

REPORTS

*Direction générale de l'Énergie et du Climat
(Directorate-General for Energy and Climate)*

*Service du Climat et de l'Efficacité énergétique
(Climate and Energy Efficiency Service)*

Report of France

Pursuant to Articles 24(1) and 24(2) of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency

2017 Update



Ministry of the Environment, Energy and Sea

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Table of contents

I. SUMMARY	9
II. FRANCE'S ENERGY EFFICIENCY POLICY	11
1. A continuous improvement in energy efficiency	11
2. ... driven by ambitious energy targets	13
2.1. A long-term vision.....	13
2.2. France's energy efficiency commitments.....	14
2.2.1. Targets pursuant to the ESD	14
2.2.2. Targets pursuant to the EED	14
2.2.3. Estimate of energy consumption by 2020.....	15
2.3. Assessment of energy savings pursuant to the ESD.....	16
2.3.1. Method.....	16
2.3.2. Results: Progress made with regard to the ESD 2016 target.....	16
2.4. Assessment of key measures.....	18
III. POLICIES AND MEASURES IMPLEMENTED BY FRANCE	20
1. Residential-tertiary sector	20
1.1. State of play	20
1.2. Policies and measures	21
1.2.1. Energy efficiency in new builds	22
(a) Widespread use of the LEB through the 2012 Thermal Regulations .	22
(b) Regulations specific to overseas communities	23
1.2.2. Improvement of the energy performance of existing buildings	23
(a) Regulatory measures.....	24
(b) Measures resulting from the LTECV.....	24
(c) Thermal Regulations for existing buildings	24
(d) Labels to encourage the emergence of more energy efficient renovated buildings	25
(e) Removal of obstacles to renovation (splitting of incentives – Article 19 of the EED).....	25
(f) Support measures	26
(g) Energy transition tax credit (<i>crédit d'impôt transition énergétique</i> – CITE).....	26
(h) VAT at reduced rate for renovation work	27
(i) Interest-free eco-loan (eco-PTZ)	27
(j) Exemption from property tax on developed properties	28
(k) Sustainable development passbook account (<i>livret de développement durable</i> – LDD).....	29
1.2.3. Renovation of the social rental housing stock.....	29

(a)	Social housing eco-loan.....	29
(b)	Rebate on property tax on developed properties	30
(c)	Mobilisation of European funds for the energy efficient renovation of social housing.....	30
1.2.4.	Fight against fuel poverty	31
1.2.5.	Information, awareness-raising, training	32
(a)	One-stop shop and PRISs (Renovation information service points) ..	32
(b)	Energy performance diagnosis	33
(c)	Awareness-raising and training measures for professionals.....	34
1.2.6.	Research and demonstration	36
1.2.7.	Review and prospects.....	37
2.	Transport sector	39
2.1.	State of play	39
2.2.	Policies and measures	41
2.2.1.	Measures resulting from the Law on the energy transition for green growth	42
(a)	Speeding up the replacement of cars, lorries, buses and coaches with low-emission vehicles. Developing cable transport	42
(b)	Development of electric mobility	42
(c)	Incentives to use bicycles	43
(d)	Mobility of businesses.....	44
(e)	Positive energy territories for green growth (<i>Territoires à énergie positive pour la croissance verte</i> – TEPCV)	44
(f)	Rural mobility plans	44
(g)	Action on traffic.....	44
(h)	'Crit'air' air quality certificates	45
2.2.2	Encouraging low-emission modes of transport	45
(a)	Encouraging the modal shift	46
(b)	Action plan for active mobility (<i>plan d'actions pour les mobilités actives</i> – PAMA).....	47
2.2.3.	Improving the efficiency of the modes of transport used	47
(a)	For road transport.....	47
(b)	Improving the performance of new vehicles and reducing their emissions	47
(c)	For inland waterway and maritime transport.....	50
2.2.4.	Improving energy efficiency in aviation	50
(a)	Improving the environmental performance of aircraft.....	50
(b)	Optimising air operations	51
(c)	Supporting the development of sustainable aviation biofuels	52
(d)	Reducing the CO ₂ emissions of air transport.....	52
2.2.5.	Raising awareness and communicating.....	53
(a)	General public	53
(b)	Local authorities and businesses.....	54
(c)	Transport professionals	55
2.2.6.	Territorial coverage	55
2.2.7.	Research, development and innovation.....	57
3.	Industrial sector.....	58

3.1. State of play	58
3.2. Policies and measures	59
3.2.1. Directive 2003/87/EC	59
3.2.2. Incentive measures	61
3.2.3. Regulatory measures	62
3.2.4. Support for standardisation	64
3.2.5. Support for the development of more efficient technologies	65
(a) Green industry initiative	65
(b) Support for innovation	66
4. Agriculture sector	69
4.1. State of play	69
4.2. Policies and measures	70
5. Public sector	74
5.1. Reinforcing the exemplary role of the State	74
(a) Reducing the energy consumption of the State's property stock	74
(b) Taking account of energy efficiency in public purchasing	75
(c) Implementing the 'exemplary administration' process	76
5.2. Enhancing the territorial coverage of climate and energy policies	76
(a) Regional planning of climate and energy policies	76
(b) Local responsibilities in terms of energy	77
(c) State assistance	80
6. Energy demand management	83
6.1. Energy savings certificates scheme	83
6.2. Support for energy efficient equipment: regulatory measures on products	84
6.3. Improving the performance of boilers and air-conditioning systems	85
6.4. Measures to achieve lighting savings	87
(a) Switching off of illuminated signage and advertisements at night	87
(b) Time change	87
6.5. Development of the energy efficiency services market	87
6.5.1. Method	87
6.5.2. Summary of results	88
6.6. Awareness-raising	89
6.7. Electricity and gas supply	90
(a) Improvement of the quality of billing	90
(b) Electricity: rollout of Linky meters	91

(c)	Gas: rollout of Gazpar meters.....	91
(d)	Energy efficiency potentials of gas and electricity infrastructures	92
(e)	Demand-side management of electricity consumption leading to significant energy savings	92
(f)	Rural electrification and 'compte d'affectation spéciale: Financement des aides aux collectivités pour l'électrification rurale' (CAS FACÉ) (special purposes account: Financing of community aid for rural electrification)	92
6.8.	Generation and supply of heating and cooling	92
6.8.1.	Map of the national territory in terms of heating and cooling demand and supply	92
6.8.2.	Assessment and cost-benefit analysis for the application of high-efficiency cogeneration and efficient district heating and cooling networks ...	93
6.8.3.	Development of high-efficiency cogeneration and efficient district heating and cooling networks	93
6.9.	Waste – Circular economy	94
6.10.	Carbon component within domestic consumption taxes on energy products	97
6.11.	'Programme d'Investissements d'Avenir (Investing for the future programme).....	98
(a)	Energy transition institutes (Instituts pour la transition énergétique – ITE), managed by the National research agency (ANR)	98
(b)	Demonstrators and experimentation platforms	99
ANNEX 1:	Abbreviations and acronyms.....	101
ANNEX 2:	Bibliography	103
ANNEX 3:	Annual report	104
ANNEX 4:	Assessment methods	116
(a)	Air-energy-climate forecast scenarios: method used to estimate energy consumption by 2020	116
(b)	Bottom-up assessments.....	121
(c)	Top-down assessments	121
ANNEX 5:	Implementation of Article 7 of Directive 2012/27/EU through the energy savings certificates scheme	122
(a)	Calculation of energy savings	123
(b)	Monitoring, verification and inspection.....	124
(c)	References of laws and regulations.....	125

Index of illustrations

Figure 1. Ranking of European Union countries by final energy intensity in 2014 (source: Odyssee)	11
Figure 2. Changes in France's final energy consumption between 1970 and 2015, corrected for climate variations, by sector (source: SOeS, 2015 energy statement) .	12
Figure 3. Changes in final and primary energy consumption, excluding non-energy uses and international bunkers, base index of 100 in 2005 (Source: SOeS)	15
Figure 4. Final energy consumption in the residential and tertiary sectors corrected for climate variations, in Mtoe, between 1970 and 2015 (source: SOeS, 2015 energy statement)	20
Figure 5. Change in the traction energy consumption of transport by energy (source: SOeS, Transport accounts 2016)	39
Figure 6: Change in the traction energy consumption of transport by mode (source: SOeS, Transport accounts 2016, excluding international marine bunkers).....	40
Figure 7. Changes in average CO ₂ emissions, in g CO ₂ /km, for new passenger cars and light commercial vehicles (source: MEEM).....	49
Figure 8. Final energy consumption in industry corrected for climate variations, in Mtoe, between 1970 and 2015 (source: SOeS, 2015 energy statement)	58
Figure 9. CO ₂ emissions of those sectors subject to the ETS Directive between 2005 and 2015 (source: Register of European Union transactions)	60
Figure 10. Final energy consumption in the agriculture-fisheries sector corrected for climate variations, in Mtoe, between 1970 and 2015 (source: SOeS, 2015 energy statement)	69
Figure 11. French energy and energy efficiency services market (source: ADEME / GALLILEO 2016)	88

Index of tables

Table 1. France's targets under Article 3 of the EED (SOeS data).....	14
Table 2. Change in final energy consumption by sector compared to 2012 in Mtoe (source: PPE).....	15
Table 3. Forecast energy consumption in 2020 (source: MEEM)	16
Table 4. Breakdown of sectoral energy savings achieved between 2007 and 2014 (source: ADEME/Enerdata, Odyssee-Mure project).....	18
Table 5. Assessment of annual energy savings generated by the main key measures (source: MEEM).....	19
Table 6. Generational cost of the eco-PTZ (source: MEEM)	28
Table 7. Number of housing units renovated under the 'Habiter mieux' programme (source: MEEM).....	32
Table 8. Annual energy savings generated by the CEE scheme (source: MEEM)	84

I. SUMMARY

In accordance with Article 3 of Directive 2012/27/EU on energy efficiency (EED), France has set itself the dual target of reducing its energy consumption to 131.4 Mtoe of final energy and 219.9 Mtoe of primary energy by 2020 (excluding non-energy uses and international bunkers). Between 2012 and 2015, France's final energy consumption, as defined by the EED, fell by 1.5 %. France has also achieved its 2016 target of 12 Mtoe in energy savings, set by Directive 2006/32/EC on energy services (ESD).

The main policies and measures currently being implemented to achieve these existing targets are described sector by sector.

In this respect, the residential-tertiary sector, which accounted for 44.9 % of France's final energy consumption in 2015, represents a major challenge for energy efficiency policies. The 2012 Thermal Regulations (*Réglementation thermique – RT*) have improved the energy performance of new buildings and should generate energy savings in the order of 1.68 Mtoe by 2020. The Thermal Regulations for existing buildings are ensuring that the energy performance of a building is significantly improved when work is carried out. The Housing energy renovation plan (*Plan de rénovation énergétique de l'habitat – PREH*) aims to speed up the renovation of existing housing stock, by relying in particular on the network of Renovation information service points (*Points Rénovation Information Services – PRIS*) and on improved coordination between existing schemes (energy transition tax credit, interest-free eco-loan, etc.). Fuel poverty is being fought in particular through the actions of the National housing agency (*Agence Nationale pour l'Habitat – Anah*) and its 'Habiter mieux' (Living better) programme. Overall, the Law on the energy transition for green growth (*Loi de transition énergétique pour la croissance verte – LTECV*) and its accompanying incentive schemes resulted in 2014 in nearly 390 000 energy efficient renovations in one year (public and private stock).

The transport sector accounted for around one-third of France's final energy consumption in 2015. The measures implemented mainly aim to support the modal shift and improvement of the energy efficiency of the modes of transport used. In 2016, the environmental bonus-penalty scheme (*bonus-malus écologique*) allowed France to become one of the new vehicle markets with the lowest CO₂ emissions in Europe (in the order of 110.4 g CO₂/km). Energy efficiency measures are also being implemented with regard to air transport and inland waterway or maritime transport.

In the industrial sector, France's energy efficiency policy is based, in particular, on Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, as well as on financial incentives, regulatory measures (including the mandatory energy audit introduced by Article 8 of the EED), support for standardisation processes and support for the development of the most efficient technologies, in particular through the 'Programme d'Investissements d'Avenir' (Investing for the future programme).

The agriculture sector is also implementing measures to improve energy efficiency through the farm competitiveness and adaptation plan.

The exemplary actions of the State and local and regional authorities in particular involve the renovation of public buildings. Action is also being taken in relation to public purchasing and local implementation of energy and climate policies through the Local climate-air-energy plans (*Plans Climat-Air-Energie Territoriaux*) and Regional climate-air-energy schemes (*Schémas Régionaux du Climat, de l'Air et de l'Énergie*). So far, 554 territories have committed to the 'Positive energy territory for green growth' (*Territoire à Énergie Positive pour la Croissance Verte – TEPCV*) label. Through the energy transition financing fund, which has distributed EUR 750 million over three years, these territories are benefiting from considerable financial support from the Ministry of the Environment for specific and innovative energy transition measures. These territories contain over 15 000 municipalities and more than 40 million people who are already moving towards the energy transition.

Lastly, key measures are enabling multi-sectoral energy savings. This is particularly the case with energy savings certificates (*certificats d'économies d'énergie – CEE*), with preparations for the fourth period having started under Article 7 of the EED. Ecodesign and waste prevention measures are also

having a major impact on the reduction of energy consumption. The French market for energy efficiency services is growing and was valued at around EUR 8.4 billion in 2015.

II. FRANCE'S ENERGY EFFICIENCY POLICY

Directive 2012/27/EU on energy efficiency (EED) establishes a common framework of measures to promote energy efficiency within the European Union. It contributes towards achieving the target of improving energy efficiency by 20 % by 2020 and paves the way for further energy efficiency improvements beyond that date.

The Member States have therefore set themselves a target in terms of an absolute level of primary energy consumption and final energy consumption in 2020 (Article 3). The energy savings target of 9 % by 2016, set by the previous Directive 2006/32/EC on energy services (ESD), also remains valid (Article 27 of the EED).

The aim of this report is to detail the policies and measures implemented in order to achieve these various targets in accordance with Article 24 of the EED. The achievement of the amounts of energy savings set under the ESD and EED will be described in particular detail.

1. A continuous improvement in energy efficiency ...

France has a final energy intensity¹ that is among the lowest in the European Union. Figure 1 below shows France's position among the European Union countries in terms of final energy intensity in 2014.

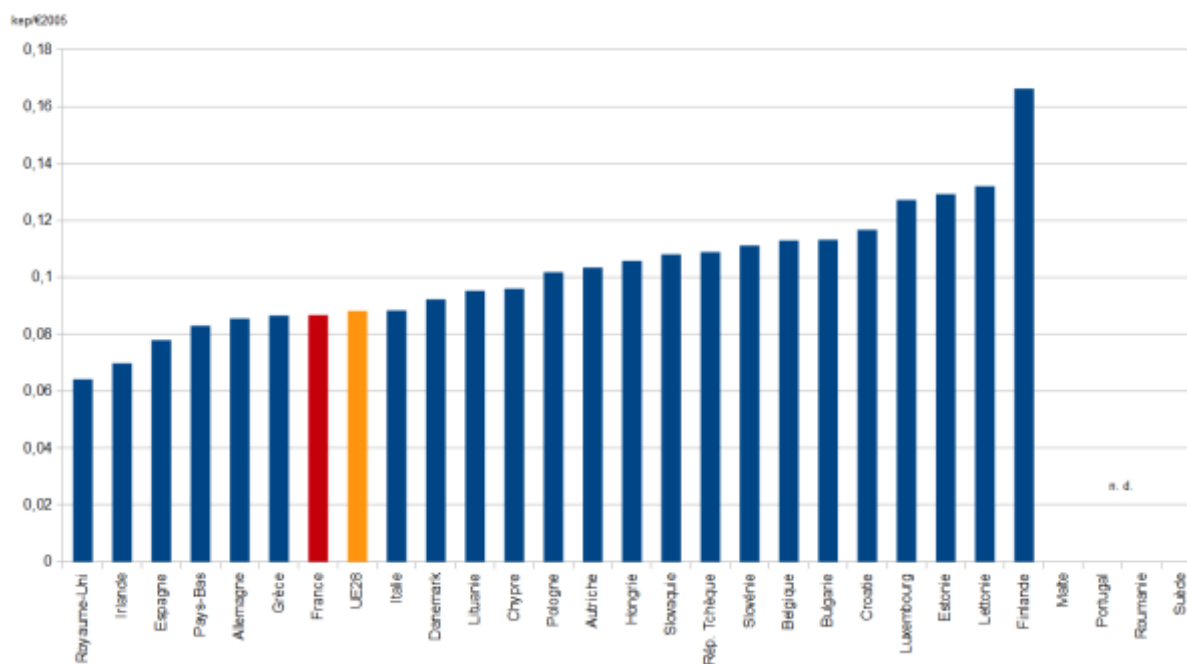


Figure 1. Ranking of European Union countries by final energy intensity in 2014 (source: Odysée)

[Key to figure:]

ke€/2005	koe/€2005
n.d.	n.a.
Royaume-Uni	United Kingdom
Irlande	Ireland
Espagne	Spain
Pays-Bas	Netherlands
Allemagne	Germany
Grèce	Greece
France	France
UE28	EU-28

¹ Energy intensity is the ratio between energy consumption and gross domestic product (GDP).

Italie	Italy
Danemark	Denmark
Lituanie	Lithuania
Chypre	Cyprus
Pologne	Poland
Autriche	Austria
Hongrie	Hungary
Slovaquie	Slovakia
Rép. Tchèque	Czech Republic
Slovénie	Slovenia
Belgique	Belgium
Bulgarie	Bulgaria
Croatie	Croatia
Luxembourg	Luxembourg
Estonie	Estonia
Lettonie	Latvia
Finlande	Finland
Malte	Malta
Portugal	Portugal
Roumanie	Romania
Suède	Sweden

Figure 2 summarises the changes in France’s final energy consumption between 1970 and 2015, by sector. After two decades of growth, France’s final energy consumption (corrected for climate variations) was almost stable between 2001 and 2008, at around 157 Mtoe per year, reflecting the effectiveness of public policies to improve France’s energy efficiency. In 2009, this consumption fell to around 151 Mtoe, reflecting not only the effect of energy efficiency policies, but also the structural effect of the economic crisis. Having fallen steadily for three years, the final energy consumption corrected for climate variations stabilised in 2015 at 149.2 Mtoe.

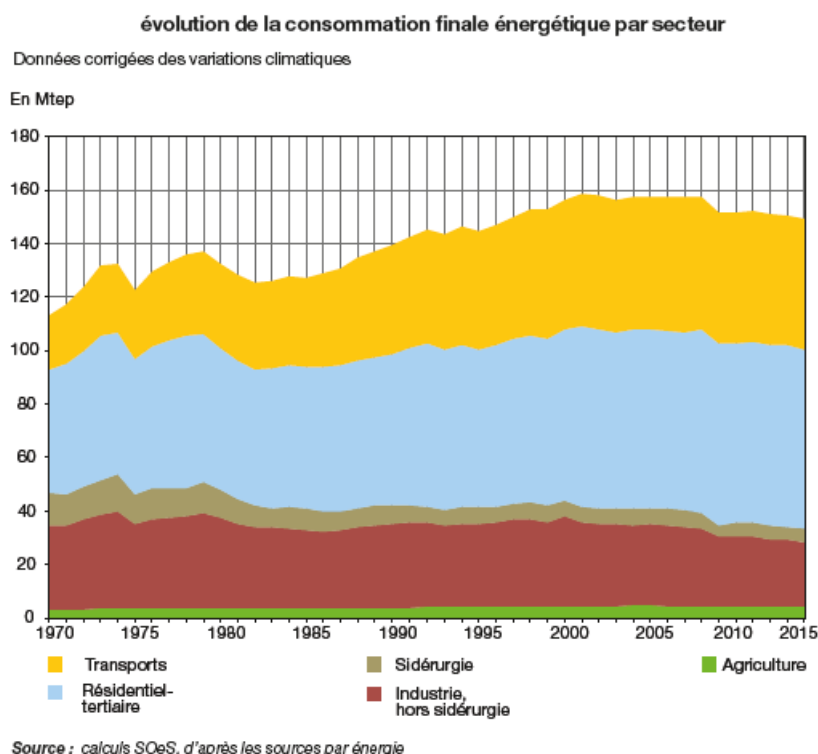


Figure 2. Changes in France’s final energy consumption between 1970 and 2015, corrected for climate variations, by sector (source: SOeS, 2015 energy statement)

[Key to figure:]

évolution de la consommation finale énergétique par secteur	Changes in final energy consumption by sector
Données corrigées des variations climatiques	Data corrected for climate variations
En Mtep	In Mtoe
Transports	Transport
Résidentiel-tertiaire	Residential-tertiary

Sidérurgie	Steel
Industrie, hors sidérurgie	Industry, excluding steel
Agriculture	Agriculture
Source : calculs SOeS, d'après les sources par énergie	Source: SOeS calculations, according to sources by energy

The annual report (see Annex 3) details the changes in energy consumption by sector.

2. ... driven by ambitious energy targets

2.1. A long-term vision

The Law on the energy transition for green growth (LTECV) and its accompanying action plans aim to allow France to contribute more effectively to the fight against climate change and to the protection of the environment, as well as to consolidate its energy independence while offering its citizens and businesses access to energy at a competitive cost.

These tools are available to citizens, businesses and territories so that they can take targeted action, increase their purchasing power by reducing household energy bills, improve their quality of life by better protecting the planet and public health, and grasp the opportunities for growth, competitiveness and jobs in existing industries and sectors of the future.

The aim of the energy transition is to establish a robust and sustainable energy model that can cope with the energy supply challenges, price changes, depletion of resources and environmental protection imperatives.

To provide a framework for the joint action of citizens, businesses, territories and the State, the LTECV sets medium- and long-term targets:

- reduce greenhouse gas emissions by 40 % between 1990 and 2030 and by 75 % between 1990 and 2050 (Factor 4), with the path being specified in the carbon budgets;
- reduce final energy consumption by 50 % by 2050 compared to the 2012 reference, with an intermediate target of 20 % by 2030;
- reduce primary energy consumption of fossil fuels by 30 % by 2030 compared to the 2012 reference;
- increase the share of renewable energies to 23 % of the gross final energy consumption by 2020 and to 32 % of this consumption by 2030;
- reduce the share of nuclear energy in electricity generation to 50 % by 2025;
- achieve a level of energy performance complying with the 'low-energy building' standards for the entire housing stock by 2050;
- combat fuel poverty;
- assert the right for all to have access to energy at an affordable cost with regard to household resources;
- reduce the amount of landfill waste by 50 % by 2025 and gradually break the link between economic growth and raw material consumption.

The LTECV has radically overhauled the tools of national and local governance to allow policies and targets to be defined on more of a joint basis. The means of action of local and regional authorities have been clarified and consolidated.

The State has established a National low-carbon strategy (*Stratégie nationale bas carbone* – SNBC), which sets long-term targets and provides cross-cutting and sectoral guidelines for achieving these targets. The national policies on transport, spatial planning, housing, energy generation and agriculture will take this strategy into account. It also sets emissions ceilings not to be exceeded for

three successive periods of five years. The first SNBC was published in November 2015. It will be revised by the end of June 2019 and thereafter every five years.

A Multiannual energy programming (*Programmation pluriannuelle de l'énergie* – PPE) must be established for two successive periods of five years. The LTECV has therefore merged the existing programming exercises in all the energy sectors (electricity, gas and heat) into a single tool and extended them to include energy consumption and networks. One PPE has been established for metropolitan France and another for each non-interconnected area, particularly the overseas territories.

For both these tools, the periods will be 2015/2016-2018; 2019-2023; 2024-2028, etc.

2.2. France's energy efficiency commitments

2.2.1. Targets pursuant to the ESD

In order to meet the requirements of the ESD (Directive 2006/32/EC on energy end-use efficiency and energy services, Article 4 of which remained in force until 1 January 2017; see Article 27 of the EED), France set itself an indicative target of achieving an amount of final energy savings of 12 Mtoe² in 2016. The intermediate target for 2010, set in France's first National Energy Efficiency Action Plan (NEEAP) in 2008, was 5 Mtoe.

The achievement of this target is described in detail in Subsection 2.3.2.

2.2.2. Targets pursuant to the EED

In accordance with Article 3 of the EED, France has set itself the targets shown in Table 1 below for energy consumption by 2020 (excluding international aviation and non-energy uses). The primary energy target has been technically adjusted from the level indicated in the NEEAP 2014, precisely to exclude non-energy uses. The European Commission's progress report of 18 November 2015 underlines the ambitious nature of this target.

	Target	Achieved 2015 (raw data)	Achieved 2015 (climate-corrected data)
Primary energy consumption in 2020 (in Mtoe, excluding international bunkers)	219.9	234.4	237.7
Final energy consumption in 2020 (in Mtoe, excluding international bunkers)	131.4	139.9	143.2

Table 1. France's targets under Article 3 of the EED (SOeS data)

In particular, the European Commission's COM(2017) 56 final report of 1 February 2017 welcomes the considerable progress made by France, calculated as gross final energy consumption (Eurostat data) between 2013 and 2014: 'The Netherlands had the largest decrease (8%) in final energy consumption, followed by France (7%) and Belgium (6%).'

Figure 3 below shows the progress made towards achieving the targets set under the EED (data corrected for climate variations):

² This figure corresponds to 9 % of France's average final energy consumption, net of aviation, international marine bunkers and final energy consumers subject to the ETS Directive. The uncertainty created by this last term means that the target of 12 Mtoe in 2016 is an overestimate of the indicative target as defined by the ESD.

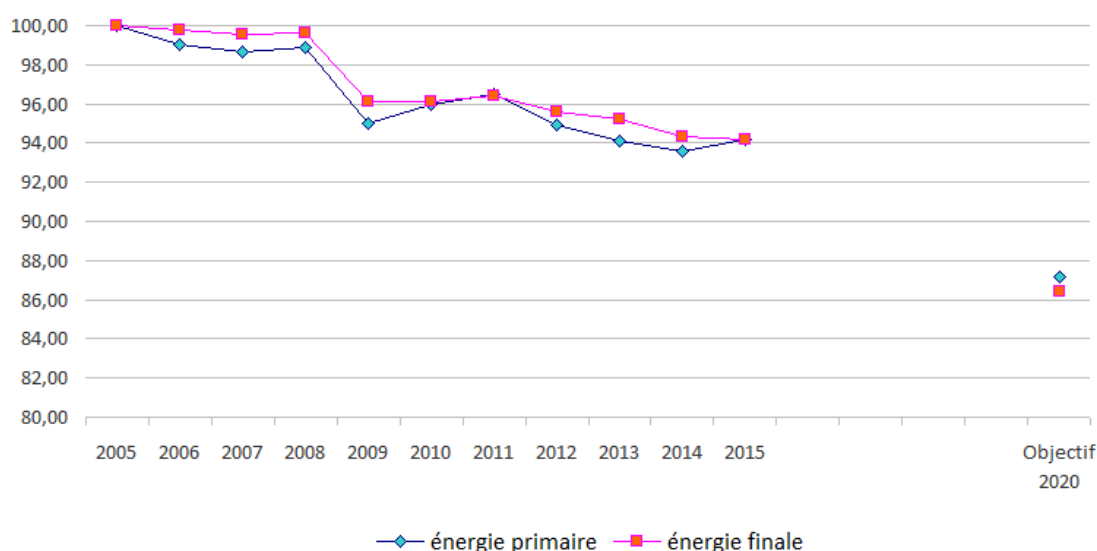


Figure 3. Changes in final and primary energy consumption, excluding non-energy uses and international bunkers, base index of 100 in 2005 (Source: SOeS)

[Key to figure:]

Objectif 2020	2020 Target
énergie primaire	primary energy
énergie finale	final energy

However, the 2020 target is highly ambitious and can be achieved only if there is a very rapid rise in committed or new measures.

2.2.3. Estimate of energy consumption by 2020

In 2015 the Ministry of the Environment, Energy and Sea (MEEM) updated the 'Scénarios Prospectifs' (Forecast Scenarios) with a view to preparing the SNBC and the PPE, pursuant to the LTECV. A reminder of the method used is contained in Annex 4.

These scenarios confirmed that the target set by France under Article 3 of the EED was achievable. Table 2 below, which stems from the modelling work, shows the sectoral breakdown of the final energy consumption in 2012 and 2023 (in Mtoe).

	2012	2018		2023	
		Scénario de référence	Variante	Scénario de référence	Variante
Industrie	32,5	32,7	35	31,7	35,6
Résidentiel tertiaire	69,1	61,7	62,3	56,7	60
Transport	49	46	49,4	43,4	50,1
Agriculture	4,5	3,9	4,4	3,7	4,6
Total	155,1	144,3	151,1	135,5	150,3

Table 2. Change in final energy consumption by sector compared to 2012 in Mtoe (source: PPE)

[Key to figure:]

Scénario de référence	Reference scenario
Variante	Variant
Industrie	Industry
Résidentiel tertiaire	Residential-tertiary
Transport	Transport
Agriculture	Agriculture
Total	Total

By deducting the energy consumption associated with international aviation, the reference scenario allows figures of 137.5 Mtoe in 2018 and 128.7 Mtoe in 2023 to be achieved. The 2020 target set under the EED therefore seems achievable. The reference scenario allows the LTECV targets to be achieved, but, given historical trends, requires significant and sustained efforts to be made in the long term.

Specifically for 2020, as required by Article 24 of the EED, the energy consumption estimates are as follows:

(in Mtoe)	2020	Excluding international aviation	EED target
Primary energy consumption	226.9	220.1	219.9
Final energy consumption	140.1	133.3 Mtoe	131.4
Industry	32.36		
Residential	36.68		
Tertiary	20.68		
Agriculture	3.72		
Transport	44.70		

Table 3. Forecast energy consumption in 2020 (source: MEEM)

As Table 3 above shows, the primary energy consumption target will almost be achieved in 2020. Also, taking into account the results presented for 2018 and 2023 and assuming that progress in terms of energy efficiency will be linear, the 2020 target for final energy will be achieved in 2021.

2.3. Assessment of energy savings pursuant to the ESD

2.3.1. Method

In order to assess the progress made with regard to the targets set by the ESD (amounts of energy savings to be achieved in 2010 and 2016), indicators have been calculated based on the top-down methods recommended by the European Commission. All the data used for this assessment are available in Annex 4.

The energy savings have been calculated in the same way as in 2011 and 2014, with the same calculation options favouring the 'preferred' indicators. In accordance with the European Commission's recommendations³, only positive indicators expressing the result of the efforts made in terms of energy efficiency have been used. Each sectoral subtotal has been calculated according to option (a) of the methods recommended by the European Commission.

These indicators have been calculated with the help of teams from the Odyssee-Mure (ADEME and Enerdata) project and from the MEEM's statistical service (SOeS).

2.3.2. Results: Progress made with regard to the ESD 2016 target

The energy savings between 2007 and 2014 (see details below) are estimated at **12.325 Mtoe**. It therefore seems that France achieved its 2016 target under the ESD in 2014.

The details of the energy savings are given in Table 4 below, sector by sector:

³ Reply from the NEEAP HELPDESK of 15 April 2011.

Sector	Indicator	Energy savings between 2007 and 2014
<i>Residential</i>	Indicator P1 (heating)	5.590 Mtoe
	Indicator P3 (hot water)	0.158 Mtoe
	Indicator P4 (household appliances)	0.303 Mtoe
	Indicator P5 (lighting)	0.266 Mtoe
	Subtotal	6.317 Mtoe
<i>Tertiary</i>	Indicator P6 (non-electricity consumption)	0.636 Mtoe
	Subtotal	0.636 Mtoe
<i>Transport</i>	Indicator A1 for P8 (energy consumption of light-duty vehicles in l/100 km)	2.024 Mtoe
	Indicator P9 (energy consumption of heavy-duty vehicles)	0.621 Mtoe
	Indicator P11 (freight rail transport)	0.025 Mtoe
	Indicator P12 (modal shift – passenger transport)	0.242 Mtoe
	Indicator P13 (modal shift – freight transport)	0.021 Mtoe
	Subtotal	2.932 Mtoe
<i>Industry</i>	Indicator P14 (energy consumption per unit of production) – Dairy industry	0.239 Mtoe
	Indicator P14 – Sugar industry	0.108 Mtoe
	Indicator P14 – Agri-food industries excluding sugar and dairy	0.760 Mtoe
	Indicator P14 – Steel	0.007 Mtoe
	Indicator P14 – Production of various minerals	0.003 Mtoe
	Indicator P14 – Production of plaster, plaster products, lime	0.014 Mtoe
	Indicator P14 – Production of other construction materials	0.186 Mtoe
	Indicator P14 – Glass industry	0.003 Mtoe
	Indicator P14 – Other basic organic chemical industries	0.568 Mtoe
	Indicator P14 – Parachemical and pharmaceutical industry	0.046 Mtoe

	Indicator P14 – Mechanical construction	0.088 Mtoe
	Indicator P14 – Electrical and electronic construction	0.005 Mtoe
	Indicator P14 – Manufacture of motor vehicles and other equipment	0.033 Mtoe
	Indicator P14 – Naval and aeronautical construction, armaments	0.077 Mtoe
	Indicator P14 – Textile, leather and clothing industry	0.060 Mtoe
	Indicator P14 – Rubber industry	0.014 Mtoe
	Indicator P14 – Plastics processing.	0.099 Mtoe
	Indicator P14 – Various industries	0.129 Mtoe
	Subtotal	2.439 Mtoe
<i>All sectors</i>	Overall total	12.325 Mtoe

Table 4. Breakdown of sectoral energy savings achieved between 2007 and 2014 (source: ADEME/Enerdata, Odyssee-Mure project)

2.4. Assessment of key measures

The main measures implemented are assessed in the sectoral sections and in Annex 4.

Table 5 below summarises the annual energy savings achieved:

Measures	Section	Final energy savings, in Mtoe						
		2013	2014	2015	2016	2017	2020	2030
2012 Thermal Regulations	Residential-tertiary			0.5			1.68	4.22
Article 14 of the LTECV (work carried out)	Residential-tertiary					0.06	0.26	0.91
Energy transition tax credit	Residential-tertiary	0.78			0.93		1.08	
Interest-free eco-loan	Residential-tertiary	0.18			0.19		0.19	
Social housing eco-loan	Residential-tertiary	0.35			0.65		1.03	
Support for the development of electric or plug-in hybrid electric vehicles	Transport						0.15	0.65
Entry into service of high-speed railway lines							0.102	0.094
Measures regarding the performance of new vehicles (bonus-penalty scheme and	Transport						0.846	1.898

European regulations)								
Mobile engine test beds for the adjustment of tractors	Agriculture				0.023		0.036	
Implementation of Article 5 of the EED	Public sector		0.049	0.118				
CEE	Energy	3.3			5.0		13.1	
Waste recycling	Energy		8.6					
Carbon component within domestic consumption taxes on energy products	Energy						1.9	2.8

Table 5. Assessment of annual energy savings generated by the main key measures (source: MEEM)

III. POLICIES AND MEASURES IMPLEMENTED BY FRANCE

1. Residential-tertiary sector

1.1. State of play

The residential-tertiary sector accounted for 44.9 % of France’s final energy consumption in 2015, i.e. 67.0 Mtoe (45.0 Mtoe for residential, 22.0 Mtoe for tertiary). This sector is the main consumer of final energy, ahead of transport and industry.

The changes in the final energy consumption of the residential-tertiary sector between 1970 and 2015, by type of energy, are shown in Figure 4. The energy mix of the residential-tertiary sector has altered significantly since the 1970s. The use of coal has almost disappeared and oil products are steadily declining. The consumption of natural gas and electricity has increased considerably.

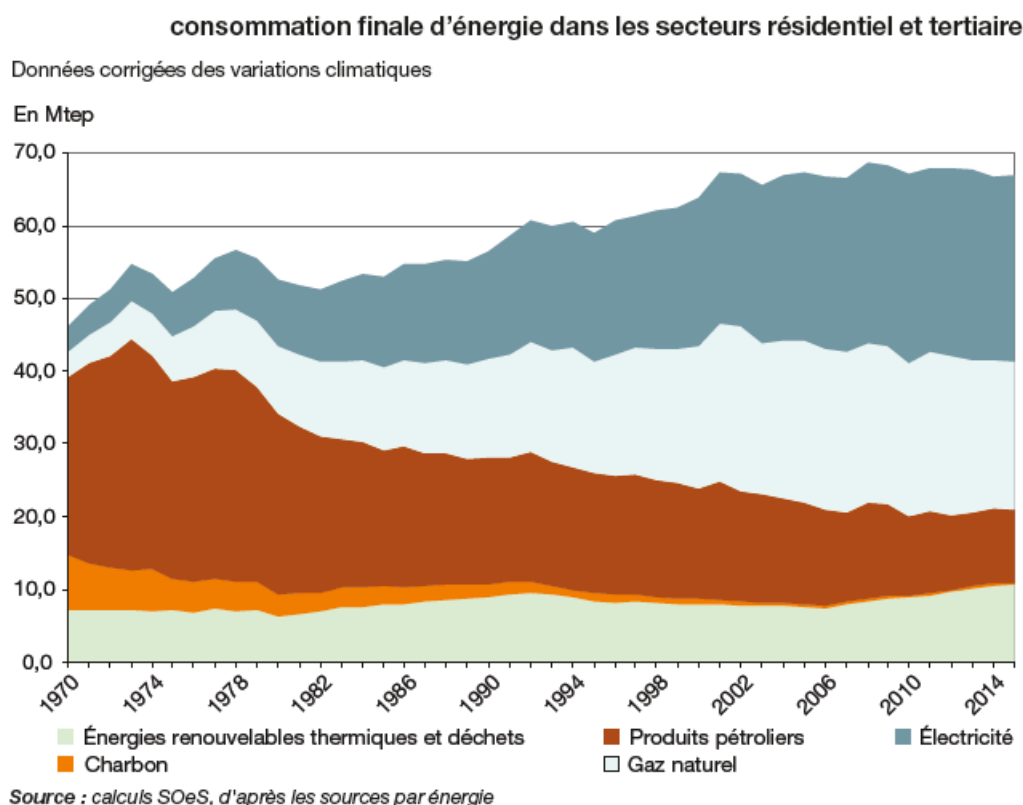


Figure 4. Final energy consumption in the residential and tertiary sectors corrected for climate variations, in Mtoe, between 1970 and 2015 (source: SOeS, 2015 energy statement)

consommation finale d'énergie dans les secteurs résidentiel et tertiaire	Final energy consumption in the residential and tertiary sectors
Données corrigées des variations climatiques	Data corrected for climate variations
En Mtep	In Mtoe
Énergies renouvelables thermiques et déchets	Renewable thermal energy and waste
Charbon	Coal
Produits pétroliers	Oil products
Gaz naturel	Natural gas
Électricité	Electricity
Source : calculs SOeS, d'après les sources par énergie	Source: SOeS calculations, according to sources by energy

In 2015 the energy consumption corrected for climate variations of the residential and tertiary sectors stabilised at 67 Mtoe (+0.3 %). The consumption of the tertiary sector (-1.0 %) moved in the opposite direction to the residential sector (+0.9 %). This stagnation came after the reduction in 2014 (-1.5 %), which was more significant in the residential sector (-2.2 %) than in the tertiary sector (-0.1 %). Following a steady increase up to the 2000s and a peak of 68.7 Mtoe in 2008, consumption was relatively stable for a long period.

