous monthly registrations from March (from 903 to 1350 matriculations in the months of March, April and June). For the first eleven months of 2013, there were 8 072 electric car registrations (+48.7% compared to the same period of the previous year). Market activities were driven in particular by the introduction on the market of the Renault ZOE, commercialised from the beginning of 2013 and that represented 65% of passenger electric car sales for the first eleven months of 2013.

A new bonus rate was introduced on 1 November 2013. The financial aid provided by this new rate are dedicated to low CO_2 emission electric or hybrid vehicles, to fundamental energy transition elements, as well as to high-efficiency thermal vehicles.

A strengthening of the malus rate came into force on 1 January 2014: this new malus rate, complementary to the bonus rate applicable since 1 November 2013, provides an even stronger incentive for the purchase of new more energy-efficient and low CO_2 emission vehicles.

Implementation of the measures regulating the performance of new vehicles allowed an annual final energy saving of 0.1 Mtep in 2010, of 1.1 Mtep in 2016 and of 2.2 Mtep in 2020.[51]

At the European level, **regulations 443/2009 limit the CO_2 emissions of passenger vehicles** and oblige automotive manufacturers to gradually reduce the CO_2 emissions of new vehicles to 130 g CO_2 /km by 2015 (65% of the fleet in 2012, 74% in 2013, 80% in 2014 and 100% in 2015). These regulations also implement a penalty mechanism in the eventuality these emission limits are exceeded. In order to send a signal to the industry for future production cycles, it has also defined a new objective for CO_2 emissions for 2020.

Moreover, regulation 510/2011/EC of 11 May 2011 provides that average emissions of light-duty utility vehicles must be progressively reduced to 175 g CO_2/km within the context of progressive implementation between 2014 and 2017. An objective value of 147 g CO_2/km has been fixed for 2020.

The European Commission, in its proposal made on 11 July 2012 to the European Council and Parliament, confirmed these objectives and maintained the major technical and administrative provisions of the initial regulations. It provides to propose by the end of 2014 a new phase of emission reductions, without fixing at this stage a schedule or objective values; to exempt all small manufacturers (less than 500 vehicles sold a year within the European Union) from these provisions and reintroduce for a limited period " super-credits " for electric vehicles (less than 35g CO_2/km).

Reduce emissions of road vehicles.

Directive 33/2009/EC obliges to take into account when purchasing vehicles through public procurement and outsourcing of public passenger transport services by road and by rail, the energy and environmental impact of these vehicles over their entire life cycle. To this end, this directive proposes two possible methods:

- The determination of technical specifications relative to the environmental and energy impact of the vehicle;
- Consideration of this impact when deciding whether to buy the vehicle either as award criteria or by monetization.

Within the context of the transposition of the directive into French law[52], the solution offered by national law is to transpose the set of options of the directive and leave the choice to purchasers.

Directive 2009/30/EC regulating the specifications of petrol, diesel and gas-oil as well as the introduction of a mechanism allowing to monitor and reduce greenhouse gas emissions, provides for a reduction in greenhouse gas emissions produced over the entire lifecycle of the fuel or energy, up to 10% per unit of energy supplied at the latest by 31 December 2020. The objective of this reduction is 6%[53]achieved thanks to the use of biofuel, replacement fuel or a reduction in flaring and venting at production sites – as well as two supplementary indicative objectives of 2% achieved on the one hand through the use of environmentally friendly carbon capture and storage technologies and the use of electric vehicles and on the other, thanks to the purchase of rights under the Kyoto Protocol Clean Development Mechanism.

Tax on fuel gives leverage in order to encourage people to adopt better behaviour with regards to energy consumption and to produce fewer greenhouse gases and local pollutants (see Energy section). An Ecological Taxation Committee was also set up on 18 December 2012 with the responsibility of drawing up advice regarding the ecological taxation measures proposed by the Government and in order to advance proposals on the topic. The committee issued an interim report in July 2013 focusing on how to make taxation " greener ". For example, recommendations were issued in order to favour a convergence of the taxation on gas oil and on petrol in order to cover the externalities generated from their consumption.

Taking into account CO_2 emissions in fuel taxation was proposed and approved by the Government in the Finance Act for 2014. It consists in progressively increasing the interest rate of domestic consumption tax on energy products (TICPE- taxe intérieure sur la consommation des produits énergétiques) based on the CO_2 content of each product. The price for a tonne of carbon will be fixed at EUR 7 in 2014, EUR 14.5 in 2015 and EUR 22 in 2016.

51 Source: SceGES assessment (see Annex 3)
52 Act 2011-12 of 5 January 2011 adapting various provisions of the legislation in line with European Union law (Article 12)
53 Compared to the European Community average of greenhouse gas emissions over the total life cycle per unit of produced energy from fossil fuels in 2010

b Aviation sector

The creation of the **Single European Sky programme** initiated by the 2004 European Regulations and consolidated by the second set of regulations (EC Directive No 1070/2009), has allowed to launch an ambitious reorganisation programme of aviation navigation services and an improvement of the management of air traffic in Europe.

The objective of the SESAR (Single European Sky Air traffic management Research) programme, which is the technological part of the Single European Sky programme, is the development over the next 30 years of a new generation of safe and efficient European air traffic management systems that also respect sustainable development issues. The objective is to reduce $C0_2$ emissions from 6 to 12% through fuel efficiency, in particular thanks to the reduction of distances travelled, waiting and driving times. The programme is expected to be introduced in 2015 and will remain in force until 2030.

Regulation No1070/2009 (called " Single Sky II ") regulates a system managing the efficiency of air navigation services and consolidates the implementation for all States of **functional airspace blocks** grouping the airspace of several Member States. France is a member of the **" FABEC - Functional Airspace Block Europe Central"** together with Germany, Switzerland, Luxemburg, Belgium and the Netherlands. The FABEC treaty came into force on 1 June 2013. The FABEC is a functional airspace block whose mission is to manage airspace and traffic in the best possible way and defragment it in order to improve air navigation efficiency within an area of 1.7 million km^2 characterised by extremely intense air traffic. The FABEC represents more than 5.5 million flights per year, that is 55% of the number of controlled flights in Europe: 66 000 tonnes of CO_2 (that is around 20 000 tep) should be reduced year after year within the scope of the FABEC performance plan 2012-2014 thanks to more efficient flight paths. Further savings are expected for the following years.

Moreover, implementation **of continuous descent procedures** are ongoing with the objective of reducing noise pollution and greenhouse gas emissions. Such procedures are in service in the airports of Orly, Charles de Gaulle, Strasbourg, Lyon, Marseille and Toulouse. Several continuous descent procedure projects are also being developed in Nantes, Bordeaux, Nice and Bâle-Mulhouse. These procedures allow to avoid variations in rotor speed avoiding the use of propellers from the beginning of descent until reaching the runway.

In order to reduce atmospheric pollutant emissions in airports, two studies are ongoing to study the feasibility of using replacement equipment (electric connection) instead of auxiliary power units (APU) that emit atmospheric pollutants and of varying landing charges based on local pollutant emissions.

Flight path 2050 of **the Advisory Council for Aeronautics Research in Europe (ACARE)** has also endorsed new long-term objectives for the aviation sector, such as a 75% reduction of aircraft CO_2 emissions by 2050 compared to the aircraft in the year 2000. In France, these objectives revolve around different actions under the Advisory Board for Civil Aviation Research (CORAC).

Since 2012, the aviation sector has integrated its European **CO_2 emission trading scheme, ETS (*Emission Trading Scheme*).** As well as technological progress and the improvements obtained in the management of air traffic, these economic measures must lead to a limitation of CO_2 emissions in Europe. After several years of negotiation and an acceleration during the last 12 months, the 38th Session of the Assembly of the International Civil Aviation Organization (ICAO) endorsed the decision to develop a global system allowing to compensate, using economic measures, the CO_2 emissions of the aviation sector (measures based on the " MBM " market). The principles of this global system shall be completed during the next Assembly in 2016 in order to be implemented by 2020. Moreover, it imposes a strict set of market measures implemented by the Member States (based on the European ETS model) for the period before the entry into force of the global system in 2020.

c Waterway and maritime transport.

Within the field of maritime transport, the main actions focus on:

- **Supporting the use of new fuels**: this support in particular is driven by a review of the provisions concerning the sulphur content of marine fuels introduced by European Directive 2012/33/EU of 21 November 2012, that converted in communitarian law the amendments made by the International Maritime Organisation (IMO) under Annex 6 of the Marpol convention on discharge of sulphur by the ships into the sea. Given the technical difficulties (supply of marine gas oil, adaptation of ships) in implementing these provisions, the government is considering the development of alternative solutions such as the use of liquefied natural gas (LNG) which would allow to meet the obligations of short-term

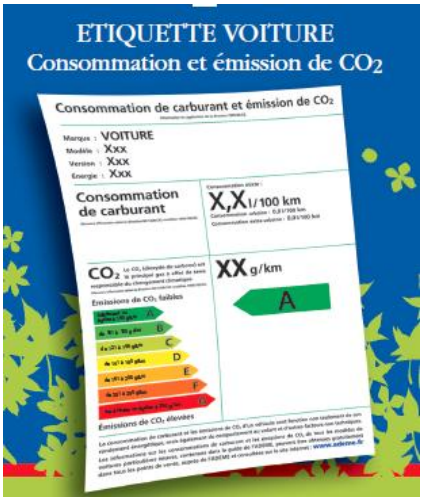
maturities (2015) concerning the control areas of SO_2 emissions (SECA - Sulphur Emission Control Area). Ship-owners are working on this option and the MEDDE has started a national reflection on the potential of the development of LNG powered marine transport.

- **Support to the work of the International Maritime Organisation** (IMO) regulating the limitation and control of ship emissions, as well as the development of emission control areas.

2.2.3. Raising awareness and communication

a The general public

The main following measures have been implemented in order to encourage a change in the behaviour of those involved:



- **The CO_2 label of passenger cars**: the CO_2 label of passenger cars upon sale has been made mandatory for all new vehicles through Decree since 10 May 2006. Its objective is to raise awareness among purchasers of vehicles and also allow implementation of fiscal measures related to CO_2 emissions. Since May 2006, it has become mandatory to apply in a visible way this label on each and every new passenger car or display it near to the car in all showrooms in France. This allows all potential car buyers to be informed in a clear and comparative way of the CO_2 emissions of the vehicle. Fuel consumption also appears on the label.

- **$C0_2$ information on transport performance**: in order to encourage low CO_2 emission transport, transport providers (passenger transport businesses or freight companies, removal firms, taxi services, agents, travel agents …) have been obliged since 1 October 2013 to inform their clients, for each form of transport, of the CO_2 emissions of each trip. Implementation of this measure was the result of long negotiations with transport professionals involved in the Transport Environmental Energy Observatory (TEEO).

  This obligation was adopted within the framework of Decree No 2010-788 of 12 July 2010 and was repeated in the Transport Code (article L.1431-3). Decree N o2011-1336 of 24 October 2011 sets a series of common calculation principles for all means of transport (rail, road, river, sea, air). It specifies the ways to inform the beneficiary as well as the schedule of implementation of the provisions. The calculation method[54] is based on a European Regulation related to the calculation and the declaration of the energy consumption and of the greenhouse gas emissions of transport services (regulation NF EN 16258[55]: methods for the calculation and declaration of the energy consumption and of the greenhouse gas emissions of transport services (freight and passenger transport)).

  This decree proposes a general methodology allowing transport companies to calculate the amount of different sources of energy consumed based on the means of transport used for each leg of the journey. This amount of energy is then multiplied by a specific emission factor for each type of energy. This factor establishes the correspondence between the amount of energy consumed and the amount of CO_2 emitted. When businesses do not calculate these values themselves, the emission factors of the energy sources and the values to be used, are set in a Decree of 10 April 2012.

- **The multimodal passenger information** is a key tool to allow a better use of available means of transport (an increase in the occupancy rate of car sharing vehicles, synergy between different means of transport,…). The French Agency for the Multimodal Information and smart-Ticketing (AFIMB- Agence Française de l'Information Multimodale et de la Billettique) was created to allow the coherent development of all these information systems at a national level.

- The **Topten** comparator (www.guidetopten.com, see Energy section) allows to identify the most energy efficient cars and utility vehicles within several subcategories (city cars, multi-utility vehicles, LCV < 700 kg...).

54 The methods guide can be downloaded from the following website: http://www.developpement-durable.gouv.fr/Information-CO2-des-prestations-de.html. This methods guide was published on the MEDDE website on 21 November 2013. In its annex, a sheet explains the links between the norm and the decree.

55 The NF EN 16258 decree has been in force since December 2012 and regulates greenhouse gases.

- The www.toutsurlenvironnement.fr portal responds to the commitment made by France for the first pillar of the Aarhus Convention " access to information on the environment ". The portal offers access to information on the environment provided by the French private players. Almost 80 000 resources are currently referenced from almost 185 contributors. Different search modes have been suggested to answer the need of information through key words, themes or by territory. The " transports " heading in particular has a series of sub-headings relative to energy consumptions and impact on the environment.
- **Every year in September " mobility week "** is organised. Since 2009, it has been incorporated into the week on road safety and is now called " mobility and road safety week ". This week, which sees the organisation of several hundreds of actions all over France, aims to generate behavioural changes in travel. The 2011 and 2012 editions in particular encouraged car-pooling and stimulated an interest in new technologies within an intermodality logic, which allows an optimal use of alternative means of transport to private cars; the 2013 edition focused even more on commuter trips.
- **Car-pooling** is encouraged in particular within the framework of urban travel plans (see infra) and the State will implement the legal certainty necessary for this form of travel. The programming bill on energy transition that is being prepared shall lead to the introduction of provisions relative to car-pooling;
- Car sharing consists in making a fleet of cars available to be shared by members thus allowing a reduction of the car stock and encouraging the use of more appropriate vehicles according to their use. In order to encourage this, a **" car sharing "** label can be attributed and used under the conditions defined by the decree of 26 October 2012 amended on 28 February 2012. This allows the authorities to reserve parking spaces for vehicles that are in possession of this label and this activity will be taken into account during urban travel plans. The " car sharing " label can only be attributed to vehicles that respect the carbon dioxide emission limitations fixed by the Decree of 26 October 2012.
- **The use of active transport and soft mobility is encouraged**, in particular the use of bicycles. Thus, the Minister of Transport set up on 3 June 2013 an interministerial work-group for the promotion of active mobility (walking and cycling). Following the proposals of this group, an action plan will soon be announced.

The " Modernisation de l'Action Publique et d'Affirmation des Métropoles " bill includes in particular a definition of car-pooling. It also provides that authorities in charge of mobility can issue a " car-sharing " label and fixes technical characteristics of the vehicles involved in this activity based on the objective of reducing atmospheric pollution and greenhouse gas emissions. Under article 32, it also offers the department and the region the possibility of transferring some of their competences to the city.

Moreover, measures in favour of **eco-driving** have been implemented: professional road haulage drivers are now trained in eco-driving as part of their initial and 5-year training. For car drivers, a set of questions for the driving theory- test has been prepared in order to take into account also eco-driving. The school road safety certificate programme and tests organised by schools have been introduced in order to include this problem.

Finally, within the framework of the extension of the energy saving **certification system** (EEC) for the period 2011-2013 (see Energy section), law No 2010-788 of 12 July 2010 (article 78) extends this system to fuel providers for fuel consumption of cars, if annual sales exceed a certain level. The obligation of energy savings for these professionals for the three-year period is of 90 TWh of the cumulative discounted final energy. This evolution has allowed to identify best practises and stimulate the development of energy saving operations within the transport sector, like modal shifts or eco-driving training.

b Communities and businesses

The ADEME has developed various evaluation tools in order to help authorities assess their fleet of cars and orient sales towards clean vehicles: for passenger vehicles, a guide on the consumptions and emissions of these vehicles has been put online on the ADEME's website[56]; for trucks, the ADEME has made a series of tools available to help in decision-making, in particular for clean buses, service vehicles, city buses and refuse collection vehicles.

The ADEME has also developed an on line tool to integrate the energy consumption and greenhouses gas emissions " from well-to-wheel " of different means of transport and for different types of motorisation.

56 A guide to the conventional consumption and CO2 emissions of new passenger cars on sale in France pursuant to directive No 1999/94/EC (www.ademe.fr/carlebelling)

c Transport professionals

Effective since 1 October 2013, passenger and freight transport service providers or removal companies have the obligation to supply information on the amount of CO_2 generated by their service. (See above). They are also subject to the implementation of mandatory energy audits (see " Industry " section).

Moreover, several voluntary programmes are today ongoing :

- " **Carriers commit to the CO_2 objective,**" : This commitment was introduced in December 2008 for road freight transport companies using trucks of 3.5 tonnes or more. After two extensions, the regulation now also addresses the passenger road transport sector (urban and extra-urban), as well as light-duty freight transport vehicles. This process offers a methodology framework to transport companies that wish to engage for a 3-year period, based on a concrete and personalised action plan, in achieving a global objective of reducing their fuel consumption and greenhouse gas emissions. These actions focus on 4 points: vehicle, fuel, driver and organisation of traffic.

  Since December 2008, the " Carriers commit to the CO_2 objective " approach has brought together more than 1 000 companies from the road transport sector, of which 13% of passenger transport companies. It represents almost 100 000 involved vehicles (that is around 18% of trucks and coaches registered in France). This approach has allowed to avoid 715 000 tCO_2 emissions.

- **The National Federation of Passenger Transport** (FNTV- fédération nationale des transports de voyageurs) signed on 14 October 2009 a Charter for the development of road safety and sustainable development measures. The objective of this Charter is to organise a working relationship between the various partners (the FNTV, the State, the ADEME...) in order to allow environmental and road safety objectives to advance.

- **In the aviation sector, a convention was signed in January 2008** within the framework of which all the players of the French aviation sector committed to putting into practice a series of concrete measures in the fight against noise pollution, for the preservation of air quality and in the fight against global warming. Among the commitments in particular the following measures appear:

  - Air France commits to the regular replacement of a substantial part of its aircraft with more energy-efficient airplanes with low CO_2 emissions;
  - Airlines have agreed to make a CO_2 calculator available to passengers;
  - Paris Airport has agreed to implement a car-pooling site between its terminals, to increase a significant number of electric vehicles replacing airport vehicles…

At the end of the four years of the convention, all commitments made were maintained or approached.

2.2.4. Studies and governance

The Urban Transport Plans (PDU) introduced by the law regulating the orientation of inland transport of 30 December 1982 define the principles of the organisation of passenger and freight transport, urban transport circulation and parking within urban transport areas. Since the decree of 30 December 1996 regulating air quality and a rational use of energy, it has become mandatory to elaborate a PDU within the areas of urban transport including in total or in part agglomerations of more than 100 000 inhabitants.

Within the PDU framework, State support to company travel, administrative travel, school transport or activity areas was reiterated within the framework of article 13 of Decree No 2009-967 of 3 August 2009. Decree No 2010-788 of 12 July 2010 (article 63) also states that the PDU, during their elaboration and review, must now include an evaluation of the avoided CO_2emissions expected following the implementation of the plan. From 2015, the obligation will be extended to all greenhouse gases. Decree No 2012-616 of 2 May 2012 sets the modalities that can be used in the evaluation of planning documents, plans, schedules or programmes that have an impact on the environment.

Finally, **voluntary approaches to the elaboration of transport plans at a company level** (PDE) instituted by the Solidarity law and urban renewal of 13 December 2000 are encouraged. In particular, agglomerations

with more than 100 000 inhabitants must create mobility advice centres destined to all site managers of activity. In June 2009, the ADEME identified 1170 PDEs, 5 times more than in 2005 representing more than one million salaries. Transport plans can also be adopted for school institutions. The evaluation carried out by the ADEME in 2008-2009 identified 1 470 processes within 61% of cases implementation of walking buses and in 16% of cases the choice of a more global approach including several measures.

2.2.5. Research

Within the sector of inland transport, several study, research and development programmes are ongoing. These challenge the scientific and industrial community on the issues of energy efficiency of the transport chain, efficiency of resources and knowledge of mobilities.

PREDIT (National experimentation research and innovation programme for inland transport) supports the majority of operational research work carried out in the inland transport sector, both for the knowledge of mobility practices of people and goods, as well as developments on vehicles (transmission system, alternative fuel, hybridisation) and the knowledge of the impact of transport on the environment. PREDIT 4, for the period 2008-2012, disposes of a budget of EUR 400 million .

PREDIT is accompanied by two associated research programmes: ITTECOP (infrastructures of terrestrial transport, ecosystems and landscapes) which aims to support research relative to the relations between infrastructures, biodiversity and landscapes and PRIMEQUAL that coordinates research aiming at supervising and improving air quality in order to reduce the risks to human health and to the environment.

Particular initiatives are currently being supported in favour of technological solutions specifically for long-haul freight transport (INNOFRET), to reduce the CO_2 footprint of this activity, strongly dependent on fossil fuels.

The State has invested EUR 1 billion in the " Vehicles of the future " programme of the future investment programme (PIA- programme d'investissement d'avenir). This effort has led to the development of innovative and sustainable technologies and solutions for the travel sector. The total available aid, in the order of several million euros, authorises the funding of genuine wide-scale demonstrators. In particular, in the mobility sector, approved projects are complete system experimentation programmes (systemic approach).

A second PIA will give EUR 300 million to the " vehicle of the future " programme. It will involve vehicles, infrastructures and road, rail, sea and river travel systems. The projects will have to set specific objectives for a reduction in consumptions, emissions and pollution. Selected through calls for expressions of interest, they will be carried out by consortia, run by companies together with, in particular, SMEs but also public laboratories or directly by the companies.

There are vacancies for the following AMI: Carbon-free vehicles; daily mobility and final routing of goods; experimentation linked to recharging infrastructures for rechargeable electric and hybrid vehicles; thermal chain traction; relief, aero dynamism, vehicle architecture, ships of the future.

Finally, several projects are supported within the framework of the FUI (fonds unique interministériel-Interministerial unique funds) and by the RGCU (réseau génie civil urbain-urban civil engineering network) to favour more energy efficient construction procedures using more noble materials and in order to increase the durability of construction work.

Within the **maritime and naval** sector, on 17 May 2011, the CORICAN (Conseil d'Orientation de la Recherche et de l'Innovation pour la Construction et les Activités Navales -Council for the Orientation of Research and Innovation in Shipbuilding and Related Activities) was set up on the basis of the commitments undertaken from the Blue Book of the Oceans Round Table of Grenelle de la Mer. The CORICAN groups together the representatives of the French naval sector (public players, NGO, trade unions, businesses) and its common objective is to contribute to a development and innovation research plan for the definition and promotion of the ship of the future " clean, efficient, safe and intelligent ship "

In the aviation sector, the technological progress made in the aeronautical industry over the past fifty years, thanks to research and innovation, has allowed to significantly improve the energy efficiency of air transport : with a reduction of more than 70% in fuel consumption – and hence of carbon dioxide emissions (CO_2) - and of 70% in nitrogen oxide emissions (NO_x). This important continued investment in research and technology meets the objectives fixed for the environment and contributes to the competitiveness of world air transport.

The **Civil Aviation Research Council (CORAC- conseil pour la recherche aéronautique civile)** has in particular allowed to create a technology roadmap pulling together all the efforts of national research. The

CORAC chaired by the Minister of Transport, groups together all the French players of air transport: airlines, airports, the aeronautical industry, relative research organisations and ministers. It works towards the coordination of all aeronautical research carried out in France. It has allowed the definition and the ambitious launch **of demonstration programmes**. It involves the fields of propulsion systems, structures (composite materials), systems (more electric planes, avionics) and helicopters. This programme must allow the emergence of technologies within these areas that will directly contribute to the achievement of the objectives set forth by the CORAC and in particular of a reduction of 50% of CO_2 emissions of aircraft by 2020 compared to the aircraft in 2000, in compliance with European objectives.

Complementary to the efforts made in view of better energy efficiency, France supports research carried out on **biofuels for the aviation sector** that will also allow to reduce emissions. The DGAC in particular guarantees the piloting of the initiative for future aeronautical fuels (Ini-FCA) which groups together the French players of air transport, the aeronautical, energy and agriculture industries. Launched in 2007, the Ini-FCA's main objective is to identify and plan the research needs within this sector for the following years. The Ini-FCA works on the technological, economic and environmental aspects necessary to launch a significant production of sustainable biofuels for the aeronautical sector. It acts to determine the most interesting and adapted sectors for France, such as, for example, biofuels originating from the transformation of sugar or oilseed crops. This work falls within the framework of the European " *Biofuel flight path 2020 roadmap*", the objective of which is the production of two million tonnes of aeronautical biofuel by 2020.