The increase in consumption recorded in 2015 was mainly due to electricity, which accounted for 38 % of the sector's final energy consumption. The residential-tertiary sector as a whole therefore recorded an increase in electricity consumption in 2015 (+1.6 %), which was more marked in the residential sector (+2.0 %) than in the tertiary sector (+1.1 %). These changes counterbalanced 2014, which saw a sharp reduction in consumption in both sectors (-3.9 %).

Having risen steadily during the 2000s, by +2.5 % each year on average, the electricity consumption of the residential-tertiary sector has generally stagnated since 2010 (-0.3 % on average per year). This stabilisation is explained by the fact that fewer new homes have been heated by electricity since the end of the 2000s, which has halted the rise in consumption in the residential sector.

Following an increase in 2014, the final consumption of oil products fell in 2015 (-2.9 %), which resumed the long-term trend of a regular decline since the end of the 1970s. This reduction was more pronounced in the tertiary sector (-3.6 %) than in the residential sector (-2.6 %).

The final consumption of natural gas stagnated in 2015, but with opposite trends in the two sectors: +1.6 % in the residential sector, offset by a significant decline in the tertiary sector (-4.2 %). Following a sustained rise since the early 1970s, at an annual rate of +6.0 % on average, the consumption of the residential-tertiary sector as a whole peaked in 2002 at 22.5 Mtoe. Since 2005, consumption has been on a downward trend, by -0.9 % on average per year.

The increase of +0.7 % for renewable thermal energy and waste in 2015 was more moderate than the rise of +3.6 % in 2014. This limited increase brought a halt to the significant rises seen in previous years of +4.2 % per year between 2007 and 2014. Almost all the consumption (91 %) was concentrated in the residential sector and mainly involved wood and heat pumps.

The energy mixes of the two sectors are quite different: the proportion of electricity is much higher in the tertiary sector (56 %) than in the residential sector (30 %), due to its intensive use for office technology, information technology and air-conditioning.

Coal, which still accounted for 17 % of energy consumption in 1970, now forms a marginal part of the final consumption of the residential-tertiary sector. Oil consumption has fallen from 58 % in 1973 to 15 % in 2015, having lost its prominent place to gas and electricity as a result of the oil price shocks.

1.2. Policies and measures

Improving the energy performance of buildings is essential in order to achieve the targets set in terms of energy efficiency, reduction of greenhouse gases and development of renewable energies. France has therefore introduced various measures designed to achieve these targets, in particular through the Housing energy renovation plan (PREH) and the LTECV:

- **widespread use of low-energy buildings** (*bâtiments basse consommation* – LEB) since 1 January 2013 for new builds (2012 Thermal Regulations);
- improved energy and environmental performance of new builds through the 'Positive energy and low-carbon building' label (E+C- label), which is the forerunner to the future regulations allowing the rollout of low carbon footprint and lower energy consumption buildings;
- **renovation of 500 000 housing units** per year by 2017, at least half of which are occupied by low-income households;
- **obligation for all new builds** for which the building permit application has been filed from 1 January 2017 and for all housing that is transferred from 1 January 2025 to have a **digital housing logbook**;
- assisted financing of energy efficient renovation projects through the 'Energy transition special envelope' fund and third-party financing services provided by approved financing, credit or third-party financing companies;

- provision of financial aid to households for energy efficient renovation work: energy transition tax credit (*crédit d'impôt transition énergétique* – CITE), eco-PTZ (interest-free eco-loan), CEE, etc.;
- easier access to information and advice for private individuals by creating a network of local platforms across the country and by providing a single freephone number in order to contact an energy efficient renovation adviser (free and impartial advice). The public service for housing energy performance is also based on a network of local energy efficient renovation platforms (Article 22 of the LTECV).

As there is significant potential to reduce energy consumption and emissions and as sources are generally scattered and funds therefore more difficult to mobilise, France is introducing a range of different tools to achieve these targets: regulations, financial incentives (budgetary and tax), training, information and awareness-raising.

1.2.1. Energy efficiency in new builds

(a) Widespread use of the LEB through the 2012 Thermal Regulations

The level of energy performance required for new builds is governed by the thermal regulations that are gradually being introduced. These are being accompanied by the training of operators from the construction industry through the previous introduction of quality labels backed by incentives.

As a result, the **2012 Thermal Regulations**⁴ strengthened the requirements with regard to the thermal performance of new buildings: all buildings for which the building permit application has been filed since 1 January 2013 are subject to these regulations. These buildings must have a primary energy consumption below a threshold of 50 kWh_{ep}/m²/year on average for the five regulatory uses (heating, domestic hot water, lighting, cooling and auxiliary systems). This obligation was applied in advance from 28 October 2011 for office, primary and secondary education, and early childhood centre buildings, whilst housing constructed in ANRU zones⁵ is subject to this obligation if the building permit application or prior declaration has been filed since 1 March 2012. However, the 50 kWh_{ep}/m²/year requirement is adjusted based on geographical location, altitude, type of building use and average surface area of the housing units. Buildings using wood energy and low CO₂ emission district heating networks also benefit from an adjustment to the primary energy consumption threshold, limited to a maximum of 30 %.

Moreover, to strengthen the implementation of these Thermal Regulations, the developer must:

- when applying for the building permit, issue a document certifying that the Thermal Regulations have been taken into account and that a feasibility study on energy supply has been carried out;
- submit, together with the declaration of completion of works, a certificate of compliance of the building with the Thermal Regulations, issued by an architect, diagnostician or building design quality control office or by a certification body if the building is subject to certification.

In addition, new buildings must be the subject of a **feasibility study on the various energy supply solutions**, and in particular on the use of renewable energies and the most energy efficient systems.

Implementation of the 2012 Thermal Regulations allowed annual energy consumption of 0.5 Mtoe to be avoided in 2015. It will allow a reduction in annual energy consumption of 1.68 Mtoe in 2020 and 4.22 Mtoe in 2030⁶.

Moreover, certification offices or associations have also launched more ambitious labels than the 2012 Thermal Regulations for new buildings (Effinergie, BBCA, NF Habitat, Promotelec).

⁴ Decree No 2010-1269 of 26 October 2010 on the thermal characteristics and energy performance of buildings and the Order of 26 October 2010 on the thermal characteristics and energy performance requirements of new buildings and new parts of buildings.

⁵ Housing built in areas reserved for low income home-buyers and benefiting from a VAT rate of 7 % instead of 19.6 % (ANRU: Agence Nationale pour la Rénovation Urbaine – National urban renewal agency).

⁶ See France's report under Article 13(1) of Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions, MEEM, 2017.

The Law on the energy transition for green growth announced that the greenhouse gas emissions of new buildings would be taken into account for the entire life cycle from 2018. To achieve these objectives, an experimental label entitled 'Positive energy and low-carbon building' was introduced in November 2016. The aim of this approach is to encourage operators to build more energy efficient buildings than required by the 2012 Thermal Regulations (although these requirements will be maintained) so that conclusions can be drawn with a view to the next regulations. The feedback will allow the requirements of the future regulations to be determined so that energy efficient buildings with controlled costs for the entire life cycle can be built.

Moreover, Article 8 of the Law on the energy transition for green growth provides that all new public buildings must lead by example in energy and environmental terms and must, wherever possible, achieve positive energy and high environmental performance.

In addition, a constructability bonus of up to 30 % may be granted to housing that leads by example in energy or environmental terms or that is positive energy housing.

(b) Regulations specific to overseas communities

In Guadeloupe, French Guiana, Martinique and La Réunion, all new housing for which building permit applications or prior declarations have been filed from 1 May 2010 must comply with the Thermal, acoustic and aeration regulations applicable in the overseas departments (*Règlementation thermique, acoustique et aération* – RTAA DOM), which are a set of three regulations specifically on thermal, acoustic and aeration matters (see Implementing Orders of 17 April 2009, amended in January 2016). The design of this housing must, among other aspects, permit limited energy consumption by favouring a bioclimatic design and by limiting the use of air-conditioning, in particular through shading devices and the use of natural ventilation. In addition, new housing must be equipped with a domestic hot water system, except for certain municipalities in French Guiana and **Mayotte**.

Furthermore, in Guadeloupe, French Guiana, Martinique and La Réunion from May 2010 and in Mayotte from December 2013, where a domestic hot water system is installed in a new housing unit, at least 50 % of the hot water needs must be met by solar energy, except where the sunlight reaching the plot does not allow for this.

In order to simplify building rules, the RTAA 2009 has evolved to allow more design flexibility in building work, while retaining the same thermal comfort, acoustic and aeration objectives for housing. The RTAA 2016 (Order of 11 January 2016 amending the Orders of 17 April 2009) applies to residential buildings in the overseas departments for which the date of filing of the building permit application or prior declaration is after 1 July 2016.

NB: The Thermal Order forming part of the RTAA 2016 only applies in French Guiana and La Réunion, given that regional Thermal Regulations (RTG and RTM respectively) have applied since May 2011 in Guadeloupe and since September 2013 in Martinique.

1.2.2. Improvement of the energy performance of existing buildings

The Housing energy renovation plan (PREH), announced on 21 March 2013, reflects the commitment to renovate 500 000 housing units per year by 2017. The PREH contains numerous measures that cover all aspects of renovation: decision-making (points of single contact, thermal renovation ambassadors); financing (energy transition tax credit, interest-free eco-loan and social housing eco-loan, energy savings certificates, implementation of third-party financing); and structuring of the sector so that requests can be correctly and properly answered (training and qualification of professionals).

These commitments were reiterated in the LTECV.

In addition, the building renovation strategy, developed in accordance with Article 4 of the Energy Efficiency Directive, sets out more broadly the general framework of the policies and measures described in detail below. This strategy includes in particular:

- 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 the other measures implemented;
- a description of the measures to raise awareness among manufacturers and professionals;
- an outline of the available financing.

This strategy is set out in a separate publication.

(a) Regulatory measures

(b) Measures resulting from the LTECV

Under Article 14 of the LTECV, when major works are carried out, such as re-roofing, renovation of façades or extension of part of the building to make it habitable, it is mandatory from 1 January 2017 to improve the energy performance of the buildings concerned (Decree No 2016-711 of 30 May 2016). This means that the energy performance must be improved during major works. Article 14 also facilitates operations to improve energy efficiency by allowing a vote by simple majority on certain works affecting the communal parts of a building.

Implementation of this obligation will allow a reduction in annual energy consumption of 0.06 Mtoe in 2017, 0.26 Mtoe in 2020 and 0.91 Mtoe in 2030⁷.

Article 17 of the LTECV gives a long-term perspective to the obligation for energy efficient renovation works in the tertiary sector, by laying down energy reduction targets for 10-year periods, with a final target of reducing final energy consumption by at least 60 % in 2050 compared to 2010.

In order to initiate the process, the **Charter for the energy efficiency of tertiary buildings** was drawn up and signed on 31 October 2013 by 30 public and private stakeholders, who have committed to work towards reducing the energy consumption of these buildings. To date 96 public stakeholders have signed this Charter.

Article 22 stipulates that the public service for housing energy performance is based on a network of local energy efficient renovation platforms. These platforms assist households in their energy efficient renovation work and continue and supplement the work of the Renovation information service points (PRIS) described below (paragraph 1.2.5.a).

Article 27 strengthens the existing provisions on the individualisation of heating costs. All multi-dwelling buildings are subject to the obligation to individualise heating costs, which will be implemented in stages according to the building's consumption. Those buildings using the least energy must therefore install systems allowing the individualisation of heating costs before 31 December 2019 (the date set for those buildings using the most energy is 31 March 2017). The LTECV requires the property manager to include items relating to the individualisation of heating costs and the associated estimates on the agenda of the joint owners' general meeting.

(c) Thermal Regulations for existing buildings

The **Thermal Regulations for existing buildings** aim to ensure a significant improvement in the energy performance of an existing building when a developer starts work likely to lead to such an improvement. The applicable measures, general Thermal Regulations and item-by-item Thermal Regulations vary according to the extent of the work undertaken, costs incurred and date of construction of the building in question.

For extensive renovation work⁸ on buildings larger than 1 000 m² constructed after 1948, the **general Thermal Regulations**⁹ set an overall energy performance target to be achieved. For housing, the Thermal Regulations impose a maximum consumption value: the energy consumption of the

⁷ See France's report under Article 13(1) of Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions, MEEM, 2017.

⁸ Renovation work costing more than 25 % of the value of the building excluding land, as defined by regulation.

⁹ Order of 13 June 2008 on the energy performance of existing buildings larger than 1 000 m² when subject to major renovation work.

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 consumption is between 80 and 195 kWh_{ep}/m²/year depending on the case. For non-residential buildings, the work must lead to a 30 % saving on the primary 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 or constructed before 1948, the **item-by-item Thermal Regulations**¹⁰ set a minimum performance for those items replaced or installed: this covers in particular insulation, heating, hot water, cooling and ventilation equipment.

The item-by-item Thermal Regulations¹¹ have been amended to take account of developments in the systems available on the market and to ensure that the energy consumption reduction targets are achieved.

(d) Labels to encourage the emergence of more energy efficient renovated buildings

A **'high energy performance renovation'**¹² label has also been created. This 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 kWh_{ep}/m²/year for the five regulatory uses (heating, domestic hot water, lighting, cooling and auxiliary systems) and a 'low-energy building renovation, LEB 2009' label for those buildings that achieve a primary energy consumption of less than 80 kWh_{ep}/m²/year for the same uses. This label also includes another level for non-residential buildings. Since 1 January 2013 it has been mandatory for a certificate stating that the Thermal Regulations have been taken into account to be provided by one of the following four professionals: architect, house diagnostician, building design quality control office, certification body if the building is subject to certification. The certificate forms an integral part of the declaration confirming completion and compliance of the works (Article R.462-4-2 of the Town Planning Code).

This label has two levels for residential buildings:

- HEP renovation level, which corresponds to a primary energy consumption of 150 kWh/m²/year (adjusted according to the altitude and climate zone);
- LEB renovation level, which corresponds to a primary energy consumption of 80 kWh/m²/year (adjusted according to the altitude and climate zone).

For non-residential buildings, the label has a single LEB renovation 2009 level, which corresponds to a consumption of less than 40 % of the consumption under the general Thermal Regulations for existing buildings.

(e) Removal of obstacles to renovation (splitting of incentives – Article 19 of the EED)

Various steps have been taken to **remove some of the obstacles**¹³ to the renovation of housing or on the recourse to virtuous uses:

- **Amendments to the rules on decisions on work** in the Construction and Housing Code, which previously could be very constraining in the case of **jointly-owned properties**:
 - majority vote of the joint owners on the performance of work in the common interest in private parts at the expense of the joint owner concerned;
 - majority vote of the joint owners on the installation of heat meters or heat cost allocators;

¹⁰ Order of 3 May 2007 on the thermal characteristics and energy performance of existing buildings, amended by the Order of 22 March 2017.

¹¹ Order of 22 March 2017 amending the Order of 3 May 2007 on the thermal characteristics and energy performance of existing buildings.

¹² Decree of 29 September 2009 creating a 'high energy performance renovation' label for certain existing buildings and the Order of 29 September 2009 on the content and conditions for the issue of the 'high energy performance renovation' label.

¹³ Article 19 of the Energy Efficiency Directive.

- mandatory inclusion, on the agenda of the joint owners' general meeting following an energy performance diagnosis – or, where applicable, an energy audit – in any building equipped with a block heating or cooling system, of an item relating to an energy saving work plan or an energy performance contract.
- **Financial contribution by the tenant after the owner has carried out energy saving work** in order to establish a 'win-win' situation between owner-landlords, who bear the cost of the work, and tenants, who benefit from the energy savings achieved: Law No 2009-323 on mobilisation for housing and the fight against exclusion, adopted on 25 March 2009, provides that the owner may require the tenant to make a contribution of up to half of the cost savings achieved. This contribution takes the form of a new heading in the rent receipt, which will continue for a period of 15 years. However, this contribution is possible only if the landlord carries out a package of energy efficiency work involving at least two measures or allowing a minimum performance level¹⁴ to be achieved and has consulted his or her tenant.

(f) Support measures

In the private residential sector, numerous incentive schemes for private individuals have been implemented to encourage the energy performance of housing to be improved:

(g) Energy transition tax credit (*crédit d'impôt transition énergétique – CITE*)

Since 2005, private individuals have been able to benefit from a tax credit for the purchase and installation of the most energy efficient materials or equipment in terms of energy savings (in existing buildings only) or for the production of renewable energy (in new buildings up to 31 December 2012 and in existing buildings). Since its creation, the list of equipment eligible for the tax credit and the required performance criteria have been regularly reviewed to encourage use of the most energy efficient technologies. The tax scheme (CITE) was enhanced on 1 September 2014, in order to speed up the rate of energy renovations, with the introduction of a single rate of 30 % without any income conditions. Qualification requirements for installers were introduced on 1 January 2015 as part of the extension of the RGE Charter (see below). As a result, cross-compliance involves the requirement for installers to have RGE qualifications.

Implementation of the CIDD-CITE (sustainable development tax credit-energy transition tax credit) over the 2009-2012 period has allowed a reduction in annual final energy consumption of 0.78 Mtoe in 2013, 0.93 Mtoe in 2016 and 1.08 Mtoe in 2020¹⁵.

The CITE has been extended until 31 December 2017 at the rate of 30 %. The eligibility criteria are set out in Article 18a of Annex IV to the General Tax Code¹⁶.

According to the latest available figures on the equipment funded, it is estimated in particular that 150 000 condensing boilers eligible for the tax credit were installed in 2015, as well as more than 21 000 air source and geothermal heat pumps and 18 000 heat pump water heaters. The number of opaque thermal insulation installations carried out in 2015 under the tax credit is estimated at 160 000 for roofs and 65 000 for walls.

In 2015, 1.12 million households benefited from an average tax credit of EUR 800 for an average declared amount of EUR 4 100, for work carried out in 2014. The tax expenditure on the CITE amounted to EUR 620 million in 2014 (2013 revenues) and to EUR 900 million in 2015 (2014 revenues). The cost of the scheme in 2016 (for expenditure made in 2015) is estimated at EUR 1.6 billion, which has enabled EUR 5.8 billion of work. To date, between 800 000 and 1 000 000 households have benefited from the CITE each year since the scheme started. The 2017 forecasts are EUR 1.6 billion.

¹⁴ Law No 2009-323 and Decrees 2009-1438 and 2009-1439 of 23 November 2009.

¹⁵ Source: MEEM (Sceges).

¹⁶ See General Tax Code, Annex 4 - Article 18a.

(h) VAT at reduced rate for renovation work

The reduced rate of VAT of 5.5 %, applicable from 1 January 2014, is only for work to improve the energy quality of housing constructed more than two years earlier, as well as associated work that cannot be avoided.

The aid provided in the form of this reduced rate of VAT allows households to immediately reduce the cost to be paid. This immediate reduction therefore encourages renovation work to be carried out to improve the energy performance of housing.

The measure also combines a direct impact on the sector with an indirect impact, thereby supporting growth. It allows jobs and businesses to be created and encourages the use of professionals.

The cost of the measure is estimated at EUR 1.1 billion in 2015 and in 2016.

The results of the OPEN 2015 survey indicate that the reduced rate of VAT and the CITE are the schemes most used by households.

(i) Interest-free eco-loan (eco-PTZ)

This loan has been available since 1 April 2009 and is aimed at individual owner-occupiers or landlords in order to finance major renovation work. It consists of three options:

1. carrying out a 'package of work';
2. achieving a minimum level of 'overall energy performance' of the housing, calculated by a thermal consultancy office;
3. upgrading an individual sewage system using equipment that does not consume energy.

This loan can finance up to EUR 30 000 of work to improve the energy efficiency of a housing unit over a period of 10 years (which can be extended to 15 years by the bank, which does not in this case benefit from the tax credit on the interest not received between the tenth and fifteenth years).

To make it easier for work to be carried out on jointly owned properties, the Amending Finance Law for 2011 opened up the eco-PTZ to associations of joint owners¹⁷.

Since June 2011, the packages of work eligible for an eco-PTZ, as well as the overall energy performance requirements, have been adapted for the overseas communities. The eco-PTZ can therefore finance some renovation work carried out in Guadeloupe, Martinique, La Réunion, French Guiana and Saint Martin.

The eco-PTZ was also improved in a number of ways on 1 January 2015, in line with the developments in the CITE, through:

- a transfer of responsibility for checking the eligibility of the work from the banks to the undertakings carrying out the work;
- an alignment of the technical criteria of the eco-PTZ with those of the CITE.

Since 2015, further changes have been made to the scheme:

- the eco-PTZ in home ownership projects: to help households purchasing property and carrying out work, it is now possible to apply for an eco-PTZ for a planned property purchase;
- the additional eco-PTZ: since 1 July 2016, it has been possible to apply for an additional eco-PTZ within three years of the first loan being granted, provided that this first loan has been paid;
- combination with the CITE: since 1 March 2016, it has been possible to combine the eco-PTZ with the CITE without any income conditions.

The eco-PTZ has been extended until 31 December 2018.

¹⁷ The 'Warsmann' Law of 22 March 2012 on the simplification of the law and administrative procedures and its implementing decree (Decree No 2013-205 of 13 March 2013) defined the legal framework for applying for a bank loan to finance work in the name of the association of joint owners. Decree No 2013-1297 of 27 December 2013 defines the terms of the joint eco-PTZ.

In 2015, 23 567 eco-PTZs were granted, with an average amount of EUR 17 190. The generational cost of the eco-loans granted in 2015 amounts to EUR 40 million. **For 2016, 22 725 eco-loans were declared as at 31 January 2017 (provisional data).**

The tax expenditure on the eco-PTZ is a year behind payment of the loan and is spread over five years. For 2010, it amounted to EUR 30 million, and increased to EUR 70 million in 2011. It then rose to EUR 100 million in 2012, EUR 110 million in 2013, and EUR 120 million in 2014. Finally, **the tax expenditure amounted to EUR 110 million for 2015.** The rise in the tax expenditure is due to the tax credit payments to credit institutions being spread over a number of years.

Generation	Number of loans	Total budget (in million EUR)	Budget breakdown (in million EUR)						
			2009	2010	2011	2012	2013	2014	2015
2009	70 933	140		28	28	28	28	28	
2010	78 484	200			40	40	40	40	40
2011	40 755	120				24	24	24	24
2012	33 861	85					17	17	17
2013	32 464	75						15	15
2014	31 196	70							14
2015	23 567	40							
	311 260	730	0	28	68	92	109	124	110

Table 6. Generational cost of the eco-PTZ (source: MEEM)

The tax expenditure is substantially lower than was originally forecast, due to falling interest rates and fewer eco-loans being granted, even though the original plans were for a gradual expansion of the scheme to 400 000 eco-loans per year. The draft Finance Law for 2016 provides for a tax expenditure of EUR 75 million.

Implementation of the eco-PTZ will allow a reduction in the annual final energy consumption of 0.18 Mtoe in 2013 and 0.19 Mtoe in 2016 and 2020¹⁸.

The energy savings certificate (*certificats d'économies d'énergie* – CEE) scheme (see the Energy section) aims to mobilise the potential for energy savings, in particular in those sectors where it is more common, such as the building sector.

In addition, on 1 January 2016 a new energy savings obligation was introduced, to promote energy savings for households in fuel poverty. This new additional obligation is set at 150 TWh cumac (cumulative adjusted TWh) for 2016-2017, in addition to the 700 TWh cumac under the CEE obligation already set for 2015-2017.

The Decree of 2 May 2017 amending the provisions of the regulatory part of the Energy Code on energy savings certificates increases the CEE target for the fourth period (2018-2020) to 1 600 TWh cumac, of which 400 TWh cumac is for households in fuel poverty.

(j) Exemption from property tax on developed properties

The Amending Finance Law for 2006 introduced the possibility of local authorities granting exemptions from property tax on developed properties for five years, at an exemption rate of 50 % or 100 %, for buildings completed before 1 January 1989 on which major work eligible for the CITE was to be

¹⁸ Source: MEEM (Sceges).

carried out. This possibility has since been extended to all buildings completed before 31 December 2008. New housing completed since 1 January 2009 can also benefit if this has the LEB label.

(k) Sustainable development passbook account (*livret de développement durable – LDD*)

On 1 January 2007 the industrial development account (CODEVI – *compte pour le développement industriel*) was replaced by the sustainable development passbook account (*livret de développement durable – LDD*), with its uses being expanded. It was previously limited to the financing of small and medium-sized enterprises, but now allows loans at favourable rates to be granted in order to finance energy saving work in housing built more than two years earlier. The work that can be financed is the same as that eligible for the CITE. The deposit limit was increased to EUR 12 000 on 1 October 2012.

For savers, it operates in exactly the same way as the *Livret A* savings account (same rate and tax exemption) with a different deposit limit (EUR 12 000 for the LDD and EUR 22 950 for the *Livret A*). In practice, 59.5 % of the total amount saved in *Livret A* and LDD accounts is managed centrally by the CDC¹⁹ (Caisse des Dépôts et Consignations – Deposits and consignments fund). As for the rest, at least 80 % must be used for loans to SMEs (without any specific environmental criterion) and at least 10 % must be used for loans intended for the energy efficient renovation of housing (eco-loans). If the total amount of loans to SMEs and for energy saving work is less than the amount allocated for this purpose, the amount concerned must then be managed centrally by the CDC.

In 2015, the amount saved in *Livret A* and LDD accounts that was not managed centrally was EUR 145.8 billion. Each credit institution respects the regulatory ratio of using at least 80 % of its resources that are not managed centrally for loans to SMEs. As regards loans intended for energy efficient renovation, it is difficult for credit institutions to measure the direct or indirect financing of energy saving work as they do not differentiate their loan offer for existing housing according to the aim of the work²⁰.

1.2.3. Renovation of the social rental housing stock

France decided to increase the renovation work being carried out in order to achieve a target of 500 000 renovations per year by 2017, with 120 000 homes being renovated within the social rental housing stock. The achievement of this target has been based on the following measures:

(a) Social housing eco-loan

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

The social housing eco-loan scheme has now been extended until the end of 2020 and its target is the renovation of 70 000 social housing units/year. An agreement was signed on 4 May 2012 by the State and the Caisse des Dépôts et Consignations. The loan that is currently being granted has a variable rate, based on the *Livret A* rate, and its maximum term has been increased to 25 years. The loan rate depends on its term so that there is a grant equivalent regardless of its term:

- the *Livret A* rate less 75 base points for a term of less than or equal to 15 years;
- the *Livret A* rate less 45 base points for a term of more than 15 years but less than or equal to 20 years;
- the *Livret A* rate less 25 base points for a term of more than 20 years but less than or equal to 25 years.

¹⁹ Mainly to finance social housing, but also high-speed railway lines, public transport at specific sites, water treatment plants, etc.

²⁰ Annual report of the Observatoire de l'épargne réglementée (Observatory for regulated savings): https://www.banque-france.fr/fileadmin/user_upload/banque_de_france/publications/OER2015_rapport.pdf

As regards eligibility conditions, borrowing organisations must now commit to a five-year intervention programme involving a maximum of 70 % energy class D housing units per organisation and per region up to a limit of 50 000 housing units per year nationally. In particular, this loan can be accessed by low-income housing associations (*habitation à loyer modéré* – HLM), semi-public companies (*sociétés d'économie mixte* – SEM) or municipalities owning or managing social housing for the purpose of energy renovations on 'energy-inefficient' housing: the loan finances the energy saving work allowing a housing unit to go from a primary energy consumption in excess of 230 kWh_{ep}/m²/year to a consumption below 150 kWh_{ep}/m²/year. Housing constructed before 1 January 1948 is subject to an alternative regime. This can benefit from the loan where it is classified in energy class E, F or G in the energy performance diagnosis (DPE) and where a combination of energy performance improvement measures with the characteristics defined in a work plan are implemented. Since September 2010, housing classified in energy class D has also been able to benefit under certain conditions, with a limit of 14 000 housing units year from 2012.

By 31 December 2015, 54 000 housing units had been the subject of a social housing eco-loan application. Since the announcement of measures forming the housing energy renovation plan on 21 March 2013, improvements have been made in order to achieve an annual rate of energy efficient renovation of 120 000 social housing units by 2017:

- a reduction in the loan rate, equal to the *Livret A* rate less 75 base points for a term of less than or equal to 15 years (with a similar rate in terms of grant equivalent over 20 years and 25 years);
- relaxation of the eligibility conditions for class D, allowing a national quota of 50 000 class D housing units per year, with the five-year renovation programmes also no longer having to guarantee a minimum of 30 % class E, F or G housing units;
- no change, however, to the technical eligibility criteria.

Implementation of the social housing eco-loan will allow a reduction in the annual final energy consumption of 0.35 Mtoe in 2013, 0.65 Mtoe in 2016 and 1.03 Mtoe in 2020²¹.

(b) Rebate on property tax on developed properties

Since 2005, low-income housing associations or property semi-public companies that have to carry out energy saving work under the Thermal Regulations in force have been able to benefit from a **rebate on the property tax on developed properties** (*taxe foncière sur les propriétés bâties* – TFPB) equal to one-quarter of the expenditure incurred during the year prior to that for which the tax is due. This rebate is deductible from the TFPB due not only for the building that has undergone the work in question, but also for all other buildings belonging to the same social landlord in the same municipality or in other municipalities provided that they all come under the same tax office²².

(c) Mobilisation of European funds for the energy efficient renovation of social housing

Since 10 June 2009, **investments made in energy efficiency and renewable energies in the housing sector have been eligible under the European Regional Development Fund (ERDF)**. For the 2007-2013 programming period, the total amount available for energy retrofitting work was 4 % of the ERDF's national envelope, which corresponded to around EUR 230 million for metropolitan France and EUR 90 million for the overseas departments, without any ceiling on the annual expenditure.

A circular was published on 22 June 2009 in order to give the regional management authorities recommendations on the use of these funds: these recommendations mainly focus on ensuring consistency with current financial measures in favour of energy saving work. It is also recommended that the conditions for granting this subsidy be modelled on those allowing the social housing eco-loan to be granted. In the overseas departments, it is recommended that interventions aiming to improve comfort in summer or use renewable energies can be funded by the ERDF as long as they are innovative or have such a cost that they justify the need for additional sources of funding. The aid must

²¹ Source: MEEM (Sceges).

²² See Law No 2009-323 of 25 March 2009.

be used for pivotal work involving a significant number of housing units and aiming for exemplary energy performance in order to give visibility to the involvement of European funds in these measures. Since August 2012, the regional prefects have been authorised to remove the 4 % rate ceiling in each region, provided that the 4 % rate is not exceeded at national level.

At European level, for the 2014-2020 period, Article 4 of the new ERDF Regulation²³ lays down an obligation to concentrate funds on Thematic Objective 4 (TO4): '*Supporting the shift towards a low-carbon economy in all sectors*'. This objective includes in particular energy efficiency and the use of renewable energies in public infrastructures and in the housing sector. This thematic concentration on TO4 breaks down as follows, by regional category:

- in more developed regions: at least 20 % of the resources at national level;
- in transition regions: at least 15 % of the resources at national level;
- in less developed regions: at least 12 % of the resources at national level.

At the national level, the investment priorities of the European structural and investment funds (including the ERDF) are set out in the Partnership Agreement²⁴. This document, produced after broad consultation, was adopted by the Commission on 8 August 2014. This agreement, which determines the scope of intervention of European funds, is based around three main challenges divided into 11 thematic objectives (TOs):

- challenge of the competitiveness of the economy and employment;
- challenge of the energy and environmental transition and of the sustainable management of resources;
- challenge of equality between regions and equal opportunities. As regards TO4, among other aspects, the Partnership Agreement stresses the importance of energy efficiency in construction, which 'constitutes ... the priority line of action in the shift towards a low-carbon economy', focusing on the residential and public tertiary sectors.

At the regional level, the Partnership Agreement states that each ERDF regional programme will apply the thematic concentration rules mentioned above. The model Partnership Agreement validated by the Commission indicates total indicative support for the priorities of Thematic Objective 4 of:

- EUR 1 819 million for the ERDF, of which EUR 759 million for Objective 4.c aimed, in particular, at energy efficiency in public buildings and in the housing sector: as at 30 September 2016, EUR 63 million had already been programmed for this objective;
- EUR 348 million for the EAFRD (European Agricultural Fund for Rural Development).

Moreover, the Partnership Agreement also states that 'all operational programmes (ERDF, ESF, ERDF/ESF) shall contribute to the achievement of the Union's objectives in terms of reducing greenhouse gas emissions in all sectors and shall be assessed in this respect'.

1.2.4. Fight against fuel poverty

France intends to reinforce its **fight against fuel poverty** through specific measures.

Article 11 of Law No 2010-788 of 12 July 2010 on the national commitment to the environment introduced a legal definition of fuel poverty. 'Under this Law, fuel poverty is the situation where a person has particular difficulty in accessing the necessary energy supply for his or her home in order to meet his or her basic needs owing to his or her inadequate resources or living conditions'.

A **Fuel poverty observatory (Observatoire de la précarité énergétique – ONPE)** was set up in March 2011 to better measure fuel poverty situations and monitor the public and private financial aid granted to disadvantaged households and also the actions, under local or national initiatives, aimed at measuring the impact of this aid and sharing experiences.

The **National housing agency (Anah)** helps owner-occupiers who fall under a resources ceiling and owner-landlords to carry out housing improvement work, and also associations of joint owners to carry

²³ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0289:0302:EN:PDF>

²⁴ <http://www.europe-en-france.gouv.fr/Centre-de-ressources/Etudes-rapports-et-documentation/Accord-de-partenariat-2014-2020>

out work on communal parts and equipment. Anah's aid can finance major work on housing constructed more than 15 years earlier. The thermal renovation and improvement of housing are the focus of Anah's actions, with particular emphasis on the remediation of substandard housing and the adaptation of housing where people have lost their independence. Anah also assists with the monitoring of work.

Since 2013, Anah's budget has been swelled by income from auctions conducted as part of the European Trading Scheme that covers the energy and industry sectors (see Industry section), up to a limit of EUR 590 million per year.

The '**Habiter mieux**' (**Living better**) programme, managed by Anah, had access to EUR 1.35 billion over the 2010-2017 period, of which EUR 500 million came from the State through the 'Programme d'Investissements d'Avenir' (Investing for the future programme), EUR 600 million from Anah itself and EUR 250 million from energy suppliers under the energy savings certificates scheme.

	2013	2014	2015	2016
'Habiter Mieux'	31 265	49 831	49 706	40 726

Table 7. Number of housing units renovated under the 'Habiter mieux' programme (source: MEEM)

The 'Habiter mieux' programme will allow 300 000 housing units to be renovated by 2017, improving their energy performance by at least 25 % (with a target of 100 000 housing units for 2017). The average energy saving made following work funded by the 'Habiter Mieux' programme is in the order of 39 % for owner-occupiers and 64 % for owner-landlords.

In addition, the 'Habiter Mieux' eco-loan was created by the Finance Law for 2016 to allow low- and very-low-income households receiving aid from Anah under the 'Habiter Mieux' programme to finance the remaining cost of their work interest-free. The eligibility conditions and procedure for granting this type of eco-loan are tailored to the specific requirements of the 'Habiter Mieux' programme.

Lastly, as part of the **energy savings certificates** scheme, the LTECV has created a new obligation specifically aimed at combating fuel poverty (Article 30). Actions funded by this scheme will be implemented among low-income households. The amount of energy savings targeted by the government is 150 TWh cumac for the 2016-2017 period and 400 TWh cumac for the 2018-2020 period. Actions in relation to social housing and under the 'Habiter mieux' programme are eligible for these fuel poverty CEEs.

Trials of energy vouchers

Article 201 of the LTECV provides for the introduction of energy vouchers to be used to pay housing energy bills.

These vouchers are intended to overcome structural impediments preventing social energy tariffs from fully achieving their goals. In fact, the number of actual beneficiaries (around 3 million at the beginning of 2016) remains below the number of those eligible (over 4 million households), and also the level is too dependent on the heating energy.

These energy vouchers, which will be worth up to EUR 227, will be allocated based on a single fiscal criterion, taking into account the income level and composition of the household. They will allow beneficiary households to pay their energy bills, whatever their means of heating (electricity, gas, fuel oil, wood, etc.). If they wish, beneficiaries will be able to use these vouchers to finance some of the energy saving work that they carry out in their housing.

As part of a two-year trial carried out in four departments (Ardèche, Aveyron, Côtes d'Armor and Pas de Calais), the first vouchers were sent out in the first half of 2016. At the end of this trial phase and based on an evaluation report submitted to Parliament, these vouchers will be rolled out nationally from 1 January 2018 in replacement for social energy tariffs.

1.2.5. Information, awareness-raising, training

(a) One-stop shop and PRISs (Renovation information service points)

The housing energy renovation plan aims to help owners make decisions by setting up a national one-stop shop and a local network for the energy renovation of private housing, which will be a genuine local public service for energy renovation, consisting of 450 Renovation information service points (PRIS) throughout the territory. The LTECV gave legislative force to the PRISs by including them in the 'local energy efficient renovation platforms' (Article 22 of the Law). These local energy efficient renovation platforms, which are intended to increase the technical and financial support offered to private individuals in their energy efficient renovation work, form the Public service for housing energy performance (*Service public de la performance énergétique de l'habitat* – SPPEH).

The national one-stop shop is based on a telephone number (free service + price of call) – 0808 800 700 – and a website (<http://www.renovation-info-service.gouv.fr/>). Its task is to guide private individuals, based on their profile and location, towards information and advice points within the local network and to offer initial basic information.

The task of the PRISs is to provide technical, financial, tax and regulatory information and offer free and objective advice to enquiring developers on the design of the energy renovation project for their housing. They are public and independent and are aimed at all private individuals (owners, joint owners, public in fuel poverty situations). They rely:

- for people eligible for aid from Anah: on the Anah network (Departmental directorates for the territories (and the sea) – DDT(M) – Directions départementales des territoires (et de la mer); delegating authorities; Departmental agency for housing information – Agence départementale d'information sur le logement – ADIL));
- for other people: on the network of Energy information centres (Espace Info-Energie – EIE) co-funded by the ADEME, regional councils, and certain departmental councils and authorities, as well as on structures created by authorities (excluding EIEs). Set up in 2001 on the initiative of the ADEME, these EIEs advise private individuals on energy efficiency and renewable energies. According to the OPEN 2015 survey (conducted among households having carried out renovation work between 2012 and 2014), 1 household out of 5 had already heard about EIEs and/or PRISs and 1 household out of 4 for those households having carried out work (and even 1 out of 3 for those having carried out an energy efficient or very energy efficient renovation). In 2015, over 170 000 people received personalised advice from 455 advisers spread across the network of more than 250 EIEs. The latest assessment of the direct environmental impact of the EIEs indicates a reduction in GHG emissions of 141 kt CO₂ eq. in 2014 as a result of over 194 000 consultations (compared to 121 kt CO₂ eq. in 2013).

The 'j'éco-rénove, j'économise' (eco-renovations save money) information campaign, launched in September 2013 by the Ministry of Housing and Equality between Regions and the Ministry of Ecology, Sustainable Development and Energy, encouraged private individuals to undertake energy efficient renovation work on their housing and to obtain assistance from the PRISs.

(b) Energy performance diagnosis

Under the Energy Performance of Buildings Directive (EPBD), the **energy performance diagnosis** (*diagnostic de performance énergétique – DPE*) has been mandatory for all buildings rented from 1 July 2007 or sold from 1 November 2006. The results must be made available by the seller or landlord to any potential purchaser or tenant who requests this on the sale or rental of the building or part thereof. Since 1 January 2011 it has been compulsory to include the energy class of a housing unit in any advertisement for the sale or rental of a property.

In order to give owners and occupants further information on the energy performance of their building and on the possible energy savings, Law No 2010-788 of 12 July 2010 on the national commitment to the environment requires an energy performance diagnosis to be carried out before 1 January 2017 where the building is heated or cooled by a communal system. Furthermore, since 1 April 2013, diagnosticians have been required to send the DPEs that they carry out to the ADEME in order to create a database: this information should improve knowledge of the energy performance of the building stock.

Given its importance as part of the policy to reduce energy consumption in buildings, the government has introduced a plan to increase the reliability of the DPE. The key points of this plan are:

- development of the skills of professionals, involving in particular:
 - the requirement to have completed basic training of bac+2 (secondary school education + two years of college) and three days of continuous training;
 - the introduction of two certification levels: 'individual' for single-family houses, apartments and tertiary lots within buildings that are mainly for residential use, as well as certificates confirming that the Thermal Regulations have been taken into account, and 'all types of building' for multi-dwelling buildings and buildings that are mainly for non-residential use, in addition to the tasks of the previous level;
- improvement of the quality of diagnoses: clarification that on-site visits are mandatory, introduction of a technical sheet detailing the input data, extra explanation of the differences between estimated and actual consumption, compulsory assessment of the software for producing the DPE, update of the agreed calculation method, and possibility of deducting the share of renewable energy from the overall consumption.

Decree No 2013-695 of 30 July 2013 regulates the **display of the DPE** in buildings occupied by the services of a public authority or public institution that are regarded as a public-access building (PAB) larger than 500 m². All buildings occupied by the services of a public authority or public institution that meet these criteria must undergo an energy performance diagnosis before 1 January 2015, except where this has already been carried out and is still valid. For all PABs larger than 500 m² that have undergone an energy performance diagnosis during their construction, sale or rental, this diagnosis must be displayed for its entire period of validity in a location visible to the public close to the main entrance or reception area. In addition, pursuant to the requirements of Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings, this Decree also orders the reduction of this threshold to 250 m² from 1 January 2015.

(c) Awareness-raising and training measures for professionals

A 'Charter of commitment on the Recognition of environmental guarantors (*Charte d'engagement relative à la Reconnaissance garant environnement – RGE*) relating to qualifications in the area of energy performance work for private individuals was signed in 2011 by the State and the main qualification bodies, as well as by trade associations. The Charter commitments prompted qualification bodies, trade associations and the State to promote quality signs and increase their reliability. This Charter was renewed on 4 November 2013 for an extra two years. This Charter brought together the following initiatives:

- The Qualit'EnR association offers qualifications (QualiPAC, QualiBois, Qualisol, QualiPV, etc.) to installers of renewable energy equipment. A qualification is being developed for vertical geothermal probe drillers and for water wells, which will replace the former Qualiforge label.
- The QUALIBAT body has introduced new 'Renewable energy' and 'Energy efficient renovation' certificates, as well as the 'Energy efficiency' mark, which now accompanies the qualifications relating to the building envelope and technical equipment.
- The QUALIFELEC association has updated its 'Electrical Installation' and 'Heating, Ventilation, Air-Conditioning' qualifications, as well as the Energy Saving and Solar Photovoltaic marks.
- The ECO Artisan qualification, developed by the CAPEB (Confédération de l'Artisanat et des Petites Entreprises du Bâtiment – Confederation of craftsmen and small building companies) and awarded by QUALIBAT, identifies craftsmen specialising in the comprehensive energy rehabilitation of buildings.
- Finally, the 'Pros de la performance énergétique' (Pros of energy performance) qualification, developed by the FFB (Fédération Française du Bâtiment – French building federation), identifies those companies that have either a QUALIBAT or QUALIFELEC professional qualification with the 'energy saving' mark or a QUALIBAT or Certibat certificate for a comprehensive energy efficient renovation offer.

When the Charter on the qualification of work was renewed in 2013 ('RGE travaux'), two further charters were signed:

- One charter to define the 'RGE études' mark, which is designed to identify project management professionals (consultancy offices, construction economists, architects) skilled in improving energy performance and to encourage the development of the skills of these project managers. It should also be noted that the RGE principle was extended to intellectual services connected with project management by the signature on 4 November 2013 of a charter between the main bodies in this sector.
- A commitment by manufacturers producing construction and renovation materials to enhance the 'energy saving' aspect when training craftsmen and to promote the 'RGE' mark.

Since the cross-compliance of public aid when granting the CITE, Eco-PTZ and CEEs was introduced in 2015, the 'RGE travaux' Charter has not been renewed. Agreements are now concluded between the qualification bodies and the State in order to define the qualification conditions for professionals holding an RGE quality sign.

In accordance with Article 18 of the EED, the list of qualified service-providers is available on the Rénovation Info Service²⁵ website. To date, 62 000 RGE undertakings have been recognised.

Other training schemes for professionals

The '**FEEBAT**' training scheme (*Formation aux Economies d'Energie des entreprises et artisans du BATiment* – Training in energy savings for building companies and craftsmen), launched in 2007 by EDF and the professional bodies FFB and CAPEB, allows professionals to receive training in energy savings delivered by authorised bodies under advantageous financial conditions throughout the territory. The most recent FEE Bat agreement was signed in 2014 for a period of four years between the Ministry of Housing and Equality between Regions, the Ministry of Ecology, Sustainable Development and Energy, EDF, professional bodies in the building trade (CAPEB, FFB and SCOPBTP), the ADEME and the ATEE. By the end of 2016, this scheme had trained more than 165 000 trainees.

The **club de l'amélioration de l'habitat** (housing improvement club), an association created in 1992 to help develop the renovation market, has implemented a training scheme focusing on the basics of the building renovation trades: this is an online learning platform aimed at building professionals²⁶.

The ADEME also supports several initiatives aimed at training building professionals:

- The **PRAXIBAT® programme** is a training tool covering energy efficiency techniques for buildings, which aims to improve the skills of all professionals in the sector (craftsmen, journeymen, apprentices, architects, trainers, etc.). To allow these professionals to learn the correct practices associated with new techniques and materials, this programme involves the rollout of platforms simulating real site conditions. By October 2016, over 150 PRAXIBAT® platforms were in use in France and nearly 2 000 trainees had been trained using these platforms, with over 740 trainers having been authorised.
- The **BEEP network** (*Bâti Environnement – Espace Pro – Built environment – Pro space*), created in 2009 by the ADEME, brings together regional resource centres that fully or partly focus on the environmental quality of building. This network pools knowledge and know-how and facilitates access to relevant and valid information as well as concrete examples. In 2015, 22 regions had a BEEP centre.
- The ADEME and the Plan Bâtiment Durable (Sustainable building plan body) have joined forces to create an **online building training platform (Massive open online course – MOOC)** that is free, open to all and accessible 24/7 (www.mooc-batiment-durable.fr). Its aim is to provide building professionals with the tools to meet the new energy and digital challenges that are impacting on trades and know-how in the building and project management sector. The first training session took place in early 2017.

Lastly, the ADEME and the Plan Bâtiment Durable, in partnership with France Université Numérique (FUN), launched the 'MOOC Bâtiment Durable' platform in mid-November 2016. These online courses will allow all trainees to acquire a general knowledge of buildings in various areas, including renovation.

²⁵ See <http://renovation-info-service.gouv.fr/trouvez-un-professionnel>.

²⁶ www.cah.fr

The first wave of courses started in January 2017 on the subject of the energy efficient renovation of buildings, with two training courses on renovation:

- 'Rénovation performante : les clés de la réhabilitation énergétique' (Energy efficient renovation: the keys to energy rehabilitation)
- 'Une méthode pour réussir vos opérations et chantiers de rénovation' (A blueprint for successful renovation work)

Following these first two MOOC courses, other training is being prepared on various subjects. In line with its editorial policy, the platform is also intended to host MOOC courses delivered independently by one or more building professionals.

1.2.6. Research and demonstration

The first **Programme de recherche et d'expérimentation sur l'énergie dans les bâtiments** (PREBAT1) (Research and experimentation programme on energy in buildings) was launched in 2005 for a period of five years. This was a national programme that coordinated and managed public research on energy in buildings and that encompassed the actions of the ministries responsible for sustainable development, energy, construction, research and industry, and their respective agencies: ADEME, ANR, Anah, BPI France and ANRU.

The objectives of PREBAT1 were to develop research, transfer of technologies and experimentation in several strategic areas: sustainable modernisation of existing buildings, planning of tomorrow's new buildings and positive energy buildings. These three main objectives resulted in efforts being concentrated on three complementary fields: acquisition and dissemination of knowledge (studies, training of professionals, dissemination of knowledge, etc.), technological research and experimentation. Over EUR 100 million of public funding was provided over the 2005-2009 period for PREBAT1, with a large part of the research work being focused on technological building blocks.

PREBAT was renewed in 2010 for the 2011-2015 period (PREBAT2), with two objectives: rehabilitation of the housing stock to the best possible energy performance level, and planning of tomorrow's new buildings.

PREBAT has also allowed two series of field experiments to be conducted, with a programme of exemplary operations being carried out by the ADEME, and research, action research and experimentation projects being carried out by the PUCA (*Plan Urbanisme Construction Architecture – Town planning, construction and architecture plan*).

Some emblematic measures of PREBAT1

- An international comparison was carried out in 2005-2007 allowing the analysis of foreign best practices (in terms of both research and operational implementation) for new and renovated high-energy-performance buildings.
- The ADEME, together with the regions, has focused most of its appropriations on supporting the development of exemplary new and renovated buildings with very high energy performance in order to demonstrate their feasibility. As a result, over 3 200 buildings were selected, following regional calls for projects, and supported over the 2007-2014 period with a total budget of around EUR 80 million (not including the budgets provided by the regions, which were around the same amount). Energy consumption measurement campaigns involving a sample of 200 buildings were also conducted and subsidised by the ADEME to the tune of EUR 5 million. Over the 2007-2010 period (PREBAT1), three-quarters of the buildings supported were new buildings (construction works), of which around 80 were positive energy buildings. Conversely, over the 2011-2014 period (PREBAT2), nearly two-thirds of the buildings supported were existing buildings (renovation works).
- Launched by the PUCA in 2008, the REHA experimentation programme promotes an innovative technical and architectural offer allowing the sustainable requalification of collective residential buildings in the public and private sectors. The first buildings were requalified under the 'REHA'

label in 2011.

The ADEME participates in the implementation of the **National research strategy (*Stratégie nationale de recherche – SNR*)** by providing financial support to research projects, demonstrators and preindustrial trials. It is involved at all stages of the scientific research and innovation process through three complementary instruments: the thesis programme, the RDI budgets (research, development, innovation) and the ‘Programme d’Investissements d’Avenir’ (PIA) (Investing for the future programme).

The ADEME has a thesis programme, involving calls for applications, to encourage research accompanying the energy and environmental transition in a context of climate change. Every year the ADEME selects 50 new doctoral students from an average of 200 applications. As a result, since 1992 over 1 500 students have benefited from this programme.

The support for RDI takes the form of calls for research projects. In the building sector, since 2013 the ADEME has annually published a call for projects ‘to develop responsible buildings by 2020’. There were 15 successful projects in the 2013-2014 edition and 14 in the 2014-2015 edition, with 54 applications having been submitted in the 2015-2016 edition.

Lastly, as part of the ‘**Programme d’Investissements d’Avenir’ (PIA) (Investing for the future programme)**, various calls for expressions of interest (CEI) and calls for projects (CP) have been launched by the ADEME to support the sustainable development of the sector through the co-financing of demonstrators. For example, the 2014 edition of the call for projects ‘Industrial methods for the renovation and construction of buildings’ aimed to support the renovation or construction of buildings with an energy performance higher than that required by the regulations through the development of ‘turnkey’ solutions, use of digital technologies and work on renewable and recycled materials. Since 2010, all the CEIs and CPs launched have led to 22 projects being supported (including the acquisition of a holding in the company ENERSENS) with a budget of over EUR 180 million, including over EUR 69 million in State aid, as well as holdings being acquired in three companies through the Fonds Ecotechnologies (Eco-technologies fund) at a cost of over EUR 19.5 million, including nearly EUR 11 million in State aid (data from January 2017).

These projects are being supported by the ADEME as part of the energy and environmental transition demonstrators measure, which has a budget of EUR 2.1 billion and which is being managed by the ADEME in order to finance demonstrators in the fields of renewable energies, CO₂ capture, storage and recovery, bio-based chemistry, advanced biofuels, hydrogen and fuel cells, energy storage, and positive energy buildings and blocks²⁷.

1.2.7. Review and prospects

Overview of all housing renovation measures

National and local stakeholders agree that the PREH has resulted in their mass mobilisation and in the multiplication of exchanges on this subject. According to the OPEN 2015 survey, 3.5 million housing units in the private sector were renovated in 2014. Around 2 million of these underwent energy efficient renovation, with 288 000 being energy efficient or very energy efficient renovations.

This number enables the level of achievement of the LTECV’s programme objective to be assessed, which is set at 380 000 for the private stock (the total figure of 500 000 includes 120 000 renovations expected in the social housing stock; the number of energy efficient renovations in social housing is around 100 000 per year).

Accordingly, the LTECV and its accompanying incentive schemes have resulted in nearly 390 000 energy efficient renovations per year (public and private stock). The objective of 500 000 by 2017 therefore requires efforts to be continued and tools to be improved.

²⁷ For more information on the projects supported as part of the PIA: <http://www.ademe.fr/entreprises-monde-agricole/innover-developper/programme-dinvestissements-davenir-pia/projets-laureats>

Prospects for the building sector as a result of the PPE and the SNBC

As regards the guidelines for 2017, the Multiannual energy programming (PPE) gives recommendations on energy efficiency. In particular it sets out the following roadmap:

Building

- significantly increase the energy efficient renovation of residential and tertiary buildings to reduce energy consumption by 28 % by 2030 compared to 2010, with interim targets of 8 % and 15 % by 2018 and 2023 respectively;
- encourage the integration of renewable and recovered energy in the residential and tertiary sectors, in particular by developing the Thermal Regulations for buildings;
- encourage the renovation of existing tertiary buildings through stricter regulatory requirements;
- through regulations for new housing that include greenhouse gas emissions via a life cycle analysis and that target a high level of energy performance, and by developing the use of renewable energies, ensure the low energy consumption (net of self-generation) of new housing and new tertiary buildings, and, through a life cycle and grey energy approach, develop the use of wood in residential construction;
- help to promote operating contracts with a real guarantee of energy savings (energy performance contracts), monitor their development, disseminate the best practices and measure their effectiveness.

The SNBC has also listed the following levers in the building sector:

- construction of new buildings with high energy and environmental performance: the implementation of the 2012 regulations and also future regulations based on a life cycle analysis of the environmental impacts of the building will help to considerably reduce greenhouse gas emissions (GHG) throughout the life of buildings;
- significant increase in energy efficient renovation by renovating the building envelope and improving the energy and climate efficiency of systems (e.g. heating, domestic hot water, cooking, etc.) so that the housing stock is fully renovated in line with the 'LEB renovation' standards in 2050;
- improved management of consumption associated with behaviour and specific use of electricity (in addition to implementing the European ecodesign and labelling directives), reinforcement of consumer information schemes, such as communication campaigns on hidden consumption, identification of the least energy efficient appliances on the internet, rollout of connected smart meters, etc.

2. Transport sector

2.1. State of play²⁸

At 50.0 Mtoe, i.e. around 34 % of final energy consumption, the traction energy consumption in transport increased in 2015 (1.3 %), despite a downward trend over the longer term (-0.5 % per year on average since 2010).

Figure 5 below shows the energy mix of the transport sector.

Figure D2-3 Évolution des consommations d'énergie de traction du transport par énergie
Niveau en millions de tep, évolutions en %

	Niveau	Évolutions annuelles			
	2015	2013	2014	2015	2015/ 2010
Carburants pétroliers	49,0	-1,5	-0,9	1,3	-0,5
Carburants pétroliers routiers	40,0	-1,2	-0,1	1,2	-0,5
Carburants pétroliers non routiers	9,1	-2,8	-4,3	1,3	-0,7
GNV	0,1	3,1	3,1	3,0	2,3
Électricité	0,9	0,6	-2,7	2,1	0,3
Ensemble	50,0	-1,5	-0,9	1,3	-0,5

Source : SOeS

Figure 5. Change in the traction energy consumption of transport by energy (source: SOeS, Transport accounts 2016)

[Key to figure:]

Figure D2-3 : Évolution des consommations d'énergie de traction du transport par énergie	Figure D2-3: Changes in the traction energy consumption of transport by energy
Niveau en millions de tep, évolutions en %	Level in millions of toe, changes in %
Niveau	Level
Évolutions annuelles	Annual changes
Carburants pétroliers	Oil-based fuels
Carburants pétroliers routiers	Road oil-based fuels
Carburants pétroliers non routiers	Non-road oil-based fuels
GNV	NGV
Électricité	Electricity
Ensemble	Total
Source : SOeS	Source: SOeS

Oil-based fuels (including incorporated biofuels) form the bulk of the energy consumed in transport, with their proportion having increased from 98.5 % in 1990 to 98.0 % in 2015. In 2015, due to the low price of oil products, their consumption increased by 1.3 % against a background of a 0.5 % fall per year on average since 2010.

Electricity consumption increased in 2015 (+2.1 %) by its fastest rate since 2010 (+0.3 % per year on average), driven by the consumption in urban transport, which increased by 2.7 % (+2.4 % per year on average since 2010), linked with the development in trams.

The use of natural gas, which began in 2002, remains very limited despite clear growth both in 2015 (+3.0 %) and since 2010 (+2.3 % per year on average).

²⁸ For the 'transport' section, the statistics quoted are taken from the Transport accounts (*Comptes des transports*) (more precise and detailed data), and not from the energy statement quoted in the other sections. This may explain certain slight differences in the figures given, particularly compared to the 'annual report' annexed to this document.

The fuel consumed in the transport sector is mainly used for road transport (81.5 % of oil-based fuels). Fuel consumption in road transport increased in 2015 (+1.2 %), having fallen by 0.5 % per year on average since 2010.

With regard to oil-based fuels in transport, 18.5 % are used for purposes other than road transport. The consumption of oil-based fuels in non-road transport is increasing at a slightly faster rate than in road transport. Consumption in air transport (14.0 % of energy consumption), which is the most significant of the non-road uses, increased in both 2015 (+4.8 %) and as an average over the period (+1.2 % per year on average since 2010), linked with the increase in aircraft movements.

Maritime and inland waterway transport uses 3.6 % of the energy in the transport sector. The consumption of diesel in rail transport is very low (0.3 % of energy consumption) and, despite its stability in 2015, has fallen significantly since 2010 (-3.9 % per year on average).

The energy consumption of urban public transport is increasing. The energy consumption of public transport is mixed: the proportion of diesel has fallen to the benefit of natural gas, which remains low (0.05 Mtoe) compared to the total consumption. This consumption has increased by 2.3 % per year on average since 2010 (+3.0 % in 2015).

The consumption of biofuels accounts for 6 % of energy consumption in the transport sector. In 2014, the consumption of biofuels was nearly 3.0 Mtoe. There are two main types of biofuel: biodiesel incorporated in diesel, and bioethanol incorporated in petrol. Biodiesel accounts for 86 % of biofuel consumption and bioethanol for 14 %. Between 2013 and 2014, the consumption of biodiesel increased by 10.8 % and that of bioethanol by 5.2 %. Overall, the consumption of biofuel has significantly increased: by 10.0 %.

Figure 6 below shows the traction energy consumption of each mode of transport. In 2015, road transport accounted for 81.5 % of the consumption of oil-based fuels.

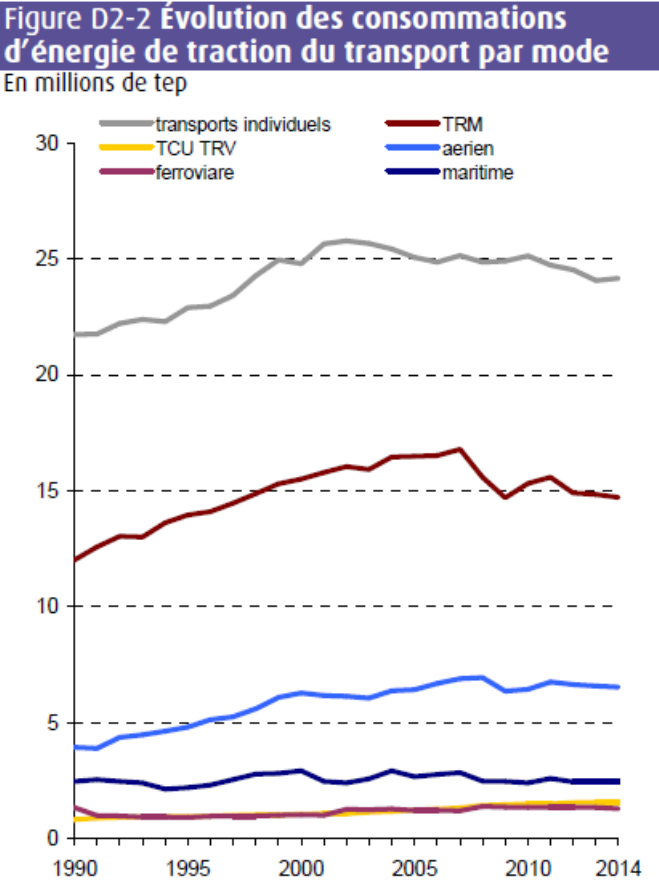


Figure 6: Change in the traction energy consumption of transport by mode (source: SOeS, Transport accounts 2016, excluding international marine bunkers)

[Key to figure:]

Figure D2-2 : Évolution des consommations d'énergie de	Figure D2-2: Changes in the traction energy consumption of
--------------------------------------------------------	------------------------------------------------------------

traction du transport par mode	transport by mode
En millions de tep	In millions of toe
transports individuels	individual transport
TCU TRV	urban public transport / road passenger transport
ferroviaire	rail
TRM	road freight transport
aérien	air
maritime	maritime

In 2015, domestic passenger transport grew by 2.1 % (in passenger-kilometres), at a rate much higher than in 2014 (+0.8 %) and also much higher than its annual average since 2010 (+0.8 %). This growth was mainly due to the **use of passenger cars, which increased significantly faster in 2015 (+2.4 %) than in 2014 (+1.1 %)**.

Rail passenger transport has experienced renewed growth (+0.3 %), with contrasting developments between high-speed trains (+0.6 %) and regional trains (-0.3 %) and intercity trains excluding high-speed trains (-2.0 %), where annual traffic has fallen for the fourth year in a row.

The growth in urban public transport has slowed (+1.1 %), more so within Île-de-France (+0.8 %) than outside Île-de-France (+2.1 %). Since 2010, this annual growth has been twice as high (+2.2 % per year on average). Over the last 20 years, urban public transport has expanded considerably, and in 2013 served 65 % of the metropolitan population.

As regards **air transport** within metropolitan France, by number of passengers, this has started to rise again (+1.0 %), with international traffic having continued its very strong growth (+4.2 %).

Lastly, **maritime traffic**, by number of passengers, remained stable in 2015 (+0.1 %), with a fall in cross-Channel and North Sea ferry traffic (-0.8 %), a reduction in traffic at the Mediterranean ports (-0.7 %), but still strong growth at the two main overseas ports (+18.9 %).

Land-based freight transport fell in 2015 (-1.6 % after -1.1 %). Since 2010, it has fallen by 1.3 % per year on average. Excluding oil pipelines, it fell by 1.8 % in 2015 and has shrunk by 1.0 % per year on average since 2010. The 2015 reduction is the combination of a fall of 2.5 % in road transport, which is the main form of land-based transport, a fall in inland waterway transport (-3.7 %) and a sharp rise in rail transport (+5.1 %). Since 2010, road transport has fallen by 1.3 % per year on average, with the use of French-registered vehicles having shrunk (-2.6 %), whereas the use of foreign-registered vehicles has increased (+0.8 %). This accounted for 38.8 % of road transport in 2015 (26.6 % in 2000, 19.3 % in 1990).

Rail freight transport has confirmed its revival (+5.1 %). Since 2010, rail transport has increased by 2.7 % per year on average.

Inland waterway freight transport fell by 2.6 % in 2015 and has shrunk over the 2010-2015 period (-1.3 % per year on average).

In 2015, road traffic increased by 2.2 %. This was mainly due to the increasing use of passenger cars (+2.4 %) and light-duty vehicles (+2.3 %). The use of heavy-duty vehicles fell once again (-0.6 %) in 2015, marked by a significant reduction in French-registered vehicles (-4.0 %) and despite an increase in the use of French and foreign buses and coaches, as well as foreign-registered heavy-duty vehicles.

2.2. Policies and measures

Improving energy efficiency and reducing air pollution are major challenges for the transport sector and its development.

Law No 2009-967 of 3 August 2009 noted the accelerated growth in non-road and non-air modes of transport. An ambitious target was therefore set in Article 10: **by 2020 reduce the greenhouse gas emissions of the transport sector to the level recorded in 1990**. The Law on the energy transition for green growth (LTECV) of 17 August 2015 takes these targets further and aims to develop clean and energy efficient transport, with the major co-benefit of improving air quality and protecting the population's health.

At the end of 2015, the National low-carbon strategy (SNBC), introduced by the LTECV, also set the transport sector a target of reducing GHG emissions by 29 % by the time of the third carbon budget

(2024-2028) compared to 2013, and by at least two-thirds by 2050. In terms of the GHG emissions of this sector by period, the guideline figures are 127 Mt CO₂ eq. for 2015-2018, 110 Mt CO₂ eq. for 2019-2023 and 96 Mt CO₂ eq. for 2024-2028.

It should be underlined that, although the targets set by France for the transport sector mainly concern greenhouse gas emissions and pollutants, these targets will in particular be achieved through reductions in energy consumption and changes in modes of transport or fuels (energy mix) and behaviour.

The policies implemented to achieve this target therefore mainly involve three areas:

- modal shift to low-emission modes of transport;
- improved efficiency of the modes of transport used;
- change in behaviour (reduction of traffic speeds, improvement of vehicle loading ratios, implementation of mobility plans, etc.).

2.2.1. Measures resulting from the Law on the energy transition for green growth

The main measures in the LTECV in order to develop clean transport are described below.

(a) Speeding up the replacement of cars, lorries, buses and coaches with low-emission vehicles. Developing cable transport

- The Decrees implementing the Law have established schemes for the **purchase of low-emission vehicles by the State and local authorities** in order to renew public fleets as follows: every year 50 % of replacements for the State and 20 % for the local authorities for purchases of light-duty vehicles, and also heavy-duty vehicles for the State; 50 % of replacements in 2020 and 100 % in 2025 for purchases of buses and coaches for public passenger transport, defined according to the journeys made. As a result, with regard to purchases of buses making journeys in the heart of urban areas, 50 % in 2020 and 100 % in 2025 must be zero carbon emission and zero air pollutant vehicles.
- **Obligation, by 2020, for taxi operators and chauffeur-driven car operators to purchase at least 10 % low-emission vehicles** when renewing their fleets, where this fleet consists of more than 10 vehicles, and obligation for car rental companies, taxi operators and chauffeur-driven car operators to purchase 10 % low-emission vehicles when renewing their fleet.
- Article 38 aims to allow **motorway concession-holders to make extensive use of preferential subscriptions** for very-low-emission vehicles and car-pooled vehicles.
- **Development of urban cable transport:** the Order provided for in Article 52 of the LTECV²⁹ removes the difficulties associated with overflight rules, which in some cases could have required all overflown land to be compulsorily purchased. In addition to being a technical measure, this involves an ecological, industrial and service dynamic in favour of the development of sustainable urban public transport. In particular, the Brest cable car was inaugurated on 19 November 2016. This is an innovative project as it is the first urban cable car in France that is aimed at daily commuter traffic and not tourist traffic. Other projects are in hand.

(b) Development of electric mobility

The threshold of 100 000 electric vehicles has been exceeded, in particular due to purchase aid provided by the clean vehicle bonus and the old diesel conversion bonus, which have been extended into 2017, and the combination of various support schemes for the rollout of recharging terminals (IRVE – electric vehicle recharging infrastructure – scheme for authorities, Advenir programme for

²⁹ Order No 2015-1495 of 18 November 2015.

companies, tax credit for private individuals, etc.). To support this accelerated growth, it is planned to roll out one million recharging points for electric vehicles (private and public) by 2020.

The LTECV imposes very specific measures to achieve the targets that it has set. Accordingly, under Article 41, in the construction of certain types of building provided with a car park (housing, tertiary, industrial, accommodating a public service, forming part of a commercial complex, cinema), one part of these parking spaces must be equipped with the 'service ducts, cabling and security devices needed to power a recharging point for electric or plug-in hybrid electric vehicles'. The same applies where work is carried out on a car park annexed to the same types of building. The Decree implementing this obligation, published on 13 July 2016, lays down the terms of application of this article and, in particular, the minimum number of spaces according to the type of building in question. Lastly, with regard to private individuals living in a jointly owned property, 'the decision to equip covered or secure-access parking spaces with recharging terminals for electric vehicles' is made by the general meeting of joint owners by a majority of the votes cast.

Finally, the costs of operating a vehicle fleet are deductible from the taxable profits. However, the tax deductibility of the depreciation on private cars is capped and Law No 2016-1917 of 29 December 2016 amended these caps. From now on, the tax deductibility of the depreciation on private cars does not apply to the part of their purchase price above EUR 18 300.

This sum is increased to EUR 30 000 where vehicles have carbon dioxide emissions of less than 20 grams per kilometre (electric vehicle) and to EUR 20 300 where their carbon dioxide emissions are at least 20 grams but less than 60 grams per kilometre (mostly plug-in hybrid electric vehicle).

This sum is reduced to EUR 9 900 where these vehicles have carbon dioxide emissions in excess of:

- 155 grams per kilometre, for those purchased or leased between 1 January 2017 and 31 December 2017;
- 150 grams per kilometre, for those purchased or leased between 1 January 2018 and 31 December 2018;
- 140 grams per kilometre, for those purchased or leased between 1 January 2019 and 31 December 2019;
- 135 grams per kilometre, for those purchased or leased between 1 January 2020 and 31 December 2020;
- 130 grams per kilometre, for those purchased or leased from 1 January 2021.

Implementation of the support measures for the development of electric vehicles or plug-in hybrid electric vehicles should allow an annual final energy saving of 0.15 Mtoe in 2020 and 0.65 Mtoe in 2030.

In terms of primary energy, the annual savings are estimated to be 0.03 Mtoe in 2020 and 0.08 Mtoe in 2030³⁰.

(c) Incentives to use bicycles

The LTECV encourages cycling as a means of daily commuting. It aims to change behaviour in order to reduce pollutant and greenhouse gas emissions during commutes:

- The **bicycle kilometrage allowance** was created by Article 50 of the LTECV. It is now possible for employers to volunteer to cover all or part of the costs incurred by employees who use bicycles for their commutes. The allowance is set at EUR 0.25 per kilometre travelled. The Ministries of the Environment and Housing have paved the way for this measure to be implemented within the civil service through a two-year trial starting in the summer of 2016 within the Ministries and their public institutions.
- **The tax reduction for businesses making a fleet of bicycles available to their staff** was created by Article 39 of the LTECV (Decree No 2016-179 of 22 February 2016). Businesses

³⁰ See France's report under Article 13(1) of Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions, MEEM, 2017.

subject to corporation tax may benefit from a tax reduction equal to the costs incurred in providing their employees, free of charge, for their travel between their home and workplace, with a fleet of bicycles, subject to a limit of 25 % of the purchase price of said fleet of bicycles.

(d) Mobility of businesses

To encourage **businesses to prepare mobility plans**, Article 51 of the LTECV sets out their content and provides for their submission to the competent authorities. In addition, the preparation of a mobility plan becomes compulsory on 1 January 2018 for any business with at least 100 employees at the same site situated within the perimeter of an urban transport plan (*plan de déplacement urbain – PDU*).

Exceptional support of EUR 30 million for 2015-2017 has been put in place for businesses **using combined transport**, i.e. undertaking to remove lorries from the roads by using river, rail and maritime modes of freight transport for part of the journey. The aim is to eliminate over 900 000 heavy-duty vehicles and 760 000 tonnes of CO₂.

(e) Positive energy territories for green growth (*Territoires à énergie positive pour la croissance verte – TEPCV*)

The TEPCV programme accompanies the implementation of the LTECV at local level. Its aim is to encourage and enhance local initiatives through the financing of innovative environmental and energy progress projects encouraging sustainable economic growth and jobs for the future. In particular it has enabled authorities to take action on the issue of the energy and environmental transition in France.

Over 500 positive energy territories for green growth have been labelled and financially supported to assist them with their measures for the energy efficient renovation of buildings, development of renewable energies, clean mobility, etc.

Over 200 positive energy territories for green growth have committed to more sustainable mobility. The transport measures mainly involve electric mobility and soft modes of transport, and break down as follows:

- 11 100 low GHG emission vehicles including:
 - 10 000 traditional or electric bicycles;
 - 510 electric cars;
 - 427 electric or hybrid commercial vehicles;
 - 110 electric, hybrid or NGV (natural gas for vehicles) buses;
 - 40 electric two-wheelers;
- 610 recharging terminals, including 65 rapid recharging terminals;
- 1 400 km of cycle paths.

(f) Rural mobility plans

Article 55 of the LTECV has created a specific transport plan for rural territories: the rural mobility plan. This new measure aims to allow these territories to equip themselves with a local mobility policy, even in the absence of an organising authority and public transport service. By seeking to balance and reconcile the various modes of transport, it contributes towards a better living environment and therefore improves the attractiveness of these territories. A methodological guide intended for local stakeholders has been available since July 2016 to help with the preparation, implementation, monitoring and evaluation of these rural mobility plans.

(g) Action on traffic

Article 13 of the LTECV lays down the regulatory framework for restricted traffic zones (*Zones à Circulation Restreinte – ZCR*). This article allows municipalities or EPCIs (public institutions for

cooperation between municipalities) to create ZCRs, which are zones in which – in order to combat air pollution – the most polluting categories of vehicles are restricted and/or prohibited through a ‘Crit’air’ identification system (see box below). The city of Paris introduced a restricted traffic zone in January 2017. The metropolises of Grenoble, Lyon and Villeurbanne have also chosen to utilise air quality certificates in order to organise differentiated traffic restrictions during pollution peaks.

Furthermore, this same Law has provided for other measures to allow authorities to act on air pollution, such as the following:

- Article 47 allows authorities to reduce the maximum permitted speed below that stipulated by the Highway Code on all or some of the public roads in a conurbation. This measure, in addition to increasing the safety of residents, encourages the modal shift, whether on a long-term basis or during pollution peaks.
- In an emergency situation in which certain categories of vehicles must be restricted, Article 48 requires the authorities organising transport to offer incentive rates for accessing the public transport network.

(h) ‘Crit’air’ air quality certificates

This is a tool to improve air quality. The certificate allows local authorities to modulate their parking and traffic policy in order to encourage use of the least polluting vehicles.

As a result, having completed the formalities to obtain an air quality certificate, drivers can, depending on the colour of the certificate and the rules adopted by town halls:

- benefit from favourable parking terms;
- benefit from preferential driving conditions;
- drive in restricted traffic zones (ZCR);
- drive in differentiated traffic zones applied during pollution peaks.

There are six classes for the cleanest vehicles, with one specific class being reserved for ‘zero engine emission’ electric vehicles. The classification is based on the pollutant emissions of passenger cars, two- and three-wheelers and quadricycles, and heavy-duty vehicles, including buses. These are then classed according to their engine and age.

The certificate can be obtained simply by making an internet application via the platform www.certificat-air.gouv.fr/.

2.2.2 Encouraging low-emission modes of transport

Article 40 of the Law on the energy transition for green growth entrusts the State with defining a clean mobility development strategy (*stratégie de développement de la mobilité propre* – SDMP), annexed to the Multiannual energy programming³¹.