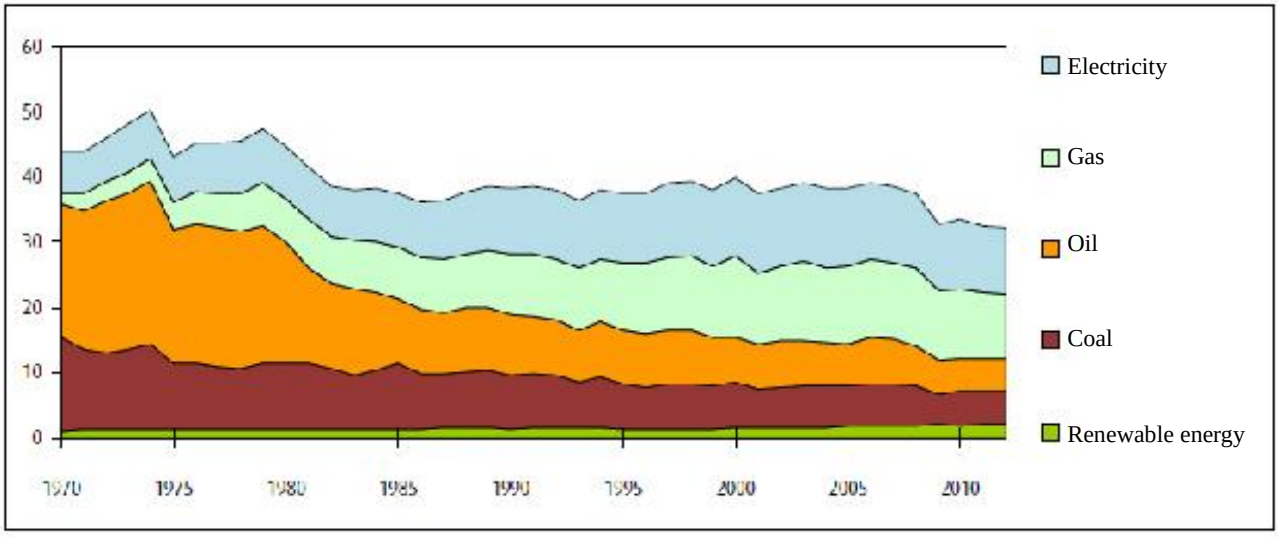
In 2012, the DGAC also funded the CAER (Carburants Alternatifs pour l'Aéronautique -Alternative Fuels for the Aeronautical Industry) research programme led by IFP-New Energy. This 4-year programme shall allow to select the best fuels adapted to the aviation sector and to carry out a global analysis of their impact, production and use.

3. Industry sector

3.1. Current situation

The final energy consumption of the industry decreased by -1.2% to 32.1 Mtep in 2012. Between 1990 and 2008, this consumption remained relatively stable. In 2009, following the economic crisis, it significantly dropped to 33.0 Mtep (-12.9%). After an increase in 2010 (+2.9%), the final consumption of the industry decreased once again in 2011. It is also at its lowest level since the introduction of energy balance sheets in 1970 as shown by Figure 7.

Final energy consumption in the industry
Data adjusted for climatic differences, expressed in Mtep



Source: SOeS calculations according to data on energy

Figure 7: The final energy consumption of the industry adjusted for climatic differences and expressed in Mtep between 1970 and 2012 (source: SOeS, 2012 Energy Balance)

According to the industrial production index of Insee, the national statistics office, industrial production decreased by -3.4% in 2012. In particular, the manufacturing industry decreased by -4.2%, the construction industry by -3.0%; the food industry was the industry that resisted the most (-0.8%).

Among the biggest energy consumers of the industry, there was a general reduction: glass production plummeted by -9.5%, the production of plaster, lime and cement products by -6.2%, as did the steel and metallurgy industries. The non-ferrous industry decreased by -5.9% and the paper-carton industry by -4.8%. Only the production of fertilisers distinguished itself with an exceptional increase of +28%.

Within this context, the decrease in the final consumption of the industry in 2012 touched all forms of energy, with fossil fuels being the most affected. The downturn of the steel industry, that consumes three quarters of the carbon used by the industry, caused a reduction in the consumption of this fuel by -3.4%. The consumption of petrol products decreased by -1.6% due to a reduction of organic chemistry (-2.5%). The demand in gas decreased by -1.7% in 2012, after a marked decrease of -7.1% in 2011: the production of fertilisers contributed to this reduction. The consumption in electricity was the least affected with a decrease of -1.0%. This decrease was however reduced to its level of 1991.

The consumption of renewable energy increased by +7.5% to 2.2 Mtep. This increase was due to the success of the “ Fonds Chaleur-heating funds ” system (see section on Energy), that aimed to support the production of heat from renewable energy, in particular in the industry. The consumption of renewable energy in the industry in 2012 was mainly attributable to the use of wood waste (84%) and agricultural residues (11%) for energy.

Since 2005, relative contributions of different energy mix of the industry have remained overall stable: around

31% for gas and electricity and 16% for petrol and coal. Only the part represented by renewable energy has steadily developed: it went from 4.6% in 2005 to 6.8% in 2012.

3.2. Policies and measures

The French policy in terms of energy efficiency and reduction of greenhouse gas emissions in the industrial sector focuses on five points:

- Market instruments and in particular European Directive 2003/87/EC establishing a European Union emission trading scheme;
- Financial incentive measures;
- Regulatory measures, in particular within the framework of the transposition of the Directive 2012/27/EU relative to energy efficiency;
- Support to these normalisation procedures and qualification of these players;
- Support to the development of more energy-efficient technologies, in particular for the development of future investments systems.

3.2.1. The European Directive 2003/87/EC[57]

The European directive 2003/87/EC establishing a **Community emission exchange scheme** (the SCEQE directive) introduced on 1 January 2005 a cap and trade system for the greenhouse gas emissions of the main industrial and energy activities of the European Union. In France in 2012, a thousand installations in the energy sector, for example in the industry sector, were subject to this directive.

After the first period from 2005-2007, the system became fully effective in 2008 for another period of 5 years which ended on 31 December 2012. During the first and the second period, each Member state established a national allocation plan for emission allowances (PNAQ- plan national d'affectation des quotas) governing the allowances for the relative installations. The total amount of allocated allowances (including those initially reserved to the new entrants) increased to 156.51 Mt of CO_2 per year for the period 2005-2007 and to 133.4 $MtCO_2$ per year for the period 2008-2012[58].

Each installation is required to return each year to the public authorities the equivalent amount of allowances of its verified emissions. If emissions are lower than the amount of allowances allocated, the facilities subject to the directive can sell them on the market or keep them on their account for future use. In contrast, if their emissions are greater than the amount of emissions allocated, businesses may acquire shares on the same market or make use of credit issued by flexibility mechanisms set by the Kyoto protocol. In France, during the period 2008-2012, businesses were authorised to use this credit from projects equivalent to 13.5% of their allocation for the period.

57 Although outside the framework of the Directive 2006/32/EC, the emission-trading scheme is an instrument that thanks to the fight against greenhouse gas emissions, has an important impact on the energy efficiency of the industrial sector. This is why this measure integrates the national plan for energy efficiency in France. Moreover, other measures destined to the industry sector do not distinguish differences between sectors subject or not to the SCEQE directive.

58 Forecast amounts within the PNAQ framework validated by the European Commission.

In France, the emissions of the sectors subject to the SCEQE directive are constantly in reduction :

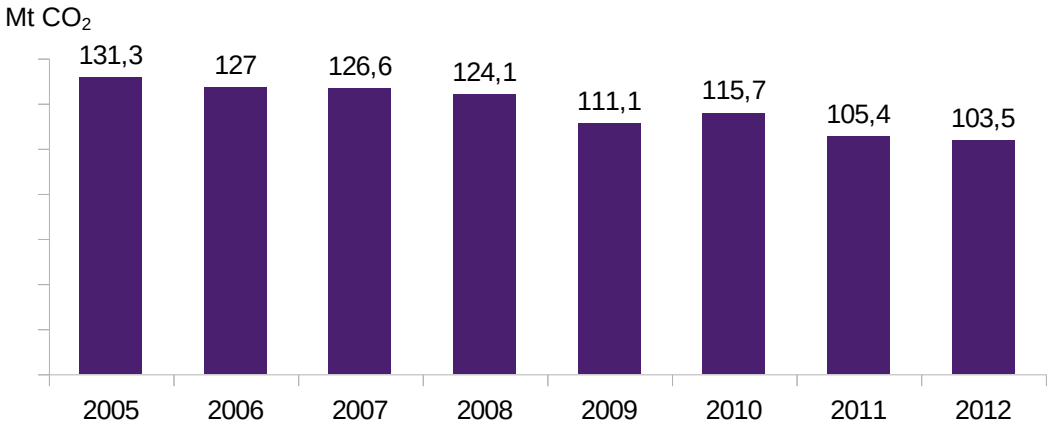


Figure 8. CO_2 emissions of those sectors subject to the SCEQE sector between 2005 and 2012 (source: Register of European Union transactions)

The SCEQE directive was amended on 23 April 2009 within the context of the implementation of the " energy-climate " package. This allows:

- To extend its field of application. From 2012, the system also integrated the aviation operations. For the period 2013-2020 (phase 3 of the system), the system was also extended to two new sectors (CO_2 emissions of the petrochemical sector, from the production of ammonium, CO_2 emissions and PFC emissions from aluminium production, N_2O emissions from the production of nitric acid,…). In total, in France around 1200 facilities belonging to 650 businesses are now involved;
- To harmonise in all Member states, the allocation methods of allowances to industrials under a benchmarking approach for all facilities;
- To maintain the system to fight the risk of carbon spillage for those exposed sectors.

The review of the directive that also allows to progressively generalise the auctioning of these allowances instead of the largely free allocation system that existed until 2012. In France, the Finance Act for 2013 attributed the resources generated from the sale of these carbon allowances to the National Housing Agency (Anah) within the limit of EUR 590 million per year. The use of this auction revenue will be the object of a specific report provided for under article 10 (3) of the directive. According to French law, the Environmental Code provides that this report be made available to the public.

The SCEQE directive must allow the European Union to meet the objective of reducing the emission of greenhouse gases fixed by the European Council in March 2007 at a reduction of 20% of global emissions by the European Union by 2020 compared to levels in 1990: the emissions of the sectors subject to the SCEQE directive will also be reduced by 21% between 2005 and 2020, knowing that this reduction will be partially achieved through the use of the flexibility mechanisms set by the Kyoto protocol.

All the provisions provided for in phase 3 of the community emission trading system were transposed into French law with the ordinance of 28 June 2012 and the Decree of 3 December 2012.

3.2.2. Incentive measures

Transversal incentive measures presented within the Energy section concerning the industrial sector:

- The total amount of **energy saving certificates** issued to the industrial sector between 2006 and 30 November 2013 was around 6.5% for a total energy saving of around 28.8 TWhcumac;
- **The ADEME's " Help in decision making "** system in particular, funds the carrying out of studies on the energy efficiency of the industry including audits or **energy diagnostics** as they have not been made obligatory by regulations but by the introduction of energy management systems. 92% of benefiting businesses are expected to put this into practise or have already done so and 73% have already put into practice actions following these studies. In 2012, 750 studies were carried out, mostly in SMEs thanks to a total funding from the ADEME of EUR 1.5 million;

- The ADEME's funding system **" Rational use of energy – investments "** allows to support the investments made by businesses to purchase energy saving equipment or make changes to processes or equipment in use. These funded operations are demonstrations or example operations. The annual budget is in the order of EUR 500 000;
- The " **Green loans "** system that is specifically dedicated to the industry sector and implemented within the context of future investments, with of an envelope of EUR 500 million[59] during its implementation in July 2010, allows the SMEs and industrial ETI to benefit from low interest loans and loan guarantees (exclusively for SMEs) for those investments allowing to increase competitiveness and the energy and environmental performance of their processes or their products. In continuation of this initiative, a new envelop of EUR 340 million of loans will be made available for the period 2014 to 2017, with a subsidised interest rate of up to 200 basis points, managed by the BPI-France, to fund investments for SMEs and ETI in all industrial sectors. The modalities will be inflected over existing green loans in order to reinforce the target of these products and the adequate assessment of the environmental impact of the funded projects.
- Moreover, " **Eco-Energy loans** " have been implemented by BPI-France since March 2012 thanks to state funding of EUR 33 million that must allow to distribute and guarantee loans of up to 100 m€. Destined to the TPE and SME, this system allows to fund the installation and work necessary to upgrade certain premises that consume a lot of energy. Four categories of equipment are involved: lighting, heating, air-conditioning and electric motorisation. The total amount of loans ranges between EUR 10 000 and EUR 50 000 for a duration of 5 years, of which a 1-year grace period in capital. Its fixed low interest rate is of 2%. Moreover, no guarantee or individual caution may be requested to the bank manager.

3.2.3. Regulatory measures

Several regulatory measures aim to encourage energy efficiency in the industry, the first of which is directive 2012/27/EU relative to energy efficiency that provides for:

- The **obligation of routine energy audits**: within the framework of the transposition of article 8, the principle of a mandatory energy audit every four years and for all businesses[60] with the exception of the SMEs was fixed under articles L.223-1 through to L.233-4 of the Energy Code of decree No 2013-619 of 16 July 2013 containing various adaptation provisions of European Union law within the sector of sustainable development (article 40) and by Decree No 2013-1121 of 4 December 2013 relative to threshold values above which a legal person carries out an energy audit. The regulatory text defining in particular the audit methodology and qualifications of service providers will be published in the first half of 2014.

  This new measure will be articulated with other existing systems within the framework of the " energy tradition " bill, in particular the obligation for the legal persons of legal firms employing more than 500 people (250 people within the regions and overseas departments), to establish every 3 years a balance sheet of their greenhouse gas emissions[61].
- **Directive 2010/75/EU** of 24 November 2010 on industrial emissions was introduced with an integrated approach. This directive imposes, for numerous industrial sectors, the implementation of the best available technologies (BAT) for the reduction of pollutant emissions, gradually following the adoption of the reviewed "BREF" conclusions, documents detailing the BAT. The conclusions on the BAT are chosen according to emission reduction criteria, waste reduction, but also to an increase of energy efficiency.

  A transversal BREF (applicable to all sectors) exists regarding the topic of energy efficiency. When an operator prepares his re-examination application, it must be placed in comparison with the conclusions on BAT of the sectorial BREF but also in comparison with the conclusions of the transversal BREF of the energy efficiency BREF.

Finally, the minimum return levels implemented by the **regulations on boilers** (see section on Residential-Tertiary sector) are equally applied to the industrial sector.

59 EUR 300 million for loans, EUR 200 million for guarantees.
60 Across all sectors of activity.
61 Therefore, in particular their energy consumption.

3.2.4. Support for standardisation

Pursuant to the directive 2012/27/EU relative to energy efficiency, France is continuing to actively support the development of **normalisation tools within the energy efficiency sector**, in particular for the industrial sector. Various tools are available for businesses that wish to improve their energy efficiency:

- **Energy diagnostics** based on the French standard AFNOR BP X30-120. It supplies the manufacturer with a photograph of the energy situation and of the energy saving solutions suitable for his site in three phases: the drafting of an overall energy balance sheet of the business, an in-depth analysis of the main identified sources of energy savings and a prioritisation of the actions to be taken with relative cost analysis. France is taking part in the work of the European Committee of standardisation that resulted in the publication in September 2012 of the first part of the European regulations relative to energy audits EN 16247. This first aspect of the establishment of an energy audit methodology follows the main criteria of French standards. It will be completed in 2014 by sectorial sections on buildings, industrial procedures and transport.
- In parallel, development support of **energy management systems** has been confirmed following the publication of the international ISO 50 001 standard which replaces the previous EN 16 001 standard within the European catalogue. The NF EN ISO 50 001 standard specifies the need to develop, implement, maintain and improve the energy management system. In particular, it provides for the requirements for use and energy consumption including measurements, documentation, reporting, the design and purchase of equipment and systems, processes and personnel that contribute to energy efficiency. In order to encourage its application, an interest rate reduction in the form of energy saving certificates is granted for energy saving operations carried out within the scope of the ISO 50 001 certification.
- The development of **a competency framework** for the consultancy firms carrying out the energy audits in the industry sector managed by OPQIBI (standard No 17-17). This framework is based on the analysis of human criteria, methods and on an analysis of references. The qualification focuses on the scope of the audit grouping together a series of consumers: procedures (specific procedures, technical equipment), utilities and buildings in view of the final and efficient energy use in all its forms for all industrial sites.
- In order to help the SMEs implement energy efficiency measures, information **offices on energy and the environment** have been opened in the Chambers of Commerce and in the Chambers of handicrafts. The mission of these offices is above all to inform businesses on energy issues. Moreover, they can carry out "energy visits" to the businesses themselves, organise collective energy audits carried out by consultancy firms, as well as hold meetings to raise awareness or carry out training sessions. To achieve this, a specific training path has been established for these participants, coordinated and supported by the ADEME, including on the topic of Energy modules on "Notions of energy and energy use", "Energy visits to businesses" and "Becoming a player in PCET (Territorial Climate Energy Plans) ".

3.2.5. Supporting the development of more efficient technologies

a Green industry initiative

France has committed to **organising future industrial sectors**, in order to be in a position to propose technologies and services enabling a transition towards a green economy, indispensable in order to achieve France's objectives in the field of production of renewable energy and of a reduction of energy consumption and greenhouse gas emissions.

The green industry initiative must address three major challenges:

- Support the emergence of new professions or activities, as well as of national export market champions;
- Assist changes that the professions of certain sectors will have to face;
- Adapt existing systems or create new ones where appropriate, for the orientation and training of workers towards developing sectors. In December 2009, around twenty strategic sectors of the green economy in terms of potential growth and employment were identified (see Table 5).

Lower greenhouse gas	Smart grids

emissions within the energy sector	CO_2 capture and storage (CSC) and its valorisation
	Renewable energy: marine energy, geothermal energy, eolic energy, solar energy, biomass energy, biofuels
Lower energy needs in order to fight climate change.	Buildings with low environmental impact
	Clean vehicles
	Green logistics and traffic management
	Energy storage and batteries – Hydrogen and Fuel cells
Lower the consumption of natural resources and raw materials	Recycling activities and waste recovery
	Green chemistry – plant chemistry
	Metrology – environmental instrumentation
	Optimisation of industrial processes
	Water – ecological engineering
	Biomass material

Table 5. The "Green industry" strategies of the green economy in terms of potential growth and use

For each of the industries identified, consultations were held in 2010 together with the players. This work allowed to identify the intervention priorities. In 2011, based on this, action plans were finalised with the aim of developing and structuring these strategic green economy industries within the context of an ambitious industrial policy. Several proposals were made within this context aiming in particular at:

- Organising public action (financial support,…) and removing regulatory limitations;
- Accompanying the organisation of these new industries, in particular favouring a grouping of players;
- Allowing a diffusion of the environmental technologies and productivity gains resulting from this.

18 green industries resulted from the framework of the Committee for the Strategic Orientation of Eco-Industries (COSEI- Comité d'Orientation Stratégique des Eco-industries). Co-chaired by the Minister of sustainable development and the Minister of Industry, this strategic committee brings together the parties involved (businesses, business federations, trade unions and administrations) and guarantees public-private consultations on limitations for the development of the industries and the definition of proposals. Since January 2012, it has the "Ecotech ambition" roadmap, made up of 87 measures.

b Support for innovation

On an annual basis, numerous **calls for projects** on energy efficiency in the industry sector are implemented:

- The **Interministerial Single Funds** (FUI), implemented to support competitiveness clusters, devotes a third of its funding to innovation projects relative to sustainable development. Six competitiveness clusters specialised in Eco technologies were set up in 2010. More broadly, 40% of the 71 clusters involve the eco-industries of which 3 involving buildings and villas, 6 energy industries, 2 recycling and circular economy, 2 biomaterials, 5 wood and biomass and 6 transport excluding aviation.
- Through the **"Innovation aid programme"** (AI), BPI-France has supported the SMEs during the technological development phase. Moreover, through the **funding of "strategic industrial innovation".** (ISI) projects, focusing on breakthrough technologies and favouring the emergence of industrial champions, between 2009 and 2011, it funded a dozen collaborative projects grouping together each time at least two companies and a laboratory for a total of EUR 140 million.
- The **SEED (Systèmes Energétiques Efficaces et Décarbonés -Efficient energy and carbon-free**

systems) programme, which has replaced the EESI (Efficacité énergétique des systèmes industriels -energy efficiency of industrial systems) programme of the National Research Agency (ANR) aims to improve industrial energy efficiency and lower CO_2 emissions. Approved research projects focusing in particular on the development of innovative energy production/conversion methods, with CO_2 capture, such as the creation of new high impact materials and energy transfer/transport components and finally a more extensive energy integration of industrial systems. This programme was renewed in 2014[62];

- The **ADEME/TOTAL programme on energy efficiency in the industry** with the view of strengthening the R&D of this sector that currently does not receive much funding, aims to contribute to supplying the French industry with a panoply of energy-efficient technologies and to favour the emergence of these technologies in the SMEs on the European and global markets. Projects grouping together big companies are also eligible. The programme, which ran from 2009 to 2013, was actualised in 2013 with the 8th Cross-thematic call for expressions of interest on utilities and transversal energy saving processes and with a call for the specific design of two technologies: exchangers and turbines. At the end of 2013, 169 applications had been received, 54 projects were approved for an estimated total amount of funding of EUR 20.6 million and 10 projects are still under review. This programme has already allowed to introduce on to the market 5 innovative eco-technologies in the field of industrial energy efficiency:
  - TMW supplier: the MHD (Multi-stage Humidification and Dehumidification) project for desalination and demineralisation through multi-effect dehumidification and humidification;
  - Concept Convergence supplier: CSMO project for the baking and drying of crustless loaves combining hot air and microwave ovens;
  - Erasteel steel plant: Conversion of hydraulic powered sheet rolling into electrically powered sheet rolling;
  - Prosim software developer: the ValiAri project coupling a data reconciliation tool with optimisation software to reduce operating costs in the production of utilities.
  - Affinage de Lorraine aluminium factory: aluminium recycling production chain integrating a tilting rotary furnace.
- Finally, the objective of the ECOINDUSTRIES (ADEME/BPI-France/DGCIS, ongoing) programme and its equivalent programme for upstream research ECOTECH (ANR, set up in 2010 and 2011) plus the EcoTechnologies & EcoServices (Eco-TS) from 2013, is to introduce the concept of sustainable development in industrial production and innovation of environmental technologies supporting the implementation of Eco technology demonstration projects or innovative services. EUR 9 million granted by the Enterprise Competitive Funds (FCE- Fonds de Compétitivité des Entreprises) integrated by ADEME funds dedicated to energy and the environment. Eco-design is part of a series of points approved for the call for projects launched in 2012 that allow to fund demonstrators of strong economic and environmental potential lower than the thresholds fixed in the call for expressions of interest (AMI) of the ADEME or in the call for projects such as the FUI.
- Within the framework of the **future investment plan** (see Section on Energy), two calls for expressions of interest (AMI) were launched in 2011 and 2012 within the field of smart grids (a programme with EUR 250 million), in particular with the aim of optimising the management of grids within the industry; moreover, within the field of green chemistry, a call for expressions of interest was launched in 2011 on the topic of plant-based chemistry.

  Two other calls for expressions of interest were launched in 2012, focusing more broadly on **the environmental efficiency of industrial activities** whatever their productions. This is the “Eco-design & Industrial Ecology” call for expressions of interest and the “Eco-efficient production systems” call for expressions of interest, which must allow to identify organisation demonstrations or eco-efficient production units. The final review in 2013 allowed to select five projects: a development and commercialisation project of thermochemical refrigeration systems, two projects leading to an increase of the environmental performance of the glass industry (Eco-design of innovative glass mill equipment and the conversion to an oxy-combustion production line allowing energy gains and reductions in emissions), a project for the production of electricity starting from low temperature heat and a project on industrial and territorial ecology combining the creation of new tools and a new economic model focusing on thermal and material synergies.

62 Workstream 2 of the 2014 action plan organised around 9 major societal challenges: http://www.ehess.fr/fileadmin/Recherche/Appels_d_offres_SHS/pa-anr-2014-aap-generique.pdf

- In order to facilitate the launch of **innovative eco-technologies** onto the market, in France experiments on a system called ETV (Environmental Technology Verification) are ongoing. The objective is to provide the developer of innovative eco-technology an “official” verification of the level of performance achieved by the eco-technology developed. Seven categories of eco-technologies have been defined among which efficient and virtuous procedures that include energy optimisation of industrial facilities. Well ahead of European experimentation, a methodological guide based on the verification of the performance of efficient and virtuous innovative procedures is available and 6 innovative processes are being verified. Furthermore, following two calls for projects for ETV verifications launched by the ADEME in 2012 and 2013, out of the 7 categories of eco-technologies, 24 ETV projects were received and 8 are already underway or being reviewed.
- The “**Thematic Institutes for Energy Transition**” programme and the institute project on the flexibility and energy efficiency of industrial facilities linked with urban areas “**Paris-Saclay Energy Efficiency**” (see section on Energy).
- The national agreement on growth, competitiveness and employment provides for important developments in funding businesses in order to guarantee, above all, efficient proximity financing to TPEs, SMEs and ETIs. Furthermore, public procurement will evolve in order to be mobilised better to accompany the development of an innovative growth of SMEs.

4. Agricultural sector

4.1. Current situation

In 2012, the final energy consumption of the agricultural-fishing sector represented 4.42 Mtep, 2.9% of the final energy consumption. This consumption increased by +0.7% compared to 2011 when the agricultural production decreased in volume according to the provisional agricultural accounts data of the Insee – National Statistics Office.

Petrol products alone represented 78% of the sector's energy consumption with 3.45 Mtep in 2012. This was essential for domestic heating oil and non-road gas-oil. Their consumption increased by +0.8% compared to 2011.

Growth was equally moderate for other forms of energy. The consumption of gas increased by +0.5% in 2012; electricity consumption remained stable in 2012 at 0.69 Mtep, after an increase of 5.1% in 2011.