Prepared in liaison with stakeholders, this document sets out the current situation in terms of the clean mobility offer, as well as guidelines and possible lines of action, by linking them to the priorities stipulated by the LTECV:

- management of demand for mobility;
- development of vehicles with low pollutant and greenhouse gas emissions and deployment of infrastructure for their refuelling;
- optimisation of existing vehicles and networks;
- improvement of modal shifts to modes of transport with the lowest pollutant and greenhouse gas emissions, including walking and cycling;

³¹ Page 210 et seq. of the PPE: <http://www.developpement-durable.gouv.fr/sites/default/files/PPE%20int%C3%A9gralit%C3%A9.pdf>

- development of collaborative modes of transport.

This document sets out the contribution of various action plans or thematic strategies to the development of clean mobility, and proposes complementary lines of action or areas of innovation to be favoured in transport.

(a) Encouraging the modal shift

In order to encourage the modal shift of passengers and freight, the **long-term improvement of rail networks** is a priority, together with the continuation of infrastructure projects in the context of realistic and financially sustainable programming. Four high-speed railway lines have just been brought into service or are under construction and will be brought into service shortly:

- Tours-Bordeaux high-speed railway line (entry into service planned for 2017) (341 km);
- Brittany-Pays-de-Loire high-speed railway line (entry into service planned for 2017) (214 km);
- completion of the Eastern high-speed railway line between Metz/Nancy and Strasbourg (entry into service in 2016) (122 km);
- rail bypass of Nîmes and Montpellier (entry into service planned for 2017) (80 km).

These four lines are in addition to 1 900 km of existing infrastructure as at 1 January 2016.

The energy savings resulting from the entry into service of the high-speed railway lines are estimated to be 0.102 Mtoe in 2020 and 0.094 Mtoe in 2030³².

As regards **inland waterway transport**, the main measures are as follows:

- The **Seine-Nord Europe canal** project involves constructing a new 105 km canal connecting the Oise with the Dunkerque-Escaut canal. In 2020, this project is expected to allow a modal shift of 500 000 heavy-duty vehicles to the inland waterways in all the areas affected, i.e. a reduction in emissions of between 220 and 280 kt CO₂ eq. by 2020³³. On 8 July 2016, the Hauts-de-France Region approved the draft financing and governance memorandum for the construction of the Seine-Nord Europe canal. The total cost of the project is estimated at EUR 4.5 billion (EUR 1.8 billion from the European Union, of which EUR 980 million over the 2015-2020 period, EUR 1 billion in state subsidies and EUR 1 billion from local authorities, of which over EUR 302 million from the Hauts-de-France Region). A subsidy of EUR 1.5 million has also been granted to the French navigation authority Voies Navigables de France (VNF) to carry out preparatory studies on increasing the gauge of the Oise (MAGEO project). The project should start in late 2017 or early 2018.
- The **Modernisation and innovation aid plan (*Plan d'Aide à la Modernisation et à l'Innovation* – PAMI)** was approved on 5 June 2013 by the European Commission. This is intended to support the growth in inland waterway transport by making a financial contribution to modernisation work on existing docks, to the construction of vessels with sufficient capacity to meet the needs of new markets and to the purchase of the first inland waterway unit for a new entrant or young buyer. An overall envelope of EUR 22.5 million, financed jointly by the State, Voies Navigables de France (VNF) and local authorities, where applicable, has been programmed for the 2013-2017 period.

This modernisation and innovation aid plan consists of four parts:

- modernisation of the fleet and support for inland waterway transport in environmental terms;
- adaptation of docks to the emergence of new traffic;
- support for the creation and development of inland waterway transport enterprises;
- promotion of innovation.

³² See France's report under Article 13(1) of Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions, MEEM, 2017.

³³ Source: <http://www.seine-nord-europe.com>. By 2050, the shift could reach between 1.2 and 2 million heavy-duty vehicles per year according to the forecast traffic scenarios.

A new aid plan is in the process of being notified to the European Commission for the 2018-2022 period, with a more substantial component for adapting the fleet to the energy transition, particularly to improve the hydrodynamics of vessels and optimise the use of onboard energy. The solutions to be applied will involve work supported by the innovation component of the PAMI, as well as work by CEREMA (*Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement* – Centre for the research and expert assessment of risks, environment, mobility and spatial planning) to improve the energy consumption of inland waterway vessels (consumption measurements on test vessels, hydrodynamic experimentation and modelling, etc.).

In addition, as stipulated by Article 41 of Law No 2013-431 of 28 May 2013 laying down various provisions on transport infrastructure and services, a **national conference on logistics** was organised in July 2015. This identified investment and service priorities within a national action plan for the logistical competitiveness of France. This conference was followed by the publication in March 2016 of the '**France Logistique**' national strategy, which sets out the guidelines for the economic development of the sector and envisages, in this context, making logistics a lever for the transformation of industrial and energy transition policies.

(b) Action plan for active mobility (plan d'actions pour les mobilités actives – PAMA)

The Action plan for active mobility, published in March 2014, instigated the rollout of 25 measures to encourage cycling and walking, and in particular the use of bicycles for commuting. This action plan has created a new motivational and ecological dynamic for soft modes of transport.

With regard to sharing the public space, the measures announced are, for example, currently enabling authorities to introduce traffic-calmed zones more easily and more widely, where speeds are reduced and where the rules of the Highway Code are adapted for cycling.

The plan has also enabled the introduction of the bicycle kilometrage allowance by private employers for their employees. This measure was extended, on a trial basis, to officials from the Ministry of the Environment and its public institutions through Decree No 2016-1184 of 31 August 2016. Cycling is a sector with strong potential, which every year generates EUR 4.5 billion in economic benefits and accounts for 35 000 jobs.

2.2.3. Improving the efficiency of the modes of transport used

(a) For road transport

(b) Improving the performance of new vehicles and reducing their emissions

In terms of GHG emissions, a target for reducing the average emissions of the entire vehicle fleet has been set by the 'Grenelle de l'environnement' (Grenelle environment forum): from 176 g CO₂/km in 2006 to 120 g CO₂/km by 2020.

At European level, **Regulation (EC) No 443/2009 limited the CO₂ emissions of passenger cars** and required vehicle manufacturers to gradually reduce the CO₂ emissions of new vehicles to 130 g CO₂/km by 2015 (65 % of the fleet in 2012, 74 % in 2013, 80 % in 2014 and 100 % in 2015). With an average of 111 g CO₂/km in 2015, France achieved this target in 2010.

The new Regulation (EU) No 333/2014 adopted by the European Union on 10 March 2014 has set the threshold of 95 g CO₂/km for cars and requires Member States to achieve a percentage of 95 % by 2020 and then 100 % in 2021 for new cars placed on the market by manufacturers.

In addition, Regulation (EU) No 510/2011 of 11 May 2011 provides that average emissions from light commercial vehicles must be gradually reduced to 175 g CO₂/km by 2017. A target of 147 g CO₂/km has been set for 2020.

The national low-carbon strategy (SNBC), introduced by the LTECV, requires the standard of '2 litres per 100 km' to be met by all new cars marketed in 2030 and this same standard to be met by the entire French vehicle fleet by 2050. This target is also set in the LTECV, with Article 36 indicating that

the development of very-low-emission vehicles is a priority of national industrial policy and setting the consumption target of '2 litres per 100 km' as a reference standard.

The air emissions of road vehicles are regulated by the Euro standards. For each category of vehicles, these set emission values for nitrogen oxides, unburned hydrocarbons, carbon monoxide and particles, which are becoming increasingly stringent over time.

Numerous measures have been implemented to encourage the purchase of the most efficient new vehicles in terms of energy consumption, greenhouse gas emissions and pollutant emissions:

- Since 2006, the amount of the **annual tax on company vehicles** has been set based on two components:
 - the first depends on the vehicle's level of greenhouse gas emissions or its engine rating for tax purposes (depending on the date of first registration);
 - the second depends on the air pollutant emissions.

Companies are subject to this tax on the vehicles that they use in France, regardless of the State in which they are registered, or that they own and that are registered in France, where these vehicles are registered in the category of passenger cars.

Estimate of the first component:

For vehicles that are EC type-approved, first registered after 1 June 2004 and not owned or used by the company before 1 January 2006, the applicable rate ranges from EUR 2 per g CO₂/km for vehicles with emissions between 50 and 100 g CO₂/km to EUR 27 per g CO₂/km for vehicles emitting more than 250 g CO₂/km. Vehicles emitting up to 50 g CO₂/km are exempt from the tax (this condition is currently only met by electric vehicles).

The applicable rate for other vehicles depends on their engine rating for tax purposes: from EUR 750 for an engine rating of no more than 3 CV to EUR 4 500 for an engine rating above 15 CV.

Estimate of the second component:

The second component of the company vehicle tax rate applies for the period from 1 October 2013 and depends on the air pollutant emissions: from EUR 20 for a recent petrol or similar vehicle (EUR 40 for a diesel or similar vehicle) to EUR 70 for a petrol or similar vehicle that was first registered before 31 December 1996 (EUR 600 for a diesel or similar vehicle).

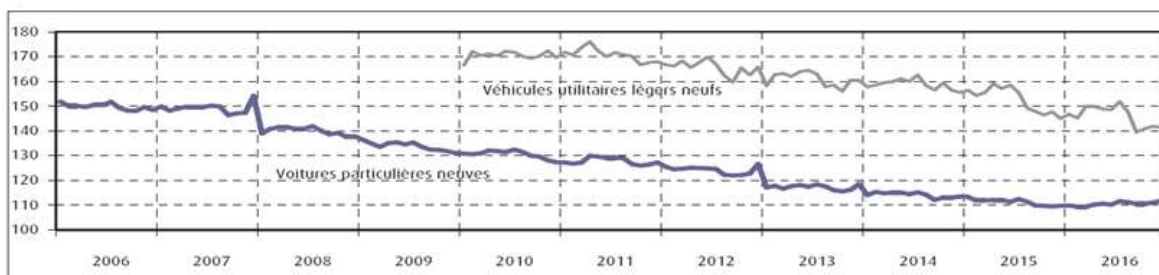
The temporary exemption that was granted to certain vehicles powered, whether or not exclusively, by natural gas for vehicles (NGV), liquefied petroleum gas (LPG) or E85 flex-fuel has been abolished. However, electric vehicles emitting less than 50 g CO₂/km are exempt from company vehicle tax, whereas hybrid vehicles that combine electrical energy with a petrol or diesel engine emitting less than 110 g CO₂/km benefit from a temporary exemption for the first eight quarters (two years).

- The **environmental bonus-penalty (*bonus-malus écologique*)** scheme should help to achieve the CO₂ emissions reduction targets for vehicles. This scheme simultaneously aims to:
 - encourage vehicle buyers to favour vehicles with low CO₂ emissions, therefore helping to change the structure of the vehicle fleet;
 - drive technological innovation by manufacturers;
 - speed up renewal of the vehicle fleet in order to remove the oldest diesel vehicles that are the most heavily polluting.

This scheme, which is based on the CO₂ emissions per kilometre of new vehicles, rewards the purchase of vehicles with the lowest CO₂ emissions and penalises the purchase of vehicles with the highest emissions (see the box on the following page). It has been a great success and has reduced the average emissions of new vehicles registered in France from 149 g CO₂/km in 2007 to 110.4 g CO₂/km in 2016.

As shown by Figure 7 below, the introduction of the bonus-penalty scheme therefore resulted in an immediate reduction in average emissions of 7 g CO₂/km, with a continued downward trend of

3.9 g CO₂/km/year compared to 0.9 g CO₂/km/year before the introduction of this scheme (2003-2007). Emissions from new passenger cars in France are among the lowest in Europe.



Source : SOeS, RSVERO

Figure 7. Changes in average CO₂ emissions, in g CO₂/km, for new passenger cars and light commercial vehicles (source: MEEM)

[Key to figure:]

Véhicules utilitaires légers neufs	New light commercial vehicles
Voitures particulières neuves	New passenger cars
Source: SOeS, RSVERO	Source: SOeS, RSVERO

In 2017, the bonus-penalty scheme has been reinforced by:

- the creation of aid for the purchase of electric bicycles, which can be up to EUR 200;
- the creation of aid for the purchase of electric two- and three-wheelers and quadricycles, with this aid being up to EUR 1 000 for vehicles with an engine power of at least 3 kW and EUR 200 if the engine power is less than 3 kW;
- the extension of the conversion bonus to commercial vehicles. From now on, a private individual or business scrapping a diesel passenger car or van registered before 1 January 2006 can claim additional aid of EUR 4 000 for the purchase of an electric passenger car or van, i.e. total aid of EUR 10 000.

Implementation of the measures relating to the performance of new vehicles (bonus-penalty scheme and European regulations) will allow an annual final energy saving of 0.846 Mtoe in 2020 and 1.898 Mtoe in 2030³⁴.

Measures relating to fuels

Directive 2009/30/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions provides for a reduction in greenhouse gas emissions, produced over the entire life cycle of the fuel or energy, of up to 10 % per unit of energy supplied, by 31 December 2020 at the latest. This reduction is made up of one target of 6 %³⁵ – obtained through the use of biofuels or alternative fuels and reductions in flaring and venting at production sites – together with two further guideline targets of 2 %, obtained, firstly, through the use of environmentally friendly carbon capture and storage technologies and electric vehicles and, secondly, through the purchase of credits under the Clean Development Mechanism of the Kyoto Protocol.

The **taxation of fuel** is a lever encouraging people to be more sparing in their energy consumption and produce fewer greenhouse gases and local pollutants (see Energy section). The idea of taking CO₂ emissions into account in fuel taxation was proposed and approved by the French Government in the Finance Law for 2014. This involves gradually increasing the rates of domestic consumption tax on energy products (*taxe intérieure sur la consommation des produits énergétiques* – TICPE) based on the CO₂ content of each product. The rate per tonne of carbon was EUR 7 in 2014, EUR 14.5 in 2015

³⁴ See France's report under Article 13(1) of Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions, MEEM, 2017.

³⁵ Compared to the European average of greenhouse gas emissions over the entire life cycle per unit of energy from fossil fuels in 2010.

and EUR 22 in 2016. The Law on the energy transition for green growth provides for this tax to continue increasing, from EUR 56 in 2020 to EUR 100 in 2030. This rate is EUR 30.5/t CO₂ in 2017.

In terms of **biofuels**, the LTECV reinforces the European approach and stipulates that, in 2030, 15 % of the final consumption of fuel in the transport sector must be renewable in origin.

Law No 2015-1785 of 29 December 2015 (Finance Law for 2016) provides that businesses subject to corporation tax or income tax under an actual taxation regime can deduct, from their taxable result, a sum equal to 40 % of the original value of assets, excluding financing costs, assigned to their activity and purchased from 1 January 2016 to 15 April 2017, where these assets come under the category of vehicles over 3.5 tonnes that are exclusively powered by natural gas and biomethane.

(c) For inland waterway and maritime transport

In the area of maritime transport, the main measures are as follows:

- **Support for the use of new fuels:** this support is in particular motivated by the revision of the provisions on the sulphur content of marine fuels introduced by Directive 2012/33/EU of 21 November 2012, which transposed into European law the amendments made by the International Maritime Organisation (IMO) to Annex VI of MARPOL on sulphur discharges from vessels. Given the technical difficulties (supply of marine gas oil, adaptation of vessels) in implementing these provisions, the French Government is working on the development of alternative solutions, such as using liquefied natural gas (LNG). Shipowners are working on this option and the MEEM has started national discussions on the potential for the development of LNG powered maritime transport.
- **Support for the work of the International Maritime Organisation (IMO)** on the limitation and control of vessel emissions at the European and international levels, as well as the development of NECA and SECA emission control areas. The 69th session of the Marine Environment Protection Committee (MEPC) in April 2016 approved a three-step process to improve the energy efficiency of international maritime transport:
 - step 1: creation of an international mandatory system for the declaration of vessel fuel consumption;
 - step 2: analysis of the data obtained;
 - step 3: decision making.

During the discussions within the MEPC, France, supported by Germany, Belgium, Morocco and the Marshall and Solomon Islands, defended an ambitious position of capping the sector's emissions.

2.2.4. Improving energy efficiency in aviation

Civil aviation accounts for around 2 % of global greenhouse gas emissions, which does not preclude the air transport sector as a whole from taking action and contributing to the fight against climate change. France is fully committed to this action, which involves specific measures not only with the airlines and stakeholders in the aeronautical industry, but also in terms of air navigation and the development of sustainable alternative fuels.

(a) Improving the environmental performance of aircraft

The environmental performance of aircraft is already a core priority of the aeronautical industry, particularly in terms of designing aircraft with ever lower CO₂ emissions. At international level, France and the French aeronautical industry have played an active role in the work of the ICAO, which has led to the implementation of a global CO₂ emissions certification standard for aircraft.

The considerable technological research efforts made in the past have resulted in a very significant improvement in the environmental performance and energy efficiency of aviation. As a result, over the

last five decades, the unit fuel consumption of aircraft, and the associated CO₂ emissions, have been reduced by 70 % to 80 %. However, in order to further reduce the environmental impact of aviation, despite the sector's growth in coming years, air transport stakeholders have committed to ambitious emissions reduction targets.

The Civil aviation research council (Conseil pour la recherche aéronautique civile – CORAC), chaired by the Minister for Transport, brings together all the French air transport stakeholders: aeronautical industry (aircraft manufacturers, engine manufacturers, equipment manufacturers, etc.), airlines, airports, research bodies and relevant ministries. It works to coordinate research efforts on aeronautical construction in France. In particular it has produced a technological roadmap bringing together all the national research efforts, including the definition and launch of ambitious demonstration programmes in order to develop technologies that will help to achieve the European targets set for 2020 and then 2050³⁶. It covers all the technological areas of aircraft: propulsion, structures (composites) and systems (more electric aircraft, avionics).

At international level, the Committee on Aviation Environmental Protection (CAEP), which is part of the International Civil Aviation Organization (ICAO), has adopted a recommendation on developing the first global CO₂ emissions certification standard for aircraft. This standard will apply not only to new types of aircraft from 2020, but also, from 2023, to new deliveries of aircraft that are already in production. From 2028, all aircraft produced must comply with the level of stringency required by the standard. The standard will apply to the entire fleet (large aircraft, regional aircraft and business aircraft) with levels of stringency and dates of applicability adapted to the various types of aircraft. This CO₂ emissions standard will help to improve the environmental performance of the fleets used by the airlines, by gradually removing the most polluting aircraft and encouraging manufacturers to design aircraft that are ever more efficient in environmental terms.

(b) Optimising air operations

France is playing an active role in all the European initiatives to reduce the CO₂ emissions of air operations. In terms of exhaust emissions, the European emissions reduction targets under the Single European Sky initiative are 10 % per flight.

Major projects are underway within FABEC in terms of studying the conditions for implementing direct routes, particularly at night. Evaluations are planned on a multiannual basis and will provide the airlines, as concepts are validated, with a network of direct routes that enable the reduction of exhaust emissions. Between 2012 and 2015, 66 000 tonnes of CO₂ were saved each year. Between 2016 and 2019, 61 000 tonnes of CO₂ will be saved.

In addition, the Single European Sky ATM Research (SESAR) project aims, among other aspects, to improve the safety and efficiency of flights as well as punctuality in the European airspace. In terms of exhaust emissions, the European emissions reduction targets under the Single European Sky initiative are 10 % per flight. The SESAR project aims to contribute to this target by 7 % in the following five areas:

- on the ground before departure (0.4 %): implementation of Collaborative Decision Making (CDM);
- in the take-off and climb phases (2 %): use of the continuous climb approach in a context taking account of capacity, noise pollution and air pollution issues;
- in the cruise phases (2 %): study of the conditions for assigning direct routes, optimum flight level, and methods for taking best account of meteorology and cost index choices;
- during the approach and descent phases (2.5 %): development of operational tools and methods to encourage continuous descents from the end of the cruise phases, together with advanced arrival management systems to ensure the shortest routes, without any delays and using the continuous descent approach;
- on the ground at the destination (0.1 %) where, for arrivals, the studies are linked to the development of CDMs.

³⁶ For example, by 2020, the aim is for new aircraft to emit less than half of the CO₂ that they emitted in 2000.

(c) Supporting the development of sustainable aviation biofuels

Based on the efforts being made by Air France and Total, the MEEM is supporting the development of biofuels at the French and European levels, as these are an essential lever for reducing the carbon footprint of air transport. The development of a national industrial sector producing biofuels is a strategic issue for France.

France is supporting the research efforts being made on aviation biofuels, which will allow air transport emissions to be reduced. In particular the MEEM is managing the initiative for future aviation fuels (*initiative pour les futurs carburants aéronautiques* – Ini-FCA), which involves French stakeholders from the air transport, aeronautical, energy and agriculture industries. Launched in 2007, the Ini-FCA's main objective is to identify and plan the research needs in this area for the coming years. In this context, collaborative research programmes have been launched and financed by the MEEM. Of particular note is the CAER research programme (*Carburants Alternatifs pour l'Aéronautique* – Alternative fuels for aviation), launched in 2012, coordinated by IFP Energies Nouvelles and conducted in partnership with the main research bodies (CNRS, INRA and INRIA) and the aeronautical industry (Airbus Group Innovations, Air France, Dassault Aviation, SAFRAN Aircraft Engines, TOTAL). This four-year programme is intended to enable the most appropriate fuels for aviation to be selected and their impact, production and use to be comprehensively analysed. The MEEM has also supported the Air France operation – 'Lab'line for the future' – which involves testing the use of biofuel on scheduled flights. Under this operation, 54 flights have been made on a weekly basis on the Toulouse-Paris Orly route, resulting in technical analyses (in terms of performance and operability) and corporate analyses (in terms of the acceptability of aviation biofuels to customers). This study, which is the first to examine the socioeconomic aspect, has taken the form of a questionnaire given to over 6 500 Air France customers: the use of biofuels to reduce CO₂ emissions has been backed by 75 % of respondents. Their introduction in air transport is regarded as a good initiative by 60 % of those questioned, subject to clear sustainability criteria.

(d) Reducing the CO₂ emissions of air transport

The air transport sector has already taken action to reduce its greenhouse gas emissions, particularly through its involvement in the EU emissions trading system (EU ETS) and by participating in the ICAO's work to establish a global mechanism based on the CO₂ emissions trading market. The historic agreement adopted by the ICAO in October 2016 proves that the aviation sector is committed to the fight against climate change and is contributing to the efforts needed to achieve the target of a rise in average temperatures of well below 2°C by the end of the century. At national level, France reduced the CO₂ emissions of its domestic air traffic by 25 % between 2000 and 2015.

At national level, the CO₂ emissions associated with French domestic air traffic have fallen markedly since 2000 (-25 %): 4.6 million tonnes of CO₂ in 2015 compared to 6.1 million tonnes in 2000. In addition to the energy efficiency improvements made to aircraft, the modal shift to the TGV high-speed trains has contributed to these results. A reduction in domestic air traffic is also expected in coming years on all the routes served by the TGV.

At European level, the purpose behind including civil aviation in the EU emissions trading system (**ETS aviation**), which has been operative since 1 January 2012, is to reduce the CO₂ emissions of the air transport sector (-5 % in 2020 compared to 2006). However, following objections from third countries, in 2013 the European Union exempted flights that are not strictly intra-European ('Stop the clock') from the system, with a view to negotiations within the International Civil Aviation Organization (ICAO).

At international level, on 6 October 2016, after three years of negotiation, the 191 Member States of the ICAO adopted a resolution on the implementation, from 2020, of a global CO₂ emissions offsetting scheme for international aviation known as CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation). Following the success of COP21 and signature of the Paris Agreement, this is an historic step in the fight against climate change. The aviation sector accounts for nearly 2 % of global CO₂ emissions and is experiencing strong growth. The aim of CORSIA is to offset any CO₂ emissions of international aviation above the level that they will reach in 2020: this is referred to as the 'carbon-neutral growth 2020' goal (**CNG2020**). The scheme will be implemented in several phases to take account of the specific circumstances and respective capacities of the various States around the world: an initial voluntary phase between 2021 and 2026 (the 68 volunteer States that will participate

in the first phase of CORSIA account for nearly 88 % of international air activity), followed by a second phase from 2027, which will apply universally to all States, except for the exempted States. The exemptions are for Least Developed Countries or LDCs, Small Island Developing States or SIDSs and Land-Locked Developing Countries or LLDCs, as well as States where the level of traffic expressed in RTK is less than 0.5 % of all the global RTKs.

By September 2017, through the Committee on Aviation Environmental Protection (CAEP), the ICAO must have developed an initial version of the Standards and Recommended Practices (SARPs) to guarantee the correct implementation of CORSIA from 2020. France, which is a member of the CAEP, is actively participating in this work, in coordination with all its European partners, in order to reach a consensus allowing appropriate SARPs to be adopted.

2.2.5. Raising awareness and communicating

(a) General public

The following main measures have been implemented to encourage a change in the public's behaviour:

- **CO₂ label for passenger cars:** the CO₂ label for passenger cars on their first sale became mandatory for all new vehicles by Decree from 10 May 2006. Its aim is to raise the awareness of vehicle buyers and also allow for the implementation of tax measures connected with CO₂ emissions. Since May 2006, this label has had to be clearly displayed on or adjacent to all new passenger cars in all points of sale in France. It gives any potential car buyer clear and comparative information on the CO₂ emissions of the vehicle. The fuel economy is also included on this label.
- **CO₂ information (now GHG information) on transport services:** in order to encourage low CO₂ emissions transport, transport providers (passenger or freight transport businesses, removal firms, taxi firms, freight forwarders, travel agents, etc.) have been required since 1 October 2013 to inform their customers of the CO₂ emissions of each transport service. This measure was implemented following wide-ranging consultation with transport professionals within the Transport environment-energy observatory (Observatoire énergie-environnement des transports – OEET).

This obligation was adopted through Law No 2010-788 of 12 July 2010 and is reiterated in the Transport Code (Article L.1431-3). Decree No 2011-1336 of 24 October 2011 sets out the calculation principles applicable to all modes of transport (rail or tram, road, inland waterway, maritime, air). It indicates how the beneficiary should be informed and sets the timetable for implementation of the provisions. The calculation method is based on the European standard for the calculation and declaration of the energy consumption and greenhouse gas emissions of transport services (standard NF EN 16258³⁷: Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers)).

- **Multimodal passenger information** is a key tool for ensuring better use of the available means of transport (increase in the load factor of vehicles due to car-sharing practices, synergies between different modes of transport, etc.). The French agency for multimodal information and ticketing (Agence Française de l'Information Multimodale et de la Billetterie – AFIMB) was created to ensure the coherent development of all these information systems at national level.
- The **Topten** comparator (www.guidetopten.com, see Energy section) allows the most energy efficient cars and commercial vehicles to be identified within several subcategories (city cars, multi-purpose vehicles, LCV < 700 kg, etc.).
- The **'Tout sur l'environnement' (All about the environment) portal**³⁸ meets the commitment made by France under the first pillar of the Aarhus Convention 'Access to Information on the Environment'. The portal offers access to information on the environment produced by French public stakeholders. There are currently nearly 80 000 resources

³⁷ Standard NF EN 16258 has been in force since December 2012 and covers all greenhouse gases.

³⁸ www.toutsurlenvironnement.fr

provided by almost 185 contributors. Different search modes are available (by keyword, theme and territory) to meet the user's information needs. The 'transport' section in particular contains a series of subsections on energy consumption and environmental impacts.

- The **European Mobility Week** was created in 2002 on the initiative of the European Commission and takes place every year in September. Since 2009, it has been merged in France with the Road Safety Week and is now called the 'European Mobility and Road Safety Week'. This week, which sees the organisation of hundreds of actions across France, aims to encourage behavioural changes in terms of travel. The 2011, 2012 and 2013 editions particularly highlighted car-pooling, new technologies within a logic of intermodality and commuting, whilst the 2016 edition focused on smart mobility and strong economic performance.
- **Car-pooling** is encouraged, particularly in the context of urban transport plans (see below). The LTECV, particularly in Articles 52, 53 and 56, lays down various provisions intended to encourage its development. Notably, undertakings with at least 250 employees and local and regional authorities must facilitate, if possible, car-pooling solutions for the travel of their employees and officials between their homes and workplaces, and motorway concession-holders must commit to the creation or development of car-pooling spaces adapted to the identified needs.
- Car-sharing involves making a fleet of cars available to subscribers and therefore reduces the number of cars on the road and encourages use of the most appropriate vehicle as applicable. To encourage car-sharing, a '**car-sharing**' label can be granted and used under the conditions defined by the Decree of 26 October 2012, which amended the Decree of 28 February 2012. This allows local authorities to reserve parking spaces for vehicles that have this label, with this activity being taken into account in urban transport plans. The 'car-sharing' label can be granted only to vehicles that meet the carbon dioxide emission limits set by the Order of 26 October 2012.

Furthermore, measures in favour of **eco-driving** have been implemented: professional road haulage drivers are now trained in eco-driving as part of their initial training and five-yearly continuing training. For car drivers, the set of questions in the theory part of the driving test has been supplemented to take account of eco-driving. School road safety certificate programmes and tests organised by schools have been supplemented to include this issue.

Lastly, with regard to the **energy savings certificates** scheme (see Energy section), Law No 2010-788 of 12 July 2010 (Article 78) extended this scheme to vehicle fuel suppliers if their annual sales exceed a certain level. At the end of September 2016, this sector had 26 standard operations sheets (14 for equipment and 12 for services). The transport sector accounted for 5.2 % of the certificates issued between 1 January 2015 and 31 January 2017 (standard and specific operations).

(b) Local authorities and businesses

The ADEME has developed various evaluation tools in order to help authorities assess their vehicle fleets and guide them towards purchasing clean vehicles: for passenger cars, a guide to the fuel economy and emissions of these vehicles has been placed online on the ADEME's website³⁹; for heavy-duty vehicles, the ADEME has provided decision-making tools, particularly for clean buses, service vehicles, city buses and refuse collection vehicles.

The ADEME has also developed an online help tool indicating the energy consumption and greenhouse gas emissions 'from well-to-wheel' of the various modes of transport and for different types of engine.

The ADEME is currently working to develop tools that will enable authorities to adopt initiatives involving voluntary commitments to reduce CO₂ emissions. These initiatives will particularly concern urban logistics.

³⁹ Guide to the fuel economy and CO₂ emissions of new passenger cars placed on sale in France, pursuant to Directive 1999/94/EC (www.ademe.fr/carlabelling).

(c) Transport professionals

Since 1 October 2013, passenger and freight transport providers and removal firms have been required to supply information on the quantities of CO₂ generated by their service (see above). They are also affected by the introduction of the mandatory energy audit for large businesses (see 'Industry' section).

Furthermore, several voluntary initiatives are currently ongoing:

- **'Objectif CO₂, les transporteurs s'engagent' (Road haulage operators commit to the CO₂ target):** this initiative was started in December 2008 for road freight transport companies using heavy-duty vehicles of 3.5 tonnes or more. Following two extensions, the scheme now also covers the road passenger transport sector (urban and interurban) as well as light-duty freight transport vehicles. The initiative provides a methodological framework to transport companies prepared to commit, for a three-year period, based on a plan of specific and personalised measures defined in a charter, to achieving an overall target for reducing their fuel consumption and greenhouse gas emissions. These measures focus on four areas: vehicle, fuel, driver and organisation of flows.

In order to get more road haulage operators to sign up to this voluntary commitment initiative, 2015 saw the creation of a label and a benchmark based on the level of CO₂ performance of the operator's vehicle fleet. This initiative is managed and monitored nationally by the AFT (Association Française pour la promotion de la formation professionnelle dans le Transport – French Association for the promotion of vocational training in Transport), in line with the decisions of the programme's steering committee.

Since December 2008, the 'Objectif CO₂, les transporteurs s'engagent' initiative has been adopted by 1 200 companies in the road transport sector, of which 13 % are road passenger transport companies. This means that nearly 100 000 vehicles are involved (i.e. over 20 % of heavy-duty vehicles and coaches registered in France), allowing one million tonnes of CO₂ to be avoided each year.

- **FRET 21 initiatives:** this scheme is aimed at shippers. Following a phase of experimentation and development of specific tools (action sheets intended for shippers in particular), the first FRET 21 initiatives were launched in May 2015.

The first 10 companies signing up to FRET 21 have come from four different sectors: agriculture, chemical, distribution and automotive. They are a mix of large and intermediate companies as well as SMEs. It is estimated that the measures to be taken by these companies during this initiative will reduce their CO₂ emissions by 1 million tonnes. They have committed to implement a total of 43 measures to reduce their emissions over this period. It is forecast that the emissions avoided will represent 75 000 tonnes of CO₂ per year, i.e. 7.5 % of emissions avoided during the initiative⁴⁰.

2.2.6. Territorial coverage

The new **regional schemes for spatial planning, sustainable development and equality between regions (schémas régionaux d'aménagement, de développement durable et d'égalité des territoires – SradDET)**, provided for by the Law of 7 August 2015 on the new territorial organisation of the Republic (*nouvelle organisation territoriale de la République – Notre*), must be approved by the regions before 28 July 2019.

These involve regional variations of the LTECV objectives, in the following areas in particular:

- making more efficient use of existing networks and equipment;
- encouraging complementarity between modes of transport as well as cooperation between operators, with new infrastructure being constructed 'where necessary';

⁴⁰ See <http://presse.ademe.fr/2017/02/fret21-bilan-des-10-premieres-entreprises-engagees-a-reduire-limpact-de-leurs-transport-sur-le-climat.html>.

- adopting measures to encourage the coherence of public transport and mobility services and the infra-regional coherence of adjacent urban transport plans;
- identifying the developments needed to establish connections between the various transport networks and modes of transport, 'particularly non-polluting modes'.

The **urban transport plans (*plans de déplacement urbains – PDUs*)** introduced by the Law on domestic transport of 30 December 1982 define the principles for the organisation of passenger and freight transport, traffic and parking within urban transport areas. Since the Law of 30 December 1996 on air quality and rational use of energy, it has been mandatory to produce a PDU for urban transport areas that are wholly or partly included within conurbations of more than 100 000 inhabitants.

In the context of PDUs, state support for the transport plans of businesses, authorities, schools and activity zones was reiterated under Article 13 of Law No 2009-967 of 3 August 2009. Law No 2010-788 of 12 July 2010 (Article 63) also states that PDUs, when being produced or revised, must now include an evaluation of the CO₂ emissions that are expected to be avoided by implementing the plan. This obligation was extended to all greenhouse gases from 2015. Decree No 2012-616 of 2 May 2012 lays down the terms applicable to the evaluation of planning documents, plans, schemes or programmes that have an impact on the environment.

In 2016, Article 66 of the LTECV and its implementing Decree No 2016-753 of 7 June 2016 extended the obligation to evaluate avoided greenhouse gas emissions to air pollutants when producing or revising urban transport plans (PDUa) and local town plans (*plans locaux d'urbanisme – PLU*) that may be regarded as urban transport plans.

National framework for charters on sustainable logistics in towns and cities. Urban logistics pose considerable challenges in terms of the functioning of towns and cities and their quality of life. The French Government decided to encourage exchanges and pooling of best practices by establishing a national framework for charters on sustainable urban logistics.

The air quality emergency plan of 6 February 2013 aimed to promote voluntary commitments to the clean delivery of goods in towns and cities, and the 2014 Environmental Conference encouraged such practices by indicating that a national framework for urban logistics would be established to encourage engagement between economic operators and authorities.

The national framework is not mandatory, but sets out principles that can be adapted locally so that they are best suited to the specific geographical and environmental characteristics and to the economic development needs of the territories concerned.

In 2015 the ADEME entrusted a consultancy office with the task of producing a toolbox for local authorities. The documents produced as part of this first assignment, which was completed in March 2016, cover a series of elements: methods, arguments, maturity test allowing each authority to review its state of progress on the issue of the mobility of goods, general knowledge on urban logistics, presentation of the operators in urban logistics and their role, indicative framework for the partnership charter, monitoring tools for the action plan, glossary of urban freight transport, bibliography of urban freight transport, national framework, action sheets.

Around 20 action sheets have been identified within this framework (for example: carry out a goods diagnosis, create a consultation body, produce a charter, etc.).

The documents will be trialled in 2017 by volunteer authorities and will be supplemented or amended so that they best meet the needs of authorities and logistics operators.

2.2.7. Research, development and innovation

'Programme d'Investissements d'Avenir' (PIA) (Investing for the future programme)⁴¹

The PIA, which was created in 2010, is intended to stimulate innovation, increase the competitiveness of businesses, encourage employment and promote equal opportunities. Transport was particularly covered by PIA 1 and PIA 2 (2010-2014) in a number of areas:

- Vehicles and transport for the future: the State allocated an envelope of EUR 1 billion for this programme managed by the ADEME. This effort allowed the funding of demonstrator projects involving innovative and sustainable transport technologies and solutions, whether road, rail, maritime or inland waterway transport (industrialisation of new solutions and technologies, support for the shift to more efficient uses of mobility, emergence of new carbon-free energy distribution infrastructures dedicated to mobility, etc.).
- Energy and environmental transition demonstrator (*démonstrateur de la transition énergétique et écologique* – DTEE).

Since the start of 2015, 'Initiatives PME' (IPME) (SME Initiatives) have been introduced to co-finance innovation projects developed by SMEs. Targeted at innovative mobility technologies and systems providing environmental benefits (lower consumption of fossil fuels, reduction of pollution, etc.), the first 'Initiative PME transports' (SME Transport Initiative) launched in January 2015 resulted in 40 projects out of 89 applications being selected on 1 June 2015. Each of these was granted a subsidy of up to EUR 200 000, with a total investment envelope of EUR 15 million. Among these projects, 28 were in the road sector, 7 in the rail sector and 5 in the maritime sector. Three other IPMEs have been launched since then (September 2015, April 2016 and October 2016, which is due to end in December 2017). In total, the first three IPMEs have supported 78 projects with a total cost of EUR 45 million and EUR 15 million in aid (100 % in the form of subsidies).

In the **maritime and naval** sector, the CORICAN (Conseil d'Orientation de la Recherche et de l'Innovation pour la Construction et les Activités Navales – Council for the guidance of research and innovation in shipbuilding and related activities) was set up on 17 May 2011 on the basis of commitments made in the Blue Book resulting from the 'Grenelle de la Mer' round tables. The CORICAN brings together all the representatives of the French naval sector (public players, NGOs, trade unions, businesses), with its aim being to contribute, in terms of research, development and innovation, to the definition and promotion of the ship of the future, which will be a 'clean, efficient, safe and smart ship'.

⁴¹ For more information on the projects supported as part of the PIA: <http://www.ademe.fr/entreprises-monde-agricole/innover-developper/programme-dinvestissements-davenir-pia/projets-laureats>

3. Industrial sector

3.1. State of play

Industry accounted for 19.0 % of France's final energy consumption in 2015, i.e. 28.4 Mtoe.

The sector's final energy consumption, corrected for climate variations, fell by 2.3 % in 2015 to 28.4 Mtoe, its lowest level since records began in 1970. Between 1985 and 2008, it was relatively stable, before falling sharply in 2009, following the economic crisis, to an initial floor of 30.3 Mtoe (-13.6 %). The increase in 2010 (+4.3 %) was only temporary, and the following years were all marked by reductions. As a result, between 2010 and 2015, the final energy consumption of industry shrank by -1.6 % per year on average.

Figure 8 below shows the changes in the final energy consumption of industry:

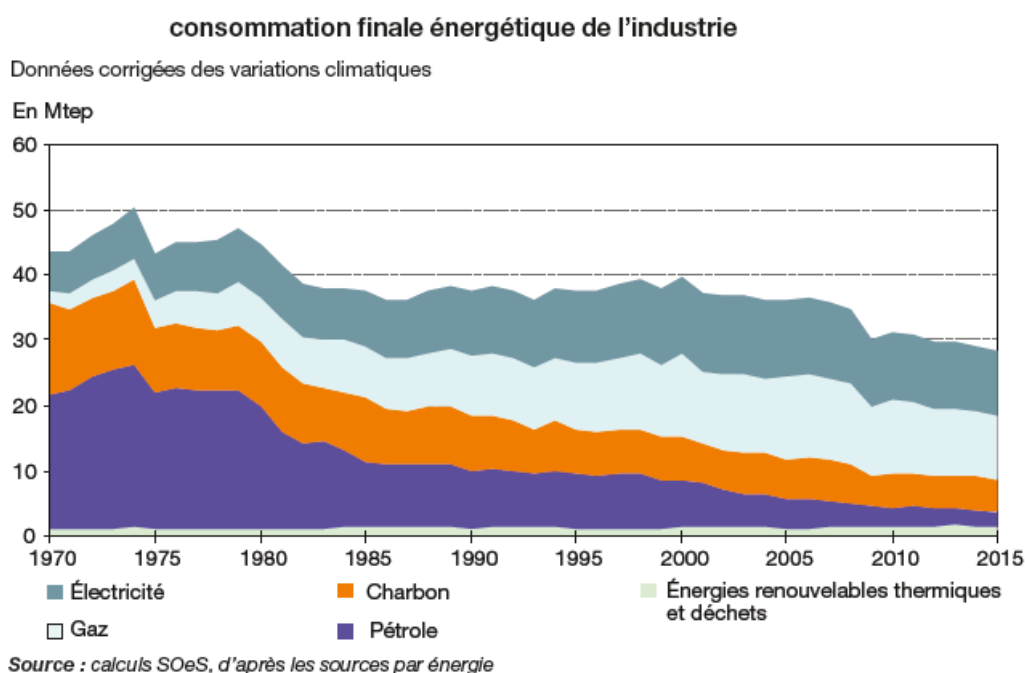


Figure 8. Final energy consumption in industry corrected for climate variations, in Mtoe, between 1970 and 2015 (source: SOeS, 2015 energy statement)

[Key to figure:]

Consommation finale énergétique de l'industrie	Final energy consumption of industry
Données corrigées des variations climatiques	Data corrected for climate variations
En Mtep	In Mtoe
Électricité	Electricity
Gaz	Gas
Charbon	Coal
Pétrole	Oil
Énergies renouvelables thermiques et déchets	Renewable thermal energy and waste
Source : calculs SOeS, d'après les sources par énergie	Source: SOeS calculations, according to sources by energy

According to the industrial production index (*indice de production industrielle* – IPI) published by the French statistics body (INSEE), industrial production, within the meaning of the energy statement, was practically stable in 2015 (-0.1 %), with the marked decline in construction (-3.9 %) being offset by the recovery in manufacturing (+2.2 %). This was therefore the first year to see an increase in manufacturing production since 2011. However, this overall trend masks considerable disparities between the sectors, particularly in energy-intensive industries. As a result, production has continued to fall in the manufacture of plaster, lime and cement (-4.2 %), in the sugar industry (-4.3 %), in paper

and cardboard (-1.5 %) and in the manufacture of fertiliser (-2.4 %). Conversely, and just as in the previous year, the chemical sector has been more dynamic (+2.0 %). Following a sharp rebound in 2014, steel and metal production fell in 2015 (-2.9 %).

The drop in the final consumption of industry in 2015 varied according to the type of energy. Demand for electricity fell by 0.5 % in 2015, which was the fifth consecutive year of falls. The largest reductions were in the paper and cardboard, mineral chemical and steel sectors.

Gas consumption fell by 1.4 %. The reductions in sectors such as steel were partly offset by a rebound in the organic chemical and agri-food sectors.

The consumption of coal in the steel sector (which consumes nearly three-quarters of the coal used in industry) fell by 6.8 %. This reduction was linked to the 7.7 % fall in the production of steel using the oxygen process, which is the process that uses coal.

The consumption of oil products in industry fell once again (-6.9 % in 2015 after -9.9 % in 2014). Among the oil products, petroleum coke (-11 %) and heavy fuel oil (-13 %) were particularly affected by this reduction. The contraction of industries using oil-based fuels, such as the manufacture of plaster, lime and cement (petroleum coke in the main) and construction, partly explains this reduction. There are also substitution effects between energies, which have been to the detriment of oil products for several years.

The industrial consumption of renewable thermal energy and waste was stable in 2015 compared to 2014, at 1.7 Mtoe. The production of paper and cardboard accounts for nearly 60 % of this consumption. The renewable energy consumed in industry is made up of 45 % wood and wood waste and 40 % black liquor, which is a by-product of the manufacture of pulp. These fuels are burnt by industrial establishments to produce heat, which is then used in their manufacturing processes or sold on to other parties.

In 10 years, the final energy mix of industry has changed little. In 2015, electricity accounted for 35 % of the mix, almost the same as gas (34 %), followed by coal at 17 %. The proportion of oil has shrunk, from 12 % in 2005 to 7 % in 2015. As for renewable energies, their proportion has increased from 3.5 % in 2005 to 6 % in 2015.

Among the most energy-intensive industries, the chemical industry is in the lead with 22 % of the total final energy consumption. This is followed by the steel sector (17 %), agri-food sector (14 %) and mineral products (13 %). These four sectors account for nearly two-thirds of the total energy consumption of industry.

3.2. Policies and measures

France's policy in terms of energy efficiency and reduction of greenhouse gas emissions in the industrial sector focuses on five areas:

- market instruments, in particular Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community;
- financial incentive measures;
- regulatory measures, in particular within the framework of the transposition of Directive 2012/27/EU on energy efficiency;
- support for standardisation and qualification processes;
- support for the development of more efficient technologies, in particular through the 'Investing for the Future' programme.

3.2.1. Directive 2003/87/EC

In France in 2015, the emissions of those sectors subject to the ETS Directive accounted for around 20 % of total emissions, i.e. 100 million tonnes of CO₂ equivalent. On a like-for-like basis, the emissions of those sectors covered by the ETS were 35.6 % lower in 2015 than 2005.

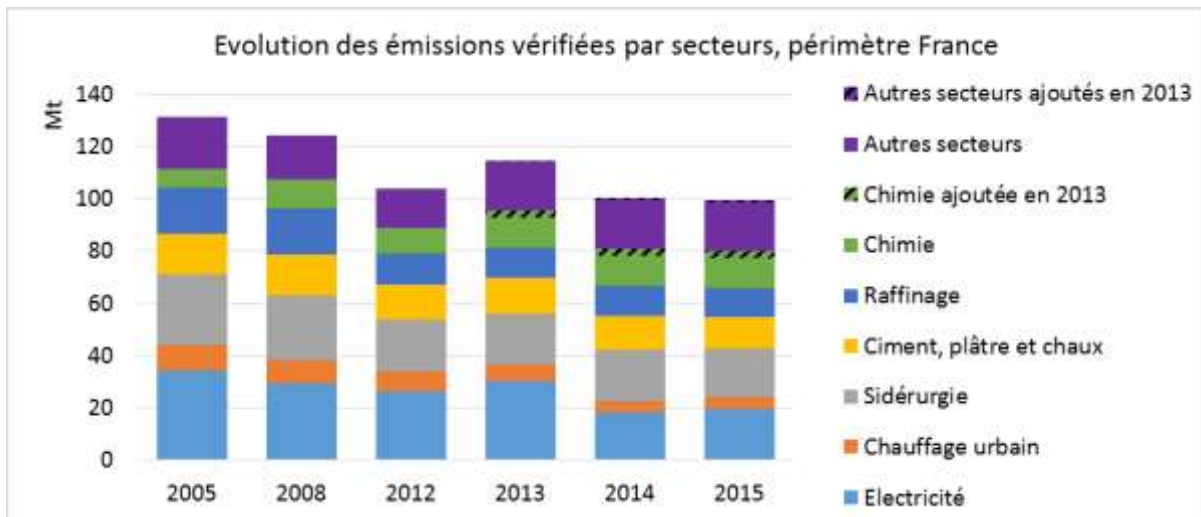


Figure 9. CO₂ emissions of those sectors subject to the ETS Directive between 2005 and 2015 (source: Register of European Union transactions)

[Key to figure:]

Évolution des émissions vérifiées par secteurs, périmètre France	Changes in verified emissions by sector, within the scope of France
Mt	Mt
Autres secteurs ajoutés en 2013	Other sectors added in 2013
Autres secteurs	Other sectors
Chimie ajoutée en 2013	Chemical sector added in 2013
Chimie	Chemical
Raffinage	Refining
Ciment, plâtre et chaux	Cement, plaster and lime
Sidérurgie	Steel
Chauffage urbain	District heating
Électricité	Electricity

Review of 2008-2012 (phase 2) and prospects for 2013-2020 (phase 3)

In the third phase of the EU ETS (2013-2020), the target for reducing emissions of EU ETS sectors is set at -21 % between 2005 and 2020, i.e. an average annual reduction of -1.74 %.

Up to 2012, almost all the allowances were allocated free of charge. Since 2013, over half of the allowances have been auctioned. Sectors exposed to a competitiveness risk continue to receive a free allocation of allowances.

Further to the European Council conclusions of October 2014 on a 2030 climate and energy policy framework, the European Commission submitted a legislative proposal on 15 July 2015 for the revision of the ETS Directive for phase 4 (post-2020), which sets out the main issues to be tackled, with a view to the period beyond 2020, in the revision of the Directive regulating the operation of the European carbon market. These issues particularly include implementation of the -43 % target in 2030 compared to 2005, free allocation of allowances in connection with a risk of carbon leakage, financing of low-carbon innovation, modernisation of the electricity sector, and implementation of solidarity between Member States, which was agreed by the European Council.

In a context of low prices and uncertainty about short-term recovery prospects, France has backed the need to reinforce the price signal of the carbon market from the start of the revision, particularly through the Canfin-Grandjean-Mestrallet mission report. At this stage, the European Council and Parliament are both proposing that the Market Stability Reserve (MSR) should be strengthened during the early years of its operation: the MSR will remove, from the planned volume of auctions (between 900 Mt/year in 2021 and 700 Mt/year in 2030), an amount equivalent to 24 % of the market surplus. This could result in auctions being reduced by around 400 Mt/year in 2019-2020, 300 Mt in 2021 and 150 Mt in 2022, until the surplus falls below the threshold of 833 Mt, when the MSR will be paused. This rebalancing of supply and demand should allow prices to recover, enabling low-carbon investments to be triggered.

3.2.2. Incentive measures

The cross-cutting incentive measures presented in the Energy section also apply to the industrial sector:

- **Energy savings certificates:** the industrial sector accounted for 20.3 % of the certificates issued between 1 January 2015 and 31 January 2017 (standard and specific operations).
- **PRO-SME** is a national programme that provides financial support (up to EUR 40 000) to businesses and authorities in order to set up an energy management system (*système de management de l'énergie* – SME) certified to ISO 50001. Forming part of the energy savings certificates scheme, it is coordinated and managed by the Association Technique Energie Environnement (ATEE) (Energy environment technical association).
- **Electricity-intensive businesses** are also encouraged to obtain ISO 50001 certification, set targets and implement an energy performance improvement plan in order to benefit from a preferential electricity tariff (reduction of the TURPE (electricity network access tariff) - Article L.351-1 of the Energy Code).
- The **ADEME's 'Aides à la décision' (Decision aid)** scheme particularly subsidises the conduct of studies on energy efficiency in industry, including energy audits that are not mandatory under the regulations, and the implementation of energy management systems. According to a study carried out in 2013 by the Galliléo consultancy for the ADEME, 92 % of beneficiary businesses in the industrial and agricultural sectors are expected to take action or have already taken action and 72 % have already implemented measures following these studies⁴². In 2015, 414 studies (pre-diagnostic, diagnostic and feasibility studies)⁴³ were conducted in the industrial and agricultural sectors. The last review carried out in 2015 showed that one business out of two receiving support to conduct an energy audit could make potential energy savings in excess of 15 % of its consumption.
- In order to help SMIs/SMEs implement energy efficiency measures, **energy and environment policy offices** have been opened in Chambers of Commerce and Industry and in Chambers of Trades and Crafts. Their task is to encourage businesses, particularly on energy issues. They can therefore carry out **'energy visits'** to businesses, arrange **joint energy audit operations** carried out by consultancy offices, and organise awareness-raising meetings or training sessions. To this end, a specific training path has been developed for these officers, which is coordinated and supported by the ADEME and which includes, on the topic of energy, modules on 'Concepts of energy and energy use' and 'Energy visits to businesses'.

In 2015, 1 144 'energy visits' were made. More broadly, 5 130 businesses were supported by the Chambers of Commerce and Industry on the issue of energy ('energy visits' and other types of support, such as information, awareness-raising, organisation of clubs, etc.).

- **'DEREFEI' programme:** the ADEME, in collaboration with various professional stakeholders (professional sector and consultancy offices), has developed a training path entitled 'Devenir Référent Énergie en Industrie' (Becoming an energy adviser in industry). This equips energy advisers with the tools and methods needed to improve the energy performance of their businesses, by establishing energy management within the business. Since its launch in June 2015, 170 trainees have been trained in 21 three-day training sessions.

In its 2016 training catalogue, the ADEME also offered a module entitled 'réaliser un audit énergétique de qualité dans le bâtiment' (carrying out a high-quality energy audit in building):

http://formations.ademe.fr/solutions/flipbook_ademe/flipbook_ademe/catalogue-formations-2016.html#p=12

⁴² Estimates based on a sample of 90 beneficiaries in the agricultural and industrial sectors (+ large commercial buildings) for operations contracted between 2008 and 2012 and completed between 2010 and 2012.

⁴³ The studies in question correspond to agreements legally concluded between 2011 and 2015 and terminated between 2013 and 2015.

- **Sectoral Guides** published by the ADEME aim to help operators gain better control of their energy consumption⁴⁴.
- The ADEME's aid scheme entitled '**Utilisation Rationnelle de l'Énergie - Investissement**' (Rational energy use - Investment) supports the investments made by businesses in purchasing energy saving equipment or making changes to existing processes or equipment. The operations aided are demonstration operations or exemplary operations. These operations involve investments made in both industry and agriculture. Examples are aid for the purchase of new cooling systems for air compressors, heat pumps and exchangers for agricultural buildings, heat recovery systems for the dishwashing water used in hotels and dehumidifiers for thermodynamic greenhouses. The annual budget is around EUR 500 000. In 2015, the amounts allocated by the ADEME to this scheme totalled EUR 759 000.
- In addition to assisting replacement with renewable energies, the **Heat fund** (see Energy section) is providing new support for **waste heat recovery**. In 2015, 27 projects were financed to the tune of EUR 16.8 million, resulting in estimated savings of 57.7 ktoe/year. In 2016, 20 operations involving an investment of EUR 23.7 million were financed, with ADEME contributing EUR 6.9 million in aid, which will generate savings of 21 ktoe/year.
- '**Prêts Verts**' (Green loans) scheme: a new envelope has been made available by BPI-France to finance SME and mid-cap investments in all the industrial sectors. The 'Prêt Vert' is intended to finance investments resulting in more energy efficient and less polluting industrial manufacturing processes and equipment or in eco-efficient products, in a context of competitiveness and growth. The 'Prêt Vert' is a loan that is not secured on the business or assets of the business owner and that is repayable over five years, with a grace period of two years. Since the programme was renewed at the start of 2015, loans of EUR 164 million have been granted to industrial SMEs and mid-caps to assist them in their energy and environmental transition projects. In order to speed up distribution of the 'Prêt Vert', its ceiling will be increased from EUR 3 million to EUR 5 million in 2017 and eligibility will be extended to services to industry, data centres and cold logistics. Finally, the scheme has been extended until 31 March 2018.
- '**Prêts Eco-Energie**' (Eco-energy loans): these loans were introduced by BPI-France in March 2012 to finance equipment eligible for energy savings certificates in the industrial and tertiary building sectors, as well as the costs associated with their installation (insulation, lighting, heat pump, audits, etc.). The 'Prêt Eco-Energie' is an unsecured loan at a preferential rate that is repayable over five years, with a grace period of one year. By 31 December 2016, over 267 of these loans had been granted to VSMEs and SMEs, with a total amount of EUR 10.7 million, to assist them in their energy optimisation projects. In order to improve this financing solution, the characteristics of the loan have been expanded, its ceiling has been increased from EUR 50 000 to EUR 100 000, and eligibility has been extended to all standard operations in the industrial and tertiary building sectors. The 'Prêt Eco-Energie', which can be combined with energy savings certificates bonuses, therefore forms a real financial lever for encouraging VSMEs and SMEs to invest in more energy-efficient solutions. The scheme has been extended until 2020.

3.2.3. Regulatory measures

Several regulatory measures aim to encourage energy efficiency in businesses and industry, first and foremost the transposition of Directive 2012/27/EU on energy efficiency (EED), which provides as follows:

- **Obligation for periodic energy audits:** as part of the transposition of Article 8 of the EED, the principle of a mandatory energy audit every four years for all businesses except for SMEs was laid down in Articles L.223-1 to L.233-4 of the Energy Code. The impact assessment on the law estimated that **5 000 large businesses** would be subject to the obligation based on the number of employees criterion.

⁴⁴ Guides available via the following link: <http://www.ademe.fr/entreprises-monde-agricole/reduire-impacts>

Articles R.233-1 and R.233-2 of the Energy Code set the thresholds above which a legal person must carry out an energy audit. Articles D.233-3 to D.233-9 of the Energy Code and the implementing Order of 24 November 2014 define the terms and conditions of exemption in the case of a certified energy management system, the scope and methodology of the audit (European standard EN 16247-1, -2, -3, -4), the terms and conditions for submitting documents proving application of the rules, the terms, conditions and criteria for qualifying external service-providers, and the criteria for recognising the competence of the internal auditor.

An IT platform for recording energy audits was made available online in March 2016⁴⁵. By 5 April 2017, 4 567 obligated businesses had registered on this platform:

- **2 747 businesses had submitted an audit** carried out according to the EN 16247 method and covering one or more establishments. Of these audits, 74 % had been carried out by an external service-provider and 10 % had been carried out internally.
- **361 businesses had opted for an energy management system** and supplied an ISO 50001 certificate covering one or more establishments.
- 1 459 audits were still ongoing and reminder campaigns were being conducted to ensure their completion.

Notices to comply will be sent out during 2017 to those obligated businesses that have not carried out the regulatory audit. In addition, measures aimed at encouraging SMEs to carry out energy audits are being developed by the ADEME (see incentive measures described above).

According to an Afnor Energies study, energy audits in businesses can allow savings of 20 % to 30 % to be identified⁴⁶. Energy audits dovetail with other existing measures, in particular the obligation for legal persons employing more than 500 people (250 people in the regions and overseas departments) to produce a statement detailing their greenhouse gas emissions every four years.

- **A cost-benefit analysis for installations generating waste heat** has been made mandatory under Article 14 of Directive 2012/27/EU on energy efficiency, in order to assess whether this waste heat can be used in a district heating or cooling network, before the launch of new combustion installation projects.

The national map of heating requirements and potential sources for heat recovery produced by CEREMA in 2014 is available online⁴⁷.

The ADEME also published in 2015 a study of the industrial waste heat potential in each region⁴⁸. The theoretical waste heat potential in France is estimated to be 51 TWh ($T^{\circ} > 100^{\circ}\text{C}$).

- **Directive 2010/75/EU** of 24 November 2010 on industrial emissions has adopted an integrated approach. This Directive requires, in numerous industrial sectors, the best available techniques (BATs) to be implemented to reduce pollutant emissions, as and when the revised BREF (Best available techniques Reference documents) conclusions are adopted, given that these documents detail the BATs. The BAT conclusions are chosen according to emission reduction, waste reduction and also energy efficiency improvement criteria.

A cross-cutting BREF (applicable to all sectors) exists on the issue of energy efficiency. When an operator is preparing the re-examination file, this must be considered not only in relation to the BAT conclusions of the sectoral BREF, but also in relation to the conclusions of the cross-cutting BREFs, including the energy efficiency BREF.

- In addition, the minimum performance levels adopted by the regulations on boilers (see Energy section) also apply to the industrial sector.

⁴⁵ <http://audit-energie.ademe.fr>

⁴⁶ See http://www.afnor.org/presse_janvier2017/laudit-energetique-entreprise-genere-20-a-30-deconomies/

⁴⁷ http://carto.geo-ide.application.developpement-durable.gouv.fr/906/Carte_chaleur_nationale.map

⁴⁸ See <http://www.ademe.fr/chaleur-fatale-industrielle>

- Lastly, rational energy use is one of the interests protected by the regulations on facilities classified on environmental protection grounds (*installations classées pour la protection de l'environnement* – ICPE – Article L.511-1 of the Environment Code).

3.2.4. Support for standardisation

In conjunction with Directive 2012/27/EU on energy efficiency, France is continuing to actively support the development of tools resulting from **standardisation in the area of energy efficiency**, particularly aimed at the industrial sector. Various tools are available for businesses wanting to improve their energy efficiency:

- Energy diagnosis, based on the French framework AFNOR BP X30-120. This provides manufacturers with a snapshot of their energy situation and the energy saving solutions appropriate to their sites, through three phases: preparation of an overall energy statement for the business; in-depth analysis of the main sources of energy savings that have been identified; and prioritisation of the measures to be taken, with their associated economic analysis. France was involved in the work of the European Committee for Standardisation, which resulted in the publication in September 2012 of the first part of the European standard on energy audits: EN 16247. Since its publication in 2014, EN 16247-3 has been the reference standard for the performance of **energy audits** in industry.
- France is supporting the development of operational tools for producing the measurement plans required by several existing standards (ISO 50001, ISO 50006, ISO 50015, EN 15900, series of EN 16247 standards). In this respect, it is actively contributing to the European standardisation work based on the French document FD X30-147 'Plan de mesurage pour le suivi de la performance de l'énergie : conception et mise en œuvre' (Measurement plan for monitoring energy performance: design and implementation) (available since November 2015).
- At the same time, support for the development of **energy management systems** has been confirmed following publication of the international standard ISO 50001, which replaces the previous EN 16001 standard in the European catalogue. The French standard NF EN ISO 50001 specifies the requirements for designing, implementing, maintaining and improving an energy management system. In particular, it indicates the requirements applicable to energy consumption and uses, including the measurements, documentation and reporting, design and purchases of equipment and systems, processes and personnel contributing to the energy performance. In order to encourage its application, several incentives (described above) have been adopted.
- Development of a **skills qualification framework** for consultancy offices carrying out energy audits in the industrial sector, managed by the OPQIBI (framework No 17-17). This framework is based on the analysis of human and methodological criteria and on the analysis of references. The qualification covers an audit scope encompassing a series of consumers, procedures (specific procedures, technical equipment), utilities and buildings with a view to the final and efficient use of energy in all its forms at the industrial sites.

The OPQIBI qualification framework has evolved to take account of the requirements in relation to the energy audit obligation imposed on large businesses. There are also other qualification bodies for service-providers, as the LNE and AFNOR also offer this service.

Since 2016, the ADEME's aid for the performance of an energy audit in industry has been conditional on the service-provider used for the study holding a qualification issued by one of these three bodies.

3.2.5. Support for the development of more efficient technologies

(a) Green industry initiative

France has committed to **preparing its industrial sectors for the future** so that technologies and services can be offered that enable the transition to a green economy, as these are essential in order to achieve France's objectives in terms of the production of renewable energy and reduction of energy consumption and greenhouse gas emissions.

The green industry initiative has to address three major challenges:

- support the emergence of new professions or activities, as well as national or export market champions;
- assist with the changes that professions in certain sectors will have to make;
- adapt existing measures or create new ones, where appropriate, in order to guide and qualify workers in developing sectors.

So far, 19 strategic sectors of the green economy in terms of potential growth and employment have been identified:

Sectors for the production of energy from renewable sources

1. Biofuels
2. Energy biomass
3. Marine energy
4. Wind
5. Geothermal
6. Solar

Sectors for the optimisation of consumption of natural resources

7. Building with low environmental impact
8. Green chemistry
9. Hydrogen and fuel cells
10. Logistics and workflow management
11. Biosourced materials
12. Optimisation of industrial processes
13. Smart electricity networks
14. Energy storage
15. Carbon-free vehicles

Sectors for the management of the life cycle of natural resources

16. CO₂ Capture and Storage (CCS) and recovery
17. Water, sanitation and ecological engineering
18. Metrology and instrumentation
19. Waste recycling and recovery

In each of the sectors identified, consultations were conducted in 2010 with stakeholders. This work allowed the action priorities to be identified. In 2011, on this basis, action plans were finalised with the aim of developing and structuring these strategic sectors of the green economy within the framework of an ambitious industrial policy. Several proposals were made within this framework, aimed in particular at:

- organising public action and removing regulatory obstacles;

- assisting the organisation of these new sectors, in particular by encouraging stakeholders to work together;
- allowing the dissemination of the resulting environmental technologies and productivity gains.

The strategic sectors for the green economy are involved in the Plan de la Nouvelle France Industrielle (Plan for the New Industrial France) through the Comité Stratégique de Filière des Eco-Industries (Strategic Committee for Eco-Industries). Co-chaired by the Minister for the Environment and the Minister for Industry, this strategic committee brings together the relevant stakeholders (businesses, business federations, trade unions and authorities) and ensures public-private consultation on the obstacles to the development of the sectors and the definition of proposals. It is structured around four themes:

- water
- waste
- renewable energy
- energy efficiency.

Since January 2012, it has been developing the 'Ambition Ecotech' roadmap, which consists of 87 measures and which has led to the signature of contracts on each of these themes.

(b) Support for innovation

Numerous **calls for projects**, including on the issue of energy efficiency in the industrial sector, have been organised:

- The **Fonds Unique Interministériel** (FUI) (Interministerial single fund), which is intended to support competitiveness clusters, devotes a third of its funding to innovation projects involving sustainable development. Six competitiveness clusters specialising in eco-technologies were labelled in 2010. More broadly, 40 % of the 71 clusters involve eco-industries, including three for building and towns and cities, six for energy, two for recycling and the circular economy, two for biomaterials, five for wood and biomass, and six for transport excluding aviation.
- Through the '**Aide à l'Innovation**' (AI) (Innovation aid) programme, BPI-France supports SMEs that are in a technological development phase. In addition, through **aid for 'innovation stratégique industrielle'** (ISI) (strategic industrial innovation) projects, focusing on technological breakthroughs and encouraging the emergence of industrial champions, between 2009 and 2011 it funded around 10 collaborative projects, each bringing together at least two businesses and one laboratory, in a total amount of EUR 140 million.
- At the request of the Ministry of National Education, Higher Education and Research (MENESR), the **National research agency** (Agence nationale de la recherche – ANR) drew up an **action plan**, which takes account of the research priorities defined in the National research strategy (*Stratégie nationale de recherche* – SNR) and which is consistent with the European framework programme for research Horizon 2020. This action plan is structured around nine societal challenges:
 - efficient management of resources and adaptation to climate change;
 - clean, safe and efficient energy;
 - stimulation of industrial renewal;
 - life, health and well-being;
 - food security and demographic challenge;
 - mobility and sustainable urban systems;
 - information and communication society;
 - innovative, inclusive and adaptive societies;
 - freedom and security for European, its citizens and its residents.

These nine societal challenges were the subject of a general call for projects involving several financing instruments to support individual or collaborative research projects in a national and international context.

In 2015, EUR 390 million was allocated to the call for projects. Out of the 667 projects selected by the ANR, 48 concerned challenge 1 'Efficient management of resources and adaptation to climate change' and 38 concerned challenge 2 'Clean, safe and efficient energy'.

- The ANR also implements the '**crédit d'impôt recherche**' (research tax credit). In 2013, nearly 23 000 businesses benefited from this credit resulting in a total claim of EUR 5.7 billion for all activities combined, therefore not just for energy.
- The **ADEME-TOTAL programme on energy efficiency in industry**, aimed at boosting the R&D effort of this sector, which currently receives little support, had the ambition of helping to provide French industry with a broad range of energy efficient technologies and encouraging the emergence of these technologies in SMEs on European and global markets. Projects involving large businesses were also eligible. The programme, which ran from 2009 to 2013, resulted in 59 projects (32 demonstrators, 24 studies, 3 software packages) being selected and contracted out of the 167 applications received. The aid provided by the programme totalled EUR 21.3 million, with 17 % coming from public funds (ADEME) and 83 % from private funds (TOTAL). By mid-2016, over 70 % of the projects had been completed and five innovative eco-technologies in terms of energy efficiency in industry had been placed on the market:
 - equipment manufacturer TMW: MHD project involving a desalination and demineralisation module using multi-stage humidification and dehumidification;
 - equipment manufacturer Concept Convergence: CSMO project involving the baking and drying of crustless soft bread through a combination of hot air and microwaves;
 - steel plant Erasteel: conversion of a hydraulically powered rolling mill into an electrically powered rolling mill;
 - software developer Prosim: ValiAri project involving the coupling of a data reconciliation tool with optimisation software to reduce operating costs in the production of utilities;
 - aluminium plant Affinage de Lorraine: recycled aluminium production line involving a tilting rotary furnace.
- As part of the **Programme d'Investissements d'Avenir** (Investing for the future programme) (see Energy section), several calls for expressions of interest (CEI) and calls for projects (CP) have been launched by the ADEME since 2010, particularly in the areas of industrial ecology, eco-efficient production systems, smart electricity networks, transport, renewable energies, storage, construction and green chemistry.

Launched in 2014 (and closed in March 2017), the **call for projects focusing on eco-efficient industries and agriculture** aimed to support demonstration projects involving innovative technological solutions and offers applied to industry, agriculture and the wood sector, and port and maritime services in terms of energy efficiency, reduction of raw materials and water, protection of the environment and space saving. In April 2017, 19 projects were selected under this call for projects. These involve a total budget of EUR 108 million, with PIA aid of EUR 46 million.

For more information on the successful projects: <http://www.ademe.fr/entreprises-monde-agricole/innover-developper/programme-dinvestissements-davenir-pia/projets-laureats>.

In order to support the launch of innovative eco-technologies on the market, a trial involving an ETV (Environmental Technology Verification) tool was started in 2012 by the ADEME. The aim of this tool is to provide the developer of innovative eco-technology with a third-party verification of the level of performance achieved by the eco-technology in question (www.verification-etv.fr). Seven target groups of eco-technologies have been defined, including energy technologies and cleaner processes involving the energy optimisation of industrial installations and buildings. To date, four innovative eco-technologies have had their performance verified using the ETV tool in France, and another 13 were in the process of being verified in October 2016.

4. Agriculture sector

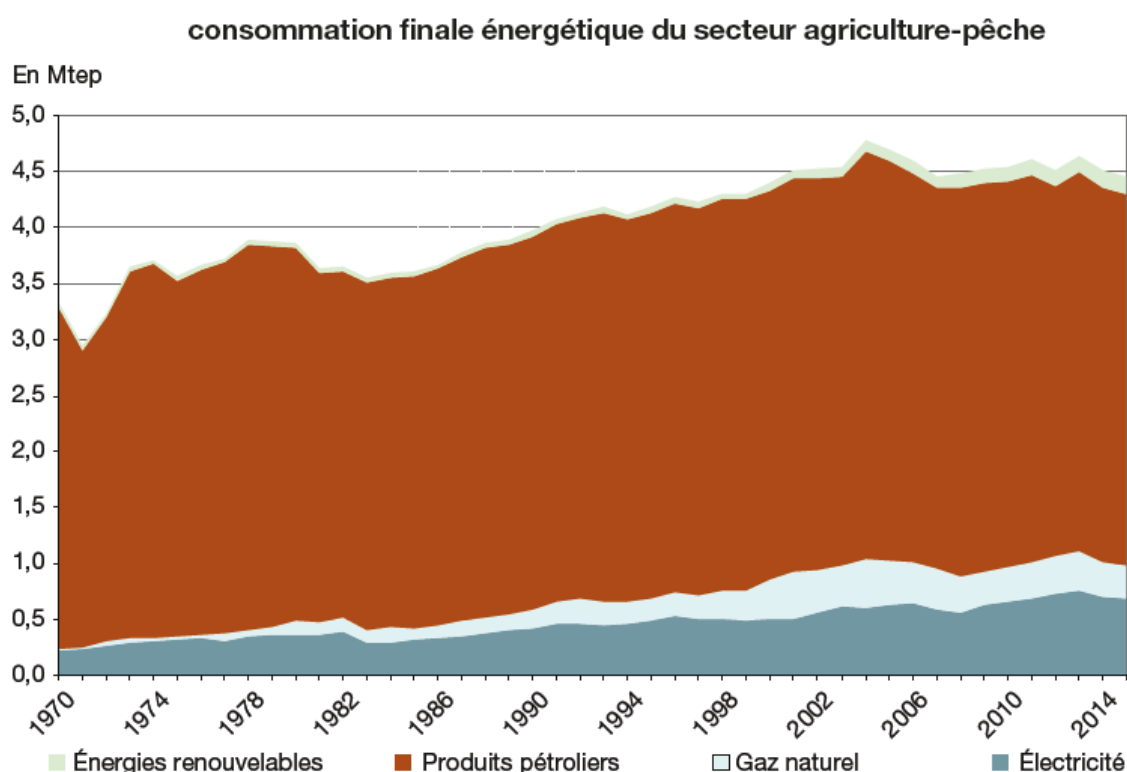
4.1. State of play

In 2015, the final energy consumption of the agriculture-fisheries sector was 4.5 Mtoe, i.e. 3.0 % of the total final energy consumption. This consumption was down 1.2 % on 2014, which was the second consecutive year of reduction, following the fall in 2014 (-2.9 %). At the same time, according to provisional data from INSEE's agriculture accounts, agricultural production by volume fell 1.6 % in 2015.

The drop in energy consumption mainly stemmed from oil products, which still account for three-quarters of the sector's consumption, but which fell in 2015 (-0.8 %). The consumption of electricity (-1.8 %) and natural gas (-4.5 %) also fell. For both these energies, however, these reductions were lower than in 2014, which was marked by an exceptionally mild climate that reduced greenhouse and livestock building heating needs.

As regards the long term, the consumption of the sector as a whole steadily increased between 1984 and 2004, at an average annual rate of +1.4 %. Since the consumption peak of 4.78 Mtoe in 2004, consumption has stabilised and even tended to fall slightly by -0.5 % per year on average between 2005 and 2015.

Figure 10 below shows the changes in the final energy consumption of this sector:



Source : calculs SOeS, d'après les sources par énergie

Figure 10. Final energy consumption in the agriculture-fisheries sector corrected for climate variations, in Mtoe, between 1970 and 2015 (source: SOeS, 2015 energy statement)

[Key to figure:]

Consommation finale énergétique du secteur agriculture-pêche	Final energy consumption of the agriculture-fisheries sector
En Mtep	In Mtoe
Énergies renouvelables	Renewable energies
Produits pétroliers	Oil products

Gaz naturel	Natural gas
Électricité	Electricity
Source : calculs SOeS, d'après les sources par énergie	Source: SOeS calculations, according to sources by energy

Oil products remain the main source of energy, although since the late 1970s they have seen competition from natural gas and electricity, whose consumption has significantly increased: +2.0 % per year on average since 1973 for electricity and +4.8 % for natural gas.

Fishing accounts for 6 % of the energy consumption of the agriculture-fisheries sector as a whole, which is mainly due to the diesel consumed by fishing vessels. This consumption fell significantly in the 2000s, with a drop of one-third between 2003 and 2008.

4.2. Policies and measures

The reduction of energy consumption and the development of renewable energies within the agriculture and forestry sector have resulted from the implementation of several support programmes. Public authority measures have particularly focused on the most energy-intensive processes, notably production in heated greenhouses, intensive production and use of tractors, and on renewable energies.

- The aid schemes for investments for the future⁴⁹ include the agricultural and agri-food sectors, with calls for projects running over three years that involve innovation and competitiveness in the agricultural and agri-food sectors ('Innovation et compétitivité des filières agricoles et agroalimentaires' – ICF2A; over EUR 1 million) and the modernisation of greenhouses (EUR 50 000). These particularly involve the market-gardening and horticultural, grain and wine sectors⁵⁰. These schemes implemented by the Ministry of Agriculture support energy savings and encourage efficient investments in energy efficiency and renewable energies. Their aims are particularly to optimise the costs and improve the competitiveness of the agricultural, agri-food and wine sectors, while reducing material losses and improving their environmental and energy performance.

The call for projects entitled 'Projets agricoles et agroalimentaires d'avenir' (Agricultural and agri-food projects for the future), which remained open until early 2017, has a budget of EUR 35 million to finance pivotal projects in the agricultural and agri-food sectors and a budget of over EUR 10 million to stimulate innovation processes in these sectors ('initiatives innovantes dans l'agriculture et l'agroalimentaire' – 2I2A – innovative initiatives in agriculture and agri-food). A specific envelope of EUR 22 million has been allocated to greenhouse projects (53 projects selected in 2015 and 64 in 2016), to which EUR 8.5 million can be added for the current CP. In the fourth wave of the greenhouse CP (2016), 12 projects out of 26 had a positive impact on energy efficiency, with three including the use of biomass and four involving waste heat.