The fishing industry represented 7% of the energy consumption of the overall agriculture-fishing sector. This consumption increased by +1.0% in 2012. This was due to the gas oil used by fishing boats. The consumption of this sector markedly dropped between 2003 and 2008 by -7.7% as an annual average. It later stabilised at around 0.29 Mtep.

4.2. Policies and measures

Reductions in energy consumption and the development of renewable energy within the agricultural and forestry sector were the result of the implementation of several support programmes. Public authority measures focus mainly on more energy-hungry processes, in particular heated greenhouse productions, intensive productions and the use of tractors and on renewable energy.

The aid scheme for investments in the greenhouse sector, implemented by the Minister of Agriculture, supports the development of horticultural greenhouses and markets favouring energy savings and the development of renewable energy. In fact, the main objectives of this scheme that was modified in 2013 are economic development and employment, as well as energy and environmental efficiency of greenhouses.

The main intervention tools are represented by aid schemes for investments in horticultural greenhouses and markets managed by France AgriMer. The objective of energy efficiency is divided into several sub-objectives: savings in the consumption of fossil fuel, high-performance equipment in terms of energy efficiency and use of renewable energy and use of unavoidable energy. Additional support comes from the green environment plan.

Regarding the schemes managed by FranceAgriMer, their budget was of EUR 10 million in 2012 and of EUR 7.1 million in 2013. The total amount of aid granted for the installation of heat pumps was of EUR 87 000 in 2012 and for the replacement of fossil fuel heating systems with renewable energy systems of EUR 1 000 000 in 2012.

The **green environment plan**, defined by the Decree of 21 June 2010 and implemented by the Minister of Agriculture, encourages energy savings in greenhouses already existing as of 31 December 2005, granting investment aid (regulation systems, open buffers, heat shields, greenhouse management, boiler management). Its implementation was carried out through a regional application of the hexagonal rural development plan for the period 2007-2013 and represents, for greenhouse energy savings, a total commitment of EUR 8.8 million of national and European funders alike. Out of the total amount, the Agriculture Ministry alone used around EUR 3.5 million of funds over 6 years (2007-2012) to finance 318 applications for a total invested amount of EUR 31.2 million.

These two systems (the Energy-greenhouse systems and the green environment system) both contributed to a reduction in the energy consumption of greenhouse productions: between 2006 and 2012, the CTIFL-Interprofessional Technical Centre for Fruit and Vegetables[63]calculated an 8% reduction in the direct energy consumption of market garden greenhouses.

The **energy performance plan for agriculture holdings**, implemented by the Minister of Agriculture, came into effect from 2009 in favour of:

63 Interprofessional Technical Centre for Fruit and Vegetables

- Raising awareness and providing advice to agricultural professionals on energy savings, production of renewable energy and reduction of greenhouse gas emissions;
- Reduction of direct (mainly farm tractors and livestock buildings) and indirect (through the introduction of modifications to agricultural practices) energy consumption;
- The development of renewable energy (agricultural methanisation, biomass boilers, solar hot water heaters, solar drying in barns, small wind turbines, off-grid photovoltaic systems).

The corresponding aid, managed by the Ministry of Agriculture is divided into two components:

- A national component for the development of mobile engine testing stations (since 2009, 11 mobile testing stations have been added to the 5 existing ones) and of agricultural methanisation (127 projects funded following calls for projects launched between 2009 and 2010) with EUR 30.2 million funded by the State;

The implementation of mobile engine testing stations for the regulation of tractors allows a final annual energy saving of 3.5 ktep in 2010, of 23.2 ktep in 2016 and of 36 ktep in 2020.[64]

- A regional component, based mainly on offering advice on energy to agricultural holdings (between 2009 and 2012, 9.000 energy diagnoses were funded within the framework of the energy efficiency plan for agricultural holdings; these were carried out in addition to other diagnoses previously carried out). In order to carry out these diagnoses, more than 530 auditors were appointed by the Agricultural Ministry services. Aid was also granted to finance investments to reduce energy consumption and develop renewable energy.

As regards to the regional component, at the end of 2012, almost 9 000 applications for the economic investment in energy and in the production of renewable energy made by agricultural holdings were accepted; the Ministry of agriculture granted more than EUR 66 million with other national and European funders contributing almost EUR 26 million. Farmers invested a total amount of almost EUR 250 million. Insulation of livestock buildings represented 44% of the total amount of investments.

Finally, the livestock building modernisation plan allows to finance the implementation of measures to reduce energy consumption and develop renewable energy, excluding those measures already eligible under the energy efficiency plan and the green environment plan.

Complementary to these programmes, more specific measures were taken:

- A summary of the data recorded during the GES energy diagnostics of farms (a summary of 3 500 Planète diagnoses carried out in 2010, a summary of 1 000 Dia'terre® diagnoses carried out in July 2013). In parallel, in 2012, the Ministry of Agriculture, following the general 2010 Agricultural census, carried out an investigation into the energy consumption and the production of renewable energy of agricultural holdings (the previous census was carried out in 1992). A specific study on the energy consumption of agricultural and forestry companies and of the CUMA-Cooperatives for the use of agricultural equipment was carried out in 2011. At the end of 2012, the Ministry of Agriculture and the ADEME commissioned a specific study on the energy performance of farms in the French overseas departments. This study, completed at the end of 2013, in particular allowed to estimate the energy consumption of these holdings and establish the implementation of leverage measures in these territories in order to improve the management of energy consumption in the agricultural sector.
- The Dia'terre® tool was developed together with the ADEME, the Ministry of Agriculture and organisations for the development of agriculture in particular to suggest a common and harmonised GES energy diagnostic method for holdings. Available since 2010, this new tool is now the diagnostic tool of election used by land consultants. It allows a centralisation of results in order to elaborate standards according to production system and/or region. The MAAF (Ministry of Agriculture, food and forestry), the MEDDE and the ADEME also support the Life+ Agriclimatechange (ACCT) project, which led to the creation in 2013 of a greenhouse gas energy diagnostic tool for agricultural holdings at a European level. The Ministry of Agriculture and the ADEME both decided to assist the adaptation of the energy GES diagnostics tool to holdings in the French overseas departments. This new tool will be available in the first half of 2014.
- The Climagri tool, introduced by the ADEME in 2010, allows to carry out an energy and greenhouse gas

64 See Annex 3

emission diagnosis at a territorial level. To date, around 45 experts have been trained in this approach and around forty trained in the ClimAgri® approach.

- The Agribalyse® database, relative to the environmental impact of agricultural productions, has been available since October 2013. It contains the analyses of the life cycles of 50 groups of agricultural products. This work, coordinated by the ADEME, has involved 14 partners, with a joint operational piloting of the INRA- the National Institute for Agricultural Research and its Swiss research station Agroscope-ART.

The ADEME accompanies both research and experimentation into reducing the energy consumption of livestock buildings (experimentation equipment, diagnostic tools…) and greenhouses.

As regards to prospective studies, the following points should be noted:

- The CASDAR- Special Funds Allocated to Agricultural and Rural Development[65]allow the carrying out of studies to determine possible ways of further reducing the energy consumption in the agricultural sector;
- A foresight exercise entitled “agricultural and energy prospective by 2030” was carried out by the Ministry of Agriculture;
- In 2012, a study on “Agriculture and Factor 4” carried out by the ADEME and the Ministry of Agriculture, proposed several study scenarios highlighting the possible contribution of French agriculture and forestry in order to achieve Factor 4 by 2050;
- The ADEME carried out a foresight exercise on the energy consumption and greenhouse gas emissions of all agriculture and forestry sectors by 2030 and 2050[66];
- In 2012, the ADEME also carried out an economic analysis of the dependence of the agricultural sector on energy: assessment, retrospective analysis from 1990 on, development scenarios for 2020;
- In 2013 a study on the energy performance of agricultural holdings was carried out in the French overseas departments, piloted by the Ministry of Agriculture and the ADEME;

Finally, at the beginning of 2014, within the context of the energy saving certification system, twenty-seven standard operating sheets[67] were established for the agricultural sector. The energy savings resulting from standardised operations in the agricultural sector represent 0.72% of deposited certificates as of 30 September 2013. The most used sheets were those for the greenhouse sector.

65 A special treasury account for “agricultural and rural development” run by the Directorate General of Education and Research (DGER) of the Ministry of Agriculture.
66 “The ADEME’s contribution to the creation of energy targets for 2030-2050” (ADEME, June 2013)
67 http://www.developpement-durable.gouv.fr/6-le-secteur-de-l-agriculture.html

5. The exemplary role of the State and territorial authorities

Both the State and the territorial authorities play a crucial role in the management of greenhouse gas emissions and energy efficiency, not only through the management of their real estate assets and relative activities but also by exercising their power (for example, urbanism as far as local authorities are concerned).

5.1. The objectives of the exemplary State policy in France

Directive 2012/27/EU relative to energy efficiency puts forward the duty for the State to act in an exemplary manner, in particular regarding article 5 (public buildings) and 6 (public procurement). Moreover, the "circular note on the exemplary role of the State" allows to orient in a broader way the public sector towards eco-responsibility and involves an important energy aspect.

a The exemplary role of buildings belonging to public organisations

Pursuant to article 5 of the directive 2012/27/EU on energy efficiency, France has decided to adopt an alternative approach in order to reduce the energy consumption of public buildings. The targeted buildings are federal buildings occupied by State services[68] (central administration and decentralised services): offices, educational or sports buildings, health or social facilities, cultural centres, shops or dwellings. Overall, these buildings cover 22.2 million m^2. Agricultural buildings, technical buildings, Ministry of Defence buildings (excluding dwellings and offices), civil engineering and road works, places of worship, as well as monuments and memorials do not fall within the scope of this directive.

This alternative approach is based on the objective already fixed by article 5 of Decree No 2009-967 of 3 August 2009 of a reduction of 40% by 2020 of the energy consumption of State buildings and relative public institutions. The combination of several types of measures will allow the State to achieve this objective:

- Work on the buildings and building equipment
- Actions linked to the management of equipment and to occupants
- Reduction of the surface area occupied by State services

The savings generated are estimated at 10 131 GWh of primary energy for the period 2014-2020. This default approach advocated by the directive for a yearly renovation of 3% of the total low-efficient building stock could lead to a primary energy saving of 2477 GWh for the same period. Details of calculations were presented in the report of October 2013 pursuant to article 5 of the Directive[69].

68 Buildings that have a DPE label classified as A, B or C do not fall within the scope of the directive, and the same holds true for those buildings with a gross surface area of less than 250 m^2

69 This report is available at the following link:
http://www.developpement-durable.gouv.fr/IMG/pdf/Synthese_de_la_notification_article_5.pdf
and http://www.developpement-durable.gouv.fr/IMG/pdf/Rapport_sur_l_article_5.pdf

b Public procurement

Public procurement constitutes a particularly important leverage action contributing to the emergence of more sustainable consumption and production modes: public procurement represents around 10% of the French GDP and contributes to giving opportunities to market players in particular thanks to the volume of purchases and the orientation given by the public authorities.

Article 6 of the Directive 2012/27/EU provides for the central government to purchase exclusively energy-efficient products, services and buildings that are compatible with efficiency in relation to cost, economic feasibility, sustainability in a broad sense, technical adequacy and a sufficient level of competition. Statutory work is ongoing to specify the obligations of State services in the procurement of high-energy performance products, service, and buildings.

More broadly, in order to encourage all public institutions towards a more efficient procurement policy in the field of energy efficiency, **procurement guides** have been elaborated by t**he Public Procurement Economic Observatory (OEAP- Observatoire économique de l'achat public-Observatoire économique de l'achat public)** . It supplies a series of recommendations for diversified sectors such as the procurement of office furniture, maintenance of facilities or purchase of professional clothing. In particular, thematic guides, specifically intended for the problem of sustainable development in the public procurement sector have been made available. These guides can also be useful for buyers in the private sector.

The Public Procurement Economic Observatory was set up in 2005 and is part of the Ministry of Economy and Finance; the executive committee of the OEAP set up the research group for sustainable development markets (GEM-DD) in 2007. Grouping together all the players of public procurement (professional organisations, those in charge of implementing economic policies and sales agents), the OEAP has been entrusted with three missions:

- Collect and gather compatible, financial and economic data relative to public procurement allowing a correct management, savings, transparency and competition, in particular through the economic census of public procurement;
- Establish, on the basis of this data, relevant economic analyses;
- Create a collaboration between the players of public procurement regarding the technical and economic aspects of public procurement, in particular thanks to market research groups (GEM) and focus groups.

Advice activities to OEAP buyers have been brought about thanks to the publication of a series of procurement guides, notices, recommendations and technical specifications[70]. Among the latest publications, a guide on energy efficiency in buildings (applied to school buildings) appeared in August 2013.

Amendments to the Code FOR Public Procurement made in 2004 and in 2006 have allowed public buyers to integrate their purchases with social and environmental criteria in the key phases of the procedure.

Finally, updating of the "National action plan for sustainable public procurement for the period 2007-2009" was carried out in the second half of 2013. Public consultation shall be held at the beginning of 2014.

c "Exemplary State" circular note

The exemplary state process was initiated thanks to the circular note dated 28 September 2005 on the exemplary role of the State in energy savings. It has grown thanks to the circular note of the Prime Minister of 3 December 2008 relative to the exemplary role of the State with regards to sustainable development in the operation of its services and public buildings, called "Exemplary State" circular note, which sets broader objectives in eco-social responsibility. Subsequently circular notes[71] have clarified the annual roadmaps that must be followed by State services (central administration and decentralised departments), in particular fixing objectives to be achieved and associated indicators to measure progress of services.

Among the various approved indicators, the ones related to energy consumption were negotiated at an interministerial level and were implemented from 2009 to 2012.

- At first, in 2009 all administrations ordered an expert flow monitoring tool in order to follow more

70 These are available for consultation on the following website page of the Directorate for Legal Affairs: http://www.economie.gouv.fr/daj/guides-et-recommandations-des-gem-et-autres-publications

71 In particular, circular note 451/SG of 11 March 2010 http://www.developpement-durable.gouv.fr/IMG/pdf/cir_30729.pdf, circular note 5495/SG of 30 September 2010, circular note 5523/SG of 5 April 2011, circular note 5585/SG of 2 May 2012 http://circulaires.legifrance.gouv.fr/pdf/2012/05/cir_35225.pdf

closely the energy consumption of their buildings and also to forecast necessary energy performance measures;

- Then an energy audit of the central administration buildings owned by the State was also requested in 2009 and 2010. Only two annex buildings of the State Council, as well as those buildings that were in the process of being sold were not audited;
- In order to follow up on audits, the Ministries were asked to demonstrate that an action plan had been created in 2012 taking into account the recommendations that had emerged from the audit. These actions are being assessed by the CGDD-Commissioner-General for Sustainable Development;
- Overall, the energy consumption of the central administration buildings markedly decreased between 2009 and 2011 (last period reviewed): a reduction of 12% in value (adjusted for inflation) was measured.

Other indicators connected with the transport and travel sectors, and with routine procurement have notably allowed to follow this development and to fix objectives regarding:

- A decrease in the limit levels of greenhouse gas emissions of purchased vehicles fixing a threshold of CO_2 emission per kilometre;
- Purchase of electric and hybrid vehicles.
- Amount of reams of paper bought each year;
- Reduction of the number of printing devices in stock.

The objectives fixed for the State administration departments in the circular note of the Prime Minister of 3 December 2008, relative to the exemplary role of the State with regards to sustainable development in the operation of its services and its public buildings were set until 2012.

A future system (currently under review) will define new objectives for the period 2014-2020: the revised circular note should lead to an important contribution to the fight against climate change and the management of energy acting in particular on occupied buildings and movements.

Within the framework of this review, four technical groups made up of representatives of the Ministries and experts have developed a series of practical sheets favouring the implementation of sustainable development in the operation of the administration departments with regards to the following areas:

- Energy efficiency of buildings
- Transport and travel
- Eco-social-responsible behaviour in sustainable procurement;
- Social responsibility of the contracting State.

Following the same model included in the annex of the circular note of 3 December 2008, these thematic sheets will constitute a set of recommendations (non-mandatory) identifying for each issue objectives, targets and strategic elements, associated means of action and indicators.

Third balance sheet of the "Exemplary State" system

The overview of actions implemented within the framework of the "Exemplary State" approach are available for consultation on the following website: http://www.developpement-durable.gouv.fr/Bilan-des-plans-pour-une.html. The last published overview shows the results of the actions taken in 2011; one can notice the following noteworthy elements:

Within the building and energy sector, thanks to the voluntarism of administration departments that implemented the necessary means, the targets of the circular note of 3 December 2008 have been exceeded. In fact, **the average energy consumption per agent went down by 12%** (in value, adjusted for inflation) between 2009 and 2011.

Certain administrations went beyond the measures evaluated by elaborating ministerial strategies on energy waste and advocating the use of energy saving certificates in order to valorise low energy consumption measures.

In the transport and travel sectors, progress made by the administration departments allowed to exceed the 2010 objectives in terms of the greenhouse gas emission of purchased or rented passenger vehicles, fixed by the circular note of 3 December 2008. The results were further improved in 2011: in fact, 91% of purchased or rented vehicles had emissions lower than the fixed emission threshold (120 gCO_2/km in 2011) even though it had gone down compared to 2010 (it was 130 gCO_2/km).

Moreover, in 2011, almost half (45%) of the professional drivers of the State were trained in eco-driving and therefore, drove in a more energy-efficient way with lower greenhouse gas emissions. In parallel, all administration departments have a system calculating the number of kilometres covered by plane, a first step towards rationalization of air travel. The use of videoconferences is now being adopted: all administration departments have rooms equipped with videoconference systems, with more than one hundred within those Ministries in which there are many decentralised services (Ministry of home affairs, Ministry of Justice).

All these measures allow to reduce greenhouse gas emissions, cut costs and improve the well-being of agents.

Regarding routine purchases, the purchase of reams of paper markedly decreased over two years: the number of reams of paper bought by agents decreased by almost one-third (30%).

The number of printing devices per agent also went down between 2010 and 2011: the reduction in the number of printers (using networks and individual platforms) in favour of shared multi-function copiers allowed to achieve a 20% reduction of the number of printing devices per agent and to increase the level of service per agent, both reducing global utilisation costs and greenhouse gas emissions.

Within the domain of social responsibility, the State's central administration services have been able to create 63 000 hours of employment for people who have been excluded from the public market due to social reasons. This represents the equivalent of the creation of 35 full-time jobs in a year for central administration alone.

Complementary to the Exemplary State circular note and its various declinations, other measures have been taken in order to encourage a clean management of carbon by the State. In fact, in 2003, within the framework of the first National Strategy of Sustainable Development, the ADEME was entrusted with the mission of creating **resource centres**. This mission consists in providing State services, public establishments and local authorities with adapted tools and reproducible examples and information adjusted for eco-responsibility. In fact, the ADEME has created a guide to eco-responsible administrations[72]; national meetings for eco-responsible administrations and local authorities are organised; a Club for the sustainable development of public establishments and enterprises has also been created.

Finally, for each ministry, a **high-ranking official for sustainable development is responsible** for "preparing its administration to make a contribution to the national strategy for sustainable development, for coordinating the elaboration of corresponding action plans and monitor their application"[73].

5.1.2. Strengthening of the territorialisation of climate and energy policies

a Planning of climate and energy policies

Since the national climate plan of 2004, local authorities have been encouraged to elaborate **territorial climate plans**[74]. Decree No 2010-788 of 12 July 2010 generalised this approach and made the approval of a Territorial Climate Energy Plan (PCET- Plan Climat-Energie Territorial) mandatory for local authorities with more than 50.000 inhabitants before 31 December 2012. This PCET is based on the mandatory preparation of an overview of **the greenhouse gas emissions balance** due to real estate and to the carrying out of the local authorities competences. (See section on Industry).

At the end of 2013, 386 adopted or under review PCET were recorded, with 20% of these representing regional and departmental PCETs[75]. These plans mainly address the fight against climate change through urbanism and the management and improvement of the energy efficiency of transport and buildings and the development of renewable energy. Overall, 610 PCETs were ongoing in the Autumn of 2013.

Decree No 2010-788 of 12 July 2010 (article 68) has also reinforced the articulation and coherence of the

72 www.administrations-ecoresponsables.ademe.fr
73 Decree No 2003-145 of 21 February 2003 focuses on the creation of an interministerial committee for sustainable development.
74 Further details on SRCAE (Energy, Air and Climate Regional Scheme) and PCET can be found at the following websites: http://www.developpement-durable.gouv.fr/Schemas-regionaux-climat-air,32879.html and http://www.pcet-ademe.fr
75 The list of PCETs is available at the following link: http://observatoire.pcet-ademe.fr/pointclimat/recherche/liste

measures at each territorial level defining a new framework of regional strategic standards. **The regions and the State must elaborate together Climate, Air and Energy Regional Schemes** SRCAE). These schemes define the regional orientation and strategies on the reduction of greenhouse gas emissions, on the fight against atmospheric pollution, on the improvement of air quality, on the management of energy requirements, on the development of renewable energy and on the adaptation to climate change. In fact, actualised through discussions with all local players, it specifies the contribution of each region and its territories in the achievement of the national and international objectives for France, in particular with regards to the reduction of greenhouse gas emissions and to the development of renewable energy industries (eolic, photovoltaic, geothermal, hydraulic, biomass). They are composed of an annex entitled "regional eolic scheme" which defines the regional territory areas conducive towards the development of eolic energy.

The PCETs must be compatible with the orientations and objectives of the SRCAE.

21 SRCAEs were adopted as of 1 December 2013[76]. 4 regions have adopted exclusively an eolic approach awaiting the adoption of a complete SRCAE.

Decree No2010-788 of 12 July 2010 also reinforced the provisions allowing **town planning documents** to guarantee a more efficient management of space, resources and energy developing action leverages leading to the management of energy requirements, the battle against urban sprawl and the promotion of sustainable cities:

- The Territorial Coherence Schemes (SCOT- Schémas de Cohérence Territoriale Schémas de Cohérence Territoriale) and the Local Urban Plans (PLU) must now take into consideration the territorial climate energy plans;
- The SCOTs and the PLUs have the possibility of defining sectors in which the urbanisation of new areas is subordinated to the obligation for constructors to respect greater energy and environmental performance;
- The SCOTs and the PLUs must include a retrospective analysis of space consumption and the objectives of the limitation of this consumption;
- The SCOTs and the PLUs can fix a minimal construction density near existing collective transport or plan extra-urban public transport.
- The territorial authorities have the possibility of authorising a size and density that exceeds regulations by up to 30% for those constructions that satisfy high-energy performance criteria or see the use of energy efficient equipment producing renewable energy. Regulations can be exceeded by up to 50% for construction of social housing;
- Moreover, notwithstanding provisions contrary to urban planning, the permission to construct cannot oppose the installation of systems producing renewable energy outside protected sectors and areas delimited by the local authorities. Article R.112-2 of the Town-Planning Code provides that supplementary floor beams necessary for the management of an existing construction in view of improving its thermal or acoustic insulation shall not be included in the surface of flooring developed in the gross work of this construction.

In order to fight urban sprawl, Decree No.2010-1658 of the Amending Finance Act of 29 December 2010 has a new section within the Town-Planning Code entitled "payment for sub-density". This section allows local authorities to define, if they wish, a minimal density threshold below which a payment is due in order to ask for authorisation to construct. The local authorities determine this threshold by geographical sector by attaching purely as an example a map of the area to the local town plan and where relevant to the land use plan. The threshold is fixed for 3 years.

The Finance Act has also simplified urban taxation. A new "management tax" (article L.331-1 of the town-planning code and amendments) now groups together all existing taxes with the exception of the office fees in Ile-de-France and archaeological surveying costs. Its objective is to promote an economical use of land and to contribute to fighting against urban sprawl.

76 http://www.developpement-durable.gouv.fr/Schemas-regionaux-climat-air,32879.html

b Local authorities for energy

At the end of 2013, 113 French towns or conurbation committees became part of the **Covenant of Mayors**. This approach provides in particular for the creation of an action plan in favour of sustainable energy (*Sustainable Energy Action Plan*), already submitted with 60% of French signatories.[77] The commitments linked to buildings represent an extremely important part of the envisaged measures.

The MEDDE's departmental services are commissioned to assist small communities in the elaboration of renovation plans for their real estate assets. They provide technical support and advice to small municipalities on becoming aware of the various regulations applicable to their building stock, the identification of sources of energy savings and the planning of energy efficiency action programmes (audits, work, energy management …). In order to assist the MEDDE's departmental services in their **mission to advise and support local authorities**, the DGALN- Direction générale de l'aménagement, du logement et de la nature (Directorate-General for planning, housing and nature), with the support of the CEREMA- centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement (Expertise and study centres for risks, environment, mobility and management), supply them with a set of methodological tools and learning packages regarding the management of real estate (energy pre-diagnostic tool, energy consumption monitoring tool, methodological documentation…).

To support the local authorities in making use of local competence on energy, the ADEME has elaborated and implemented a service called **"Advice in shared energy"** (CEP). During the creation of this service, the ADEME offers technical support and financial assistance during the first three years of operation. The CEP, a locally based service, is directed at municipalities with less than 10 000 inhabitants (a counsellor can work on a total population of around 40 000 inhabitants); its objective is to:

- Manage energy by tracking invoices;
- Reduce consumptions to the same comfort level;
- Assist the municipality in its building projects to optimise its choices;
- Carry out awareness programmes.