Other support was provided up to March 2015 through three complementary plans:

- The 'plan végétal pour l'environnement' (PVE) (green environment plan), implemented by the Ministry of Agriculture and managed at regional level, in particular encouraged energy savings in greenhouses through environmentally-focused investment aid (regulation systems, open buffers, heat shields, greenhouse development, boiler development). This plan was implemented as part of the regional rollout of the 'Plan de développement rural hexagonal' (National rural development plan). Over the 2007-2013 period, this plan involved total commitments, from all the national and European funders combined, of EUR 8.8 million for greenhouse energy savings. Out of this total, around EUR 3.5 million in aid was committed by the Ministry of Agriculture alone over six years (2007-2012) in order to finance 318 applications, with a total invested amount of EUR 31.2 million.

⁴⁹ See <http://agriculture.gouv.fr/stephane-le-foll-appelle-stimuler-linvestissement-dans-les-secteurs-agricole-et-agroalimentaire>.

⁵⁰ See <http://www.franceagrimer.fr/filiere-vin-et-cidriculture/Vin/Aides/Investissements/Programme-d-investissements-des-entreprises-vitivinicoles-Appel-a-projet-2016>

Pending finalisation of the new programming of the 'Plan de Développement Rural 2014/2020' (Rural development plan 2014/2020), the green environment plan was temporarily renewed in 2014.

- The '**plan de performance énergétique des exploitations agricoles**' (energy performance plan for agricultural holdings), implemented by the Ministry of Agriculture, applied between 2009 and 2014 and aimed to:
 - raise awareness and provide advice to agricultural professionals on energy savings, production of renewable energy and reduction of greenhouse gas emissions;
 - reduce direct energy consumption (mainly agricultural tractors and livestock buildings) and indirect energy consumption (through changes to agricultural practices);
 - develop renewable energies (agricultural anaerobic digestion, 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, was divided into two components:

- a national component for the development of mobile engine test beds (in 2009 and 2010, 11 mobile test beds were added to the five that already existed) and agricultural anaerobic digestion (127 projects funded following calls for projects launched between 2009 and 2010). i.e. EUR 30.2 million committed by the State;

The provision of mobile engine test beds for the adjustment of tractors should allow a final annual energy saving of 3.5 ktoe in 2010, 23.2 ktoe in 2016 and 36 ktoe in 2020⁵¹.

- a regional component, mainly involving the provision of energy advice to agricultural holdings.

As regards this regional component, by the end of 2012, nearly 9 000 applications for investments in energy savings and production of renewable energy had been made by agricultural holdings, with the Ministry of Agriculture granting over EUR 66 million and other national and European funders contributing nearly EUR 26 million. Farmers invested a total of nearly EUR 250 million. Insulation of livestock buildings accounted for 44 % of the total amount invested.

- Lastly, the '**plan de modernisation des bâtiments d'élevage**' (livestock building modernisation plan) allowed projects to reduce energy consumption and develop renewable energies to be financed, except for those projects already eligible under the energy performance plan and the green environment plan.

From 2007 to 2013, over 40 700 projects were supported under the livestock building modernisation plan, 22 000 under the green environment plan and 10 800 under the energy performance plan. In 2014, the appropriations allocated by the Ministry of Agriculture to these schemes totalled EUR 30.2 million and allowed over 4 200 projects to be supported. There were also EUR 55 million in EAFRD appropriations in 2014.

Since 1 January 2015, the three plans described above have been merged, simplified and expanded. The appropriations allocated by the Ministry of Agriculture to investment in agricultural holdings have been significantly increased.

The new modernisation aid is now being implemented through a single scheme – the '**plan de compétitivité et d'adaptation des exploitations agricoles**' (PCAE) (agricultural holding competitiveness and adaptation plan) – within a decentralised framework based on consultation between the DRAAFs (Regional departments for food, agriculture and forestry) and the regional councils, which are now the managing authorities for rural development programmes. The basic co-financing rate permitted by the rural development regulation has increased to 63 % in transition

⁵¹ Source: MAAF.

regions and to 53 % in other regions, compared to the rate of 50 % for the 2007-2013 programming, which is further reinforcing the lever effect.

The guidelines and objectives of the PCAE have been jointly defined by the State and regions and involve four priorities:

- modernisation of livestock holdings, which is the top priority of the plan;
- pursuit of dual economic and environmental performance in the crop sector;
- improvement of the energy performance of all agricultural holdings;
- commitment to an agro-ecological approach, particularly those pursued within an economic and environmental interest grouping (*groupement d'intérêt économique et écologique – GIEE*).

The Ministry of Agriculture allocated an envelope of EUR 84.5 million to this plan in 2016. The state appropriations supplemented by those from the regions, the EAFRD and other funders (Agences de l'Eau, ADEME, etc.) have therefore allowed nearly EUR 350 million in appropriations to be distributed each year over the 2015-2017 period, i.e. well above the annual provisional envelope of EUR 200 million. The 2017 appropriations of the Ministry of Agriculture allocated to the modernisation of agricultural holdings will be at the same level as the 2016 appropriations.

In addition to these programmes, more targeted measures have been taken:

- The data recorded during '**diagnostics énergie-GES**' (energy-GHG diagnoses) carried out on holdings have been summarised (summary of 3 500 Planète diagnoses in 2010 + summary of 1 000 Dia'terre® diagnoses in July 2013; see Dia'terre® details below).
- The **Dia'terre® tool** has been developed jointly by the ADEME, the Ministry of Agriculture and agricultural development bodies so that, in particular, a common and harmonised energy-GHG diagnosis method can be proposed for holdings.
- The **ClimAgri tool®**, introduced by the ADEME in 2011, allows energy and GHG diagnoses to be carried out at regional level. Since the launch of this tool, around 67 experts have been trained in its use and 62 ClimAgri® diagnoses have been carried out.
- The **Agribalyse®** database on the environmental impact of agricultural production has been available since October 2013. It contains life cycle analyses for 50 groups of agricultural products. This work, coordinated by the ADEME, has involved 14 partners, with joint operational management by the INRA (National institute for agricultural research) and the Swiss research station Agroscope-ART.

The ADEME is also supporting research and experimentation aimed at reducing the energy consumption of livestock buildings (experimentation with equipment, diagnostic tools, etc.) and greenhouses.

In terms of studies and prospects, the following should be noted:

- The CASDAR⁵² (Special purposes account for agricultural and rural development), which allows studies to be carried out in order to find potential ways of further reducing the energy consumption of the agricultural sector.
- INRA 2013 study: 'Quelle contribution de l'agriculture française à la réduction des émissions de gaz à effet de serre ?' (What is the contribution of French agriculture to the reduction of greenhouse gas emissions?).
- AFClim forecast 2012-2013 (Agriculture, forestry, climate): development of adaptation strategies.

⁵² See <http://agriculture.gouv.fr/developpement-agricole-et-rural-casdar>.

- Forecasting exercise managed by the Ministry of Agriculture entitled 'Agriculture Energie 2030: l'agriculture face aux défis énergétiques' (Agriculture Energy 2030: the energy challenges facing agriculture).
- The 2012 study on 'Agriculture et Facteur 4' (Agriculture and Factor 4), managed by the ADEME and the Ministry of Agriculture, which proposed several study scenarios highlighting the possible contribution of French agriculture and forestry to the achievement of Factor 4 by 2050 for all sectors combined.
- The forecasting exercise carried out by the ADEME on the energy consumption and GHG emissions of all sectors, including agriculture and forestry, by 2030 and 2050 ('visions Energie-Climat' – Energy-Climate visions).
- The economic analysis of the dependence of agriculture on energy carried out in 2012 by the ADEME, involving an assessment, retrospective analysis from 1990 and development scenarios for 2020.
- The 2013 study on the energy performance of agricultural holdings in the overseas departments, managed by the Ministry of Agriculture and the ADEME.

In addition, as part of the **energy savings certificates** (CEE) scheme, 20 standard operations sheets for the agricultural sector were produced in November 2016. The CEEs issued between 1 January 2015 and 30 September 2016 for standard and specific operations in the agricultural sector represented 5 % of all the CEEs issued in this period.

Lastly, as part of the '**Programme d'Investissements d'Avenir**' (PIA) (Investing for the future programme), the ADEME has supported projects in the agricultural sector, including the Osiris project (*Optimisation des Séchoirs à grains en Intégrant une fonction Refroidissement Innovante pour la Stabilisation* – Optimisation of grain dryers by including an innovative cooling function for stabilisation) and the Tank 2020 project (*Tank innovant de stockage de lait économe en énergie utilisant un fluide à bas potentiel de réchauffement* – Innovative and energy-efficient milk storage tank using a fluid with low heating potential) submitted under the call for projects focusing on eco-efficient industries and agriculture⁵³.

⁵³ For more information on the projects supported as part of the PIA: <http://www.ademe.fr/entreprises-monde-agricole/innover-developper/programme-dinvestissements-davenir-pia/projets-laureats>

5. Public sector

The State and the local and regional authorities play a vital role in controlling greenhouse gas emissions and energy efficiency, not only through the management of their property assets and their direct activities, but also in the context of the exercise of their powers (for town planning, for example, with regard to the local authorities).

This section particularly sets out the implementation of Articles 5 (state property) and 6 (purchasing by public bodies) of the Energy Efficiency Directive.

5.1. Reinforcing the exemplary role of the State

(a) Reducing the energy consumption of the State's property stock

In accordance with Article 5 of Directive 2012/27/EU on energy efficiency, France has opted for the alternative approach in order to reduce the energy consumption of the State's property stock. The buildings affected by the implementation of this article are public buildings occupied by state services: offices, educational or sports buildings, health or social buildings, cultural buildings, shops or housing. In total, these buildings cover 22.2 million square metres. Agricultural buildings, technical buildings, Ministry of Defence buildings (excluding housing and offices), road and services civil engineering structures, places of worship, as well as monuments and memorials are excluded from the scope of the Directive.

This alternative approach is based on the target set by Article 5 of Law No 2009-967 of 3 August 2009 of a 40 % reduction by 2020 in the energy consumption of the buildings of the State and its public institutions. It will take a combination of several types of action for the State to achieve this target:

- work on the building envelope and equipment of buildings;
- measures associated with the management of equipment and occupants;
- reduction of the surface area occupied by state services.

The savings generated in this way are estimated at 10 131 GWh of primary energy over the 2014-2020 period, compared to 2 477 GWh using the default approach. Details of the calculations are available in the October 2013 report submitted in accordance with Article 5 of the Directive⁵⁴.

The initial assessment information available (based on the total energy bill for the property stock occupied by the State, indicated in the Chorus budget monitoring tool, and on feedback on energy costs) suggests that the following energy savings were made during the first two years of implementation of Article 5 of the Directive:

Energy savings made	Final energy	Primary energy
In 2014 (compared to 2013)	580 GWh	780 GWh
In 2015 (compared to 2014)	1 380 GWh	1 840 GWh

In particular, regarding property disposal, the State relinquished 1 684 628 m² in 2014 and 802 983 m² in 2015.

In addition, a national roadmap for the energy transition of state buildings has been produced by the State's Property Directorate. This roadmap involved interministerial and inter-establishment consultations so that the various lines of work could be jointly defined. During 2016, six workshops brought together a total of 84 participants:

⁵⁴ This report is available at the following addresses: <http://www.developpement-durable.gouv.fr/sites/default/files/Synthese%20de%20la%20notification%20article%205.pdf> and <http://www.developpement-durable.gouv.fr/sites/default/files/Rapport%20sur%20l'article%205.pdf>

- Acting on the rotation cycles of property stock
- Acting on the property stock retained
- Improving monitoring and reporting
- Improving the training and support of stakeholders
- Launching trials to create interest
- Putting the energy transition at the heart of the State's property governance

These workshops helped to consolidate the recommendations and develop specific measures and lines of action applicable to the entire property stock of the State and its operators.

At national level, the structure in charge of managing the implementation, monitoring and updating of the roadmap is the National public property conference (Conférence nationale de l'immobilier public – CNIP), which is the only national governance body for the State's property policy and was created by the Prime Minister's Circular of 27 April 2016. The CNIP is an advisory body that is answerable to the State's Property Directorate, with final decisions being made by the Minister for Public Property.

To continue the dynamic generated by the workshops, the State's Property Directorate has created an ad hoc CNIP focusing on the issue of the energy transition in state buildings, which met for the first time on 4 October 2016 and which will continue to meet every two months. The State's Property Directorate is relying on representatives from the Ministry of the Environment and Energy to co-facilitate the CNIP and propose updates to the roadmap. Points of contact have been identified in each central administration so that information can be properly circulated within each ministry and among operators. This ad hoc CNIP is responsible for proposing tools and methods that the CNIP can use to implement, monitor and update the roadmap.

(b) Taking account of energy efficiency in public purchasing

Public procurement is a particularly important lever for action in terms of contributing to the emergence of more sustainable methods of consumption and production: public purchasing accounts for around 10 % of French GDP and helps to give opportunities to market players, in particular due to the volume of purchases and the guidance given by public authorities.

Article 6 of Directive 2012/27/EU provides that central governments shall purchase only products, services and buildings with high energy-efficiency performance, insofar as that is consistent with cost-effectiveness, economical feasibility, wider sustainability, technical suitability, as well as sufficient competition. These provisions have been implemented by France through Decree No 2016-412 of 7 April 2016 on taking account of energy performance in certain public contracts.

More broadly, in order to encourage all public bodies towards a more energy efficient procurement policy, **procurement guides** have been developed by the **Observatoire économique de l'achat public** (OEAP) (Public purchasing economic observatory). These guides give recommendations on aspects as varied as the purchase of office furniture, maintenance of facilities or purchase of professional clothing. In particular, thematic guides, specifically intended to take account of the issue of sustainable development in public purchasing, have been made available. These guides can also be useful for buyers in the private sector. Since April 2016, a reform has been taking place involving the transformation of the Observatoire économique de l'achat public (Public purchasing economic observatory) into the Observatoire économique de la commande publique (OECPP) (Public procurement economic observatory). The development of guides should continue, but using other forms and methods. The new tasks of the OECPP include collecting and analysing data on the economic and technical aspects of all public procurement contracts.

Among the latest publications, a guide to public purchasing as a response to climate challenges and an introduction to taking account of the life cycle cost in a consultation were published in 2016.

In addition, the PNAAPD (*plan national d'action pour les achats publics durables* – national action plan for sustainable public purchasing) 2015-2020 identifies sustainable public purchasing as a genuine instrument for supporting environmental policies and sets targets for 2020. These include:

- 25 % of contracts concluded during the year containing at least one social provision;

- 30 % of contracts concluded during the year containing at least one environmental provision;
- at the requirement definition stage, 100 % of contracts being the subject of a comprehensive analysis intended to define whether sustainable development objectives can be taken into account in the contract.

(c) Implementing the ‘exemplary administration’ process

The ‘exemplary administration’ process was introduced through the Circular of 28 September 2005 on the exemplary role of the State in terms of energy savings. It was extended by the Prime Minister’s Circular of 3 December 2008 on the exemplary role of the State with regard to sustainable development in the operation of its services and public institutions, with said ‘Exemplary State’ Circular laying down broader objectives in terms of eco-social responsibility. Further Circulars have determined the annual roadmaps to be followed by state services (central government and decentralised services), in particular by setting targets to be met and laying down associated indicators to measure the progress of services.

This process was further developed through the Prime Minister’s Instruction of 17 February 2015 on the interministerial ‘exemplary administration’ action plan for the environment 2015-2020, with four priorities being set:

- energy savings
- sustainable mobility
- resource savings and waste reduction
- conservation of biodiversity.

The interministerial ‘exemplary administration’ measure therefore aims to ensure the energy and environmental transition of the State’s operation and in particular includes a line of action on energy savings.

The ministries and also public institutions and state operators with more than 250 employees must draw up their own exemplary administration plan containing the priorities defined in the Instruction. A reporting scheme has been introduced to monitor achievement of the plan’s targets. In particular, an energy consumption indicator has been established in order to improve the energy performance of buildings.

5.2. Enhancing the territorial coverage of climate and energy policies

Local and regional authorities have a key role to play in the fight against climate change, control of energy consumption, promotion of renewable energies, and improvement of air quality. They are responsible for pivotal investments in energy terms: buildings, networks (lighting, heating) and transport. Through their town and spatial planning policies, they organise the distribution of activities and residential sites. Through their economic and regional development policies, they determine how to exploit the energy potential of their areas.

In particular, these authorities are responsible for planning (especially at regional level) and facilitating (especially at intermunicipal level) the energy transition.

These powers can be exercised at various levels through a range of tools, specifically focusing on Climate-Air-Energy issues or other sectoral themes.

(a) Regional planning of climate and energy policies

The region is recognised as being the appropriate level for coordinating studies, disseminating information and promoting energy efficiency measures. It allows the rollout of regional energy efficiency platforms within public institutions for cooperation between municipalities (EPCI). It can develop an appropriate training offer on the energy transition.

In terms of Climate-Air-Energy planning, three scenarios can be identified:

- In Ile-de-France and Corsica, the **SRCAE** (*Schéma Régional Climat Air Energie* – Regional climate-air-energy scheme) remains the regional planning document for Climate-Air-Energy.

Resulting from Law No 2010-788 of 12 July 2010 on the national commitment to the environment, the SRCAE is a planning document that establishes, at regional level, the guidelines for mitigating climate change, i.e. reducing greenhouse gas emissions, adapting to climate change, i.e. actions to reduce a region's vulnerability to climate change, preventing and reducing air pollution, and developing renewable and recovered energy.

- In metropolitan France, excluding Ile-de-France and Corsica, the SRCAE will disappear in favour of the **SRADDET** (*Schéma Régional d'Aménagement, de Développement Durable et d'Égalité des Territoires* – Regional scheme for spatial planning, sustainable development and equality between regions) as soon as this is adopted (by mid-2019 at the latest).

The NOTRe Law (New territorial organisation of the Republic) in fact created this new planning scheme: the SRADDET. This scheme involves a comprehensive document on spatial planning, mobility, energy and the fight against climate change.

The SRADDET replaces several other sectoral planning documents, including the SRCAE. The SRADDET is set to incorporate their essential elements, particularly the objectives in terms of mitigating and adapting to climate change, combating air pollution, controlling energy and developing renewable and recovered energy.

- In the overseas departments, the **SAR** (*Schéma d'Aménagement Régional* – Regional development scheme) has been the equivalent of the SRCAE since the Law on the energy transition for green growth.

Regardless of the scenario, the Law on the energy transition introduced two new documents:

- Creation of the **regional programme for energy efficiency**: this programme will include:
 - a plan for rolling out energy efficient renovation platforms, which, for private individuals, will offer advice to help them with their renovation projects (see Building section);
 - a component for financing the energy efficient renovation of buildings;
 - a breakdown of the energy efficient renovation targets set by the regional scheme.
- Creation of the **regional biomass scheme**: this scheme will link up with the national biomass mobilisation strategy in order to optimise the use of this resource at regional level. It will particularly aim to meet the needs of the Multiannual energy programming (PPE). These schemes should be established within 18 months of the Law being enacted, i.e. in February 2017.

(b) Local responsibilities in terms of energy

Planning documents

Since the Law on the energy transition for green growth, the intermunicipal level has been the level for 'coordination of the energy transition':

- Driving role of the **500 positive energy territories for green growth (TEPCV)**

A TEPCV is a territory for the exemplary mobilisation of green growth. The local authority undertakes to reduce the energy needs of its inhabitants, structures, economic activities, transport and leisure activities. It proposes a comprehensive programme for a new development model that is more efficient and economical.

There are six priority areas of action in these territories:

- reduction of energy consumption: in particular through insulation work on public buildings, switching off of public lighting after a certain time, etc.;

- reduction of pollution and development of clean transport: through the purchase of electric cars, development of public transport and car-pooling, etc.;
 - development of renewable energies: including, for example, the installation of photovoltaic panels on public infrastructure, creation of district heating networks, etc.;
 - conservation of biodiversity: by eliminating pesticides in the maintenance of public gardens, developing agriculture and nature in towns, etc.;
 - fight against wastage and reduction of waste: through the abolition of plastic bags, measures to improve recycling and development of short channels for food in school canteens, etc.;
 - environmental education: by raising awareness in schools, informing inhabitants, etc.
- Pivotal role of the **PCAETs**

PCAETs (*Plans Climat-Air-Énergie Territoriaux* – Local climate-air-energy plans) are now mandatory for public institutions for cooperation between municipalities (EPCI) with their own tax status that existed on 1 January 2017 and that cover more than 20 000 inhabitants. The metropolis of Lyon and the local public institutions in the metropolis of Greater Paris are also subject to this obligation.

Under 20 000 inhabitants, voluntary PCAETs can be produced. Their content can therefore be similar to mandatory PCAETs, but the PLUis (*Plans locaux d'urbanismes intercommunaux* – Intermunicipal local town plans) will not have to take them into account.

The PCAET is therefore the reference Climate-Air-Energy document for all stakeholders in the territory. It consists of a diagnosis, strategy and quantifiable targets, an action programme, and a monitoring and evaluation system.

The Law entrusts the coordination of the energy transition to the public institutions for cooperation between municipalities (EPCI) as soon as they have produced their first PCAET.

As regards communities, local public institutions and metropolises (including Lyon) with over 50 000 inhabitants, PCAETs must be produced without undue delay. In communities with 20 000 to 50 000 inhabitants, the PCAET must be produced by 31 December 2018. The PCAET must then be revised every six years.

The ADEME manages the resource centre for Local climate-air-energy plans⁵⁵ and offers training, particularly for local authorities. It has also published a summary brochure entitled 'Élus, l'Essentiel à connaître sur les PCAET' (The essential guide to PCAETs for elected officials) and a very comprehensive guide entitled 'PCAET, comprendre, construire et mettre en œuvre' (Understanding, constructing and implementing PCAETs). It also supports voluntary initiatives by financing the 'Climat Pratic' tool (www.climat-pratic.fr). Intended for small local authorities, intermunicipal associations, villages and regional nature parks, this tool offers them step-by-step guidance on producing an action programme tailored to the constraints and assets of their territory. Created by the ADEME, the RAC-F (Réseau Action

⁵⁵ See www.territoires-climat.ademe.fr

Climat – France) and the CLER (Réseau pour la transition énergétique), and inspired by the Climate Compass tool, this tool can be downloaded free of charge and with open rights.

With regard to the above measure, the regions, the departments and those local authorities with more than 50 000 inhabitants must produce a statement detailing their greenhouse gas emissions (BEGES – *bilan des émissions de gaz à effet de serre*) in relation to their property and responsibilities, which must also include an action plan to reduce their emissions.

The ADEME has a **training programme** for local and regional authorities. It has also contributed to the development and dissemination of the **Cit'ergie** label (French name for the European Energy Award), which is intended for local authorities and which rewards, over a period of four years, the quality management process of the authority's energy and/or climate policy.

The State and the ADEME have also developed various methodological tools aimed at assisting stakeholders in their quantification of the GHG impact of an action, which are available from the resource centre as part of the resources on greenhouse gas statements (www.bilans-ges.ademe.fr).

- **Taking better account of energy in town plans**

The Law on the energy transition has made three changes to the contents of the PLUi and its tools:

- The first of these changes concerns the PADD (*Projet d'Aménagement et de Développement Durable* – Spatial planning and sustainable development project), which is a document that sets out the guidelines for the town planning project. The PADD now also sets out general guidelines for energy networks, whatever the energy sources involved: gas, electricity, heat.
- The second of these changes concerns the national town planning regulation. This can now define the sectors in which structures, work, installations and facilities are subject to minimum renewable energy generation requirements. The earlier provision of the Code allowed urbanisation to be subject to compliance with reinforced energy and environmental performance requirements. The Law on the energy transition has added to this measure and now allows local authorities to specify the renewable energies and the minimum proportion of their generation.
- The third of these changes concerns the possibility of derogating from town planning rules. Certain provisions of the town planning regulation in fact pose an obstacle to external insulation work, heightening of buildings or installation of solar protection devices. As a result, external insulation work, where subject to prior declaration or building permit, can be refused by the mayor if the requirements of the town planning regulation on external appearance are not met. In order to resolve this issue, the Law on the energy transition allows the mayor to derogate from the town planning rules when a building permit application or prior declaration is submitted. Three techniques can be subject to a derogation from the rules on the footprint, height, layout and external appearance of structures: external insulation; insulation by heightening existing buildings; installation of solar protection devices that project from façades.

- **Responsibility for district heating networks:** new tasks for municipalities and intermunicipal associations

The Law on the energy transition formalises a new responsibility for municipalities in relation to the creation and operation of public district heating and cooling networks. It also stipulates that this responsibility may be transferred by the municipality to an intermunicipal association to which it belongs.

In addition, the obligation to produce a masterplan for the district heating network is laid down by Article 194 of the LTECV, which makes it compulsory for authorities owning a district heating network that was in service on 1 January 2009 to produce a masterplan. This masterplan must be produced before 31 December 2018. The aim is to help each owner of an existing district heating network conduct a forecasting exercise on the future of their network to 2030 and to provide them with various scenarios so that they can decide on a programme of work to be undertaken during this period.

Other initiatives

At the beginning of 2017, 86 French towns or groupings of conurbations committed to the **Covenant of Mayors**⁵⁶. This approach provides in particular for the creation of a Sustainable Energy Action Plan, which has already been submitted by 78 French signatories. Eight signatories have reached the third stage of the approach (monitoring of results). The commitments associated with buildings are an extremely important part of the envisaged measures.

The MEEM's departmental services have been tasked with assisting small local authorities in the production of renovation plans for their property assets. They provide technical support and advice to small municipalities with regard to understanding the various regulations applicable to them, understanding their building stock, identifying sources of energy savings and planning energy efficiency measures (audits, work, energy management, etc.). In order to assist the MEEM's departmental services in their **task of advice and support to local authorities**, the CEREMA provides them with a set of methodological tools and learning packages regarding the management of property assets (energy pre-diagnosis tool, energy consumption monitoring tool, methodological documentation, etc.).

So that local authorities have access to local 'energy' skills, the ADEME has developed and introduced a service entitled '**Conseil en énergie partagé**' (CEP) (Shared energy advice), which in particular finances the recruitment of energy experts to be shared by several small municipalities within the same territory⁵⁷. Once this service has been set up, the ADEME provides technical support and financial assistance for the first three years of its operation. The CEP, which is a local service, is aimed at municipalities with fewer than 10 000 inhabitants (one adviser can cover a total population of around 40 000 inhabitants). Its aims are to:

- manage energy by monitoring invoices;
- reduce consumption without affecting comfort;
- assist the municipality in its building projects to optimise its choices;
- conduct awareness-raising actions.

At the end of 2016, there were 290 advisers in post within 153 host structures, with 5 000 member municipalities representing 8.5 million inhabitants.

Energy performance contracts (see Energy section) are also being developed within local and regional authorities. Numerous towns, groupings of conurbations, and departmental and regional councils are introducing this type of contract: examples are available in the brochure⁵⁸ published by the Fedene (Fédération des Services Energie Environnement – Federation of energy and environmental services).

(c) State assistance

The **Contrats de Projets État-Régions (CPERs)** (State-Regions project contracts) are the preferred tool for assisting the local and regional authorities with the implementation of their climate and energy policies: under the previous contracts between the State and the regions (project contracts for the 2007-2013 period), the State prioritised support for the regional climate-energy plans and, through the

⁵⁶ See http://www.conventiondesmaires.eu/about/signatories_en.html

⁵⁷ These experts are attached to local structures such as local energy and climate agencies (*agences locales de l'énergie et du climat* – ALECs), project territories (Pays, PNR, SCOT, etc.), energy associations, intermunicipal structures or even associations).

⁵⁸ <http://www.fedene.fr/sites/default/files/u277/Exemples%20de%20CPE%20en%20tertiaire%20%282%29.pdf>

ADEME, financed the territorial energy actions (actions for energy savings and development of renewable energy) by EUR 76 million per year. This support was extended, through the territorial component of the CPERs, to assistance from the regions for sub-regional climate plans. The regions' commitment to energy efficiency in particular results in the implementation of local policies for the facilitation, awareness-raising and support of energy saving and renewable energy generation measures, in partnership with the State. In this context, through Contrats d'Objectifs Territoriaux (COT) (Local objective contracts), the ADEME finances those territories that want to equip themselves with internal engineering for the development of PCETs (*Plans Climat-Énergie Territoriaux* – Local climate-energy plans).

The CPERs have a carbon neutrality target. The NECATER method allows the carbon impact of an investment programme to be determined, by taking into account the entire life cycle of the projects financed.

The new programming period of the State-Regions project contracts (2015-2020) focuses on five main themes in metropolitan France, including the energy and environmental transition. Discussions about the priorities inherent in each theme led to the Circular⁵⁹ of 15 November 2013 and to specifications intended for the regional prefects, which allow for consultation with the Regions and which serve as the basis for future negotiations.

As with the previous contracts, the regions can rely on the ADEME's assistance measures in order to implement the energy transition. Furthermore, the Circular of 15 November 2013 introduced the obligation of cross-compliance to which projects financed by the State will be subject. This is a new aspect compared to the 2007-2013 period.

The CPERs were signed during 2015. The approach involves two three-year contracts: 2015-2017 and 2018-2020.

The investment priorities are defined in close collaboration with those of the European funds.

Lastly, several calls for projects aim to facilitate the development of the **Ville Durable** (Sustainable City) in order to implement Article 8 of Law No 2009-967 of 3 August 2009 encouraging the use of exemplary operations for the 'sustainable development of the regions' and conurbations by promoting the definition of 'comprehensive energy, architectural and social innovation programmes, in line with existing building stock':

- The objectives of the **ÉcoQuartiers** (EcoDistricts) call for projects are to ensure national and international recognition of communities that have adopted exemplary approaches, to draw attention to the most virtuous of these communities by granting a specific distinction, to promote a new way of building and development, in accordance with the principles of sustainable development, and to support corporate actions, through the creation of a 'Club opérationnel ÉcoQuartier' (EcoDistrict Operational Club) managed by the MEEM. From 2009, when the label was launched, to 2016, 51 ÉcoQuartiers obtained the level 3 label issued by the Ministry throughout France. This represents a total of 66 000 housing units that have been built or renovated.

To give new impetus to the ÉcoQuartiers approach, 12 priorities will be set for the ÉcoQuartiers label⁶⁰:

- to specifically address the challenges of the Paris Agreement: 500 ÉcoQuartiers in 2018;
- to adapt the ÉcoQuartiers approach to the specific characteristics of areas, particularly rural areas, with the aim of 30 % of the operations being carried out in the rural environment by 2018;
- to move from prototype ÉcoQuartiers to ÉcoQuartiers accessible to all;
- health, biodiversity and nature in towns and cities: ÉcoQuartiers synonymous with living well and quality of life;
- ÉcoQuartiers will achieve their objectives only if the residents are engaged;

⁵⁹ http://circulaires.legifrance.gouv.fr/pdf/2013/11/cir_37675.pdf

⁶⁰ See <http://www.logement.gouv.fr/les-ecoquartiers>

- ÉcoQuartiers practical analysis.
- The **Programme d'Investissements d'Avenir** (Investing for the future programme), managed by the Commissariat général à l'investissement (Commissariat-General for Investment), devotes EUR 668 million to the 'Ville de demain' (City of Tomorrow) action managed by the Caisse des Dépôts et Consignations. The 'Ville de demain' action encourages the development of a new way of designing, building and managing towns and cities as part of the ÉcoCité (EcoCity) approach.

Since 2010, through the 'Ville de demain' action, the State has supported integrated urban projects that are exemplary in terms of environmental excellence and innovation, carried out by public or private operators in metropolises or large conurbations. The aim of this partnership approach is to develop attractive and resilient towns and cities that protect the environment, social cohesion and quality of life of their inhabitants.

The 'Ville de demain' programme is being implemented in two tranches:

- The first tranche, between 2010 and 2014, allowed the selection of innovative and ecological projects developed by 19 large French cities forming part of the EcoCité approach.
- The second tranche between 2015 and 2020, which has a budget of EUR 320 million, is a continuation of the first tranche, as all metropolises can now access the financing.

The call for projects for the second tranche took place in 2015 and resulted in the selection of 31 territories, including 13 in the Ile-de-France, which form part of the ÉcoCité approach and are therefore benefiting from the financial support of the 'Ville de demain' programme.

6. Energy demand management

Cross-cutting energy demand management measures, involving all sectors, are also being implemented, including in particular:

- the energy savings certificates (EEC) scheme, which is the main measure of the French energy efficiency policy and which is intended to mobilise sources of energy savings, particularly in those sectors where these are more common;
- support for the most energy efficient products through regulatory and financial measures;
- support for the development of energy services and, in particular, energy performance contracts;
- awareness-raising campaigns, importance of meter readings and billing, development of smart networks;
- promotion of heating and cooling efficiency, support for high-efficiency cogeneration;
- waste prevention;
- taxation;
- investments for the future, research and innovation.

Lastly, measures to enhance territorial coverage (planning tools, aid provided by local authorities), described in the 'Public sector' section, supplement the policy implemented at national level.

6.1. Energy savings certificates scheme

The energy savings certificates (CEE) scheme, created in 2005 and governed by Article L.221-1 et seq. of the Energy Code, is a key tool of the French energy demand management policy. This scheme is based on a three-yearly obligation to make energy savings under CEEs (1 CEE = 1 kWh cumac⁶¹ of final energy), imposed by the public authorities on energy sellers (electricity, gas, fuel oil, fuel, etc.), described as 'obligated parties', where their energy sales exceed thresholds set by regulation.

CEEs are issued by the Ministry of Energy's services to eligible operators (not only obligated parties, but also other legal persons not subject to the obligation, such as local and regional authorities, social housing providers, the Anah, etc.) who have carried out energy saving operations complying with certain criteria laid down by order. These CEEs can be freely traded.

At the end of the period, the energy sellers/obligated parties must prove, subject to a deterrent penalty giving full discharge, that they have met their obligations by holding certificates for an amount equivalent to these obligations.

The first two periods were marked by a sharp rise in the targets (54 TWh cumac for 2006-2009 and then 460 TWh cumac for 2011-2014). The scheme is currently in its third period (2015-2017) with a target of 850 TWh cumac for the period, of which 150 TWh cumac is for households in fuel poverty (this new obligation was introduced on 1 January 2016 by the LTECV). Preparations are being made for the fourth period (2018-2020). The Decree of 2 May 2017 amending the provisions of the regulatory part of the Energy Code on energy savings certificates increases the CEE target for the fourth period (2018-2020) to 1 600 TWh cumac, of which 400 TWh cumac is for households in fuel poverty.

The measures taken between the start of the scheme and 31 December 2013 accounted for over 685 TWh cumac, of which nearly 85 % were in the building sector.

⁶¹ The term 'cumac' is a contraction of the French words 'cumulée' (cumulative) and 'actualisés' (adjusted). For example, the number of kWh cumac saved following the installation of an energy efficient appliance therefore corresponds to the cumulative total of the energy savings made each year during the appliance's life cycle. In addition, the energy savings made each year after the first are adjusted by dividing the previous year's savings by 1.04 (4 % discount rate).

The measures taken since 2014 account for 378.2 TWh cumac⁶². The details of the energy savings generated each year are estimated in Table 8 below:

	2013	2016	2020
Energy savings generated by all operations carried out between 2006 and 2013 (<i>ex post</i> evaluation)			
Annual energy savings	3.3 Mtoe	2.8 Mtoe	2.3 Mtoe
Energy savings generated by all operations carried out between 2006 and 2016 (<i>ex post</i> evaluation)			
Annual energy savings	3.3 Mtoe	5.0 Mtoe	4.0 Mtoe
Energy savings generated by all operations carried out between 2006 and 2016 (<i>ex post</i> evaluation) and extension of the scheme to 2020 (projections)			
Annual energy savings	3.3 Mtoe	5.0 Mtoe	13.1 Mtoe

Table 8. Annual energy savings generated by the CEE scheme (source: MEEM)⁶³

6.2. Support for energy efficient equipment: regulatory measures on products

Regulatory measures targeting energy-using products have been implemented at Community level.

- **Ecodesign:** Framework Directive 2009/125/EC establishes a framework for the setting of ecodesign requirements for energy-related products. These can be set by regulation or voluntary agreement. A total of 31 measures implementing the Framework Directive were adopted between 2008 and 2016 (stand-by and off modes, street and tertiary sector lighting, simple set-top boxes, power supplies and battery chargers, domestic lighting, electric motors, circulators, refrigeration equipment, televisions, washing machines, dishwashers, fans, vacuum cleaners, all types of heater, etc.). In addition to domestic products, the Ecodesign Directive allows performance levels to be set for professional equipment, for example transformers or professional refrigeration equipment.

The work is continuing and, at the end of 2016, the European Commission presented a work programme for the 2016-2019 period. Work has already been started and should be presented soon to interested parties at meetings of the Consultation Forum. This work programme includes the revision of numerous regulations (white goods, vacuum cleaners, lighting, etc.) and proposals on new domestic equipment (in particular windows, water-saving equipment, computers and servers) or professional equipment (industrial furnaces, professional dishwashers, data centres).

The ecodesign regulations for lighting, which cover not only domestic lighting but also public lighting, have enabled local authorities to make substantial savings on this major cost item.

The figures contained in the preparatory studies relate to the EU. It is therefore difficult to assess the savings for France. However, France has adopted measures to encourage the replacement of non-energy efficient products with energy efficient products (see tax credits for heaters and water heaters or CEEs for lighting and other equipment). In addition, the ADEME distributes guides and gives advice to private individuals, businesses and local authorities on all equipment subject to the ecodesign and labelling regulations. In France, the ecodesign and labelling aspects are regarded as complementary and are therefore dealt with together. France is supporting and encouraging the Commission to pursue this work as quickly as possible, given the proven effectiveness of these regulations.

⁶² CEEs issued up to 31 January 2017 for standard operations carried out since 1 January 2014, excluding fuel poverty. These figures are provisional and do not reflect all the operations carried out over the period.

⁶³ This evaluation does not include information, innovation and training programmes.

- **Energy labelling:** Directive 92/75/EEC of 22 September 1992, which has been replaced by Directive 2010/30/EC (currently being revised), sets out a regulatory framework allowing the indication by labelling on energy-related products of information on the consumption of energy and other resources to be required by way of delegated acts. The aim of the labelling is to guide the consumer towards the most efficient products in terms of energy and other environmental aspects (water, noise, etc.), with professionals also being targeted (manufacturers, importers and distributors), who must ensure that the information is accurate, particularly when classifying the product in the A to G colour scale. A+, A++ and A+++ classes have gradually been introduced, although the current revision aims to rationalise the labelling in order to return to a scale from A to G.