Energy performance contracts (see Section on Energy) are also under development in the territorial communities. Numerous towns, conurbation committees, general or regional councils implement this type of contract: examples are available in the brochure[78] published by Fedene (fédération des services énergie environnement - Federation for environmental energy services).

Energy management systems are also a useful way of continuously improving energy efficiency in local communities: in particular, the town of Saint-Raphaël was the first French town to attain ISO 50001 accreditation.

c Support from the State regarding State-Region project contracts

In order to assist the territorial authorities in the implementation of their climate and energy policies, the **State-Region Project Contracts (CPER-Contrats de Projets État-Régions)** represent the ideal tool: within the framework of contracts between the State and the regions (project contracts for the period 2007-2013), the State placed as a priority the support to regional climate-energy plans and through the ADEME finances up to EUR 76 million per year of territorial energy actions (actions for energy savings and the development of renewable energy). This support extends via the territorial aspect of the CPER to the assistance from the regions for sub-regional climate plans. The region's commitment to energy efficiency in particular translates into the implementation of local policies, the raising of awareness and support to energy saving actions and the production of renewable energy, in partnership with the State. Within this framework, the ADEME finances with Territorial objective contracts (COT) those territories that wish to equip themselves with internal engineering for the development of the PCET.

The objective of the CPERs is carbon neutrality. The NECATER method of the interministerial delegation for

77 Further information is available at the following website: http://www.conventiondesmaires.eu/about/covenant-in-figures_fr.html
78 http://www.fedene.fr/sites/default/files/u277/Exemples%20de%20CPE%20en%20tertiaire%20%282%29.pdf

the management of the territory and regional attractiveness (DATAR - Délégation interministérielle à l'aménagement du territoire et à l'attractivité régionale) allows to evaluate the carbon impact of investment programmes taking into account the life cycle of all financed projects.

The CPER's[79] mid-term review shows that the financed operations have emissions of around 12 Mteq. The CO2 produced during the realisation phase. Regarding the life span of the financed projects, the CPERs are moving slightly away from carbon neutrality: the index ranges from +55 to -21 according to the CPERs, with a national average of +20 (neutrality was between -15 and +15). The "agriculture and fishing", "higher education" and "territorial management" points focus on gas emissions. As regards to these last two points and in the same way as for OP (operational programmes), the building constitutes the main action advantage to improve neutrality (improve energy performance and privilege rehabilitation rather than new construction). Compensations in terms of emissions are mainly linked to the ADEME component (energy management, renewable energy, etc.) and to the "equipment and transport" aspect (collective transport, multimodal transport, etc.).

Regarding future State-Region plan contracts, the Prime Minister announced on 2 August 2013 a new form of contract that will focus on five main themes in the city among which ecological and energy transition. Considerations made on the priorities concerning each theme led to the circular note of 15 November 2013[80] and to specifications for the Regional Prefects that opened discussions with the Regions and serves as a basis for future negotiations. As with the previous form of contract, the regions must focus on the accompanying actions of the ADEME in order to implement energy transition. Moreover, this circular note introduced the obligation of cross-compliance to which the projects financed by the State will be subjected and this constitutes a novelty compared to the period 2007-2013.

The results of the considerations launched by the circular note shall be transmitted by February 2014. A phase of formal negotiations will follow leading to the drafting of the first CPERs in the Summer of 2014. The approach shall be articulated in two three-year contracts: 2015-2017 and 2018-2020.

Investment priorities shall be defined in close coherence with those made by European funds.

The ADEME proposes a **training system destined** to territorial authorities, as well as **different tools** among which the "drafting and implementation of a PCET" guide and the "Climate practice" tool (created by the Réseau Action Climat-France –Climate Action Network France, the ADEME, Etd and the CLER), as well as an online resource centre that can count on a PCET observatory. It has also contributed to the implementation and the diffusion of Cit'ergie labelling (the French name of the "European energy award" label) destined to local authorities rewarding for 4 years the quality management processes of the energy and/or climate policies of the authorities.

The State and the ADEME have also supplied local authorities with a **free method for establishing a balance sheet of the greenhouse gas emissions** .

In 2012, the ADEME also agreed to grant funding for the renovation of public lighting of municipalities with less than 2 000 inhabitants. Thanks to a funding envelope of EUR 20 million, it has been possible to renovate 70.000 light points in almost 2 000 municipalities. This measure has allowed an annual saving of 20 GWh[81].

The territorial authorities also have the possibility of adding value to their actions within the framework of the **Energy Saving Certification (EEC)** system implemented by the planning and orientation law of the energy policy of 13 July 2005. This system allows public authorities to put into practice, within the scope of their competences, energy saving actions, to obtain support in the decision-making process (for example, audits) or to receive a partial funding of their energy improvement actions.

Finally, several calls for projects have the objective of favouring the development of a **Sustainable Town** that aims to implement article 8 of the Decree 2009-967 of 3 August 2009 encouraging the valorisation of exemplary operations for the "sustainable management of territories" and of agglomerations by encouraging

79 http://www.datar.gouv.fr/sites/default/files/110609_etat_necater_mi-parcours_fr.pdf
80 http://circulaires.legifrance.gouv.fr/pdf/2013/11/cir_37675.pdf
81 Source: ADEME

the definition of “global energy, architectural and social innovation programmes in continuity with existing building stock”:

- The objectives of the **EcoQuartiers (EcoDistricts)** call for project are to ensure national and international recognition to communities that have started to adopt exemplary approaches, to attract attention to the most virtuous districts through specific distinction, to promote a new way of building and development, to conform to the principles of sustainable development, to support a corporate approach and this should come about through the creation of an “EcoQuartier Operational Club” ran by the MEDDE. In 2011, a second call for EcoQuariters project was launched by the State with an even greater ambition in terms of the quality of the projects. 394 local authorities made an “écoquartier” candidate application as of 1 July 2012. 24 innovative projects were approved.
- The **EcoCité** approach addresses big agglomerations, growing at a fast rate, structured in inter-municipal authorities and that have an important project on sustainable management and housing. The EcoCité approach aims to identify exemplary integrated urban development strategies (in terms of design, discussion and implementation). 19 urban territories have also engaged alongside the State in the ecologic transition of the towns. They represent 31 inter-municipal authorities and 10 million inhabitants. Implementation of the EcoCité projects have today been actualised thanks to the decision of the State to provide financial support within the scope of the Future Investments Programme. Funds for the Town of the future programme of the Future Investments Programme (PIA), the management of which was given by the State to the Caisse des Dépôts disposes of EUR 750 million dedicated to EcoCités. Its priority is to facilitate the emergence of urban innovation and of demonstration projects with high environmental performance based on an integrated approach of transport and mobility, of energy and resources and of urban and housing organisation. As of 30 September 2013, the funded projects represented a total amount of investments estimated at EUR 3.3 billion in addition to a State funding of EUR 294 million . A reduction of energy needs and energy consumption is at the heart of the operational strategies thanks to passive buildings and considerations on their thermal exchange. The use of renewable energy and local energy recovery is encouraged, as is the use of smart solutions to optimise the storage and distribution of energy. New measures concerning global high-efficiency energy renovation programmes are expected for 2014.
- The call for project for **Reserved Public Transport Corridors** (TCSP-Transports Collectifs en Sites Propres – see section on transport), which aims to support the local authorities in the development of infrastructures for reserved public transport corridors.

6. Management of energy requirements

Transversal energy measures for the management of energy requirements, involving all sectors, have also been implemented among which in particular:

- The energy saving certification system (EEC), the main measure of the French policies on energy efficiency which aims to generate sources of energy savings, in particular in those sectors where they are more common;
- Support high-efficiency products through regulatory and financial measures;
- Support the development of energy services and in particular energy performance contracts;
- Awareness campaigns, the importance of inspections and invoicing, the development of smart networks;
- The promotion of efficiency of heating and cooling, support for cogeneration;
- Waste prevention;
- Future investments in research and innovation;
- Taxation.

Finally, the territorialisation systems (planning tools, support given by local authorities) described in the "Exemplary role of the State and the territorial authorities" section complete the policy implemented at a national level.

6.1. The Energy Saving Certification system

The **energy saving certification system (ESC),** introduced by Law No. 2005-781 of 13 July 2005 fixing the energy policy guidelines (POPE law) is based on the three-year obligation of achieving energy savings, expressed in the ESC[82], imposed by public authorities on energy suppliers ("obligees"). These are also encouraged to promote energy efficiency among their clients (households, local authorities or professionals).

The ESCs are attributed subject to certain conditions by the services of the Ministry of Energy to eligible players (obligees but also other legally established companies[83]) who carry out energy saving operations or in certain cases, develop renewable energy, and these can be exchanged. At the end of the period, the obligee energy sellers must give evidence, subject to a penalty providing full discharge of two euro cents per missing kWh $_{cumac}$, of the fulfilment of their obligations by being in possession of the necessary certificates for these obligations.

The national objective of energy savings for the first period of this system (from 1 July 2006 to 30 June 2009), was fixed at 54 TWh $_{cumac}$ and was shared among obligee sellers[84] based on their sales volumes and the TTC price of energy. This objective was achieved with almost 65 TWh$_{cumac}$ of certified energy savings as of 1 July 2009, with more than 86% in the residential sector.

A transition period was created from 1 July 2009. No energy saving objectives were fixed for this period during which those eligible (of which some sellers) continued to carry out energy saving actions. In view of the positive results of the first period, Decree No.2010-788 of 12 July 2010 focusing on the national commitment to the environment extended the ESC system for another three years[85] and extended the energy saving obligations to the providers of fuel the consumption in car fuel. The range of people eligible to apply for certificates has also been limited to sellers, to public authorities, to the Anah and to social housing.

The second period started on 1 January 2011, with an obligation level fixed at 345 TWh$_{cumac}$, for all energy

82 The unit of measure used by the ESC is the kWh of final cumulative energy and updated according to the life span of the product (kWh cumac of final energy). An ESC corresponds to 1 kWh $_{cumac}$ of energy saved.

83 The local authorities, the National Housing Agency, social housing, the mixed economy companies propose third-party financing.

84 For the first period, sellers were suppliers of electricity, gas, liquefied petrol, heating or cooling gas from grids (over a certain threshold of annual sales in GWh) and sellers of domestic heating oil. (From the first litre of fuel oil sold).

85 Articles 14-17 of Decree No 2005-781 of 13 July 2005 of the programme fixing the guidelines of the energy policy, amended by Decree No 2010-788 of 12 July 2010 focusing on the national commitment to the environment; decree N°2010-1663 of 29 December 2010 relative to the energy saving obligations within the scope of the energy saving certification system; Decree No 2010-1664 of 29 December 2010 relative to energy saving certificates.

suppliers.

In order to guarantee continuity of the system with a third period, the second period was extended by one year: the period will end on 31 December 2014. Operational procedures for this extra year are the same as those for the period 2011-2013 and the figures related to energy saving obligations is constant (an extra 115 TWh_{cumac} in 2014).

The third period will start on 1 January 2015 with a three-year objective of 660 TWh_{cumac}.

As of 30 November 2013, the number of energy saving certificates issued since the beginning of the system was **462 TWh_{cumac}** of which 90.4% of operations were carried out in the building sector.

	2013	2016	2020
Energy savings generated by all the ESC issued as of 31 November 2013 (ex-post assessment)			
Annual energy savings	2.5 Mtep	2.44 Mtep	2.37 Mtep
Energy savings generated by all the ESC issued as of 31 November 2013 (ex-post assessment) and by the extension of the system until 2020.			
Annual energy savings	2.5 Mtep	5.17 Mtep	9.29 Mtep

Table 6. Annual energy savings generated by the ESC system (source: MEDDE)[86]

The objective of this energy saving certification system under article 7 of the European directive on energy efficiency (EED) is of 97 TWh_{cumac} in 2014 and of 171 TWh_{cumac} starting from 2015. It is fixed at a level that is coherent with an energy saving of 314 TWh for the period 2014-2020. Details of the energy savings under article 7 of the EED are given in Annex 4. The energy saving certification system is described in Annex 5.

6.2. Funding for high-performance equipment: regulatory measures for products.

Regulatory measures for energy using products have been implemented at a Community level.

- **Eco-design**: the Framework Directive 2009/125/EC establishes a framework for fixing requirements in terms of Eco-design applicable to energy products. These can be fixed or via regulations or with a voluntary agreement. 20 implementing measures from the framework directive were adopted between 2008 and 2013 (stand-by and off mode, street lighting and tertiary building illumination, simple numeric decoders, power supplies and battery chargers, domestic lighting, electric engines, circulators, refrigeration equipment, televisions, washing machines, dishwashers, ventilation fans, vacuum cleaners, boilers…). Others are under preparation at the European Commission.

  At a national level, as regards to streetlights, a national convention has been signed by France and by the Lighting Union in order to bring forward the withdrawal date of low-efficiency light bulbs.

Implementation of the regulation of the Eco-design directive regulating the ban of incandescent light bulbs allows a reduction of annual final energy consumptions of 0.46 Mtep in 2013, 0.76 Mtep in 2016 and of 0.75 Mtep in 2020[87].

Implementation of the regulation of the Eco-design directive regulating televisions allows a reduction in the annual final energy consumption of 0.3 Mtep in 2020[88].

86 Assessment method described in Annex 3. This assessment does not include information, innovation and training programmes.
87 Source: SceGES assessment (see Annex 3)
88 Source: MEDDE assessment (see Annex 3)

– **Energy labelling**: the European directive 92/75/EEC of 22 September 1992, in replacement of the directive 2010/30/EC, fixes a regulatory framework that allows to impose, by way of delegated acts, the indication through labelling of information concerning the energy consumption and consumption of other resources of electrical products. The objective of the labelling is to orient the consumer towards energy efficient products within the energy plan and other environmental aspects (water, noise…); professionals are also targeted (builders, importers and distributors). A new energy label has been gradually implemented since 2010. On the new energy label, the energy efficiency of the appliance appears, as does the energy consumption in kWh per year. This new label introduces three extra classes to the energy efficiency levels: A+, A++, A+++.

  It is linguistically neutral; texts have been replaced with identical pictograms for all 28 EU Member States presenting specific indications for each type of appliance. It has become an indispensable tool when choosing equipment.

6.3. Development of energy efficiency services market

6.3.1. Methodology

In order to understand the energy efficiency services market in its totality and diversity, the ADEME commissioned at the end of 2013 a study to conduct a survey and market research of energy and energy efficiency services, starting with interviews conducted to different market players (providers, applicants, public funds). This study resulted in the results and conclusions presented below [89].

From a methodological point of view, this study is based on:

- The definition of energy value chains: The analysis of the Study on the Exploitation of real estate;
- A distinction between services **acting directly** on energy consumption (“Energy services” “Energy efficiency services”) and correlated services **contributing** to energy efficiency (upstream services, technical or financial services);
- A distinction between **energy services and energy efficiency services,** depending on the service proposed explicitly involves energy savings whether on a contractual basis or not (example: a maintenance contract versus an incentive contract);
- **The energy performance contract** (CPE), presented in a **transversal contractual form** in relation to the value chain, has also been defined.

89 All the data cited in this paragraph, with the exception of the section on the CPE, come from this ADEME/CODA STRATEGIES study !French survey and market research into energy efficiency services” - 2013.

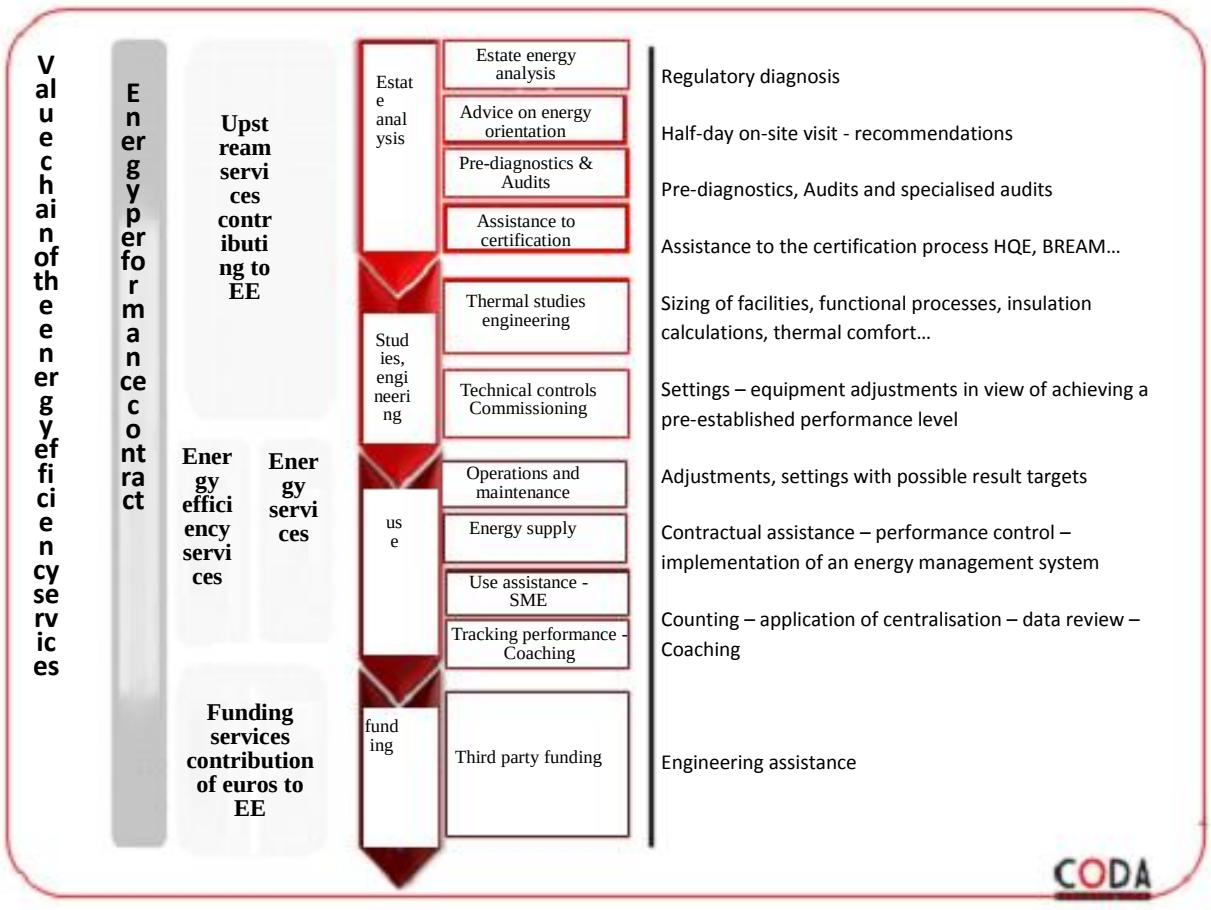


Figure 9. Value chain of energy and energy efficiency services (source: ADEME/CODA STRATEGIES 2013)

6.3.2. Summary of results

As illustrated by this value chain, the French energy and energy efficiency services market presents great diversity and heterogeneity. However, it is possible to identify the following main market segments:

a Additional upstream services, prior to energy efficiency measures:

- **DPE** (see "residential-tertiary" section): the number of DPE has been estimated at 600 000 annual diagnoses carried out in the first years of implementation of the system that became mandatory in 2006. However, this market decreased by 4% in 2013 for the second consecutive year: this market considerably suffered the drop in property sales and the perceived lack in reliability[90] and the fall in prices. The rate of current enrolment of DPE based on the DPEs managed by the ADEME allows to assess the annual market of DPE at around EUR **130 million in 2013** (1 million DPEs carried out annually at an average price of EUR 130). This market could increase to EUR 147 million in 2017.
- **Energy advice visits** are usually free services offered by the Chambers of Commerce and Industry or by Energy Information Points (see "residential-tertiary" section) resulting in recommendations. The equivalent market of these services has been evaluated at EUR **30 million**, corresponding to the equivalent of 300 full-time jobs created within this framework.
- The development of the **energy audits and diagnostics market** expected over the next years is based on a certain number of regulatory developments (obligation of audits for co-owned properties, obligation of audits in big companies…). In 2013, the energy audit market was evaluated at EUR **183 million** divided as follows:

90 A DPE reliability plan has since been implemented.

- Industrial audits: a market of EUR 54 million in 2013, that should see a steady growth due to the obligation of audits in big companies introduced by the DEE.
- Tertiary audits: a market of EUR 80 million per year in 2013, based on the expressed desire of land owners, great sites and of the public sector to acquire more information on their land before starting renovation work.
- Residential audits: based on social housing, co-owned properties and private dwellings, the residential audit market was estimated at EUR 90 million in 2013.
- Audits/Diagnostics in the agricultural sector: a market of EUR 3 million per year in 2013, resulting in the implementation of an Energy Efficiency Plan for agricultural holdings.

– **The development and implementation of energy management systems**: the ISO 50001 standard appeared in June 2011 and since then around fifty companies have been certified in France. At the beginning, it was the energy efficiency service companies, thermal users and manufacturers of regulation systems that adopted this approach for their own business. Now, the biggest contributors are companies from the food industry, the pharmaceutical industry and the steel industry, as well as local authorities. In this last case, the ISO 50001 certification often falls within the more global framework of the elaboration of the PCET (see section on "exemplary role of the State and of territorial authorities"). The market players have shown a growing interest since mid-2013 and the number of certified companies should grow considerably. Currently, the market of services related to the ISO 50001 certification still remains strongly limited with a total amount estimated at EUR **1.8 million** for 2013. This market could reach EUR 7.7 million by 2017.

– **Engineering and thermal studies** associated with energy optimisation represented in 2013 almost EUR **1 450 million.** One can also cite emerging markets of thermal management and of *commissioning*[91] that generated respectively in 2013 a market of EUR 60 million and EUR 3 million.

b Energy and energy efficiency services associated to exploitation

– **Project Management Assistance** services: the extrapolation of data collected from certain players allows to estimate the impact of assistance services on exploitation at around EUR **25 million.**

– Energy efficiency services linked to **metering and sub-metering** represented in 2013 a market of EUR **144 million**, divided in the following way:

- Residential sector: the market connected to the **identification of heating costs** is estimated at EUR **25 million**; EUR **80 million** of the market can also be attributed to the identification of domestic hot water costs.
- In the residential sector: the **sub-metering non-residential** market represents in France almost EUR **39 million**. The market is in full expansion and all of these at a tertiary and industrial level. The evolution of the market is rapid and is based on both *start-ups* and conventional players. CODA Strategies estimate that the market will be more than EUR 126 million by 2020 (with services representing almost 70% of this amount).

Energy coaching[92] is an emerging energy efficiency service for which the amount of funds involved seems modest (in the order of EUR **2 million**).

c Thermal equipment providers

The services invoiced to the end client, in certain cases are integrated with a re-invoicing of the fuel purchased for the service. This part of the value has been isolated in the study carried out by the CODA Stratégies cabinet. The data presented below does not integrate this component (reported in the final summary table).

91 *Commissioning*: the set of procedures aiming at guaranteeing that the energy performance of a facility corresponds to the expected one.

92 Energy coaching is based on guiding building users (dwellings, offices, factories) towards better codes of practices and therefore towards optimal energy consumption in relation to the building's characteristics. This approach is particularly relevant within the scope of the installation of households in LEB or even BEPOS (positive energy buildings) dwellings, for which consumer behaviour has a significant impact on the energy performance of a dwelling.

- **Services connected to the use of collective boilers** (excluding energy supply):
  - Energy services: Medium-term contracts and result-based contract without incentives corresponded to a market of EUR **2.6 billion** in 2013.
  - Energy Efficiency Services: Contracts with profit that can be associated with energy efficiency contracts (as long as the user is involved in the search of an energy saving contract) represented a market of EUR **429 million** in 2013.
- **Energy services related to the use of heating networks** : services linked to the use of these networks (excluding energy supply) represented a market of EUR **875 million** in 2013.
- **Energy services related to the use of industrial cogeneration units** : services relevant to industrial cogeneration generate a market of EUR **235 million**.
- **Energy services related to the maintenance of individual boilers**: maintenance of individual boilers corresponded to an energy service market of EUR **1 088 million** in 2013.

d Electrical equipment providers

- **Energy services related to the use of public lighting** (excluding CPE): these services represent a market of EUR **405 million**, which corresponds to the value of maintenance services of public lighting equipment (repair of breakdowns, preventive maintenance and replacement of lights, surveillance and remote management of the public lighting system). The "energy efficiency" component is growing; maintenance companies are making more and more commitments on energy consumption, even commitments on the reduction of consumption at the end of the contract period. A part of this market therefore, could be considered as part of these energy efficiency services.
- **Energy services related to the maintenance of electrical installations with an energy impact**: the global market of electrical installations represents more than EUR 28 billion. Within this market, one can isolate maintenance services that have an energy impact (lighting, renovation of electrical panels, management of reactive energy…) representing up to EUR **1.2 billion**, that is 4% of the global market.
- The energy efficiency services market associated with **regulation and GTB equipment**[93] was estimated at EUR **50 million** in 2013.

e Energy performance contract

- Energy efficiency services via **energy performance contracts** (see section below): this type of contract has seen quite a surge over the past few years. The data shown below gives an idea of the projects involved. The corresponding market was estimated at EUR **133 million** in 2013 to which one must add EUR **56 million** relative to the CPE completed within the scope of the PPP[94] for public lighting.

  The distribution of the market according to the amounts invested shows that the extreme segments are those that generate greater revenue. Above all, these segments offer the possibility of creating an offer of equipment and installers that use the CPE formula to renovate equipment on-site, without taking on extensive work on the building.

93 Technical management of buildings
94 Public-private partnerships

Assessment of the Energy Performance Certificates depending on the amount invested (M€)

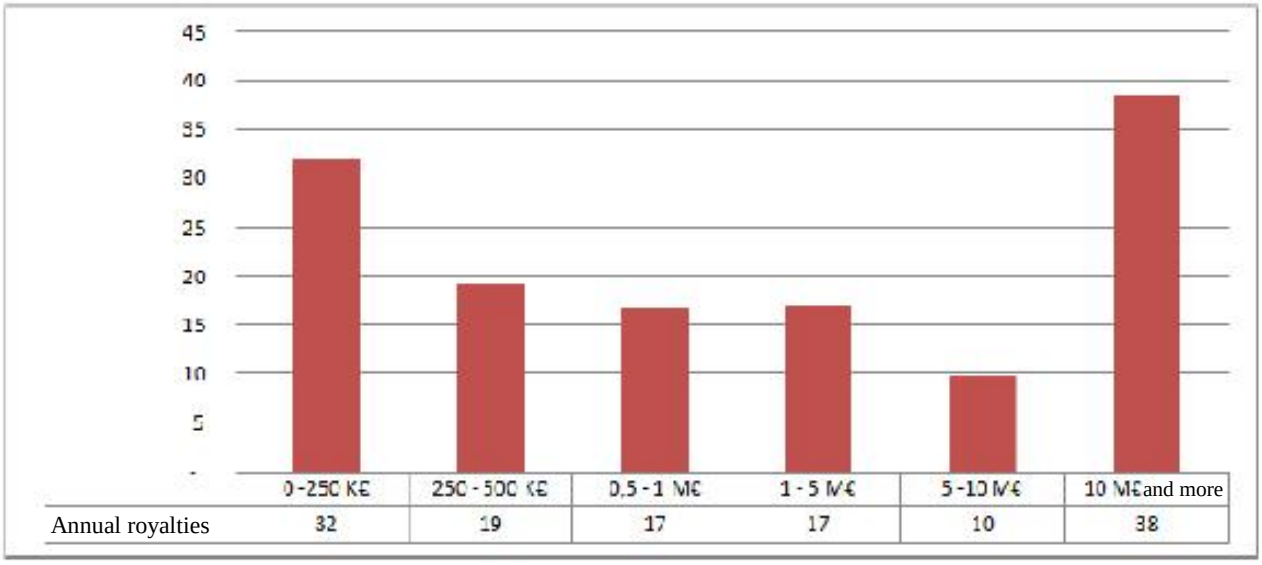


Figure 10. State of progress and analysis of the French market of energy efficiency services (Source: ADEME/CODA STRATEGIES - 2013)

Conclusion

In view of the above elements, one can estimate that the overall amount of the energy and energy efficiency services market at EUR **7.2 billion** in 2013.

	Energy supply	Services contributing to energy supply	Energy services	Energy efficiency services	Total
Analysis of estate		352			352
Studies and engineering		1 530			1 530
Specifications	2 661	-	6 384	841	9 887
Total	2 661	1 882	6 384	841	11 769

Figure 11. Summary of the markets related to energy and energy efficiency services (in millions of euros) (Source: ADEME/CODA STRATEGIES - 2013)

6.3.3. Factors encouraging and hindering the development of the French energy and energy efficiency services market

Over the past years, energy services have benefited from a set of factors favouring their development.

National regulations have evolved on the one hand to transpose European directives and on the other, under the voluntary effect of public authorities. The latter has translated in the adoption of the Decrees No2009-967 of 3 August 2009 and No. 2010-788 of 12 July 2010 through the implementation of the 2012 Thermal Regulations and soon through the presentation of a bill in favour of energy transition. This set of dispositions has played a fundamental role in leading to the emergence of new businesses (for example, the market of Energy Performance diagnostics, the development of Energy Performance Contract offers) or in accelerating the development of certain services (for example, energy audits). These regulatory provisions have notably changed the perception of users, investors and providers on the market. In fact, investors now believe that they run a major financial risk of devaluation of their real estate if they do not rapidly improve the energy performance of their property. The energy saving certification system has also had a particular

influence, both in building and multiplying the offer of energy services but also in improving a turn-around in demand, introducing a monetisation of energy efficiency.

The **evolution forecasts of energy costs** are now oriented in an upward trend, in particular due to the global energy context.

All these factors have increased the **dynamic aspect of the offer**. Finally, new businesses are introducing innovative offers for energy efficiency services and are introducing technical and commercial innovations.

Nevertheless, it remains true that a certain number of hindering factors continue to hamper the development of the energy efficiency services market:

- Users, clients and investors are faced with the **complexity** of certain markets or of certain contracts;
- Moreover, currently the short-term return **on investment in** certain cases, in particular for extensive investments and associated services is difficult to demonstrate.

The development of energy performance contracts

"Energy performance contracting" (CPE) is defined by directive 2012/27EU on energy efficiency in the following way: it is a "contractual agreement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, during which time investments (work, supplies or services) are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings".

The "Ortega" report[95]published in March 2011 has allowed to identify the main limitations to the development of the CPEs and favour its boom. In particular, following the appearance of this report, the CREM markets (see below) have been integrated by the Code of Public Procurement. Contract models have also been made available[96].

As regards to the residential sector, article 7 of the Decree No 2010-788 of 12 July 2010 introduced the obligation for private co-owners to study a CPE (or an energy saving work plan) following a mandatory audit (see "residential-tertiary" section).

As regards to the public sector, article 5 of the Decree No 2009-967 of 3 August 2009 has allowed to amend the law regulating public procurement in order to allow the implementation of CPE, in particular in the shape of a global market grouping together design, realisation and exploitation or maintenance services, when improvements in energy efficiency are contractually guaranteed. In March 2010, the Mission Supporting Public-Private Partnerships (MAPPP)[97] published within the context of the renovation of public buildings, a contract model adapting the CPE to the partnership agreement modalities. Finally, the Ministry of Energy published in July 2010 to the attention of public persons and operators, a guide to energy performance contracts relative to public work[98], so as to guide and enlighten those public players who wish to use CPEs to achieve energy savings.

Several possibilities are available for public authorities that wish to implement a CPE:

- via a public energy efficiency market[99]. Since Decree No 2011-1000 of 25 August 2011 that amended article 73 of the Public Procurement Code, the market can be global involving:
  - Realisation, exploitation, maintenance
  - design-realisation of work, exploitation and maintenance contracts
- via a partnership contract[100]

Moreover, the energy efficiency certification system also encourages the development of CPEs. Two specific standard operating sheets, for the residential and tertiary sectors, allow to apply low-interest rates to energy

95 They are available for consultation at the following website: http://www.planbatimentdurable.fr/IMG/pdf/rapport_contrats_de_performance_energetique_ortega_mars_2011.pdf
96 Contract models are available at the following links: http://www.developpement-durable.gouv.fr/document126820; http://www.economie.gouv.fr/files/directions_services/ppp/cpe_clausier_type.pdf
97 The MAPPP is an expert organisation of the Ministry of Economy that offers support to public persons who apply for support in the realisation of public-private partnerships. The contract model can be downloaded from http://www.ppp.bercy.gouv.fr/cpe_clausier_type.pdf.
98 Downloadable from http://www.developpement-durable.gouv.fr/Guide-du-contrat-de-performance.html
99 See Public Procurement Code and ordinance No 2005-649 of 6 June 2005.
100 Ordinance No 2004-559 of 17 June 2004

saving actions carried out within the context of a CPE.

Ongoing considerations

The Sustainable Building Plan has considered the issue of guaranteeing energy performance. In fact, in 2012 it published an "Energy Performance Guarantee" report. This report concludes that it is necessary to distinguish two types of guarantee:

-an intrinsic **energy performance guarantee** (GPEI- garantie de performance énergétique intrinsèque) will be elaborated at the moment of conception. The provider engages in a maximum level of "conventional" energy consumptions according to a use scenario. The outline of this guarantee will be based on the five utilities defined in the 2012 Thermal Regulations. It is intrinsic to the quality of the building and does not depend on user's behaviour.

- **the guarantee of energy results** (GRE- garantie de résultats énergétiques) will incorporate the exploitation and use of the building. This time the provider engages in a maximal level of actual energy consumption, expressed in final energy that can be measured with a simple method.

A work group has been set up in order to establish provisions that aim to create the necessary conditions to give constructors a ten-year guarantee also ensuring energy performance issues. The report was published[101] on 17 June 2013 and concludes that the ten-year responsibility must be delineated taking into account only the conventional consumption with regards to the 2012 Thermal Regulations (5 utilities). In order to achieve this, it is necessary to amend the law to change the Construction and Housing Code in order to introduce this guarantee and lead to consumptions exceeding a threshold fixed by the decree.

It is also necessary to amend the standard clauses applicable to structural damage insurance contracts in the Insurance Code, in order to set out in particular, expertise conditions, as well as insurance claims regarding problems in consumption energy.

The group also agreed on the need to create:

- a GPEI Charter with which all players commit to respecting the GPEI methodological guide that lists 60 measures to be achieved throughout the project to guarantee the respect of the ensured performance.

- an SED (simulation énergétique dynamique - dynamic energy simulation) calculation tool respecting minimal specifications, in order to "update the data of each phase of the project and to maintain a cap on guaranteed consumptions".

6.4. Generation of own-consumed renewable energy

The National Action Plan in favour of renewable energy[102], forwarded to the European Commission, describes France's support policy for the development of renewable energy, as well as development objectives. Among the renewable energy sectors considered, only the thermal **solar power** and **renewable energy from heat pumps** (PAC) can be considered by France as own –consumption and thus participate in the improvement of energy efficiency pursuant to Annex III of the Directive 2006/32/EC103.

For the collective housing, tertiary, agricultural and industrial sectors, the main national system for financially supporting the development of renewable heat is **represented by heat funds**, implemented by article 19 of Decree No 2009-967 of 3 August 2009 of the programme relative to the implementation of the Grenelle Environmental Roundtable and with an annual envelop of around EUR 220 million. Run by the ADEME, it offers support through investment aid for the development of the use of biomass, geothermal energy, solar power, recovered energy, as well as for the development of heat networks using these forms of energy. The procedures to award these aids are two: call for projects "BCIAT"[104] for biomass projects in the industrial, agricultural and tertiary sectors with more than 1000 tep/year and regional "one-shop" aid for all other projects of a certain size complementary to aid provided by the CPER for smaller size projects. Almost 2 500 projects have been funded since 2009 with an annual production of almost 1120 ktep of renewable energy.

101 http://www.apogee.oxatis.com/PBHotNews.asp?CatID=2039539
102 Available on the MEDDE website: http://www.developpement-durable.gouv.fr/Politique-de-developpement-des,13554.html
103 Funding of photovoltaic energy is based on a high rate of generated electricity; this encourages the re-sale of the overall generated electricity. Some installations for the generation of renewable electricity (photovoltaic, eolic) are off the grid in existing isolated areas and are developing in particular, overseas but the energy generated remains low and was not taken into account here.
104 "Biomass heat tertiary agricultural industry"

a Development of solar energy

The multiannual scheduling of heat investments (called “heat PPI ”) expects a significant growth of the number of solar thermal collectors installed between 2006 and 2020. The fixed objective for the production of 817 ktep of renewable heat from individual solar thermal installations in 2020 translates into almost 30% of equipment in individual dwellings multiplying almost by 48, compared to 2005, the solar energy generation in this sector. In the field of collective installations (collective housing, tertiary housing), the expected growth of collective solar energy corresponds to a multiplication factor of 11 of the production in 2005 in order to achieve 110 ktep in 2020.

Financial aid for solar energy in the residential sector is integrated by a global policy for the development of renewable energy in the building sector (see Residential-tertiary section). Special emphasis has been placed within the 2012 Thermal Regulations, on encouraging the installation of individual solar water heaters for new private houses built from 2013. In the collective, tertiary, agricultural and industrial sectors, financial support for solar energy is guaranteed by the heat funds and by the CPER (see the “Exemplary role of the State and territorial authorities”).

The generation of renewable heat from solar power is growing with 133 ktep in 2012 against 49 ktep in 2005.

Finally, a call for expressions of interest launched by the ADEME in 2010 led to the presentation of 31 applications representing a total amount of work for new systems within the field of solar energy of more than EUR 600 million.

b Development of heat pumps

As for solar power, a significant growth in renewable energy generated by heat pumps thanks to heat PPI is expected by 2020. The objective of the total generation of renewable energy starting from PAC, in all sectors, was increased to 1 300 ktep in 2012 and to 1850 ktep for 2020 with a production in 2012 estimated at 1 227 ktep.

In the residential sector, financial support for the development of heat pumps falls within the global policy of financial support for the development of renewable energy in the building sector (CIDD, interest-free eco-loans, ESC). Financial support for geothermal energy saw a sharp rise in 2010 including the expenses fronted to lay underground heat exchangers within the bases of Sustainable Development tax credit in favour of geothermal heat pumps. In the collective, tertiary, agricultural and industrial sectors, financial support to geothermal heat pumps is guaranteed by the heat funds and by the CPERs (see “Exemplary role of the State and the territorial authorities”).

Since 2001 and until the operational implementation of the heat funds in mid-2009, aid granted for “exemplary operations”, even for demonstration operations and limited to fundamental operations with geothermal probes was integrated in the ADEME aid schemes. The creation of heat funds, implemented to facilitate the extensive diffusion of renewable heat generation operations has allowed to integrate the set of typical geothermal operations within the aid scheme for diffusion (geothermal energy from deep aquifers, geothermal energy from superficial aquifers, geothermal energy from probe fields) and as part of geothermal energy to broaden the range of eligible solutions using heat recovery operations from used water and/or sea water.

Organisation of the Geothermal energy sector

The development of geothermal energy has been identified by France as one of the priority sectors for green growth and in the fight against climate change and is subject to a **”green sector” approach”** (see Industry section).

The National Geothermal Committee was set up in July 2010 in order to accelerate the development of geothermal energy in France proposing measures and recommendations for the development of each form of geothermal energy. This work started with four priority issues: simplification of administration, quality, staff training and diffusion of information to all interested parties.

Finally, the French Association of Geothermal Energy Professionals, grouping together all the professionals of the sector, was set up in June 2010 with the objective of promoting geothermal energy businesses, techniques and productions in France and in Europe.

The regulatory developments in favour of the development of geothermal energy

Installations for the generation of renewable energy from geothermal energy can be subject to authorisation or declaration procedures within the framework of several legal texts, in particular the Mining Code and the Environmental Code.

A simplification of the legal framework relative to operations of little importance is underway through the creation of new regulatory texts that will come into force in 2014.

6.5. Raising awareness

Several information campaigns have been initiated and continue to be initiated in order to raise awareness within the general public regarding a reduction of greenhouse gas emissions and energy efficiency among which:

- **The "energy is our future, let's save it" "** message: introduced by decree and the Order of 28 November 2006, this slogan is obligatory for all advertisements of companies selling electricity, heating or cooling systems, solid, liquid or gas fuel or services related to the use of these forms of energy.
- The **eco-citizens site** of the ADEME[105], set up in 2009, allows to support individuals in obtaining the information they need in a more simple form. Since its launch, this site has received almost 1 million visits per year (1 112 431 visits for the year 2013). Structured around moments of daily life of the French population, this site is in great part interactive and also offers reports and extremely concrete information. It offers internet users various tools, such as practical guides, videos, surveys and links for further information. The most visited sections are: 1) How to finance my project, 2) My home, 3) My waste.
- The **Eco-Watt system** is also an important measure to raise awareness: it is an alert system (via email or text message …) encouraging the reduction of electrical consumption and has been gradually implemented since 2008 in those regions most at risk of power cuts during winter frosts (Brittany, Provence Alpes Côte d'Azur)[106]. In Brittany, a balance sheet published by the Electricity network[107] in occasion of the start of the 6th edition (2013-2014) shows that almost 49 000 players are already involved in this system and that 180 commitment charters have been signed by private or public establishments. It is expected that in the PACA, the system will be available for the first time for all regions in 2013.
- **Comparators** are also available for the public in order to identify the most energy-efficient equipment (cars, household appliances…) in line with the "**Topten guide**"[108]website: this guide is a WWF-France and CLCV (Consommation, Logement, Cadre de Vie – FR) consumer's association initiative. This purchase comparator, developed on the Swiss model is funded by the ADEME and is part of the European Euro-Topten network www.topten.info, also funded by the European Commission. Interest in this site is currently growing significantly, in particular due to the above-mentioned "Topten éco", signalling the most energy-efficient products from an energy efficiency point of view and at a lower price than the average market price.
- Moreover, Decree No2010-788 of 12 July 2010 (article 75) provides that legal persons governed by private law with more than 500 employees (250 overseas), as well as public legal entities employing more than 250 people, the State and the territorial authorities with more than 50 000 inhabitants must carry out by the end of 2012 and then every 3 years a **balance of their greenhouses gas emissions** (see Industry section).

6.6. Metering and billing

a Improvement of the quality of billing

Decree No.2006-1537 of 7 December 2006 relative to the energy sector and in particular, article 42, introduced into the Consumer Code a section dedicated to electricity and natural gas sectors. Among the provisions introduced in this occasion safeguarding the consumer there is the obligation for all electricity and

105 For further information please visit the website: www.ecocitoyens.ademe.fr
106 More details can be found at the following websites: http://www.ecowatt-bretagne.fr/ and http://www.ecowatt-provence-azur.fr/
107 Further information is available at the following links: http://www.ecowatt-bretagne.fr/wp-content/uploads/2013/11/EcoWatt-Bretagne-CP-26112013.pdf and http://www.ecowatt-bretagne.fr/wp-content/uploads/2013/11/EcoWatt-Bretagne-DP-26112013.pdf
108 For further information please visit the website: http://www.guide-topten.com/

natural gas providers to permit, at least once a year, a bill based on consumed energy. Consumers of electricity and natural gas also receive at least once a year a bill based on their actual energy consumption. This notably reflects the desire of the consumer to be able to spread its energy costs throughout the year: in fact, in France, almost half of all consumers have undersigned an option consisting in budgeting on a monthly basis their expenses receiving only one bill a year.

In order to reduce the number of bills based on an estimate of consumption and to better define these estimates, Decree No2010-1488 of 7 December 2010 regulating the new organisation of the electricity market in particular under article 18, has introduced two provisions : the first specifies that in the case of bills based on an estimated index, the estimate made by the provider shall appropriately reflect the likely consumption: the second introduces the obligation for providers to offer their clients the possibility of supplying information on their actual consumption, possibly under index form, to be taken into account in their invoices.

The ministerial decree of 18 April 2012 relative to electricity or natural gas bills, and their payment modalities and report conditions or recovery of overpaid amounts, specified the application conditions of these new obligations introduced by the decree of 7 December 2010. In fact, this decree imposes that each electricity or natural gas bill must show the period during which the consumer can send its indexes to be taken into account for the issuing of the next bill.

In order to encourage consumers to reduce their consumption levels, the same Decree of 18 April 2012 imposes for providers the obligation of showing on each bill the consumption history in kWh for the full year preceding the issuing of the bill thus allowing a comparison with the consumption of the previous year.

These obligations in the field of billing are accompanied by provisions that aim to facilitate the access of consumers to consumption data. In fact, through the transposition of the decrees 2009/72/EC and 2009/73/EC of 13 July 2009, the Decree of 7 December 2010 also implemented the right of the consumer to access his consumption data free of charge. The application decree of this legislative measure is being completed and will take into account the provisions provided for under article 10 of the directive 2012/27/EU of 25 October 2012 relative to energy efficiency.

The transposition of the provisions of this measure into the field of billing information will soon be the object of legislative provisions.

The deployment of smart meters is also underway with regards to electricity and gas.

b Electricity: deployment of Linky meters

The Prime Minister announced in July 2013 an initial deployment through ERDF of 3 million smart meters called Linky meters by 2016. Moreover, 35 million meters should be deployed by 2020. The call for offers for the first period was launched on 11 October 2013.

The new meter will allow to understand better the profile of user consumption (to know the load curve over 30 minutes) and will make the direct transmission of orders and information relative to consumption possible. In fact, Linky will allow to improve the quality of the service provided to the consumer (billing based on actual consumption data, remote metering and maintenance operations etc.). Therefore, the user will dispose of better information on levels of consumption.

The meter will finally allow to improve and accelerate diagnostics in cases of a malfunctioning of an electrical installation and more in general will allow to optimise the management of electrical installations.

Deployment will be accompanied by clear and straightforward information for each consumer (before, during and after installation) explaining the functions of the new meter and relative information systems and by raising awareness on consumption management issues.

c Gas : deployment of Gazpar meters

The Ministry of Economy and Finance and the Ministry of Ecology, Sustainable Development and Energy confirmed in August 2013 its support to the diffusion of the “Gazpar” smart meter, a project promoted by GrDF-Gaz Réseau Distribution France (French gas distribution network).

Smart meters are among the first steps towards smart energy networks. Gazpar transmits via radio transmission the index readings allowing to know in every moment the actual consumption of the client. Its

deployment will simplify billing: it will be directly based on actual consumption and will no longer require the use of estimates.

These new metres will also facilitate the achievement of energy savings and will help citizens better manage their consumption. For example, alerts could be transmitted when consumption exceeds a certain threshold. More broadly, it will allow the development of innovative diagnostic services and will facilitate the piloting of consumptions.

This system will also allow to improve the performance of network providers: reduction of direct purchase costs of data metering, reduction of claims, improvement of the knowledge of the number of meters.

Upon the issue of the call for offers procedures launched by the GrDF, the ministries could make the decision to give a formal and final approval of the deployment of the Gazpar meter, if the interest in this meter from the market and consumers is confirmed and compliant to the Energy Code. At the end of this process, deployment will involve 11 million meters by 2022.

In practice, the GrDF will initiate the deployment of the Gazpar smart metres with a pilot study of 150 000 metres installed in 24 municipalities representative of different situations encountered (type of consumer and urban configuration). At the start of this pilot study, which will last 1 year, the deployment of 11 million metres will be continued for 6 years, in all French regions to be completed at the end of 2020.

Moreover, GrDF promises to inform all members of the project regarding its objectives and benefits with the support of the public authorities. As with all the experiments carried out in 2010 and 2011, between 2014 and 2016 GrDF will implement local discussion groups gathering local authorities and licensing authorities, consumer associations, low-income housing organisations and all participating members who wish to take part, in each of the four areas involved in the pilot deployment (24 municipalities) with the objective of validating communication methods and guiding consumers involved in deployment in order to meet the objectives of the project and in particular to favour energy management.

6.7. Development of smart grids

The development of electric utilities and generation from renewable energy creates new constraints on electrical systems. These trends, together with the high price of primary energy sources and an awareness of climate issues at a national level, make a better management of electricity demand, a better pilotage and better efficiency of the whole electrical system necessary. The issues for the consumer and the citizen are three: improvement of the quality and continuity of the electrical supply necessary to allow the supply of the required services to the consumer, guarantee the safety of supply and the management of energy billing. In particular, the emergence **of smart electrical grids** will allow to respond to these issues and identify at the same time a strategic green sector for the French industry (see Industry section) and is also part of the 34 industrial plans announced in September 2013.

Within the context of the research funding plus future investments, four calls for expressions of interest (AMI) promoted by the ADEME have allowed the financing of 16 demonstration projects (EUR 83 million of public funding, total budget of EUR 304 million) covering all tension levels and flexibility sources (integration of renewable energy and energy storage in networks, pilotage of demand according to the energy and capacity of industrial, tertiary and residential consumers). The objective of these demonstration projects is a technical-economical validation of the new architecture of electrical systems and the identification of new business models, among which innovative rates facilitated by smart meters in view of large-scale deployment.

In parallel to these projects, in 2013, the CRE set up workshops and started electronic consultations in order to gather the positions of the participating parties on the regulations and regulatory blocks.

Premiums awarded to energy efficiency operators.

The Decree of 15 April 2013 aiming at preparing for the transition towards a clean energy system institutes a premium, financed by the contribution of electricity public services, granted to operators aiming at improving “the advantages created for the people, in particular regarding management of energy demand or energy saving”. A decree of the State Council fixing the methodology establishing the calculation rules or this premium is being developed.

Rural electrification and amortization funds for electrification charges (FACÉ- fonds d’amortissement des charges d’électrification)

Electric power distribution is subject to two distinct regimes: an urban regime and a rural electrification regime. Within the rural regime framework, the granting authorities, namely the municipalities or their public cooperation establishments (inter-municipal electrification unions), ensure the management of the development work of low-voltage networks, in other words of extension work, level of security and aesthetic improvement. This work is therefore financed by authorities. The objective of the **amortization funds for electrification charges** (FACE')[109] is to grant financial aid to granting authorities that carry out work to develop electric power distribution networks on the territory of municipalities considered as rural. These funds, created by the Finance Act of 31 December 1936, grant funding to those authorities managing rural electrification work. In particular, it is possible to finance energy efficiency work through the special "MDE (Management of electricity demand) –Isolated sites" programme whose objective is to manage the demand of electricity and the local generation of renewable energy (or other forms of energy in overseas departments) to avoid the reinforcement of more expensive networks.