The labelling is linguistically neutral as texts have been replaced with identical pictograms in all 28 EU Member States, with specific information being given for each type of appliance. This has become a vital tool in the correct choice of equipment and is now well-known among users as it has become more widespread (in addition to domestic products, this labelling now applies to vehicles and buildings).



6.3. Improving the performance of boilers and air-conditioning systems

- *Boilers between 4 kW and 400 kW*

Low-power boilers (4 kW to 400 kW) must meet minimum performance levels when they leave the factory, before they are placed on the market. They must carry the CE mark and be accompanied by an EC declaration of conformity.

Pursuant to Directive 2010/31/EU on the energy performance of buildings, France has implemented an **annual boiler servicing obligation**. This applies to all boilers (gas, fuel oil, biomass, multi-fuel) with an output of between 4 kW and 400 kW. Servicing must be carried out every year and a boiler service certificate must be issued to the customer (occupant, owner or joint property association for communal boilers) no later than 15 days after the work and must be kept for two years by the customer so that it can be presented in the event of an inspection. This certificate informs the customer about the state of the boiler and heating system.

Servicing must be carried out every calendar year by a qualified professional. If a boiler is replaced or a new boiler is installed, the first service must be carried out no later than in the calendar year following replacement or installation.

The annual servicing of a boiler involves checking the boiler, cleaning and adjusting it where necessary, and giving the appropriate advice on its correct use, possible improvements to the entire heating system and the potential interest in replacing this boiler/system.

To accompany the implementation of this regulation, the Ministry and the ADEME produced a practical guide⁶⁴ on the servicing of boilers, as well as a guide on the renovation of heating systems entitled 'Se chauffer sans gaspiller' (Heating without wasting). Professionals from the sector have also worked together to produce a guide containing technical factsheets intended for professionals in order to ensure the correct application of the regulations⁶⁵.

- *Boilers between 400 kW and 20 MW*

Boilers with an output of 400 kW to 20 MW must undergo a **mandatory inspection**, at least every two years, on the initiative of the boiler's operator. This inspection involves checking the boiler's performance, its measuring instruments, correct operation of the system, and maintenance of the boiler room book. The concentration of air pollutants (NOx) must also be measured.

The list of technical bodies that can carry out these regular inspections is provided by the French accreditation body COFRAC (Comité français d'accréditation).

- *Air-conditioning systems and reversible heat pumps*

Pursuant to Directive 2010/31/EU, France has also introduced a **regular inspection of air-conditioning systems** with a cooling output of more than 12 kilowatts. This obligation was transposed by a Decree of 31 March 2010 and two Orders of 15 December 2016 (these Orders repeal the Orders of 16 April 2010).

All air-conditioning systems and reversible heat pumps with a rated output of more than 12 kilowatts are covered by this obligation.

The inspection must be carried out at least once every five years, on the initiative of the building's owner or joint property association. Where a new air-conditioning system is installed, the first inspection must take place no later than in the calendar year following replacement or installation of the system.

The inspection involves examining the air-conditioning book, assessing the performance of the air-conditioning system, assessing its sizing in relation to the interior climate control requirements, and making the necessary recommendations on correct use of the system in place, possible improvements to the entire system, the potential interest in replacing the system, and any other possible solutions. In addition, the inspector must issue an inspection report, which must be given to the customer within a month of the inspection. This report must be included in the air-conditioning book, and will serve as evidence if a check is made, and must be kept for at least 10 years by the customer.

The inspection of the fully or partly working system must be carried out on site.

The inspector must be independent of the air-conditioning system being inspected, i.e. the inspector must not have any links with the system's owner or their agent, or with a company that installed the system, or with a company that is responsible for the servicing, maintenance or operation of the system or that has a current energy performance contract covering the system under inspection. In addition, the inspector is prohibited from being involved in the implementation of any recommendations made as a result of the inspection. The inspector must also meet the mandatory prerequisites when applying to become an inspector and must be supervised by the certifying body during the period of validity of his or her certification, which is five years.

There are currently three bodies accredited by COFRAC, which represents around 200 inspectors.

⁶⁴ Downloadable from the ADEME and Ministry websites: www.ademe.fr or www.developpement-durable.gouv.fr

⁶⁵ Available from <http://www.energies-avenir.fr/>

6.4. Measures to achieve lighting savings

(a) Switching off of illuminated signage and advertisements at night

Since 1 July 2012, **new illuminated signage and advertisements** must be switched off between 01:00 and 06:00⁶⁶. This new regulation will gradually be applied to all existing installations by 2018. The implementation of this measure represents a substantial source of energy savings and will allow a saving of around 800 GWh each year for signs and more than 200 GWh for advertisements.

On 1 July 2013, the Order regulating how long certain lighting installations can remain switched on entered into force in order to prevent energy wastage and reduce light pollution⁶⁷. The Order lays down a general switching off rule that is applied in various ways depending on the type of lighting in question:

- the interior lighting of buildings for professional use must be switched off one hour after the premises have been vacated;
- building façade lighting must be switched off no later than 01:00;
- shop window lighting or window display lighting must be switched off no later than 01:00 or one hour after the premises have been vacated, whichever occurs later.

Rules governing when this lighting can be switched back on are also laid down:

- shop window lighting or window display lighting can be switched back on from 07:00 or one hour before the start of activity, whichever occurs earlier;
- building façade lighting cannot be switched on before sunset.

(b) Time change

Introduced in France in 1975 following the oil crisis of 1973-74, the **time change** is intended to allow energy savings by reducing lighting requirements. It mainly involves ensuring the optimum correspondence between hours of activity and hours of sunlight to limit the use of artificial lighting.

The time change allowed around 440 GWh of lighting to be saved in 2009, i.e. the consumption of approximately 800 000 households. Thanks to these savings, France has therefore avoided emitting 44 000 tonnes of CO₂. In 2030, the total reduction in emissions due to the time change could be 70 000 to 100 000 tonnes of CO₂.

6.5. Development of the energy efficiency services market

6.5.1. Method

In order to understand the energy efficiency services market as a whole and its diversity, at the end of 2013 the ADEME commissioned an initial study reviewing and analysing the energy and energy efficiency services market, based on interviews with various market operators (providers, customers, public authorities). This study was updated and supplemented in 2016, resulting in the following figures and conclusions⁶⁸.

The method used for the review and analysis of the French energy efficiency services market involved:

- a literature review;

⁶⁶ Decree No 2012-118 of 30 January 2012.

⁶⁷ Order of 25 January 2013 on the night-time lighting of non-residential buildings in order to limit light pollution and energy consumption.

⁶⁸ All the figures cited in this paragraph comes from this new ADEME/GALLILEO BUSINESS CONSULTING study: 'Etat des lieux et analyse du marché français des services d'efficacité énergétique' (Review and analysis of the French energy efficiency services market), 2016.

- qualitative interviews with 45 players from various segments of the demand (residential, tertiary, industrial, agriculture) and supply;
- a quantitative survey of 75 businesses offering energy and energy efficiency services in France, backed up by an analysis of complementary data (studies, activity reports, INSEE data including ESANE (Development of annual business statistics), DIANE and ORBIS business databases, Infogreffe, etc.);
- benchmarking with five countries (United States of America, United Kingdom, Netherlands, Germany and Ireland);
- workshops on the co-construction of recommendations to develop the energy efficiency services market.

In total, over 120 stakeholders in the energy efficiency services market were consulted between May and December 2016.

6.5.2. Summary of results

The energy and energy efficiency services market was estimated at EUR 13.5 billion in 2015, including energy supply:



Figure 11. French energy and energy efficiency services market (source: ADEME / GALLILEO 2016)

[Key to figure:]

Marché française des services énergétiques (fourniture incluse)	French energy services market (including energy supply)
13,5 Mds €	EUR 13.5 billion
Analyse du Patrimoine (SCEE)	Analysis of Assets (SCEE)
Étude Ingénierie (SCEE)	Studies and Engineering (SCEE)
Exploitation (FE + SE + SEE)	Operation (FE + SE + SEE)
dont 2,9 Mds € FE	of which EUR 2.9 billion FE
hors FE	excluding FE
Marché française des services énergétiques	French energy services market
SCEE : services contributeurs à l'efficacité énergétique	SCEE: services contributing to energy efficiency
SE : services énergétiques	SE: energy services
SEE : services d'efficacité énergétique	SEE: energy efficiency services
FE : fourniture d'énergie	FE: energy supply

If energy services and energy efficiency services only are taken into account (without including services contributing to energy efficiency and energy supply), this gives a market total of EUR 8.4 billion in 2015, compared to EUR 7.2 billion in 2013, as mentioned in the NEEAP 2014.

In 2015, the energy and energy efficiency services market (including supply) saw growth of 14.4 % compared to the 2013 value. Excluding energy supply, this growth exceeded 16 % (taking into account the broad scope of the analysis of assets, studies and engineering, and operation). The details are given in the summary of the study published on the ADEME's website.

Services associated with the analysis of assets:

This segment was estimated at EUR 403 million in 2015, up 11 % on 2013. This dynamic is largely due to growth in the pre-diagnosis and audit market (around 16 %). The growth in the certification and labelling assistance market must also be underlined: this segment was estimated at EUR 13 million in 2015, up 44 % on 2013. For construction operations such as renovation, certifications (NF HQE, BREEAM, LEED, etc.) and labels (EFFINERGIE+, BEPOS EFFINERGIE, etc.) have become a prerequisite: they are essential in order to be able to objectify and assess the performance of buildings. The growth in qualifications for businesses and professionals (RGE in particular) has created a dynamic in terms of recognising and ensuring visibility of the quality of the energy efficiency services offer.

Services associated with studies and engineering:

This segment was estimated at EUR 1.748 billion in 2015, up 14 % on 2013, in line with the overall dynamic in the market. Among the notable points, strong growth (41 %) in the technical inspection segment can be underlined, which is in line with the perception among providers that an increasing number of energy efficiency consultancy offices are emerging.

Services associated with installation, operation and maintenance:

The market in services associated with installation, operation and maintenance grew by 17 % over the 2013-2015 period and was estimated at EUR 8.442 billion in 2015 (excluding energy supply). This was mainly due to the **operation of collective boiler rooms**, which saw growth of 28 %: the market was estimated at EUR 5.091 billion in 2015 (including energy supply) and at EUR 3.818 billion excluding energy supply. This accounts for 45 % of the installation, operation and maintenance market and is therefore the most important segment.

6.6. Awareness-raising

Various information campaigns have been, and are continuing to be, conducted in order to raise awareness among the general public about energy efficiency, including:

- **Awareness-raising campaign on environmentally friendly practices 'Ensemble, économisons l'électricité'** (Together we can save electricity): in December 2016, the Ministry of the Environment launched with the ADEME, RTE and ENEDIS an information campaign on good practices to save electricity. This aimed to raise the awareness of the French public about practices allowing them to reduce their day-to-day electricity consumption, particularly during cold periods. Practical advice was available over the internet⁶⁹, supplemented by a radio spot.

A survey conducted among 1 000 people revealed that advice to moderate consumption during the cold snap was largely heard, and heeded by over half of the population (52 %). At work, 59 % of people took action to reduce their electricity consumption during the cold snap.

- The **Eco-Watt scheme** is also an important awareness-raising measure: it involves an alert system (by email, SMS, etc.) encouraging the reduction of electricity consumption, which has gradually been introduced since 2008 in those regions most threatened by electricity cuts during winter cold snaps (Brittany, Provence-Alpes-Côte d'Azur)⁷⁰.

⁶⁹ More information available via the following link: <http://www.developpement-durable.gouv.fr/Une-campagne-de-mobilisation.html>

⁷⁰ More details can be found at the following websites: <http://www.ecowatt-bretagne.fr/> and <http://www.ecowatt-provence-azur/>

In Brittany, a review published by Réseau de transport d'électricité⁷¹ at the start of the 9th edition (2016-2017) shows that 58 000 participants are now involved in this scheme and that over 190 commitment charters have been signed by private or public establishments. In Provence-Alpes-Côte d'Azur, over 26 000 participants are involved in the scheme, with 91 commitment charters having been signed⁷².

- **'L'énergie est notre avenir, économisons-la'** (energy is our future, let's save it) message: introduced by the Decree and Order of 28 November 2006, this slogan is mandatory for all advertisements by companies selling electricity, heating or cooling systems, solid, liquid or gaseous fuels, or services associated with the use of these forms of energy.
- The **'Particuliers et écocitoyens'**⁷³ (Private individuals and eco-citizens) pages of the ADEME website offer information and advice to private individuals on making their day-to-day lives more environmentally friendly. Structured around moments in the lives of French people, these pages provide very specific information and explanations that are accessible to everyone. Every week a topical report is published for users to read. These pages offer users a variety of tools, such as practical guides, videos, graphics and links to further information. The most visited sections are: 1) How to finance my project; 2) My home; 3) My waste.
- **Comparators** are also available to the public in order to help them identify the most energy efficient equipment (cars, household appliances, etc.), in similar fashion to the **'guide Topten'**⁷⁴ website: this guide is a WWF-France and CLCV (Consommation, Logement, Cadre de Vie – Consumption, housing and living environment consumer association) initiative. This purchase comparator, based on the Swiss model www.topten.ch, is funded by the ADEME and forms part of the Euro-Topten European network www.topten.info, which is itself funded by the European Commission. This website is currently expanding rapidly, particularly due to the 'Topten eco' label, which indicates the most energy efficient products that are cheaper than the average market price.

6.7. Electricity and gas supply

(a) Improvement of the quality of billing

Since Law No 2006-1537 of 7 December 2006 on the energy sector was adopted, the Consumer Code has contained a section on the electricity and natural gas sectors (Articles L.224-1 to L.224-16). The consumer protection provisions include the obligation for electricity and natural gas suppliers to ensure that at least one bill a year is based on the energy consumed (L.224-11).

Article L.224-12 stipulates that, if a bill is based on an estimated reading, the supplier's estimate must duly reflect the likely consumption.

The scope of this provision was reinforced by Article 202 of Law No 2015-992 of 17 August 2015 on the energy transition for green growth, which prohibits a supplier from billing for consumption more than 14 months before the last supplier or customer meter reading (except in the case of fraud or prevention of the meter reading).

In order to encourage consumers to reduce their consumption levels, the Order of 18 April 2012 requires suppliers to show on each bill the consumption history in kWh for a full year preceding the issue of the bill, thus allowing a comparison with the consumption in the previous year.

These billing obligations are also accompanied by provisions aiming to facilitate access by consumers to their consumption data. As a result, through the transposition of Directives 2009/72/EC and 2009/73/EC of 13 July 2009, the Law of 7 December 2010 has also given consumers the right to access their consumption data free of charge. The decree implementing this legislative measure is currently in the consultation phase and will take into account the provisions laid down by Article 10 of Directive 2012/27/EU of 25 October 2012 on energy efficiency.

⁷¹ More information available via the following links: <http://www.ecowatt-bretagne.fr/ecowatt-bretagne-9eme-edition-mesures-particulieres-cadre-dun-hiver-exceptionnel/> and <http://www.ecowatt-bretagne.fr/wp-content/uploads/2015/11/EcoWatt-BZH-CP-24112015.pdf>

⁷² <http://www.ecowatt-paca.fr/wp-content/uploads/2015/12/EcoWatt-PACA-Communique-de-Presse-Saison-6-.pdf>

⁷³ For more information, go to the website: www.ecocitoyens.ademe.fr

⁷⁴ For more information, go to the website: <http://www.guide-topten.com/>

Furthermore, Law No 2015-992 of 17 August 2015 on the energy transition for green growth (Article 28) introduced the obligation for energy suppliers to offer their customers in fuel poverty (in receipt of the energy voucher), free of charge, a remote display device showing their energy consumption. This obligation will apply from 2018, depending on the progress made in rolling out smart meters.

(b) Electricity: rollout of Linky meters

In July 2013 the Prime Minister announced the initial rollout by Enedis of 3 million smart electricity meters, known as Linky meters, by 2016. Furthermore, 35 million meters should have been rolled out by 2021. The invitation to tender for the first tranche was launched on 11 October 2013. By the beginning of 2017, over 3 million Linky meters had been installed. Enedis is aiming for the target of 8 million meters by the end of 2017.

The new meter will enable a more detailed understanding of the consumption profile of users (information on the load curve at 30-minute intervals) and will allow orders and information on consumption to be sent directly. Linky will therefore improve the quality of the service provided to consumers (billing based on actual consumption data, remote meter reading and maintenance operations, etc.). Users will therefore have access to better information on their consumption levels.

Lastly, the meter will improve and speed up diagnostics in the event of a malfunction in an electrical installation and, more generally, will optimise the management of electricity networks.

The rollout will be accompanied by clear and comprehensible information for every consumer (before, during and after installation) explaining the functions of the new meter and associated information devices and raising their awareness of consumption management issues.

In addition, pursuant to Article 28 of the Law on the energy transition, Decree No 2016-1618 of 29 November 2016 provides that households in fuel poverty will receive a remote display device for their consumption data.

(c) Gas: rollout of Gazpar meters

The Minister for the Economy and Finance and the Minister for Ecology, Sustainable Development and Energy confirmed in August 2013 their support in principle for the general rollout of the 'Gazpar' smart meter, which is a project developed by GrDF (Gaz Réseau Distribution France – French gas distribution network).

Smart meters are one of the first steps towards smart energy networks. Gazpar sends the meter readings via radio link so that a customer's actual consumption can be determined (consumption readings are sent twice a day). Its rollout will simplify billing as this will be directly based on actual consumption and it will no longer be necessary to use estimates.

These new meters will also facilitate energy savings and will help citizens to better manage their consumption. For example, alerts may be sent to customers when their consumption exceeds a certain threshold. More broadly, they will allow for the development of innovative diagnostic services and will facilitate the management of consumption.

This device will also improve the performance of system operators: reduction of direct purchase costs of meter data, reduction of complaints, better understanding of the meter stock.

The decision on the widespread rollout of smart gas meters by Gaz Réseau Distribution France (GrDF) was made on 23 September 2014 by the Minister for Ecology, Sustainable Development and Energy and the Minister for the Economy, Industry and Digital Technology⁷⁵.

Rollout is being preceded by a pilot phase, which started at the end of 2015 and which aims to install 170 000 meters in four areas (24 municipalities representative of the various situations encountered in terms of type of consumer and urban configuration): Hauts-de-Seine (municipalities of Nanterre, Puteaux and Rueil-Malmaison), Lyon Region (4th and 9th districts of Lyon, Caluire-et-Cuire), Le Havre and 18 municipalities in the Pays de Saint-Brieuc. The pilot phase of the rollout is intended to test the

⁷⁵ <https://www.legifrance.gouv.fr/eli/decision/2014/9/23/DEV.R1422501S/jo>

technical and organisational installation of the first meters in these areas. By January 2017, nearly 110 000 meters had been installed.

The Gazpar meter will continue to be rolled out over the next six years to all French regions. There will eventually be 11 million meters by 2022.

(d) Energy efficiency potentials of gas and electricity infrastructures

In accordance with Article 15 of the Energy Efficiency Directive, transposed in particular by Decree No 2015-1442 of 6 November 2015 on the assessment of the energy efficiency potentials of electricity networks and gas infrastructures, undertakings in charge of the transmission or distribution of electricity or gas have carried out work on their energy efficiency potentials.

In terms of gas, initial feedback seems to suggest that, as distribution networks are passive, aside from reducing leaks, the levers for action are limited.

(e) Demand-side management of electricity consumption leading to significant energy savings

The Law of 17 August 2015 on the energy transition for green growth introduces a specific mechanism for valuing the demand-side management of electricity consumption leading to significant energy savings. It also lays down the conditions for valuing the demand-side management of electricity consumption on electricity markets and through the adjustment mechanism.

Decree No 2016-1132 of 19 August 2016, which was adopted pursuant to this Law, therefore further details the conditions for valuing the demand-side management of electricity consumption on electricity markets and through the adjustment mechanism. Decree No 2017-437 of 29 March 2017 on the valuation of the demand-side management of electricity consumption leading to significant energy savings, itself also adopted pursuant to the Law, lays down the terms of the specific mechanism for valuing demand-side management leading to significant energy savings (categories, methods of calculating the energy savings rate, methods of validation and control by the public electricity transmission system operator, terms relating to the financial flows introduced by the mechanism in particular).

(f) Rural electrification and 'compte d'affectation spéciale: Financement des aides aux collectivités pour l'électrification rurale' (CAS FACÉ) (special purposes account: Financing of community aid for rural electrification)

Electricity distribution is subject to two distinct regimes: an urban regime and a rural electrification regime. Under the rural regime, the granting authorities, namely municipalities or their public institutions for cooperation (intermunicipal electrification associations), manage the development work on low-voltage networks, i.e. extension, reinforcement, safeguarding and aesthetic improvement work. This work is therefore financed by these authorities. The aim of the rural electrification aid is to offer financial aid to granting authorities that are undertaking this development work on electricity distribution networks within the territory of municipalities regarded as rural. This fund, created by the Finance Law of 31 December 1936, was converted into a special purposes account in 2012. It pays subsidies to those authorities managing rural electrification work. In particular, it can finance energy efficiency work through a special 'MDE' (electricity demand management) programme, which aims to finance electricity demand management measures that can avoid network reinforcements that would be more costly.

6.8. Generation and supply of heating and cooling

6.8.1. Map of the national territory in terms of heating and cooling demand and supply

Pursuant to Directive 2012/27/EU, a national map of demand and existing and potential supply points, as well as the evolution of demand for heating and cooling, has been produced.

The map, which is managed by CEREMA, can be consulted at http://carto.geo-ide.application.developpement-durable.gouv.fr/906/Carte_chaleur_nationale.map.

National maps for the residential, tertiary, industrial and agricultural sectors (excluding industrial and agricultural processes) have been published on the website <http://reseaux-chaleur.cerema.fr/carte-nationale-de-chaleur-france>. These show the heating and cooling requirements and the main existing, planned or potential heating and cooling facilities (planned or existing district heating networks, electrical power plants, waste-to-energy power plants or combined heat and power plants).

Among other purposes, these maps can be used as the basis for discussions on the development of renewable and recovered energy within a territory and help with the drafting of various planning documents (SCoT, PCAET, SRADDET, etc.). These data can also be used in studies carried out in order to produce masterplans for district heating networks. They offer a basic understanding of the heating and cooling demand in a territory so that the most appropriate areas for creating or extending a district heating or cooling network can be determined. Likewise, in the cost-benefit analysis of the ICPE scheme for the use of waste heat, industrialists can more easily determine the surrounding heating requirements that they could meet.

6.8.2. Assessment and cost-benefit analysis for the application of high-efficiency cogeneration and efficient district heating and cooling networks

The national assessment and cost-benefit analysis are based on the Multiannual energy programming (PPE) published on 27 October 2016, which analyses, based on scenarios and trends, the outlook for the evolution of electricity and heating demand and the development of cogeneration and efficient district heating networks. This assessment covers the entire territory and takes account of all the criteria (technical, economic, environmental, etc.). As regards cogeneration, the national cost-benefit analysis is also based on the report on the national potential for the application of high-efficiency cogeneration submitted to the Commission in 2011 pursuant to Directive 2004/8/EC on cogeneration.

The cost-benefit analysis conducted for each thermal electricity generation installation pursuant to Article 14(5) of Directive 2012/27/EU has led to regulatory measures being adopted: Decree No 2014-1363 of 14 November 2014 and the Order of 9 December 2014. These texts require a cost-benefit analysis to be conducted in order to assess the possibility of using industrial waste heat within a network. In practice, this obligation is imposed on all industrial installations over 20 MW generating waste heat and on energy generation installations over 20 MW within a district heating and cooling network (new projects or projects involving a major renovation). Exclusion criteria have been adopted in accordance with the Directive, depending on the distance, temperature and waste heat flow rate. The decision has been made to rely on the regime of facilities classified on environmental protection grounds.

6.8.3. Development of high-efficiency cogeneration and efficient district heating and cooling networks

With regard to efficient district heating and cooling networks, the targets of the Law on the energy transition for green growth are ambitious. On the one hand, they aim for the proportion of renewable energies in our final gross energy consumption to be 23 % by 2020 and 32 % by 2030. On the other hand, district heating and cooling networks are identified as an essential vector for the mass mobilisation of energy sources such as biomass, geothermal energy, heat recovery from waste-to-energy power plants or use of industrial waste heat. For this reason, the LTECV also aims to quintuple the quantity of renewable and recovered heat and cold supplied by district heating and cooling networks by 2030 (compared to 2012).

The support system for meeting these targets for efficient district heating and cooling networks involves several measures, including the following:

- Reduced rate of VAT on the supply of heating with a 50 % rate of renewable and recovered energy.

- Heating fund managed by the ADEME, which provides specific aid to networks that are or will be mainly powered by renewable and recovered energy. Renewable heating projects and district heating and cooling networks that apply for aid from the 'Fonds chaleur' (Heating fund) are examined at regional level and, depending on their importance, also at national level. This aid mechanism encourages a dynamic at all territorial levels, whilst also supplementing the aid provided by local and regional authorities or under the ERDF.
- Adjustment of the maximum consumption of new buildings under the Thermal Regulations if they are connected to a low greenhouse gas emitting district heating network.
- Classification of networks allowing the mandatory connection of new buildings or extensively renovated buildings to networks that are mainly powered by renewable or recovered energy.
- Local and regional authorities responsible for a public heating or cooling distribution service must produce a masterplan for their district heating or cooling network before 31 December 2018. This masterplan must help to achieve the objective of powering these networks by renewable and recovered energy. It includes an assessment of the quality of the service provided as well as possibilities for extending and increasing the density of this network and for connecting this network with other networks located nearby.

As regards natural gas cogeneration, the Multiannual energy programming (PPE) published at the end of 2016 does not set any development target, but does refer to eventual replacement with cogeneration installations powered by biomass or incorporation of biogas in existing units, whenever possible.

High-efficiency natural gas cogeneration installations within the meaning of Directive 2012/27/EU can benefit from the following support measures:

- an on-tap feed-in tariff, for installations under 300 kW;
- an additional on-tap remuneration, for installations under 1 MW;
- an additional remuneration granted following an invitation to tender procedure, for installations over 12 MW that constantly supply a heat customer with heat. Two invitations to tender are currently being prepared to support this type of installation, provided that they commit, in accordance with the PPE guidelines, to undertake a transition to either biomass or biogas.

Since the start of 2016, support for the generation of electricity through biomass cogeneration has been based solely on invitations to tender organised by the Commission de Régulation de l'Énergie (CRE) (Energy regulatory board):

- The first invitations to tender were launched between December 2003 and July 2010. The fifth invitation to tender was launched on 17 February 2016. It is open, for three years, to installations with an electrical output between 300 kW and 25 MW. Projects must in particular meet the EED's high energy efficiency criterion. Projects are selected according to the tariff proposed by applicants, and successful applicants receive a 20-year additional remuneration contract.
- These invitations to tender have enabled the development of installations with a total output of 380 MW at the end of 2016. Other operational installations were able to benefit from an on-tap feed-in tariff, which was abolished at the start of 2016.
- The launch of invitation to tender 'CRE 5' should help to achieve, at the rate of 50 MW per year, the targets set in the PPE, namely increasing from 400 MW installed at the end of 2015 to 540 MW at the end of 2018 and between 790 MW and 1 040 MW at the end of 2023.

6.9. Waste – Circular economy

Although waste management is not an economic sector that is directly identified in terms of final energy consumption, **waste prevention** may allow the energy consumption of all sectors associated with the production and sale of goods, and in particular industry and transport, to be reduced. It may

also allow energy consumption associated with the collection, sorting and processing of waste to be reduced.

The Framework Directive on waste management (Directive 2008/98/EC) established a waste hierarchy that all waste producers must observe: avoid producing waste (prevention); re-use; recycling; other forms of recovery, including energy recovery, and disposal.

To this end, numerous measures aimed at preventing the generation of waste have been implemented, including the following:

- The National waste prevention programme (*Programme national de prévention des déchets – PNP*) 2014-2020, published and notified to the European Commission in 2014, and reinforced since then by several provisions of Law No 2015-992 of 17 August 2015 on the energy transition for green growth (LTECV)⁷⁶ and by a Law focusing on the fight against food wastage⁷⁷, which forms the national strategic framework of the public waste prevention policy in France.

The PNP, which was developed with all stakeholders, defines the strategic guidelines of the public waste prevention policy and the sustainable production and consumption measures to be taken in order to prevent waste. The PNP's ambition is to gradually break the link between economic growth and waste generation, and it therefore represents a lever for implementing the energy and environmental transition. In fact, it is fully in line with the approach of the circular economy being a tool for the evolution of our economic model towards a sustainable model, not only in environmental terms but also economically and socially. One of the targets set is a 7 % reduction in the quantity of household and similar waste (HSW) produced per inhabitant in 2020 compared to 2010. This target has subsequently been increased by the LTECV to 10 %.

- Since 2012, all local and regional authorities responsible for the collection or processing of household and similar waste must adopt a **local programme for the prevention of household and similar waste (*programme local de prévention des déchets ménagers et assimilés – PLPDMA*)**. This programme sets waste quantity reduction targets and details the measures implemented to achieve these targets. On 1 January 2009, in order to help authorities meet this obligation in advance, the ADEME introduced a support scheme for the implementation of local voluntary prevention programmes. In 2014, 66 % of the French population was covered by a local prevention programme. To help new areas define and implement their PLPDMA, the Ministry of the Environment and the ADEME are finalising a new practical guide, which is based on the experience of the first authorities that voluntarily committed to the prevention measures and which sets out the waste prevention measures indicated in the PNP 2014-2020 and the LTECV.
- The LTECV requires local and regional authorities to make progress with rolling out incentive-based pricing, with a target of 15 million inhabitants covered in 2020 and 25 million in 2025. They can trial this in part of their area in order to facilitate its adoption.
- The **awareness-raising measures** of the Ministry of the Environment and the ADEME have been reinforced: an initial awareness-raising campaign aimed at the general public, entitled '*réduisons vite nos déchets, ça déborde*' (let's quickly reduce our waste), was launched in 2005 for a period of three years, with specific measures being taken as follows:
 - Scheme for refusing flyers: 9 million '*Stop Pub*' (Stop advertising) stickers were made available to local authorities via the ADEME.
 - End of disposable carrier bags: between 2002 and 2010, the number of free plastic bags in the retail trade dropped tenfold, in favour of re-usable and sustainable bags (carrier bags). Under the LTECV, single-use plastic carrier bags have been prohibited since 1 July 2016, and plastic bags other than carrier bags (referred to as 'fruit and vegetable' bags) have been prohibited since 1 January 2017, except where they are biosourced and compostable in domestic composting.

⁷⁶ <https://www.legifrance.gouv.fr/eli/loi/2015/8/17/DEVX1413992L/jo#JORFSCATA000031044389> / Title IV: COMBATING WASTAGE AND PROMOTING THE CIRCULAR ECONOMY: FROM THE DESIGN OF PRODUCTS TO THEIR RECYCLING, codified in particular in Article L.541-1 of the Environment Code.

⁷⁷ Law No 2016-138 of 11 February 2016 on the fight against food wastage:

<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000032036289&categorieLien=id>

A third '*Réduisons vite nos déchets, ça déborde*' campaign was launched in November 2013. This aims to support changes in behaviour in order to improve waste prevention and management. Aimed not only at private individuals, but also local and regional authorities and businesses, it promotes practices and actions that can reduce the generation of waste at source and in particular demonstrates to businesses that they can make savings by reducing their waste.

A new national campaign, focusing on the fight against food wastage, was launched in May 2016 with a slogan of '*Ça suffit le gâchis*' (That's enough waste)⁷⁸. Its aim is to involve consumers, businesses and authorities in the fight against food wastage and losses and restore the value of food. Since November 2016, the second phase of this campaign has been targeting businesses, particularly those in the agri-food, distribution, and commercial and institutional catering sectors. The campaign's aim is to encourage them to take action through specific examples of committed businesses that have saved financially by reducing their food waste.

In addition, since 2006, the '**Semaine de la Réduction des Déchets**' (Week for Waste Reduction) has been organised across France. In 2009, the Week for Waste Reduction 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 make the waste prevention and reduction policies of the European Union and Member States widely known (Directive 2008/98/EC of 19 November 2008). During the European Week for Waste Reduction 2016 (19 to 27 November 2016), 4 589 labelled actions were taken in France⁷⁹.

- With regard to businesses, the legislation on **facilities classified on environmental protection grounds (*installations classées pour la protection de l'environnement – ICPE*)** is one of the levers for applying the principle of waste prevention: impact studies required as part of applications for authorisation to operate these facilities must assess the volume and polluting nature of the waste generated by the facility, as well as the measures planned to eliminate, limit and compensate for the nuisance caused by the facility's operation, in particular in terms of disposing of operating waste.
- The **ecodesign** approaches taken in businesses are also an important lever in terms of taking into account the entire life cycle of a product and reducing, at source, the generation of waste and also the consumption of energy. These approaches are particularly encouraged by the waste prevention and management measures involving 'extended producer responsibility' (EPR)⁸⁰.
- Activities to **extend the life span** of manufactured products (repair, re-use) help to minimise the energy consumption needed to produce new goods. In addition, the development of new business models such as the service economy model (purchase of a use or service rather than actual purchase of a good) allows the intensity of use of materials, energy consumption and waste generated at all stages of the life cycle of products to be reduced.
- The **local management** of waste (for example: organic material, inert building waste, etc.) can generate important fuel savings thanks to the reduction or optimisation of waste collection routes. With regard to household waste, which local authorities are responsible for collecting, savings can be made by adapting the frequency of collections, which are on average still too high in France compared to our main European neighbours. Decree No 2016-288 of 10 March 2016 permits authorities to reduce the collection frequency where they introduce the separate collection of bio-waste. A range of collection route optimisation software and systems is also allowing the resources used to be adapted to the actual load factors.

Once waste generation has been reduced as far as possible, the cycle of the material contained in waste flows to be recycled or disposed of must continue to be optimised: this involves the recycling and energy recovery of residual waste.

Waste recycling allows a significant energy saving: recycling allows natural resources to be preserved by re-using the materials in waste, and energy consumption, greenhouse gas emissions and consumption of water linked to industrial production to be reduced. For example, the production of secondary aluminium consumes only 5 % of the energy needed to produce primary aluminium.

⁷⁸ <http://www.casuffitlegachis.fr/>

⁷⁹ <http://www.serademe.fr/bilan/bilan-2016>

⁸⁰ See Article L.541-10 et seq. of the Environment Code.

The recycling statement for France produced by the ADEME shows that, in 2014, 15 million tonnes of recycled material were incorporated in the production of 36 million tonnes of five materials (steel, non-ferrous metals, paper and cardboard, plastic, glass). This recycling has in particular allowed the following savings:

- 18.7 million tonnes of CO₂ equivalent, i.e. around 3.6 % of French annual gross emissions;
- 158 million m³ of water, i.e. around 2.9 % of the French annual net consumption.

In terms of energy savings, this study shows that, in 2014, waste recycling allowed around 100 TWh to be saved, i.e. around **8.6 Mtoe**⁸¹.

Lastly, the intensification of material recycling indirectly results in the generation of sorting residues or residues from industrial processes to prepare for recycling. Certain fractions are too small and too mixed to extract recyclable materials from them. As a result, the industrial sorting of packaging and paper, previously separated at source by households, generates around 15 % to 20 % of recycling rejects that must be disposed of. This type of waste can be used for heat recovery, with differing efficiencies in terms of energy generation. The search for energy efficiency can result in **solid recovered fuel** being obtained, which will then be used to replace fossil fuels (in the cement industry; as a source of power for urban district heating networks). Following the adoption of the LTECV, a regulatory framework specific to these fuels resulting from waste has been developed. The ADEME's waste fund started to finance two projects in 2016, following an invitation to tender launched at the start of 2016 on solid recovered fuel.

6.10. Carbon component within domestic consumption taxes on energy products

Domestic consumption taxes on energy products (*taxes intérieures de consommation sur les produits énergétiques* – TICPEs) apply to the consumption of energy products falling within the scope of Directive 2003/96/EC on the taxation of energy.

Article 32 of the Finance Law for 2014 incorporated, within this taxation, a carbon component that is progressive and proportionate to the CO₂ content of the products taxed. The carbon component was set at EUR 7/tCO₂ in 2014 (applying 'internally', i.e. without affecting the existing tax levels, except for products for which the tax amount is less than EUR 7/tCO₂) and then increased to EUR 14.5/tCO₂ in 2015 and EUR 22/tCO₂ in 2016. The Amending Finance Law for 2015 set its rate for 2017 (EUR 30.5/tCO₂). The increases already applied since 2014 have led to a total increase of 6.23 euro cents/l (excluding VAT) in the case of diesel and 5.38 euro cents/l (excluding VAT) in the case of petrol. This has led to the difference in the TICPE between the two fuels reducing by 0.85 euro cents/l (excluding VAT), bearing in mind that the harmonisation of the two taxes has also been ongoing since 2015.

Furthermore, the Law on the energy transition for green growth of 18 August 2015 defines the longer term path of the carbon component of the TICPE, by setting the rates of this component for 2018 (EUR 39/tCO₂), 2019 (EUR 47.5/tCO₂), 2020 (EUR 56/tCO₂) and 2030 (EUR 100/tCO₂).

The tax increase connected with this carbon component does not apply to energy-intensive businesses within the meaning of Article 17 of Directive 2003/96/EC that are subject to the EU ETS. The rate applied to energy-intensive installations has not changed since 2014.

In the transport sector, there are reduced TICPE rates for certain categories of professions and uses (mainly road freight transport). The carbon component is not incorporated in these reduced TICPE rates.

The impact of the carbon component in terms of reducing energy consumption is estimated at 1.9 Mtoe in 2020 and 2.8 Mtoe in 2030 (transport and building sectors)⁸².

⁸¹ Source: Bilan national du recyclage 2005-2014 (National recycling statement 2005-2014), November 2016.

⁸² See France's report under Article 13(1) of Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions, MEEM, 2017.

6.11. 'Programme d'Investissements d'Avenir (Investing for the future programme)

With an overall envelope of EUR 47 billion (plus a new tranche of EUR 10 billion laid down in the Finance Law for 2017, which is currently being launched), the Investing for the future programme should allow the financing of profitable assets and research and innovation infrastructures that are valuable for the economic development of France in four strategic areas: higher education and training, research, industrial sectors and SMEs, and sustainable development.