6.8. Promotion of heating and cooling efficiency /Supporting cogeneration

6.8.1. A complete assessment of the potential of applying cogeneration to high performance and efficient heating and refrigeration networks.

In view of the assessment requested by paragraph 1 under article 14 of Directive 2012/27/EU, a fact-finding mission has been assigned to a consortium piloted by the SETEC Environment provider following a call for offers launched in July 2013. This mission aims to establish a description and a national mapping of demand and of existing and potential supply points, as well as the evolution of the demand of heating and refrigeration over the next ten years.

6.8.2. A cost-advantage analysis for the application of high performance cogeneration and efficient heating and refrigeration networks.

The national cost-advantage analysis will be based at first on a pluriannual scheduling of investments for the generation of heat (heat PPI) and electricity (electricity PPI) created in 2009 that analyses based scenarios and trends, the perspectives of the demand in electricity and heating and the development of cogeneration and of efficient heating networks. For cogeneration, the national cost-advantage analysis will also be based on the relationship relative to the national potential for the application of high-performance cogeneration submitted to the Commission in 2011 pursuant to the directive 2004/8 relative to cogeneration.

This work will be actualised by 2017.

The cost-advantage analysis of the installation pursuant to paragraph 5 under article 14 of the directive 2012/27/EU will lead to the creation of regulatory provisions for a new heating network or will have as its objective substantial renovation studying the possibility of valorising waste heat stemming from nearby industrial facilities. Thresholds will be fixed based on the quantity of waste heat available, its temperature and the distance between industrial facilities and heat networks. This analysis could be introduced in the authorisation regime of facilities classified for the protection of the environment.

The analysis of the national potential for the application of high-performance cogeneration submitted to the Commission in 2011 pursuant to article 6 under directive 2004/8/EC showed that cogeneration facilities structurally present for heat consumers in France a competiveness deficit compared to a separate generation of heat and a purchase of electricity from the network.

Pursuant to paragraph 4 under Article 14 of Directive 2012/27/EU, France will exempt facilities generating thermal energy, industrial facilities, heat networks and their facilities for the generation of energy with a total thermal output greater than 20MW resulting from a cost-benefits analysis in order to assess the costs and advantages of a conversion of these facilities into high-performance cogeneration installations.

6.8.3. Policies and measures for the development of high-performance

109 Further information is available at the following website: http://www.developpement-durable.gouv.fr/L-electrification-rurale-et-le.html

cogeneration and efficient heating and refrigeration networks.

Regarding cogeneration, the 2009 electricity PPI had forecast a reduction of the number of cogeneration facilities powered by natural gas and a growth of biomass cogeneration in particular with the replacement of facilities powered by natural gas.

Funding for natural gas cogeneration is granted through the obligation to purchase the electricity produced through cogeneration, which was recently adjusted by the Decrees of 9 and 11 October 2013 in order to comply with paragraph 11 of Article 14 of the Directive and its Annexes I and II in view of stabilising the existing number of facilities. The Decree of 9 October 2013 in particular provides for an increase of primary energy savings to 10% for new purchasing contracts.

Funding the generation of electricity through cogeneration from biomass depends on purchase rates or on calls for offers:

- The development of facilities of 5 to 12 MWe (starting from 1 MWe for sawmills) is supported by regulated purchase rates. The current purchase rate was reassessed in 2011 (rate decree of 27 January 2011). The rate provides for a premium expressed in Euros/MWh for projects achieving more than 50% in energy efficiency.
- The development of facilities with more than 12 MWe is supported by calls for offers, called calls for "CRE" offers. The first call for offers, CRE1, was launched in December 2003; the last one, CRE 4 was launched in July 2010. Energy efficiency is a project rating criteria, which encourages candidates to optimise the use of generated energy.

For efficient heat networks, the heat PPI had forecast an ambitious development in line with the European objective of 20% of renewable energy as part of the final energy consumption in 2020, aiming at a tripling of the number of equivalent connected dwellings and a major use of renewable energy and recovered energy. Within this framework, the support system for efficient heating and refrigeration networks is associated to several measures, in particular:

- A reduced VAT rate on the supply of heat with a 50% rate of renewable and recovered energy,
- Heat funds managed by the ADEME providing specific aid to networks powered mainly or in view of being powered mainly by renewable or recovered energy,
- The classification of resources allowing the mandatory connection of new buildings, or extensively renovated buildings to networks powered mainly by renewable energy or recovered energy,
- Adjustment of the maximum consumption of new buildings in cases of connections to low greenhouse gas emission heat networks.

6.9. Waste – Economic circular note

Even if waste management does not represent an economic sector directly identified in terms of final energy consumption, the **prevention of waste production** allows to reduce the energy consumption of all sectors linked to the production and commercialisation of goods and in particular of the industry and transport sectors. It also allows to reduce the energy consumption linked to waste collection, sorting and treatment.

The Framework-Directive on waste management (Directive 2008/98/EU) has established a prioritisation of waste management that all producers of waste must respect: first, to avoid the production of waste (prevention); then for re-use and recycling; after, other forms of energy valorisation and finally elimination.

To this end, numerous measures aiming at preventing the production of waste have been implemented, among which:

- Since 2012, all the territorial authorities responsible for the collection and treatment of household or similar waste must implement a local programme **for the prevention of household or similar waste**. This programme fixes objectives for the reduction of the quantity of waste and describes the measures implemented to achieve these objectives. Since 1 January 2009, in order to fund authorities to anticipate this obligation, the ADEME has implemented a support scheme implementing territorial plans and local prevention programmes. After four years of implementation, 65% of the French population is involved in a local prevention programme. These plans are becoming a regulatory obligation, the ADEME, as part of the recasting of its aid scheme, will soon put forward aid for those plans presenting ambitious waste

prevention plans. An ADEME guide will soon be available on this subject:

- Decree No2009-967 of 3 August 2009 provides that authorities implement by 2014 a **tariff incentive** scheme for public waste disposal services. A variable component shall be introduced: it will take into account the nature, weight, volume or the frequency of waste collection. In 2009, the ADEME financed pioneering authorities in the implementation of royalty incentives that allowed to put feedback to good use and facilitate generalisation. Decree No 2010-788 of 12 July 2010 (article 195) also introduced the possibility to experiment the implementation of a variable component of the tax on household waste collection;
- **Awareness measures** of the ADEME have been reinforced: a first awareness campaign for the general public entitled *"let's quickly reduce our waste",* was launched in 2005 and lasted 3 years and specific measures were carried out concerning:
    - Waste scheme for advertisements: 9 million *Stop Pub* stickers were made available to local authorities via the ADEME;
    - Reduction in the quantity of disposable shopping bags: their number was divided by 4 over 4 years.

  A second three-year awareness campaign was launched in 2009. The objective of this campaign was to promote the adoption of the most virtuous and simple gestures. "I'll rent tools", "I'll buy refillable products", "I'll use my own mug"... It is focused mainly on the prevention of waste production.

  The last campaign was launched in November 2013, with the creation of 3 new TV adverts broadcast to the general public[110].

  Moreover, since 2006, the **Waste Reduction Week** has been organised all over France. In 2009, the Waste Reduction Week was extended to the rest of Europe with funding from the LIFE+European programme. Numerous tools have been developed within this framework (communication kits) in order to broadly communicate prevention and waste reduction policies within the European Union and Member States (Directive 2008/98/EC of 19 November 2008). 12 682 actions of the SERD (European Week for Waste Reduction) were carried out in 23 countries during the 2013 SERD from 16 to 24 November of which 2 692 actions in France alone.

  Finally, the ADEME "-10% waste objective" operation launched in 2003 aims to set an example and achieve a domino effect, the prevention and valorisation of waste in companies. Today this operation has been completed and the ADEME can capitalise from the experience gained in using the document base that has allowed to elaborate exemplary action sheets and develop a toolbox for the diffusion of best practices.
- With regards to businesses, the legislation on **establishments classified for environmental protection** (ICPE- installations classées pour la protection de l'environnement) constitutes one of the application levers of the principle of waste prevention: impact studies requested within the context of the authorisation applications to use these facilities must evaluate the volume and the polluting characteristics of the waste produced by the facility, as well as the measures envisaged to suppress, limit and compensate inconveniences linked to exploitation and in particular in terms of eliminating generated residues.
- The **Eco-design** approach applied to companies also constitutes important leverage in order to take into account the complete life cycle of a product and to reduce at the source waste production and energy consumption.
- Activities for the **extension of the life cycle** of manufactured products (re-employment, re-use) contribute to minimising energy consumption. Also the development of new business models such as the service economy model (the purchase of use or of a service rather than the actual purchase of an asset, for example, car sharing of an electric car) allows to reduce the intensity of use of the material, energy consumptions and the generated waste at all stages of the life cycle of the products.
- **Reduction at the source** of waste production and the management of local waste (for example, organic material, inert building site waste of BTP- building and public works…), can generate important fuel savings thanks to the reduction or optimisation of waste collection networks. Territorial authorities are responsible for the collection of household waste and gains are expected through the adaptation of the frequency of collections that are on average still too high in France compared to our main European

110 http://www.reduisonsnosdechets.fr/

neighbours. An amendment of the collection Decree of 7 February 1997 is being prepared in order to give authorities the power to reduce the frequency of collections under certain conditions. Various software and optimisation systems of collection shifts have also allowed to adapt the means used to the actual filling rates.

At the end of 2013, the MEDDE submitted to the public its **National Waste Prevention Plan 2014-2020 project**. This plan elaborated together with the participating parties, targets all categories of waste (mineral waste, hazardous waste, non-hazardous and non-mineral waste) and all economic players (household waste, company waste, private and public service waste, public administration waste). Its ambition is to gradually break the link between economic growth and waste production and it constitutes leverage for the implementation of energy and environmental transition. In fact, it falls completely within the approach of the economic circular note as a tool for the evolution of our economic model towards a more sustainable model, not only environmental but also economic and social. One of the approved objectives is a 7% reduction of the quantity of household and similar waste produced per capita in 2020 compared to 2010[111].

Once waste production has been reduced to a minimum, it is necessary to continue to optimise the material cycle contained in the waste cycle in order to recycle it or eliminate it: this takes place thanks to recycling and to energy recovery from residual waste.

Waste recycling allows a significant gain in energy: recycling allows to preserve natural resources by reusing the material obtained from the waste and to reduce energy consumption, greenhouse gas emissions and the consumption of water linked to industrial production. For example, the production of secondary aluminium consumes only 5% of the energy necessary to produce primary aluminium.

The recycling statement in France prepared by the ADEME shows that in 2010, 15 million tonnes of recycled material were integrated in the production of 36 million tonnes of five materials (steel, non-ferrous metals, cardboard paper, plastic, glass). Recycling in particular has allowed to save:

- 20 million tonnes of CO_2 equivalent, around 3.6% of the French annual gross emissions;

-171 million m^3 of water, around 2.9% of the French net annual consumption.

In the field of energy savings, this study shows that in 2010, waste recycling allowed to achieve a saving of 106 million gigajoules of energy, around **2.53 Mtep**[112].

This study is still ongoing: the next results should allow to better understand if a similar amount of energy savings could be achieved every year.

Finally, intensification of material recycling indirectly translates into the generation of collection or sorting residues or residues from industrial procedures for the preparation of recycling. Certain fractions are too small and too mixed to extract them from recyclable materials. Therefore, the industrial sorting of packaging and paper, previously separated at the source by households, generates around 15 to 20% of sorted refuse which must be eliminated. Thermal valorisation from this type of waste can be achieved with different levels of performance of energy production. Research into energy efficiency can lead to the obtainment of solid recovered fuel, which will then be used in replacement of fuel sources (in the cement industry: a source for urban heating networks).

During the environmental conference in 2013, a round table was started on the topic of **the saving circular note** and the government adopted a roadmap of measures within this field[113].

6.10. Future investments

With an overall envelope of EUR 35 billion, Future Investments shall allow the financing of profitable assets and infrastructures for the research and development necessary for the economic development of France according to four strategic points: higher education and training, research, industrial sectors and SMEs, and sustainable development.

As of 1 January 2013, of the EUR 35 billion initially available in the Future Investments programme, EUR 28 billion were dedicated to projects and EUR 4.4 billion were in the process of being attributed or destined to finance other major Government priorities such as the thermal renovation of housing. EUR 2.2 billion were

111 For further information: http://www.developpement-durable.gouv.fr/La-Prevention-de-la-Production-de.html
112 Source: http://www2.ademe.fr/servlet/getDoc?cid=96&m=3&id=85913&p1=00&p2=0502&ref=17597, p.24 and
113 http://www.developpement-durable.gouv.fr/Les-enjeux-de-l-economie.html

dedicated to reorientation of which EUR 300 million to the launch of new calls of expressions of interest targeted by the ADEME for the key issues of energy transition.

The allocation of funds for new energy was done according to two main programmes:

a Institutes for energy transition (ITE- instituts pour la transition énergétique) managed by the National Research Agency (ANR)

The "institutes for energy transition (ITE)" programme (ex-institutes of themes of excellence for decarbonised energy) of the Future Investments aims to create a worldwide campus for technological innovation within the field of renewable energy, new energy technologies and energy efficiency.

These public-private research centres will create a structure base for research and innovation activities of the decarbonised energy sectors in line with the logic of the competitiveness clusters and with the priorities in the field of research on energy. These activities are divided according to permanent technological and economic strategies (work programmes of the duration of less than ten months), collaboration projects, common training activities and shared investments in particular in prototyping, study and demonstration facilities.

This programme has an envelope of EUR 1 billion financing up to 50% of the ITE activities. Project selection grouping together in the same location training institutes, private and public applied research laboratories and economic players, was carried out through two calls for projects in 2010 and 2011. The Prime Minister on 1 June 2011 approved two ITEs and then on 9 March 2012 another six ITEs.

b Experimentation demonstrations and platforms

The ADEME operates four measures within the Future Investments programme. In continuation of the Research Demonstration Funds, the objective of these measures is to finance technological demonstrations and platforms, selected within the framework of the Call for Expressions of Interest (AMI). During the period 2010-2012, a total of 31 AMI were launched giving rise to the selection of 115 projects (as of 18 June 2013). Overall, these projects represent a total budget of more than EUR 3 billion of which a public financing of EUR 940 million[114]:

- Technological demonstrators and platforms for renewable and decarbonised energy and green chemistry (EUR 1 125 million)

This measure can count on an envelope of EUR 1 125 million to finance demonstrator projects and technological platforms covering the sectors of solar, wind and marine power, geothermal energy, CO_2 capture, storage and valorisation, plant-based chemistry, advanced biofuels, hydrogen and fuel cells, energy storage, and positive energy blocks and buildings.

Following the AMI on Marine Energy in 2009, financed by the Future Investments scheme, 14 AMI were launched over the period 2010-2013 giving rise as of 31 December 2013 to the contractualisation of 39 projects, with more than 5 projects being granted Research and development funds.

- Economy circular note (EUR 210 million)

This action measure can count on an envelope of EUR 210 million to finance research and demonstration projects on topics related to depollution, eco-design, waste collection, sorting, recycling and valorisation.

Four AMI were launched over the period 2010-2013, and gave rise as of 31 December 2013 to the contractualisation of 13 projects.

- Smart electrical grids (EUR 165 million)

This measure can count on an envelope of EUR 165 million to finance research and demonstration projects on the integration of intermittent renewable energy (wind, solar, marine…) within electrical grids and on the development of smart products and services allowing the management of energy consumption.

Two AMI were launched in 2009 and 2010 within the framework of the Research and development funds and financed by this measure. A third AMI was launched in 2011. A fourth AMI was launched for the period March-December 2012.

The third AMI gave rise as of 31 December 2013 to the contractualisation of 6 projects, with more than 8

114 This financial aid was granted as subsidies and in the majority of cases in the form of repayable advances. Equity investments of prudent investors are also possible.

projects funded by the Research and development funds.

- Vehicles of the future (EUR 950 million)

This measure can count on an envelope of EUR 950 million to finance technology demonstration projects and innovative and sustainable solutions in the field of travel.

Following the Call for expressions of Interest (AMI) for Demonstrator and Research Funds and financed by the Future Investments scheme, 12 AMIs were launched over the period 2010-2013 and gave rise to the contractualisation as of 31 December 2013 of 28 projects, with more than 5 projects financed by the Research Funding.

6.11. Research and innovation

a The National Research Agency (ANR) supports collaborative research projects

Within the field of new energy and energy efficiency technologies, the measure targeted by the National Research Agency (ANR) has allowed to invest almost EUR 70 million a year since the creation of the agency. Since 2011, five programmes have been the subject of calls for projects and allowed co-funding in 2012.

- 14 projects within the field of renewable generation and management of electricity (PROGELEC- PROduction renouvelable et Gestion de l'ÉLECtricité);
- 10 projects within the field of Energy Efficiency & Decarbonised Systems (SEED- Systèmes Energétiques Efficaces & Décarbonés);
- 10 projects within the field of Sustainable Transport and Mobility (TDM- Transports Durables et Mobilité);
- 12 projects within the field of Sustainable Towns and Buildings (VBD- Villes et Bâtiments Durables).
- The Biomaterials and Energy programme was not the object of a call for project in 2012.

b Closer to commercialisation, the Interministerial Single Funds (FUI) support collaborative projects of competitiveness clusters.

The FUI finances collaborative research and development projects of competitiveness clusters. Oriented funding to support applied research projects focusing on the development of products or services likely to be placed on the market in the short or long-term.

The funds could count on EUR 600 million for the period 2009-2012 of which EUR 495 million for R&D projects and EUR 105 million for innovation platforms. The projects likely to be financed are considered based on their innovative character and on the economic activity that they could generate upon the launch of a call for projects.

c The national funds dedicated to the Eurogia+ funding scheme financing industrialisation projects with partners from at least two European member states.

Created in 2008, Eurogia+ is a scheme relative to energy dedicated to all those technologies trying to reduce carbon emissions. It involves both the use of hydrogen or renewable energy (wind, biomass, geothermal, solar, hydraulic, etc.) or energy efficiency. It gives French businesses the possibility of taking part in a collaborative R&D project together with European partners. 17 states (Austria, Belgium, Croatia, Denmark, Estonia, France, Germany, Hungary, Iceland, Ireland, Israel, Monaco, Poland, Slovenia, Spain, Turkey and Norway) are taking part in offering financial support to the players of the project.

In 2012, three new projects were approved bringing to 18 the number of projects co-financed by France within this framework for a total budget of EUR 77million.

d 2011 Satellite Applications Plan

The 2011[115] Satellite Applications Plan is a strategic and operational tool of the MEDDE to improve the

115 http://www.developpement-durable.gouv.fr/IMG/pdf/Ref_-_Plan_d_applications_satellitaires_2011.pdf

actualisation of its missions by making a justified use of satellite applications. Three identified measures of this plan are on energy management, energy demand and the reduction of greenhouse gas emissions:

- Within the “Sustainable coast management” programme, the “Implementation of a pilot project for the use of littoral generated energy” has an exploratory objective and is related to the generation of energy;
- Within the “Sustainable mobility” project, the “Evaluating the possibility of satellite navigation systems for the tarrification of mobility and identification of the possible conditions for their deployment” measures and the “Evaluating and valorising the potential of satellite navigation systems favouring automatized eco-driving and identification of the conditions for their deployment in France and in Europe” measures also have an exploratory objective and are related to energy savings. Attention shall be paid to progress allowing to carry out inventories of the emission of pollutants into the air (mainly greenhouse gases, as well as regulated pollutants,) based on physical measures rather than on an economic estimates.

6.12. Domestic Consumption Tax on Energy Products (TICPE- Taxe Intérieure de Consommation sur les Produits Energétiques) – Increase of rates according to CO_2 content

Taxation has a significant impact on energy consumption, in particular within the transport sector. The Domestic Consumption Tax on Energy Products (TICPE), which has an impact on the consumption of motor fuel and heating fuel, represents the fourth budgetary revenue of the State (EUR 13.7 billion forecast for 2013), before VAT, income tax and corporation taxes. Duties collected on energy products fall within the directive 2003/96/EU that establishes minimum levels of taxation. These are 33€/hl for gas oil and 35.9€/hl for petrol. France receives by virtue of these two fuels, values that are higher than Community minimum values: therefore, the TICPE national[116] rates in 2013 applied to gas oil and petrol at the pump are respectively 42.84€/hl and 60.69€/hl.

Due to this variance between the minimum Community and the TICPE rates in France, the consumption of motor fuel in the long-term has thus significantly gone down compared to a situation in which the French rates would be aligned to minimum Community values.

This reduction is estimated for gas oil at the pump at **4.9 Mtep** per year in 2013, 4.3 Mtep per year in 2016 and 4.1 Mtep per year in 2020 and for petrol at the pump at **0.5 Mtep** per year in 2013, 0.4 Mtep per year in 2016 and 0.3 Mtep per year in 2020.

Forecasts for 2016 and 2020 must however be considered with caution: the evolution of barrel prices as well as the dollars/euros exchange rate, that are in fact fundamental determinants of the pump price, are subject to great variability.

The price-elasticity of motor fuels in the long-term has been estimated at -0.7, in other words, an increase of 1% in price induces a 0.7% decrease in long-term consumption. This is a value that falls within the forecast range of the CGDD (from -0.6 to -0.8) in the “Motor fuel Consumption: effect of prices in the long-term according to type of population” report of April 2011.

A hypothesis on the evolution of prices per barrel needs to be made for forecasts for 2016 and 2020. For this reason, a hypothesis of the evolution of the international price of imported petrol per barrel must be made through reference “Prospective Energy – Climate – Air Scenarios for France for 2030” April 2013 table 7 (p.14): 65€10/bbl in 2010, 89 €10/bbl in 2015, 98 €10/bbl in 2020.

Moreover, the Finance Act for 2014 has introduced a progressive and proportional TIC (Domestic Consumption Tax) rate for the carbon dioxide content (CO_2) of the different energy products. The tax rate will be fixed for each project to keep a check on its impact on greenhouse effects, integrating the value of CO_2 content in the product, starting from a carbon tonne value of EUR 7 in 2014, EUR 14.5 in 2015 and EUR 22

116 It is a national TICPE rate except for adjustments made by the regions.

in 2016.

This system gets inspiration from the proposal for reform of European energy taxation proposed by the European Commission and supported by France.

In 2014, three products subject to excise duties, comparatively the least taxed products in relation to their carbon content, will see their level of taxation increased: natural gas, heavy fuel and carbon. The expected return of this measure is of EUR 340 million in 2014, EUR 2.5 billion in 2015 and then EUR 4 billion in 2016 which will contribute to respecting the Public Finance strategy based on the stabilisation of the tax ratio.

The introduction of a carbon fraction at 7€/tCO_2 (plus 14.5 €/t in 2015 and 22€/t in 2016) will have an impact on energy savings within the two main sectors that emit carbon (in the industry and energy production sectors, regulated by the European Emissions Trading Scheme - ETS) that are the road transport and residential-tertiary sectors.

IV. ANNEXES

1. Annex 1: Abbreviations and acronyms

ADEME: Agence de l'environnement et de la maîtrise de l'énergie -French Environment and Energy Management Agency

AMI: Call for expressions of interest

Anah: Agence Nationale pour l'Habitat- National Housing Agency

ANRU: Agence Nationale pour la Rénovation Urbaine: National Urban Renewal Agency

LEB: low energy buildings

ESC: energy saving certificates

CIDD: crédit d'impôt développement durable- sustainable development tax credit

CPE: contrat de performance énergétique-energy performance contract

CPER: Contrats de Projets État Régions-State - Region project contracts

DGEC: Direction Générale de l'Energie et du Climat - Directorate General for Energy and Climate

DGALN: Direction Générale de l'Aménagement, du Logement et de la Nature – Directorate General for planning, housing and nature

EED: Directive 2012/27/EU on energy efficiency

ESD directive: DIRECTIVE 2006/32/EC on energy efficiency for final use and energy services.

SCEQE Directive: European directive 2003/87/EC establishing an emission trading scheme within the European Union.

DPE: Diagnostic de Performance Énergétique - Energy Performance Diagnosis

ENR: renewable energy

ERP: public-access buildings

ERDF: The European Regional Development Fund

GES: greenhouse gases

NOME law Decree No 2010-1488 of 7 December 2010 focusing on the new organisation of the electricity market

Pope law: Programme law No 2005-781 of 13 July 2005 fixing the guidelines of the energy policy

MAAF Ministère de l'Agriculture, de l'Agroalimentaire et de la Forêt - Ministry of Agriculture, Food and Forestry

MEDDE Ministry of Ecology, Sustainable Development and Energy

Mtep: megatons of oil equivalent

OEET: Observatoire énergie-environnement des transports - Transport Environmental Energy Observatory

PAC: pompes à chaleur - heat pumps

PCET: plan climat-énergie territorial - territorial climate-energy plan

PLS: Prêt Logement Social - Social Housing Loans

PLU: Local Urban Plans

NEEAP: National Energy Efficiency Action Plan

PREBAT: programme de recherche et d'expérimentation sur l'énergie dans les bâtiments - research and experimentation programme for energy in buildings

PREH: Plan de Rénovation Energétique de l'Habitat - The housing energy efficiency improvement plan

PRIS: Point Rénovation Info Services – Renovation Information Service Points

PTZ: Prêt à Taux Zéro – interest-free loans

RT: Thermal regulations

RTAA DOM: Réglementation Thermique, Acoustique et Aération applicable dans les Départements d'Outre-Mer - Thermal, acoustic and aeration regulations applicable to French Overseas Departments

SceGES: assessment tool of policies and measures "Scénarisation des Emissions de Gaz à Effet de Serre - Greenhouse gas emissions scenario"

SCOT: Schémas de Cohérence Territoriale - Territorial coherence schemes

SEE: Services d'Efficacité Energétique - Energy Efficiency Services

SOeS: The MEDDE's Observation and Statistics Office

SRCAE: Schéma Régional Climat Air Energie - Energy, Air and Climate Regional Scheme

TCSP: Transports Collectifs en Sites Propres - Reserved Public Transport Corridors

TICPE: Taxe Intérieure sur la Consommation de Produits Energétiques - Domestic consumption tax on energy products

2. Annex 2: Annual report

The tables below summarise the figures provided for the year 2012 pursuant to article 24 of the directive 2012/27/EU.

Statistical data on energy consumption

	2012	2011	Evolution
Gross final energy consumption	246.46	246.52 Mtep	-0.02%
Gross final energy consumption	153.47	148.67	+3.2%
Sectorial final energy consumption*:			
- Final energy consumption for the industry*	32.1	32.5	-1.2%
- Final energy consumption for the transport sector*	49.2	49.6	-0.8 %
- Final energy consumption for the residential sector*	46.0	45.9	+0.3%
- Final energy consumption for the tertiary sector*	22.6	22.9	-1.0 %
- Final energy consumption for the agricultural sector*	4.4	4.4	+0.7

* adjusted for seasonal variations

The increase in the gross final energy is explained mainly by the increase in heating consumption in 2012 compared to 2011. In particular, in the month of February, France experienced exceptional frost conditions with an average temperature of 1.5 °C, being 3.5°C less than the seasonal average. The climate stringency index for 2012 increased to 0.973 against 0.812 in 2011.

In the residential sector, the energy consumption of the residential sector, adjusted for climatic differences, is slightly on the increase with +0.3% in 2012 after +1.2% in 2011. The consumption of petrol products (-7.0%) and gas (-1.7%) are decreasing. As regards to electricity, consumption has increased by 4.0%. For the record, it decreased in 2011 for the first time since 1970, date in which the series of energy balance sheets was introduced. This rebound is placed within the long-term trend: +2.3% per year on average between 1997 and 2012. It can be explained in part by a very hot summer in 2011 that favoured the use of air conditioning. Adjustments for climatic differences were unable to neutralise this effect, because adjustment currently only concerns the effects on the cold temperatures on energy consumption.

As regards to agriculture, in 2012, the final energy consumption of the agriculture-fishing sector represented 4.42 Mtep, 2.9% of the final energy consumption. This consumption has increased by +0.7% compared to 2011, when agricultural production decreased in volume according to the provisional agricultural accounts data of the Insee – National Statistics Office.

Petrol products represented 78% alone of the sector's energy consumption, with 3.45 Mtep in 2012. It is represented mainly by domestic fuel and non-road gas oil. Its consumption increased by +0.8% compared to 2011.

Progression was equally moderate for other forms of energy. Gas consumption increased by +0.5% in 2012; electricity consumption remained stable in 2012 at 0.69 Mtep, after a +5.1% increase in 2011.

Fishing represents 7% of the energy consumption of the entire agriculture-fishing sector. This consumption increased by +1.0% in 2012. It is represented mainly by the gas oil consumed by fishing boats. The consumption of this sector experienced a significant -7.7% decrease on annual average between 2003 and 2008. Since then, it has stabilised at around 0.29 Mtep.

Other indicators:

	2012	2011
Added gross value for the industry*, in constant euros 2005[117]	224.3	226.8 billion EUR
Gross adjusted value for services (including transport) in constant euros 2005	1 295	1 288 billion EUR
Available revenue of households[118]	1 338.4	1 326.3 billion EUR
Number of households	28.490.000	28.208.000
Gross domestic product, in constant euros 2005[119]	1 808.8	1 808.6 billion EUR
Gross electricity production generated by thermal power plants[120]	35.1 TWh	36.3 TWh
Gross electricity production via cogeneration[121]	19.2 TWh	18.6 TWh
Production of heat via thermal electricity plants[122]	Not available	Not available
Gross heat production via cogeneration facilities including recovered heat of industrial origin	84.6 PJ[123]	146.7 PJ
Consumption of heating fuel generated by thermal power plants[124]	348.4 PJ	400.0 PJ
Number of passenger-kilometres (pkm)[125]	984.9	984.1 billion

117 http://www.insee.fr/fr/themes/comptes-nationaux/tableau.asp?sous_theme=5.2.2&xml=t_6202
118 http://www.insee.fr/fr/themes/comptes-nationaux/tableau.asp?sous_theme=2.1&xml=t_2101
119 http://www.insee.fr/fr/themes/comptes-nationaux/tableau.asp?sous_theme=1&xml=t_1102
120 Gross electricity production generated by power plants (including auto-electricity generators)
121 Gross electricity production generated by cogeneration plants (including auto-producers)
122 Waste heat generated by thermal power plants is not compatible with international statistics (IEA-International Energy Agency and EUROSTAT questionnaires). The main waste heat is generated by nuclear plants (it represents around due thirds of generated energy, against only one third for electricity). This vapour is not commercialised in France (it is entirely dissipated into the atmosphere and rivers, unlike other EU countries where it is used to supply district-heating networks) thus, it is not compatible according to the IEA and EUROSTAT. Moreover, the measurement of this heat would face methodological difficulties involving the necessary coefficient techniques for an approximate calculation. For classic thermal power plants (fossil-fuel powered), the heat generated is less significant, but one can no longer not measure it and one cannot make it compatible for the same reasons.
123 In compliance with the instructions of the IEA, only the heat sold by auto-producers has been accounted for since 2012; the heat produced and auto-consumed by the auto-producers within the scope of their industrial activities is no longer taken into account. Since the break in the series, backward projections for 2011 have no longer been calculated.
124 Consumption of heating fuel generated by power plants (including cogeneration) including auto-generators of electricity
125 Transport accounts for 2012, p.47

Number of tonne-kilometres (tkm), including pipelines[126]	323.7	342.3 billion
Population (thousands of people)[127]	63 556	63 249

*Manufacturing industry, extractive industries and others

Complementary data compared to the 2013 annual report:

	2012	2011
Consumption of fuel generated by cogeneration power plants[128]	260.2 PJ	288.4 PJ
Losses in the transmission and distribution of energy[129]	77.19 Mtep	81.43 Mtep
Heat production from district heating plants[130]	58.6 PJ	Not available
Consumption of heating fuel in district heating plants	77.9 PJ	Not available

Finally, information relative to the transposition of articles 5 and 7 is given within the text of PNAEE (see section entitled “Exemplary role of the State and authorities” and the section on “Energy” and in annex 5.

126 Transport accounts for 2012, p.31
127 http://www.insee.fr/fr/themes/document.asp?reg_id=0&ref_id=ip1429#inter1, http://www.insee.fr/fr/themes/tableau.asp?reg_id=0&ref_id=NATnon02145
128 Including auto-producers
129 This figure is overestimated and corresponds to the “losses and adjustments” heading of the energy balance sheet: this item includes network losses (electricity) and “statistical adjustments” for energy corresponding to the difference between the total amount used and the total amount available.
130 It is the heat produced by district heating plants, the net energy fed into the network (not taking into account 4PJ of purchased heat mainly in low-capacity incineration plants) and injected also into the heat network.

3. ANNEX 3: Assessment methods

3.1. Air-energy-climate prospective scenarios: methodology used to forecast the energy consumption by 2020

1. Macro-economic data of the financial year

Macro-economic data was obtained in great part with the aid of the ENERDATA and ERASME teams based on the report prepared by the ERASME team for the Strategic Analysis Centre (CAS): “New growth sectors” The calculation assumptions of these different scenarios are summarised below.

- International context

The assumptions made for the international macro-economic data (apart from Europe) are the results of the latest OCDE (Economic Outlook, last updated in June 2012) work. The SEURECO/ERASME team for the creation of “The new growth sectors” scenarios for the CAS also collected these data; data is in line with the assumptions made for France.

- Projected growth path for France

The reference scenario of the DGEC study follows the growth figures of the “constrained” scenario, with an average annual growth rate of 1.9% for the period 2010-2020. It should be noted that this figure, which is higher than what one finds in other types of work, could be explained by taking into account the pension reform and the new demographical INSEE scenario (higher labour force projections).

Table 7- Economic growth forecasts for France (constrained CAS scenario)

	2010	2011	2012	2013	2014	2015	2015 - 2020:	2020 -2025:
France	1.5	1.7	1.0	1.9	2.1	1.7	2.1	1

- Demographics

During the previous financial year, the “high fertility” scenario of the INSEE, updated in 2006, was used. In fact, the latest population data indicate that the central population growth scenario for 2010 had already been achieved in 2008.
For this financial year, the last update of the INSEE scenarios was approved in its Central Scenario variant. Moreover, data corresponding to the French overseas departments and the French Overseas Countries and Territories are available.

Table 8-Demographic forecasts (INSEE 2010, central scenario)

Expressed in thousands of inhabitants.	2000	2010	2020
Mainland France	58858	62881	65962
Réunion	716	824	918
Martinique	384	403	415
Guadeloupe	388	404	409
Guyana	162	238	330
New Caledonia	211	249	287
Other overseas communities	406	492	607

Based on these figures, the population of mainland France will increase to almost 66 million inhabitants by

2020.

- **Sectorial growth**

The SEURECO/ERASME team has supplied associated sectorial growth data in line with the national projections of GDP.

Table 9- Growth of added sectorial values (constrained CAS scenario)

	2010 -2015	2015 - 2020:
Agricultural sector	0.8 %	1.3 %
Industry sector	2.6 %	1.3 %
Construction sector	2.1 %	2.5 %
Services sector	1.6 %	2.2 %

- **Energy prices**

Assumptions on the price of fuel were the same as those forecast by the International Energy Agency (IEA) in the World Energy Outlook 2011 within the "Current Policy" scenario.

Table 10-Assumptions on energy prices (IEA WEO 2011)

			2010	2015	2020
Oil	Current policies	€10/bbl	65	89	98
Gas (European market)	Current policies	€10/Mbtu	6	8	9
Coal	Current Policies	€10/tonne	83	87	91

- **Coal price**

Assumptions on the price of coal were differentiated on the one hand based on different measurement scenarios and on the other, on the ETS sectors and non-ETS sectors. For the sectors covered by the ETS, the estimated value was issued by the World Energy Outlook (WEO) 2011 of the IEA in order to be in line with the assumptions made for the price of fossil fuels. For the non-ETS sectors, no carbon price was imposed for 2020 for any of the scenarios.

Table 11-Summary of approved carbon prices

€10/t	2020
ETS	25
Non-ETS	0

- **dollar/euro exchange rate**

Since the exchange rates are assumed to converge in the long-term towards their level of purchasing power parities (PPA-parité pouvoir d'achat), the euro-dollar exchange rate is fixed at 1€ = 1, 2 US$, simulating a backward trend towards the parity of the two currencies.

2. Reference energy scenarios: Enerdata, MedPro, POLES: general functioning

Energy scenarios are achieved thanks to the association of the technical-economic MedPro model

developed by ENERDATA and the POLES model.

Med-Pro is a technical-economic simulation model of the long-term final energy demand based on a detailed representation of the energy consumption by sector, use and type of energy.
Moreover, the POLES model is a simulation model of the world energy system by 2050. It is a recursive simulation model: starting from an initial point and then year by year, evolution is achieved on the one hand, by progressive adjustments of the offer and demand and on the other, by price adjustments.
The use of the POLES model is here necessary to:

- Establish comprehensive prospective energy balance sheets for France, integrating the offer and demand of energy;
- Take into account the impact of European and world energy trends especially through international prices and environmental constraints on the French balance sheets.

3.2. Bottom-up assessments

3.2.1. 2012 Thermal Regulations:

a Presentation of the measure

New thermal regulations, the 2012[131]thermal regulations (TR), have reinforced requirements concerning the thermal performance of new buildings: all new buildings having applied for a building permit after 1 January 2013 will have to achieve a primary energy consumption lower than the threshold of 50 kWhep/m²/year.

b Assessment sources and assumptions

A DGALN study showed that in order to respect the requirements of the 2012 TR (50kWhEP/m2/year), a certain number of technical solutions have emerged (isolation mixes + equipment). Among the dozen technical solutions studied by the DGALN, three have emerged in terms of costs. Therefore, it could reasonably be supposed that the large majority of new buildings must respect the 2012 TR doing so by following one of the three technological solutions.

- Joule heating and thermal ECS (operating thanks to extracted air, with dual flow ventilation) + improved LEBs. This solution is the least expensive in terms of investment but still represents an overall cost over 20 years because it needs one subscription instead of two (electricity+gas) and does not require heating maintenance costs.
- PAC heating + thermal ECS + classic LEBs
- Gas condensation boilers + ECS backup solar heating + classic LEBs

In order to be able to carry out an assessment with SceGES of the impact of the 2012 TR, the following assumptions were made:

- The time between the application for the building permit and the occupation of the dwelling is of one year. Therefore, the measure will give results from 1 January 2014.
- All new dwellings built after 1 January 2015 use one of the three solutions cited above in order to meet the 2012 TR
- These three solutions are used equally, each representing 1/3 of the market.
- The number of buildings going beyond the TR (HPE=TR-10%, THPE=TR-25%) progressively increases over the years.

Following the assumptions mentioned above, the assessment cannot produce results for the year 2013.

c Results

Implementation of the 2012 TR will allow an annual energy saving of 1.15 Mtep in 2020.

131 See decree No 2010-1269 of 26 October 2010 relative to the thermal characteristics and energy performance of constructions and the decree of 26 October 2010 relative to the thermal characteristics and energy performance requirements of new buildings and of building extensions.

Mtep saved	Total
2016	0.41
2020	1.15

3.2.2. CIDD

a Presentation of the measure

The equipment used in this assessment benefiting from tax credit is the following: condensation boilers, insulation of opaque and glass walls, solar hot water, heat pumps, wood burning appliances and photovoltaic panels (eligible for tax credit until 2013).

b Assessment source and assumptions

The impact of the implementation of the CIDD over the period 2009-2012 is assessed here. The number of dwellings involved according to the type of operation is presented in the following table.

	2009	2010	2011	2012
Condensation boilers	323 626	111 075	111 075	111 075
Wall insulation	18 281	11 960	11 960	11 960
Roof insulation	282 813	185 032	185 032	185 032
Window insulation	440 634	173 636	173 636	173 636
CESI	22 986	17 217	17 217	17 217
SSC	2 572	2 079	2 079	2 079
PAC	123 237	64 320	64 320	64 320
Firewood stoves/wood burning stoves	130 155	114 432	114 432	114 432
Pellet stoves	192 445	175 258	175 258	175 258
Wood-fired boilers	16 985	11 767	11 767	11 767

Table 12-Number of dwellings involved in the CIDD

Source: for the past period, the number of installed renewable energy equipment is based on the statistics of the Observ'ER (Observatory for Renewable Energy). The number of dwellings equipped with opaque walls, window glazing, low temperature boilers and condensation boilers has been deducted from the declared or estimated annual tax expenditure and from average estimated prices. For the period 2011-2012, the number of dwellings involved was estimated by extending the trends observed.

Moreover, data issued from the point of intersection between the income revenue and property tax for 2007 have allowed to determine in which types of dwellings the equipment is installed: year of construction, private house (PH) or apartment block (AB).

c Implementation within SceGES

Installation of this different equipment (over the period 2009-2012) is interpreted with the SceGES in the following way:

- Independent wood-fired boiler systems (AIC - Appareils indépendants de chauffage au bois) (fire wood, wood burning and pellet stoves, wood heaters and PAC:
- In existing buildings, the installed appliances under the tax credit replace first of all the same type of equipment with lower performance. In a second moment, if the number of installed appliances is greater than the number of installed appliances of the trend, these new appliances replace other types of heating systems. Replacement depends on the appliance considered. For example, for the wood AIC, the appliances installed independent of the trend are replaced first by carbon AIC, then by GPL AIC, electric AIC and finally by integrated electric heaters.

- In new dwellings, the appliances installed first replace the same type of appliances with lower performance installed within the trend scenario. Then, if the number of appliances installed under the tax credit is greater than the number of appliances installed within the trend, the market segment of these appliances is increased to the detriment of other heating systems. For example, for wood AIC, this increase is firstly to the detriment of systems for which the market segments are currently low (carbon AIC, electric AIC, fuel AIC, gas sources, GPL AIC) and then to the detriment of integrated electric heaters.
- Solar power: the installation of appliances leads within the SceGES to an increase in the number of appliances in the building stock of each region compared to the trend scenario.
- Condensation boilers and low temperature boilers: these are installed in replacement of traditional fuel and gas boilers at the end of their life cycle.
- Thermal insulation with opaque walls and glazing: the number of dwellings benefiting from tax credit is directly implemented within the SceGES through a percentage of each housing stock referred to. Opaque wall thermal insulation should be achieved with the application of 20cm of glass wool (lofts, R=6.1) and insulation with glazing by fitting reinforced PVC insulation type windows (U=1.5).
- Photovoltaic solar energy: the photovoltaic power units installed each year fall within the SceGES in the shape of annual surfaces installed per region following the figures supplied by Obser'ER.

d Results

Implementation of the CIDD measure for the period 2009-2012 has allowed the following reductions in energy consumption:

	Gain in Mtep
2013	0.78
2016	0.93
2020	1.08

3.2.3. Interest-free eco loans

Presentation of the measure

All private owners can benefit from interest-free eco-loans for projects in their main residence including co-owners and rented dwellings. With a duration of 10 years and the possibility of being extended to 15 years by the bank, it allows to finance up to EUR 30 000 in works for the improvement of the energy efficiency of the dwelling.

Assessment sources and assumptions (ex-post assessment, city boundaries)

The SGFGAS database, collecting the characteristics of the loan contracts allows to determine the number of each type of measure carried out between 2009 and the second half of 2013 and the type and year of construction of the dwellings in which they were carried out. The number of dwelling renovations financed by interest-free eco-loans within the SceGES, as well as an estimate of the corresponding tax reduction are shown in the following table:

	2009	2010	2011	2012	2013 (2^{and} quarter)
Number of interest-free eco-loans issued	70 933	80 300	40 755	33 861	8 007
Tax reduction generated expressed in m€ from loans contracted in the year n[132]	140	200	130	n/a	n/a

As an example, the bunch of work carried out in 2009 was characterised by the following measures:

132 Source: Ministry of Social housing /DHUP

	Percentage of loans
Window insulation	75%
Roof insulation	49%
Wall insulation	28%
Heat pumps	23%
Condensation boilers	19%
pellet, wood-burning boilers	17%
CESI	11%
Wood-fired boilers	3%
Low temperature boilers	2%

It is considered that all measures carried out within the framework of the interest-free eco-loans are extra compared to the SceGES trend scenario.

As regards to thermal insulation, the number of dwellings benefiting from an interest-free eco-loan is directly implemented within the SceGES through an application percentage of different insulation solutions to the housing stock. Thermal insulation of opaque walls should be achieved with the application of 20 cm of glass wool (applied to lost loft space; R = 6.1), 10 cm of extruded polystyrene in the walls (internal insulation; R =3.3) and glazing with the fitting of PVC type windows (U=1.5). The application percentages are divided into 4 categories of dwellings following the SGFGAS statistics:

	Windows (%)		Roofs (%)		Walls (%)	
	MI	IC	MI	IC	MI	IC
Before 1975	7,2	1,5	5,4	0,8	3,7	1,0
Between 1975 and 1989	7,3	0,9	5,6	0,5	2,0	0,5

The rate of application of the measures in percentage of different stocks.

As regards to the replacement of the heating system with an independent wood burner or wood fired boiler, one should first consider that the wood burning appliances installed eligible for the interest-free loan replace the low performance wood burning appliances that are at the end of their life-cycle. This assumption is interpreted in the SceGES as an increase in the performance of the wood-burning boilers for the years considered. The performance value then reaches the 2035 value of the reference scenario. In a second moment, if the number of installed appliances is greater than the number of appliances reaching the end of their life cycle, one should consider that new appliances would replace other types of heaters.

For the PAC, the interest-free eco-loans means an increase of the PAC replacing heating appliances at the end of their life cycle.

For condensation boilers and low temperature boilers, one supposes that these boilers will replace traditional fuel and gas boilers at the end of their life cycle. This assumption is interpreted in the SceGES as an increase in the average performance of gas and fuel boilers (10% for low temperature boilers and 20% for condensation boilers compared to the average performance of boilers installed in 2005). The performance value then meets the 2035 value of the reference scenario.

Finally, regarding domestic solar water heaters, the interest-free eco-loans translate into an increase in the rate of appliances in the overall housing stock.

Results

Gains achieved in the reduction of energy consumption are presented in the following table:

Mtep	Total
2013	0.18
2016	0.19
2020	0.19

3.2.4. Eco-Social housing loans: Assessment of the renovation measure of social housing

a Presentation of the measure

The State has fixed a renovation objective for the whole social housing stock. To this end, 120 000 of the most energy-hungry social dwellings in which the energy consumption is greater than 230 kWhEP133/m²/year (energy classes E, F, and G of the energy performance diagnosis - DPE) and 150 kWhEP/m²/year (energy class D) will undergo work by 2017 in order to reduce their conventional annual primary energy consumption per m2 to values lower than 150 kWhEP/m²/year (for classes E, F and G) and to values lower than 80 kWh/m²/year (thus allowing the achievement of a gain in the conventional primary energy consumption of 85 kWh/m²/year).

Distribution of the renovation programme for the entire social housing stock (housing investment plans– March 2013)

	2014	From 2015 to 2017	After 2017:
Number of renovated social housing units	90 000	Between 90 000 and 120 000 per year	120 000

Source: planning bill relative to the implementation of the Grenelle Environment Roundtable.

In order to achieve this objective, a series of new measures has been provided. Alongside the social housing eco-loans (eco-PLS), introduced in 2009, the VAT on renovation work has been reduced from 10% to 5% in the social housing stock from 1 January 2014. Furthermore, with objective of achieving 120 000 renovations per year by 2017 announced within the framework of the housing energy renovation plan, it was decided to make social housing eco-loans even more appealing, in particular with a reduction of its rate and relaxation of eligibility criteria for energy class D. Since 2013, the loan has also been opened to dwellings with energy classes D of the DPE within the limit of the national quota of 50 000 dwellings a year.

b Implementation of the measure

At first, it is necessary to identify the stock for which the measure will be applied. Only the application of building insulation measures (roofs, walls, windows and floors) can be targeted for the low-income housing stock alone.

With SceGES, one can select the dwellings for which one wishes to implement insulation based on region, type of heating, type of dwelling (detached house or apartment blocks) and period of construction. One disposes of intermediate outputs allowing to calculate year by year the unit consumption for each category of dwelling characterised by the combination of region x type of heating x type of dwelling x year of construction.

It is considered that the measure is applied as an additional measure to the renovations carried out within the trend scenario; therefore, targeting the categories of the most energy-hungry dwellings by the year 2020 within this trend scenario. To simplify the implementation of the SceGES, dwellings built before 1975 will not be considered. Moreover, a refinement of the assessment region by region is an extremely cumbersome process, which has a low impact on results, and therefore dwellings will be differentiated according to type of boiler and type of dwelling.

The implemented insulation measures are the following:

- Windows: PVC 4 + 16 + 4 Argon
- Roofs: the laying in the lost loft space of 20 cm of glass wool (for detached houses); external balconies + sealing, 15 cm polyurethane for apartment blocks);
- Walls: External insulation, 15 cm HD polystyrene;
- Floors: external insulation / unheated areas, 10 cm polystyrene.

The table below shows the 800 000 most energy-hungry low-income dwellings to which the measures were applied and their energy consumption for heating. Consumption included hot water, it is necessary to add an

133 [1] kWh of primary energy

average of 30 kWh/m2 to the consumption indicated in the table for apartment blocks and 20 kWh/m2 for detached houses.

These 800 000 targeted dwellings represent around 12% of the low-income social housing stock and 23% of the energy consumption for heating of the low-income social housing stock.

Type of dwelling	Heating system	EP 2020 trend consumption	EP 2020 consumption after renovation	Number of dwellings
MI	Wood AIC	426	150	166 914
MI	Carbon AIC	310	108	11539
MI	Electrical AIC	448	150	122016
MI	Wood CCC	772	276	643
MI	Carbon CCC	571	195	5
MI	District heating CCC	578	219	755
MI	Electrical CCC	706	271	418
MI	Heating oil CCC	388	134	10 403
MI	Gas network CCC	391	136	11 235
MI	Wood CCI	385	138	12 295
MI	Integrated electricity heating	363	133	228 184
IC	Electricity AIC	319	123	135 000
IC	Wood CCC	435	183	2 417
IC	Electricity CCC	394	182	4 986
IC	Wood CCI	330	130	1 088
IC	Integrated electricity heating	309	123	92 002

It seems that for most dwellings, complete insulation measures allow to achieve 150kWhEP/m2. The wood, carbon, district heating and electricity CCC in dwellings are present in an extremely low number of dwellings. In order to achieve this objective, it will be necessary to use more efficient materials and possibly change heating appliances (high-performance wood appliances): but the replacement of heating appliances can be considered within the SceGES only for low-income social dwellings and poses therefore, a problem for the measurement of its impact.

c Results

The measure in the form that it was applied here generates **a gain in final energy consumption of 0.35 Mtep in 2013, 0.65 Mtep in 2016 and 1.03 Mtep in 2020** compared to the trend scenario.

3.2.5. Eco-tax

Presentation of the measure

The Grenelle 1 law provides for the implementation of a kilometric eco-tax, which will be applied to trucks. This eco-tax will be applied to those national networks of publicly managed roads and roads managed by the territorial authorities likely to be subject to an increase in traffic.

Implementation of the measure

The assessment of this measure with the SceGES model uses two sources of data:

- A CGDD study of November 2009 “the national and regional impact of the eco-tax on trucks”: This study assesses the impact of the eco-tax on the shift to railway and river transport. The study is based on the definition of the eco-tax as it was conceived in the beginning and does not take into account the exemption measures introduced by the Parliament. The estimated revenue before these

exemption measures was EUR 1.2 billion against EUR 1 billion today;

- a study on the tariffication mission of the Ministry of Ecology dated 6 April 2010. This study carries out an assessment of the different traffic forecast models and estimates the reduction in motor fuel consumption of trucks following the implementation of this measure.

The CGDD also forecasts an increase in the circulation of rail and waterway networks from 2012 to:

- + 730 million tonnes.km per year for rail traffic;
- +118 million tonnes.km per year for waterway traffic.

These assumptions fall within the SceGES model that evaluates the impact of this shift on greenhouse gas emissions and energy consumption.

The tarrification mission estimates a gain in fuel consumption of 1.24% per year for trucks.

The average emission factor for trucks is estimated at 845 gCO_2/km and their average consumption in fuel is 32 kg per 100 km.

The SceGES model then allows to estimate the impact of this reduction in consumption on the total consumption of the sector.

Results

In terms of energy savings, the annual expected gain will increase to 0.165 Mtep in 2016 and to 0.168 Mtep in 2020.

3.2.6. Improvement of the performance of new vehicles

Presentation of the measure

The Grenelle Environment Roundtable has fixed an objective for the reduction of the average emissions of the overall French stock from 176 gCO_2/km to 130 g by 2020.

Moreover, numerous measures have been implemented at a national and community level in order to encourage the purchase of new more energy-efficient vehicles in terms of energy consumption and greenhouse gas emissions, thus:

- The CO_2 label for passenger vehicles;
- The “environmental bonus-malus scheme”

At a European level, regulation 443/2009 limits the CO_2 emissions of passenger cars and imposes car manufacturers to gradually reduce the CO_2 emissions of new vehicles to 130 gCO_2/km by 2015. It also defines the new long-term objective of 95g CO_2/km in 2020.

a Source and assessment assumptions

In order to interpret these measures, the following assumptions of the average unit values of emission for new vehicles for a particular year were made:

- 130g CO_2/km in 2012 and until 2015,
- plus a linear decrease to 95 gCO_2/km in 2020.

The consequences of European Regulations for the specific average consumption of new registered cars equipped with an internal combustion engine (ICM) in France will depend in particular on the number of rechargeable electrical and hybrid vehicles among new registrations. It is considered within the framework of this assessment that the diffusion of rechargeable electric and hybrid cars follows the assumptions of the trend scenario of the SceGES with a marginal penetration of these vehicles on the market by 2020. The objectives above are therefore directly applied to the ICMs.

b Implementation with SceGES

SceGES allows to test the measure decreasing the unit consumptions of new vehicles in a proportional manner compared to the evolution of unit emissions of the vehicles. The measure is not applied to passenger vehicles already in circulation. As they age, these vehicles maintain their reduced consumption.

The reduction of the average emission factor of CO_2 of all passenger vehicles introduced onto the tested

market is presented below. It is directly linked to the reduction in the average energy consumption of all passenger vehicles on the market.

Table 13. Assumptions on the reduction of the average emission factor of CO2 of all passenger vehicles on the market.

	Average CO_2 emissions of new vehicles – gCO_2/km
2005	153.6
2009	133
2010	130
2011	130
2012	130
2013	130
2014	130
2015	130
2016	123
2017	116
2018	109
2019	102
2020	95

The measure was tested by applying the same reduction rate of the unit consumption of passenger vehicles to all passenger vehicles regardless of carburation. The scenario of the registration rate of petrol and diesel passenger vehicles remains the same as the trend scenario.

Results

Implementation of the measures concerning the performance of new vehicles allows an annual final energy saving of 0.1 Mtep in 2010, of 1.1 Mtep in 2016 and of 2.2 Mtep in 2020.

3.2.7. Mobile engine test centres

The objective of this measure is a direct bottom-up assessment without the use of the SceGES tool.

Presentation of the measure

The reduction in the consumption of fossil fuel in agriculture is part of the development of a sustainable agricultural model combining the economic viability of agricultural holdings with the respect for the environment. It contributes, within the context of the implementation of the energy performance plan (EPP) of agricultural holdings launched in 2009 by the Ministry of Agriculture, to achieve the objective of 30% of agricultural holdings with low energy dependence by 2013.

As well as carrying out the energy performance diagnosis of holdings and developing renewable energy on investments, the EPP is based on investments and practices leading to the consumption of less fossil fuel. The testing of tractors at engine test centres for a better regulation is part of the practices encouraged to reduce consumption of motor fuel.

Within the EPP framework, 10 new engine test centres were financed, in addition to the 5 existing engine test centres.

Interpretation of these assumptions

A test centre allows to perform 300 diagnoses and regulations of tractors per year; the regulation of a tractor allows to achieve a reduction of 900 litres of motor fuel consumption per year.[134]

134 Source MAAPREAT, 2010

Around 1.25 million tractors are used in agricultural holdings in France. In 2009 (starting date of the measure), there were 5 test centres. Between 2009 and 2011, the EPP allowed the acquisition of 10 additional test centres. This assessment assumes in the end that the regulation of the tractor is permanent and that the life cycle of the tractor is longer than 10 years.

Results

With all these assumptions, this measure allows to achieve an annual final energy saving of 3.5 ktep in 2010, 23.2 ktep in 2016 and of 36 ktep in 2020.

3.2.8. Implementation of the Eco-design directive (lights)

Presentation of the measure

The directive-framework 2005/32/EC, replacing the directive-framework 2009/125/EC, establishes a framework for the setting of requirements in the field of Eco design applicable to energy-using products or linked to energy. The measures can be fixed by regulations or via voluntary agreement. The measures adopted to date pursuant to regulations focus for example, on stand-by and off modes of appliances, on street lighting and illumination of tertiary buildings, power supplies and battery chargers, domestic lighting, electrical engines, circulators, refrigeration equipment, ventilators… At a national level with regards to light bulbs, a national convention was signed by France and the Lighting Union in order to bring forward the date in which low energy efficient light bulbs will be withdrawn from the French market.

Source and assessment assumptions

The following assumptions have been approved[135]:

- in the residential sector, it is estimated that the measure will allow an annual saving of the electricity consumption of lighting of 6TWh by 2016 compared to the 12TWh consumed of the reference (2008);
- In the tertiary sector, the saving in electricity consumption achieved with the measure is estimated at 2 TWh compared to 32TWh (due to the low presence of incandescent light bulbs in this sector)

This measure can be modelled using the SceGES tool modifying the average power of the used lighting points:

- For the residential sector: a halving of the power of lighting points between 2008 and 2016 compared to the trend was taken into account;
- For the tertiary sector: a reduction of 1/16 between 2008 and 2016 of the average power of lighting points between 2008 and 2016 was taken into account.

These reductions are likely to be implemented in a linear manner between 2009 (starting date of the entry into force of the regulation pursuant to the Eco-design directive for this equipment) and 2016. This assumption of a linear decrease depends on the fact that the regulation provides for a progressive banning between 2009 and 2012 but there is the possibility of stocking incandescent light bulbs, stocks that however, will logically be depleted over time.

Implementation with SceGES

The implementation of this decrease in the residential sector for three uses “main residence – individual houses”, “main residences – apartment blocks” and “second homes”, starts from their respective trends and in the tertiary sector for the eight uses concerned.

Results

The gains achieved are presented in the following table:

	Gains expressed in Mtep
2013	0.46
2016	0.76

135 Source: ADEME

2020	0.75

3.2.9. Implementation of the Eco-design directive (televisions)

Presentation of the measure

The European regulation No642/2009 fixed requirements in the field of the electricity consumption of televisions.

Source and assessment assumptions

The following assumptions were made[136]:

- The average consumption of a television in France is of 186.2 kWh/year
- television ownership in 2011 was of 1.6 televisions per household, but it is believed that this ownership rate will increase to 2.1 televisions per household by 2020.
- The current distribution of televisions is maintained:

Size of computer screens (in inches)	15	30	50
Proportion	14%	56%	30%

Results

This measure allows a final energy saving of 0.30 Mtep/year by 2020

3.2.10. ESC

Ex-post assessment of energy saving operations carried out between 1 July 2006 and 30 November 2013

On 30 November 2013, the number of ESC issued was of 462 TWhcumac. The assessment of energy savings depends on all the operations carried out since the start of the system in 2006.

For each of these operations, the total amount of ESC issued, expressed in kWhcumac[137], was converted into annual energy savings according to the life span of the considered measure. The life span of the measures was taken into account to consider for 2016 and 2020 only those measures that still have an impact.

The total energy savings achieved were achieved by summing the annual savings of each standardised operation.

An ex-ante assessment of future periods of energy saving certificates

In order to evaluate the energy savings generated by the third and fourth period of this system, the following assumptions were made:

- The annual energy savings considered are of 97 TWhcumac in 2014 plus 171 TWhcumac each year starting from 2015. The difference compared to the objective of 115 TWhcumac in 2014 plus 220 TWhcumac from 2015 is due to the set of measures that cannot all be applied under the directive:
  - The certificates issued within the framework of the training, information and innovation programme, as well as the bonus scheme introduced for the fight against energy poverty, the overall renovation or also the French Overseas departments should not be considered.
  - Thermal renewable energy operations on transport and energy distribution, in particular for biomass boilers and independent wood burning appliances as well as those on heat networks.
- According to the assessment of the operations carried out within the energy saving certification system introduced on 1 January 2011, the average updated life span of actualised energy saving actions is of

136 Source: ADEME

137 Each standardised operation corresponds to a standard volume of achieved, accumulated and updated energy savings, on the standard life span of the operation.

13.4 years. In the first period, this life span was of 12.8 years. The life span of the operations increases with the increase of insulation operations. Based on an increase in the life span, identical to what has already been observed, the average lifespan is estimated at 14 years for the period 2015-2020.

Results

The gains obtained are presented in the following table.

Table 14. Annual energy savings generated by the ESC system (source: MEDDE)

	2013	2016	2020
Energy savings generated by all the ESC issued as of 31 November 2013 (ex-post assessment)			
Annual energy savings	2.5 Mtep	2.44 Mtep	2.37 Mtep
Energy savings generated by all ECS issued as of 31 November 2013 (ex-post assessment) and through the extension of the system to 2020			
Annual energy savings	2.5 Mtep	5.17 Mtep	9.29 Mtep

3.3. Top-down assessments

The calculation of energy efficiency indicators pursuant to the ESD directive, calculated based on the methods recommended by the European Commission, are described in the table hereafter.

4. ANNEX 4: Implementation of article 7 of Directive 2012/27/EU

4.1. Expected energy savings for this period

Under paragraph 1 of Article 7 of Directive 2012/27/EU, France must achieve annual energy savings representing 1.5% of the energy sales to the end consumers compared to the average for 2010-2012. In order to achieve energy sales, auto-generation of electricity and of the renewable fraction of thermal renewable energy is deducted from the final energy consumption not adjusted for climate.

In Mtep	**2010**	**2011**	**2012**
Final energy consumption adjusted for climatic differences: total excluding bunkers (source 2012 energy balance)	154,90	155,24	154,39
Climatic adjustments: total of all energy (source 2012 energy balance)	-4,51778	6,56606	0,92317
Transport consumption: total excluding bunkers (source 2012 energy balance)	49,4033	49,5588	49,1771
Estimate of the actual energy consumption excluding auto-consumption	**100,97**	**112,25**	**106,14**
Electricity auto-generation (source production survey, except the 2012 estimate)	0,93566	0,77399	0,76133
Thermal energy Auto-generation (source : SOES, MEDDE)	9,08156	7,64893	8,97708
Actual final energy consumption minus auto-consumption	**90,96**	**103,82**	**96,40**
Average 2010-2012		**97,06**	

The annual target will therefore be of 1.456 Mtep, being 40.8 Mtep for the overall period.

During the second period of the energy saving certification system (between 31 December 2010 and 31 December 2013), 295 TWhcumac of ESC were granted. With regards to the average life span of the updated operations of 13.4 years, the period 2011-2013 has allowed a cumulative saving of 176 TWh between 2010 and 2020, being 15.1 Mtep.

Excluding the energy consumption of the ETS sector of this basis and valorising a part of the operations already carried out within the framework of the second period of the energy saving certification system within the 25% flexibility limit, the annual objective of energy savings for France under article 7 is also of 1.092 Mtep.

In the overall period 2014-2020, also 30.57 Mtep in final energy will have to be saved, the equivalent of 355 TWh.

4.2. Measures put in place to meet the requirements of Article 7.

Within the framework of articles 7.1 and 7.9, France will use a set of measures to the extent that will allow over time an evolution particularly in terms of system efficacy in order to meet the annual target of 1.092 Mtep of energy savings. These measures include: the obligation of energy providers to justify energy saving operations, budget and taxation measures (sustainable development tax credit, interest-free eco-loans, eco tax on trucks, increase the domestic tax rate on CO2 consumption), financing measures (guarantee funds for energy renovation) and organisational measures aiming at facilitating energy renovation measures (passports for energy renovation whose implementation is expected to be completed in 2015).

4.3. Contribution of the measures to the objective of the Directive

Thanks to these implemented measures, France will achieve 362 TWhcumac of energy savings considered under the energy efficiency directive:

	2011-2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	
EEC 2011-2013	22,01	22,01	22,01	22,01	22,01	22,01	22,01	22,01	60,07

EEC		8,58	8,58 12,21	8,58 12,21 12,21	8,58 12,21 12,21 12,21	8,58 12,21 12,21 12,21 12,21	8,58 12,21 12,21 12,21 12,21 12,21	8,58 12,21 12,21 12,21 12,21 12,21 12,21	73,29 61,07 48,86 36,64 24,43 12,21 12,28
Guarantee fund			2,05	2,05 2,05	2,05 2,05 2,05	2,05 2,05 2,05 2,05	2,05 2,05 2,05 2,05 2,05	2,05 2,05 2,05 2,05 2,05 2,05	8,18 6,14 4,09 2,05 0,70
Renovation passport			0,12	0,12 0,12	0,12 0,12 0,12	0,12 0,12 0,12 0,12	0,12 0,12 0,12 0,12 0,12	0,12 0,12 0,12 0,12 0,12 0,12	0,58 0,47 0,35 0,23 0,12
Total									

5. ANNEX 5: Energy saving certificates

Presentation of the measure

Energy saving calculations

Two ways of obtaining the ESC

Standard operating sheets defined by decrees[138]were elaborated in order to facilitate the application of energy saving measures. These are classified by sector (residential, tertiary, industrial, agricultural, transport, networks) and define, for the most frequent operations, the lump energy savings in kWh_{cumac} and the life span of the operations. These operations correspond to "expected savings". For heating operations, it takes into account the climate area of operations following the distribution in three geographical areas used in the thermal regulations. The list of standard operating sheets can been found in Annex 2 of this document.

These standard operating sheets are suggested by the Energy Environmental Technical Association (ATEE - l'association technique énergie environnement) grouping together all parties participating in this system. The sheets are then checked by the ADEME and governed by the DGEC.

The energy savings achieved other than from standard operations correspond to specific operations. They correspond to uncommon operations that cannot be standardised, in particular for the definition of the lump volume of ESC issued. In this case, it is "estimated savings".

The applicant must respect six steps for a specific operation:

1. Carry out an energy diagnosis

2. Establish the situation before the operation

3. Determine the reference situation and motivate one's choice

4. Determine the temporary situation after the operation including theoretical energy balance sheets before and after

5. Justify the amount of certificates applied for and in particular the choice of the life span of equipment

6. Justify the calculation of Internal Rate of Return (>3years)

The ADEME and the national energy saving certificates centre guarantee the validity and veracity of requested energy savings.

Additionality of the system

Pursuant to decree No 2010-1664, the system respects two major principles to ensure the additionality of the system:

1 only those measures which go beyond regulations at the beginning of the period can give rise to the issuing of the ESC.

2 the reference situation for the calculation of the lump energy savings corresponds to the technical and economical state of the product or service market at the latest date for which data is available. In the case of improvement work on the thermal performance of the shell of an existing building or of its fixed thermal systems, the reference situation of the energy performance takes into account the overall state of the property stock of the same nature and the level of performance of material and equipment used at the latest

138 The list is available on the website http://www.developpement-durable.gouv.fr/1-le-secteur-du-batiment.html

date for which data is available.

When a person carries out measures within the framework of a specific operation aiming at achieving energy savings, these cannot be taken into account for the issuing of energy saving certificates if the savings achieved do not offset the investment costs after more than three years.

The active and incentive role of obligations

The obligations must prove at the moment of application for certificates that they have had an active and incentive role. In order to demonstrate this, one must attach to the application for the energy saving certificate application:

- a description of the active and incentive role of the applicant,
- a justification that this contribution is direct and took place before the initiation of the operation,
- a sworn statement signed by the recipient of the energy saving operation of the active and incentive role of the applicant in the carrying out of this operation.

The treatment of double counting

When an operation has multiple applications, it gives rise to the issuing of only one ESC at the most, based on the first completed application to be received, on a first-come-first served basis.

Surveillance, monitoring and control

National energy savings certificates centre

The national energy saving certificates centre offers a service of national competence linked to the Directorate General for energy and climate. It is responsible for the surveillance, monitoring and control of energy saving certificates. In particular it is responsible for:

- the examination of applications and issuing of energy saving certificates
- the examination of applications and approval of energy saving action plans
- the implementation of controls, detection of infringements and imposition of specific sanctions for these infringements
- the management and setting of individual obligations
- the administrative reconciliation at the end of the three-year period
- the communication and information on the system
- informing Prefects and decentralised services of actions relative to their territories
- the archiving of the files of candidates for the applications for certificates and applications for the approval of energy saving action plans, the issuing of certificates and agreements, the carrying out of control operations, determination of infringements and if necessary the declaration of corresponding sanctions.

Application for energy saving certificates managed by the French National Authority PNCEE

In order to apply to the administration for energy saving certificates, the applicant has the choice to present an individual application containing all supporting details or an application via an energy saving action plan.

The action plan notion introduced in the second period allows the system to be industrialised. Subject to prior official authorisation issued by the national centre, an action plan has the advantage of simplifying future certificate applications so that at the time the application is made no evidence of the operations must be submitted.

The list of documents to attach to the application is defined in the decree of 29 December 2010 fixing the list

of elements necessary for an energy saving certificate application and the contents of an agreement application for an energy saving action plan

The centre controls 20% of applications for the most important applicants (more than 250 GWh_{cumac} of applications per year) and 10% for the others.

National energy savings action plan

The content of the energy savings action plan is defined in the decree of 29 December 2010 fixing the list of elements necessary for an application for energy saving certificates and for the compilation of an agreement application for an energy saving action plan. It includes the following elements:

- the scope within which the measure will be carried out: geographic distribution, expected volumes, type of action involved, incentive measures for the beneficiary etc.);
- all the measures put in place to ensure that the action plan is followed (supporting documents to be submitted: certificates issued on honour by the beneficiary and the professional carrying out the work (often called “Certificate of final completion”, document proving the operation has been carried out, technical documentation etc.),
- The commitment to submit before 31 March of every year a report indicating all the inspection measures carried out.

An action plan involves exclusively the operations defined within the standard operating sheets on energy savings. Non-standardised operations, called specific operations, are therefore excluded from the scope of application of an action plan.

The procedures put in place by the administration to examine the awarding of the energy saving certificates and authorise the energy saving action plans are based on the decrees No 2010-1664 of 29 December 2010 amended with regards to the energy saving certificates and the above-mentioned decree of 29 December 2010.

The National Centre shall examine the action plans, require any further documentation and then shall take a decision on the application within six months from the date of receipt of the complete application, notified by letter. If no reply is received within this time period, then the application is deemed to have been rejected.

Developments in the control system

Within the framework of the third period, a simplification of application procedures is underway. The main way is through a generalisation of the declaration system: a control of the system shall be carried out via a posterior control on a sample of applications that will allow any possible abuses to be sanctioned and in time implement mandatory certification of applicants or representatives through accredited certifying organisations and/or approval from the administration. This declaration system imposes a standardisation of the accepted documents for the awarding of certificates.

References of legislation and regulations

Energy Code	
Articles L.221-1 à L.222-9 of the Energy Code	definition of the energy savings certification system
Law	

Article 35 of Decree 2006-1771 of 30 December 2006 of the amending Finance Act for 2006	recalls the principle that the settlement payment and relative penalty of late submission, provided for under article 14 of decree No 2005-781 of 13 July 2005 modifies the programme fixing the guidelines of the energy policy, reduction in taxable profit are not permitted.
Decrees	
Decree No 2010-1663 of 29 December 2010 amended regarding energy saving obligations within the framework of the energy saving certification system	fixing the individual obligations of energy savings; creation of collective facilities; declaration of annual energy sales; where required, establishment by the Ministry of Energy of declarations of the annual energy sales; notification of the individual obligations of energy savings; verification of the application of these obligations; annulment of the energy saving certificates; formal notice; establishment of the amount of compensatory levy; other financial sanctions.
Decree No 2010-1664 of 29 December 2010 amended relative to energy saving certificates	the definition of the persons eligible for an energy saving certificate (ESC); the definition of the measures that could lead to the issuing of a ESC; maximum time between the achievement of an energy saving operation and the following ESC application; calculation of the ESC allowance to be granted upon completion of an energy saving operation; approval modalities of an energy savings action plan; submission and examination of an ESC application; minimum threshold of energy savings for an ESC application; grouping of eligible persons with a view to reaching this threshold; maximum number of issued ESC issued within the scope of the information, training and innovation programmes; period of validity of the ESC; control measures adopted following the issuing of ESC within the scope of the energy saving action plan; formal notice; fixing of sanctions, or particular penalties applicable in the case of shortcomings in the issuing of ESC; system assessment.
Decree No 2006-604 of 23 May 2006 amended relative to the maintenance of a National Energy Savings Certificate Registry	with the objective of keeping a National registry of energy saving certificates; coverage of costs due to implementation and the keeping of the registry.
Decrees	
For operations initiated after 1 January 2011: order of 29 December 2010fixing a list of documents for an energy saving certificate application and the compiling of an application for the approval of an energy	list of supporting documents for the energy saving certificate application; compiling of the application for the approval of an energy savings action plan, modification of an energy saving action plan; annulment or withdrawal of an authorisation.

savings action plan	
For operations initiated before 1 January 2011: order of 19 June 2006fixing the list of supporting documents for the application for an energy savings certificate	list of supporting documents for the application for energy saving certificates;
Decree of 29 December 2010amended relative to the application modalities of the energy saving certification system	declaration of the annual energy sales to households and to service sector companies; for gas oil, determination of the lump sum relative to sales to households and to service sector companies discount rate; low interest rates for those areas not connected to the metropolitan and continental power grid; minimum threshold for the submission of an application for an energy saving certificate.
Decree of 19 December 2013 fixing the amount of maintenance fees for the national registry of energy saving certificates	maintenance fees for the year 2014.
Circular note	
Circular note of 29 June 2011 relative to the second period of the energy saving certification system	this circular note clarifies certain provisions that appear in the above-mentioned decrees.

Decrees defining standardised energy saving operations	
1. Order of 19 June 2006 defining standardised energy saving operations	Creation of 70 standard operating sheets
2. Order of 19 December 2006 defining standardised energy saving operations	Creation of 23 standard operating sheets
3. Order of 22 November 2007 defining standardised energy saving operations	Creation of standard operating sheets and modification of 24 sheets
4. Order of 21 July 2008 defining standardised energy saving operations	Creation of 31 standard operating sheets and modification of 8 sheets
5. Order of 23 January 2009 defining standardised energy saving operations	Creation of 12 standard operating sheets, modification of 4 sheets and removal of one sheet
6. Order of 28 June 2010 defining standardised energy saving operations	Creation of 16 standard operating sheets, modification of 44 sheets and removal of 2 sheets
7. Order of 15 December 2010 defining standardised energy saving operations	Creation of 23 standard operating sheets, modification of 66 sheets and removal of 8 sheets
8. Order of 14 December 2011 defining standardised energy saving operations	Creation of 29 standard operating sheets, modification of 102 sheets and removal of 5 sheets.
9. Order of 28 March 2012 defining standardised energy saving operations	Creation of 11 standard operating sheets, modification of 27 sheets and removal of one sheet
10. Order of 31 October 2012 defining standardised energy saving operations	Creation of 23 standard operating sheets, modification of 30 sheets and removal of 2 sheets

11. Order of 4 June 2013 defining standardised energy saving operations	Modification of 2 sheets
12. Order of 24 October 2013 defining standardised energy saving operations	The creation of 35 standard operating sheets and modification of 44 sheets

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