As at 31 December 2016, out of the EUR 47 billion initially allocated to the Investing for the future programme, EUR 40 billion had been committed, with EUR 27 billion of third-party co-financing (private businesses for two-thirds of this figure, public operators and local and regional authorities for the rest). Out of the EUR 10 billion specifically allocated to the energy and environmental transition, EUR 9.5 billion had been committed, with EUR 14.8 billion of co-financing. The ADEME's calls for projects have in particular enabled the issue of energy efficiency in the building, industrial, agricultural and mobility sectors to be targeted and hundreds of demonstration projects to be selected.

The funds for new energies have been allocated on the basis of two main programmes:

(a) Energy transition institutes (Instituts pour la transition énergétique – ITE), managed by the National research agency (ANR)

The 'Energy transition institutes' programme, which is part of the Investing for the future programme, aims to create world-class technological innovation campuses in the field of renewable energies, new energy technologies and energy efficiency.

This programme has an envelope of EUR 1 billion, financing up to 50 % of ITE activities. The operator of this measure on behalf of the State is the National research agency (ANR).

The ITE Efficacity (ITE specialising in the field of urban energy efficiency) and the ITE INEF4 (interdisciplinary platform in the field of carbon-free energies) are particularly involved in energy efficiency.

More specifically, **Efficacity** is an ITE dedicated to the energy transition of urban areas. It aims to help improve the energy efficiency of towns and cities, by developing technological innovations and tools (benchmarks, models, software, decision aids).

Its R&D projects are structured around three programmes:

- optimisation of the main components of the urban system at sub-district level (railway hub, city block);
- optimisation of the energy system at district level, by focusing on waste energy recovery, decentralised energy generation, storage and smart management of networks;
- development of a method for measuring the environmental and socioeconomic impacts of a project at urban level and proposal of innovative economic models to encourage investments contributing to the energy transition of towns and cities.

The ITE **INEF4** concerns research and innovation in the field of sustainable construction and renovation. Its strategic plan involves three main programmes:

- 'Concevoir' (Design), to design new methods and new multi-criteria tools that are more accurate and more accessible, encouraging a multidisciplinary approach to the circular economy;
- 'Réaliser' (Carry out), to carry out new construction and renovation work, integrating passive and active architecture and technical systems with new construction solutions with a low environmental impact (wood and other biosourced materials);

- 'Exploiter' (Operate), to operate buildings with new services and systems for maintaining comfort, air quality and energy management at various levels, from the building to the district, taking into account users' behaviour.

(b) Demonstrators and experimentation platforms

As part of the Investing for the future programme, the ADEME is tackling 21 issues organised into two main actions⁸³:

• Energy and environmental transition demonstrators

As an essential step in transforming, industrialising and marketing an eco-innovative idea, the demonstrator stage is always risky and requires major financing. With funding of EUR 2.1 billion, this action covers the following six areas: circular economy, renewable energies, energy efficiency, bio-based chemistry, sustainable building and, lastly, water and biodiversity. The three main aspects connected with energy efficiency are described below:

○ Carbon-free energies and green chemistry

This aspect aims to finance demonstrator and technological platform projects covering the areas of solar, wind and marine energy, geothermal energy, CO₂ capture, storage and recovery, bio-based chemistry, advanced biofuels, hydrogen and fuel cells, energy storage, and positive energy blocks and buildings.

○ Circular economy

This aspect aims to support research and demonstration projects on issues involving decontamination, ecodesign, and waste collection, sorting, recycling and recovery, as well as to support actions tackling the issues of water and biodiversity (since 2015).

○ Smart electricity networks

This aspect aims to finance research and demonstration projects on the integration of intermittent renewable energies (wind, solar, etc.) within electricity networks and on the development of smart products and services allowing improved management of electricity consumption.

• Vehicles and transport of the future

With funding of EUR 1.1 billion, this major energy transition programme is aiming to speed up not only the innovation and industrialisation of new solutions and technologies and the shift to more efficient uses of land and sea mobility, but also the emergence of new carbon-free energy distribution infrastructures dedicated to mobility, including smart roads.

This programme aims to finance demonstrator projects involving innovative and sustainable transport technologies and solutions (industrialisation of new solutions and technologies, support for the shift to more efficient uses of mobility, emergence of new carbon-free energy distribution infrastructures dedicated to mobility, etc.).

By the end of 2015, the Investing for the future programme had, since its launch, supported 21 calls for projects, including six IPMEs (see box below) through the ADEME, and 349 projects involving over EUR 1 billion in state aid, all programmes combined, with nearly EUR 500 million in the form of capital (on behalf of the State through the ADEME or through the Ecotechnology fund).

'Initiatives PME' (SME initiatives)

Created as part of the Investing for the future programme in 2015, the 'Initiatives PME' (SME initiatives) arose from the need to better support and consolidate the innovation capacity of French

⁸³ For more information on the projects supported as part of the PIA: <http://www.ademe.fr/entreprises-monde-agricole/innover-developper/programme-dinvestissements-davenir-pia/projets-laureats>

small and medium-sized enterprises through a more flexible support mechanism responding to their constraints:

- an extremely quick financing decision (financing response in around six weeks);
- aid given in the form of a subsidy that can be up to EUR 200 000 (70 % of which can be paid on notification of the aid).

At the end of September 2016, the State announced support for 174 SMEs through the Investing for the future programme for the energy and environmental transition, with a total amount of EUR 32 million in aid.

As an extension to the SME initiative 'Performance énergétique dans le bâtiment et l'industrie' (Energy performance in building and industry) financed in 2016, the ADEME published in September 2016 the SME initiative 'Efficacité énergétique et économie de ressources dans le bâtiment, l'industrie et l'agriculture' (Energy efficiency and resource saving in building, industry and agriculture), with the aim of supporting research and development projects helping to speed up the development and marketing of innovative solutions in the areas of energy efficiency and resource saving in building, industry and agriculture.

GreenTech initiative

Following the assistance of '21 startups des Cleantech ambassadrices de la French Tech à la COP21' (21 Cleantech startups as ambassadors of French Tech at COP21), the ADEME also took part in 2015 in the GreenTech initiative (launched jointly by the Minister for the Environment, Energy and Sea, and the Minister for the Economy, Industry and Digital Technology), which aims to support, as part of the PIA 'Démonstrateurs de la transition écologique et énergétique' (Energy and environmental transition demonstrators), the projects of French startups (pre-seed phase) in the area of digital technology applied to the energy and environmental transition.

Out of 51 successful applications, five concern the issue of 'energy savings':

- ENERDIGIT: system for managing electrical flexibility for energy-intensive manufacturers involved in demand-side management actions.
- ILEK: platform for matching up local renewable electricity supply and demand.
- BIMBIAG: computer tool for collecting and processing energy audit data on mobile terminals.
- AIR ADAPT: multi-sensor system allowing the heating requirements of tertiary premises to be adjusted according to the ambient temperature, radiant temperature, CO₂ rate, humidity and clothing worn by occupants (result of a study on the number of insulating layers worn according to weather conditions).
- LUKO: low-cost plug-and-play Home Energy Management solution. A sensor is attached to the meter using double-sided tape and sends consumption information by radio link to a relay plugged into a socket, which communicates wirelessly with the house's internet router. The consumption information of various household appliances can be viewed on a smartphone.

IV. ANNEXES

ANNEX 1: Abbreviations and acronyms

- ADEME: Agence de l'environnement et de la maîtrise de l'énergie (Environment and energy management agency)
- CEI: 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
- PEB: Positive energy building
- CEE: Certificats d'économies d'énergie (Energy savings certificates)
- CEREMA: Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement (Centre for the research and expert assessment of risks, environment, mobility and spatial planning)
- CITE: Crédit d'impôt transition énergétique (Energy transition tax credit)
- CPER: Contrats de Projets État R^{égions} (State-Regions project contracts)
- EED: Energy Efficiency Directive 2012/27/EU
- ESD: Directive 2006/32/EC on energy end-use efficiency and energy services
- ETS Directive: Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community
- DPE: Diagnostic de Performance Énergétique (Energy performance diagnosis)
- E+C-: 'Énergie positive et réduction Carbone' (Positive energy and low carbon) label
- RE: Renewable energy
- RRE: Renewable and recovered energy
- PAB: Public-access building
- ERDF: European Regional Development Fund
- GHG: Greenhouse gases
- ICPE: Installations classées pour la protection de l'environnement (Facilities classified on environmental protection grounds)
- ITE: Instituts pour la transition énergétique (Energy transition institutes)
- LTECV: Loi de transition énergétique pour la croissance verte (Law on the energy transition for green growth)
- MAAF: Ministry of Agriculture, Agri-Food and Forestry
- MEEM: Ministry of the Environment, Energy and Sea
- MLHD: Ministry of Housing and Sustainable Homes
- Mtoe: Million tonnes of oil equivalent
- OEET: Observatoire énergie-environnement des transports (Transport environment-energy observatory)
- ONPE: Observatoire de la précarité énergétique (Fuel poverty observatory)
- OPEN: Observatoire permanent de l'amélioration énergétique du logement (Permanent observatory for the energy improvement of housing)

HP: Heat pumps

PCAET: Plan climat-air-énergie territorial (Local climate-air-energy plan)

PLS: Prêt Logement Social (Social housing loan)

PLU: Plans Locaux d'Urbanisme (Local urban development plans)

NEEAP: National Energy Efficiency Action Plan

NWPP: National waste prevention programme

PPE: Programmation pluriannuelle de l'énergie (Multiannual energy programming)

PREBAT: Programme de recherche et d'expérimentation sur l'énergie dans les bâtiments (Research and experimentation programme on energy in buildings)

PREH: Plan de Rénovation Energétique de l'Habitat (Housing energy renovation plan)

PRIS: Point Rénovation Info Services (Renovation information service point)

PTZ: Prêt à Taux Zéro (Interest-free loan)

R&D: Research and development

RT: Réglementation Thermique (Thermal Regulations)

RTAA DOM: Réglementation Thermique, Acoustique et Aération applicable dans les Départements d'Outre-Mer (Thermal, acoustic and aeration regulations applicable in the French overseas departments)

ScoT: Schémas de Cohérence Territoriale (Territorial coherence schemes)

SEE: Services d'Efficacité Energétique (Energy efficiency services)

SME: Système de management de l'énergie (Energy management system)

SNBC: Stratégie nationale bas carbone (National low-carbon strategy)

SOeS: Service de l'Observation et des Statistiques (Observation and statistics office) of the MEEM

SRCAE: Schéma Régional Climat Air Energie (Regional climate-air-energy scheme)

SRADDET: Schémas régionaux d'aménagement, de développement durable et d'égalité des territoires (Regional schemes for spatial planning, sustainable development and equality between regions)

TEPCV: Territoire à énergie positive pour la croissance verte (Positive energy territory for green growth)

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

TURPE: Tarif d'Utilisation des Réseaux Publics d'Electricité (Public electricity networks access tariff)

VAT: Value added tax

UIOM - UVE: Unité d'incinération d'ordures ménagères - unité de valorisation énergétique (Waste-to-energy power plant)

ANNEX 2: Bibliography

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- Report from the Commission to the European Parliament and the Council (COM(2017) 56 final): 2016 assessment of the progress made by Member States in 2014 towards the national energy efficiency targets for 2020 and towards the implementation of the Energy Efficiency Directive 2012/27/EU as required by Article 24(3) of the Energy Efficiency Directive 2012/27/EU, February 2017:

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ANNEX 3: Annual report

- Statistical data linked to energy consumption

The following tables summarise the statistical data to be provided for the year 2015 pursuant to Article 24 of Directive 2012/27/EU.

Statistical data on energy consumption (in Mtoe):

Consumption in Mtoe	Year		
	2013	2014	2015
Actual primary energy consumption (all uses, not corrected for climate variations)	259.6	249.6	253.4
Gross primary energy consumption (excluding non-energy consumption, not corrected for climate variations)	246.17	235.61	240.4
Final gross energy consumption (not corrected for climate variations)	153.17	143.00	145.9
<u>Final energy consumption by sector</u> (corrected for climate variations):			
- Residential	45.6	44.6	45.0
- Tertiary	22.2	22.2	21.9
- Transport	48.7	48.9	49.4
- Industry	29.1	28.8	28.4
- Agriculture	4.6	4.5	4.5
<i>Total final energy consumption by sector</i>	<i>150.6</i>	<i>149.3</i>	<i>149.2</i>

Source: SOeS

The changes in the figures not corrected for climate variations are in line with the conditions experienced: 2013 was the harshest year, followed by 2015, whereas 2014 was the mildest year.

Corrected for climate variations, the final energy consumption has constantly fallen. It stagnated in 2015, with an increase in consumption in the two main sectors: residential (+0.9 %) and transport (+1.0 %). Only energy consumption in the transport sector has increased over two consecutive years.

The energy statement published in November 2016 describes in more detail the changes in energy consumption in these sectors, allowing the reasons for this increase to be better understood:

- In the residential sector:

In 2015 the energy consumption corrected for climate variations of the residential and tertiary sectors stabilised at 67 Mtoe (+0.3 %). The consumption of the tertiary sector (-1.0 %) moved in the opposite direction to the residential sector (+0.9 %). This stagnation came after the reduction in 2014 (-1.5 %), which was more significant in the residential sector (-2.2 %) than in the tertiary sector (-0.1 %). Following a steady increase up to the 2000s and a peak of 68.7 Mtoe in 2008, consumption was relatively stable for a long period.

The increase in consumption recorded in 2015 was mainly due to electricity, which accounted for 38 % of the sector's final energy consumption. The residential-tertiary sector as a whole therefore recorded an increase in electricity consumption in 2015 (+1.6 %), which was more marked in the residential sector (+2.0 %) than in the tertiary sector (+1.1 %). These changes counterbalanced 2014, which saw a sharp reduction in electricity consumption in both sectors (-3.9 %).

Having risen steadily during the 2000s, by +2.5 % each year on average, the electricity consumption of the residential-tertiary sector has generally stagnated since 2010 (-0.3 % on average per year). This stabilisation is explained, among other aspects, by the fact that fewer new homes have been heated by electricity since the end of the 2000s, which has halted the rise in consumption in the residential sector.

Following an increase in 2014, the final consumption of oil products fell in 2015 (-2.9 %), which resumed the long-term trend of a regular decline since the end of the 1970s. This reduction was more pronounced in the tertiary sector (-3.6 %) than in the residential sector (-2.6 %).

The final consumption of natural gas stagnated in 2015, but with opposite trends in the two sectors: +1.6 % in the residential sector, offset by a significant decline in the tertiary sector (-4.2 %). Following a sustained rise since the early 1970s, at an annual rate of +6.0 % on average, the gas consumption of the residential-tertiary sector as a whole peaked in 2002 at 22.5 Mtoe. Since 2005, gas consumption has been on a downward trend, by -0.9 % on average per year.

The increase of +0.7 % for renewable thermal energy and waste in 2015 was more moderate than the rise of +3.6 % in 2014. This limited increase brought a halt to the significant rises seen in previous years of +4.2 % per year between 2007 and 2014. This can be partly explained by a reduction in sales of wood-burning appliances and an improvement in their energy efficiency, as these account for three-quarters of the sector's renewable energy consumption. Almost all the consumption (91 %) was concentrated in the residential sector and mainly involved wood and heat pumps.

The energy mixes of the two sectors are quite different: the proportion of electricity is much higher in the tertiary sector (56 %) than in the residential sector (30 %), due to its intensive use for office technology, information technology and air-conditioning.

Coal, which still accounted for 17 % of energy consumption in 1970, now forms a marginal part of the final consumption of the residential-tertiary sector. Oil consumption has fallen from 58 % in 1973 to 15 % in 2015, having lost its prominent place to gas and electricity as a result of the oil price shocks.

- In the transport sector:

In 2015, the final energy consumption of transport reached 49.4 Mtoe, which was significantly higher than 2014 (+1.0 %), after +0.7 % in 2013. These last two years marked a rebound on the trend seen in previous years. After a period of steep increase between 1985 and 2003 (+2.4 % a year on average), consumption then declined gradually, by -0.3 % a year on average between 2003 and 2013.

According to initial estimates made by the Service de l'observation et des statistiques (SOeS) (Observation and statistics service), inland goods transport, measured in tonne-kilometres, fell sharply in 2015 (-4.8 %) in the wake of road freight (-6.9 %), and despite a rise in rail freight (+5.6 %). Inland waterway freight, which accounts for 4 % of the total, shrank by 3.6 %, mainly due to the reduction in the transport of construction materials.

Transport in private vehicles, which accounts for around 80 % of passenger-kilometres, increased by +2.0 % within the national network. In Ile-de-France, public transport activity remained stable (+0.1 %), with a slight fall for the metro and Paris city and suburbs (RER RATP) networks (-0.7 %), which was likely a consequence of the attacks in January and November 2015. At national level, rail passenger transport was also stable (+0.2 %), with high-speed trains, which accounted for 72 % of the traffic in

2015, being slightly up (+0.6 %). Air traffic, measured by number of passengers, saw a sharp rise at French airports, driven by international traffic (+3.8 %).

Like its proportion of goods and passenger transport, road transport accounted for nearly 83 % of the transport sector's energy consumption in 2015, which has been stable for 10 years. Within the energy consumption of road transport, around 60 % was for passenger transport and 40 % for goods transport. Air transport accounted for 13 % of consumption in 2015, of which 87 % was for international air transport (international aviation bunkers) and 13 % for domestic air transport. Rail transport (including trains, metros and trams) accounted for only 2 % of the sector's energy consumption, well below its proportion of transport activity.

Oil-based fuels (petrol, diesel, LPG, jet fuel, excluding incorporated biofuels) are almost entirely used for road and air transport. Deliveries of these fuels increased by 1.0 % in 2015, therefore reaching a total of 45.4 Mtoe.

In 2015, deliveries of road diesel (excluding incorporated biodiesel) rose by 0.2 % and therefore accounted for over 70 % of all oil-based fuel deliveries in France. However, this proportion was slightly down in 2015, with a larger increase (+1.2 %) in deliveries of premium petrol (excluding incorporated bioethanol). This marks a notable turnaround compared to previous years (due in particular to the gradual alignment of tax rates), with the proportion of premium petrol in deliveries of oil-based fuels having fallen from 47 % in 1990 to 14 % in 2014.

At 6.9 Mtoe, sales of jet fuel increased sharply by 4.8 %, following a fall of 0.7 % in 2014 and in line with the increase in traffic. Deliveries of fuel to French ports for international maritime connections, referred to as international marine bunkers, fell by 10.5 % to 1.6 Mtoe. By convention, international marine bunkers are not taken into account in the national energy statement, unlike international aviation bunkers.

The consumption of incorporated biofuels (renewable thermal energy) in oil-based fuels rose by 1.4 % in 2015, to 3.0 Mtoe, which marked a slowdown in growth compared to the trends in previous years. Biodiesel accounts for 86 % of biofuel consumption compared to 14 % for bioethanol and biopetrol.

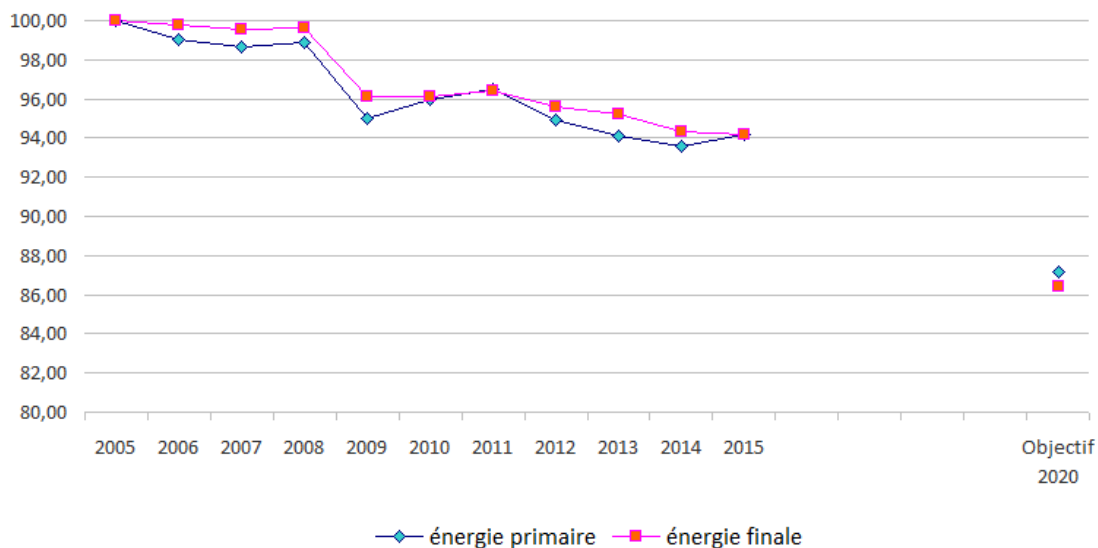
The consumption of electricity grew by 2.1 %, driven by rail transport. In 2015, transport consumed 0.9 Mtoe of electricity.

Natural gas consumption increased by 3.0 %. As of 1 January 2016, over 2 500 buses and coaches were powered by natural gas in France. However, at under 0.1 Mtoe, the consumption of natural gas in transport remains negligible compared to other energy sources.

Overall, the energy mix in the transport sector remained stable in 2015: 92 % for oil products, 6 % for renewable energies (biofuels) and 2 % for electricity.

Changes in energy consumption, in the context of the targets set in Article 3 of the Directive:

Pursuant to Article 3 of Directive 2012/27/EU on energy efficiency, France has set itself the dual target of reducing its energy consumption to 131.4 Mtoe of final energy and 219.9 Mtoe of primary energy by 2020 (excluding international air transport and non-energy uses). Excluding non-energy uses and international aviation, energy consumption in France in 2015, corrected for climate variations, was 237.7 Mtoe of primary energy and 143.2 Mtoe of final energy. The following graph shows the progress made towards achieving these targets (data corrected for climate variations):



[Key to figure:]

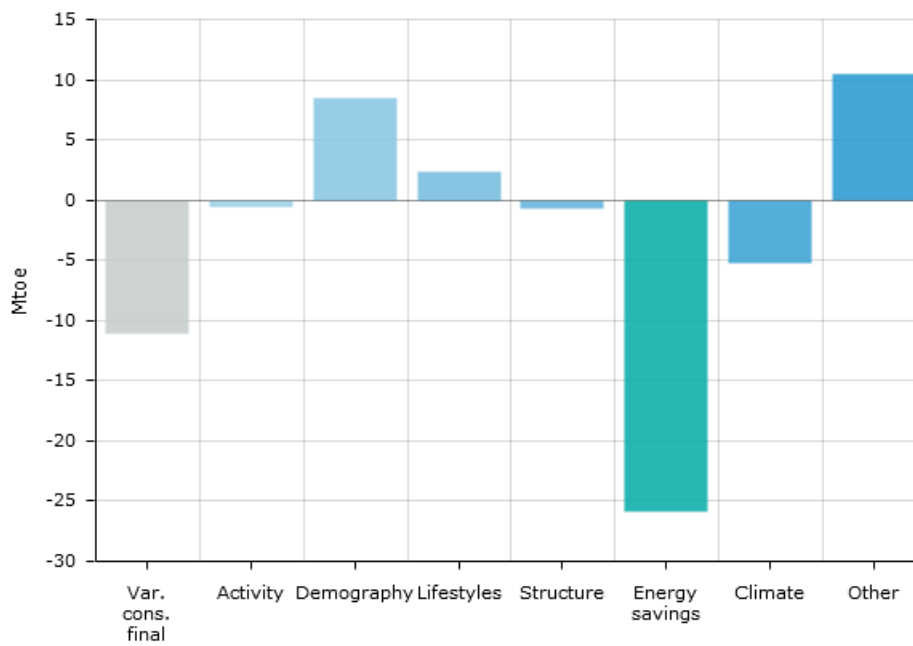
Objectif 2020	2020 Target
énergie primaire	primary energy
énergie finale	final energy

The 2020 target is highly ambitious and can be achieved only if there is a very rapid rise in committed or new measures.

Furthermore, the following graph, produced by the Odyssee-Mure project, breaks down the changes in final energy consumption in France between 2000 and 2014, and shows the significant progress made in terms of energy efficiency over this period:

Changes in final energy consumption between 2000 and 2014 (in Mtoe)⁸⁴

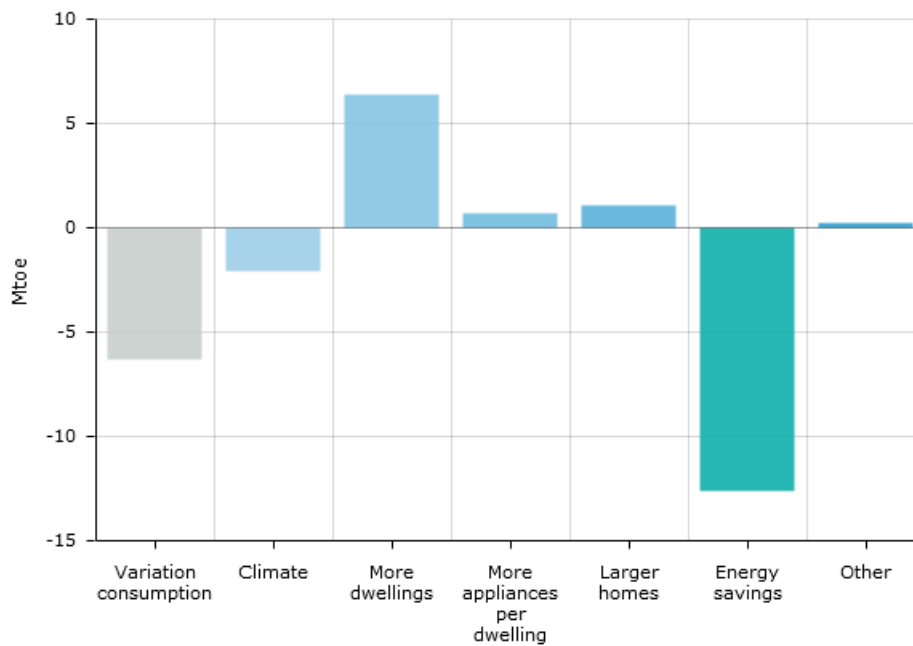
Variation final energy consumption - France - Mtoe (2000-2014)



The Odyssee-Mure project also sheds light on the long-term dynamics at play in the residential and transport sectors, in which energy consumption rose in 2015:

- Residential sector:

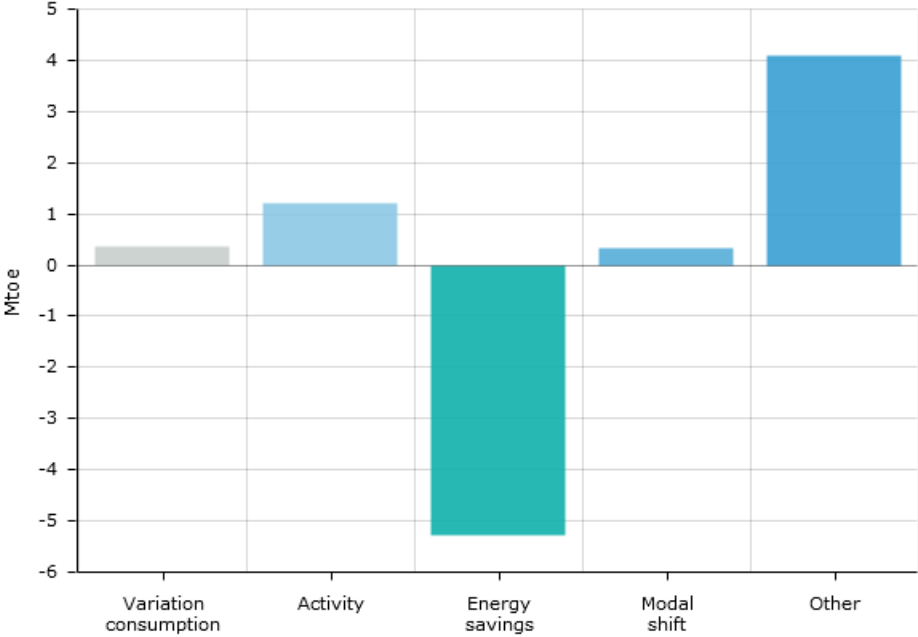
Variation households consumption - France - Mtoe (2000-2014)



⁸⁴ Source: Odyssee, 2016

- Transport sector:

Variation transport consumption - France - Mtoe (2000-2014)



Other indicators required by the Directive:

Statistics on heat and electricity generation (in Mtoe):

	2013	2014	2015	Source
Gross electricity production by thermal power plants	40.9	40.5	41.3	SOeS / Eurostat
Heat production by thermal power plants	3.3	2.9	3.2	SOeS / Eurostat
Fuel consumption by thermal power plants	124.5	123.7	125.5	SOeS / Eurostat
Gross electricity production by cogeneration	1.4	1.3	1.4	SOeS / Eurostat
Gross heat production by cogeneration plants, including industrial heat recovery	1.9	1.7	1.9	SOeS / Eurostat
Fuel consumption by cogeneration plants	4.5	4.2	4.7	SOeS
Heat production from district heating plants of which heat delivered	1.4 1.2	1.2 1.0	1.3 1.1	SOeS / Eurostat SOeS
Fuel consumption by district heating plants of which fuel consumption by district heating plants for heat production	1.8 1.4	1.6 1.3	1.7 1.3	SOeS / Eurostat SOeS
Losses from transport and energy distribution (all fuels)	3.8	3.6	3.7	SOeS / Eurostat

Financial statistics

	2013	2014	2015	Source
Gross value added for industry ⁸⁵ (in EUR billion 2010)	254.4	253.4	259.5	INSEE
Gross value added for services (in EUR billion 2010)	1 472.4	1 487.3	1 507.0	INSEE
Disposable household income (in EUR billion)	1 321.9	1 332.8	1 352.0	INSEE
Number of households (in thousands)	28 687	28 912	29 123	INSEE
Population (in thousands)	65 525	66 021	66 318	INSEE
Gross domestic product (in EUR billion 2010)	2 055.5	2 068.6	2 095.0	INSEE
Number of passenger-kilometres (in billions of pkm)	900.1	907.6	927.9	SOeS
Number of tonne-kilometres (in billions of tkm), excluding oil pipelines	332.2	329.0	323.1	SOeS

- Energy savings achieved pursuant to Article 7 of the EED

Pursuant to this article, France has set itself a target of 365 TWh, i.e. an annual target of 1.12 Mtoe in energy savings (revised data), to be achieved through the implementation of energy savings certificates in the main.

Measures implemented over the 2014-2015 period as part of the energy savings certificates scheme will allow combined energy savings of around 138 TWh to be achieved by 2020, i.e. 38 % of the energy savings to be made over the 2014-2020 period.

	Energy savings generated (TWh)							
	2014	2015	2016	2017	2018	2019	2020	Combined
CEE	18.27	14.03	13.49	12.87	12.30	11.39	10.46	92.80
		11.94	7.28	7.00	6.67	6.38	5.65	137.70

Actions initiated in 2015 will allow over 100 TWh of energy savings to be generated during their lifespan. Over the 2015-2020 period, this will result in nearly 45 TWh being saved.

In 2015 the volume of energy savings certificates issued corresponded to savings of 314.3 TWh cumac⁸⁶, of which at least 247 TWh can be taken into account under the Directive, i.e. 18.5 TWh a year, or around 1.59 Mtoe, based on an average lifespan of the actions implemented of 13.4 years⁸⁷.

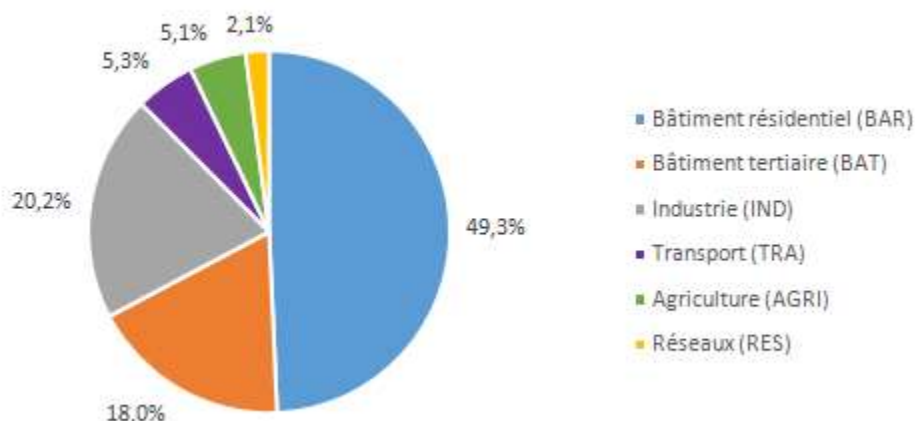
The CEEs issued between 1 January 2015 and 31 March 2017 for standard and specific operations (excluding fuel poverty) break down as follows between the sectors:

⁸⁵ Manufacturing industry, mining and quarrying, others.

⁸⁶ Source: National register of CEEs (www.emmy.fr).

⁸⁷ Average lifespan observed during the second period of the EEC scheme, in accordance with the notification of December 2013 in relation to Article 7.

CEE délivrés par secteur



[Key to figure:]

CEE délivrés par secteur	CEEs issued by sector
Bâtiment résidentiel (BAR)	Residential building (BAR)
Bâtiment tertiaire (BAT)	Tertiary building (BAT)
Industrie (IND)	Industry (IND)
Transport (TRA)	Transport (TRA)
Agriculture (AGRI)	Agriculture (AGRI)
Réseaux (RES)	Networks (RES)

- Energy savings achieved pursuant to Article 5

As described in more detail in Section 5.1.a, France made the following energy savings in 2013 and 2014:

Energy savings made	Final energy	Primary energy
In 2014 (compared to 2013)	580 GWh	780 GWh
In 2015 (compared to 2014)	1 380 GWh	1 840 GWh

- Measures implemented in 2016

The following main texts were adopted during 2016:

- Multiannual energy programming (Programmation pluriannuelle de l'énergie – PPE)
 - Decree No 2016-1098 of 11 August 2016 on the procedures for the assessment and simplified revision of the multiannual energy programming
 - Decree No 2016-1442 of 27 October 2016 on the multiannual energy programming
- Energy savings certificates (Certificats d'économies d'énergie – CEE)
 - Order of 8 February 2016 amending the Order of 4 September 2014 listing the information required in applications for energy savings certificates and the documents to be filed by applicants
 - Order of 8 February 2016 amending the Order of 29 December 2014 on the implementation procedures for the third period of the energy savings certificates scheme
 - Order of 8 February 2016 amending the Order of 22 December 2014 defining standard energy savings operations

- Order of 9 February 2016 validating the 'Objectif CO₂, les transporteurs s'engagent' (Road haulage operators commit to the CO₂ target) programme as part of the energy savings certificates scheme
- Order of 9 February 2016 validating the 'SMEn' (Energy management system) programme as part of the energy savings certificates scheme
- Order of 9 February 2016 validating the 'LED dans les TEPCV' (LEDs in positive energy territories for green growth) programme as part of the energy savings certificates scheme
- Order of 4 March 2016 amending the Order of 22 December 2014 defining standard energy savings operations
- Order of 14 March 2016 validating the 'ADVENIR' programme as part of the energy savings certificates scheme
- Order of 2 June 2016 amending the Order of 22 December 2014 defining standard energy savings operations
- Order of 6 July 2016 validating the 'Toits d'abord' (Roofs first) programme to reduce the energy consumption of households in fuel poverty as part of the energy savings certificates scheme
- Order of 5 August 2016 validating the 'Expérimentation d'un passeport de rénovation énergétique dans les TEPCV avec pré-diagnostic en ligne' (Testing of an energy efficient renovation passport in positive energy territories for green growth with online pre-diagnosis) programme as part of the energy savings certificates scheme
- Order of 20 October 2016 amending the Order of 22 December 2014 defining standard energy savings operations (corrected)
- Order of 20 October 2016 amending the Order of 4 September 2014 listing the information required in applications for energy savings certificates and the documents to be filed by applicants
- Order of 9 November 2016 validating support programmes for energy savings in households in fuel poverty as part of the energy savings certificates scheme
- Order of 14 December 2016 amending the Order of 22 December 2014 defining standard energy savings operations
 - Energy transition tax credit (Crédit d'Impôt Transition Énergétique – CITE)
- Order of 17 February 2016 implementing Article 200 quater of the General Tax Code on the energy transition income tax credit
- Decree No 2016-235 of 1 March 2016 amending Article 46 AX of Annex III to the General Tax Code on the energy transition tax credit
- Finance Law for 2017 No 2016-1917 of 29 December 2016
 - Interest-free eco-loan (Eco-prêt à taux zéro – éco-PTZ)
- Decree No 2016-560 of 6 May 2016 on repayable interest-free advances to finance renovation work to improve the energy performance of older housing
- Decree No 2016-1072 of 3 August 2016 on offers of repayable advances without additional interest to finance renovation work to improve the energy performance of older housing
- Order of 3 August 2016 amending the Order of 30 March 2009 on the conditions for applying the provisions on repayable interest-free advances to finance renovation to improve the energy performance of older housing
- Order of 3 August 2016 amending the Order of 25 May 2011 on the application overseas of the provisions on repayable interest-free advances to finance renovation work to improve the energy performance of older housing
- Order of 8 August 2016 on the conditions for applying the provisions on repayable interest-free advances in respect of beneficiaries of aid for the fight against fuel poverty granted by the Anah
 - Individualisation of heating costs
- Decree No 2016-710 of 30 May 2016 on the individual determination of the quantity of heat consumed and the distribution of heating costs in multi-dwelling buildings

- Order of 30 May 2016 on the distribution of heating costs in multi-dwelling buildings
 - Work undertaken
- Decree No 2016-711 of 30 May 2016 on insulation work in the event of façade renovation, re-roofing or property development work in order to make properties habitable
 - Inspection of air-conditioning systems and reversible heat pumps
- Order of 15 December 2016 on the regular inspection of air-conditioning systems and reversible heat pumps with a cooling output of more than 12 kilowatts
- Order of 15 December 2016 defining the criteria for the skills certification of natural persons carrying out the regular inspection of air-conditioning systems and reversible heat pumps with a cooling output of more than 12 kilowatts, and the accreditation criteria for certification bodies
 - Guarantee fund for energy efficient renovation (Fonds de garantie rénovation énergétique)
- Decree No 2016-689 of 27 May 2016 on the conditions of eligibility for the guarantee fund for energy efficient renovation
- Decree No 2016-1097 of 11 August 2016 on the guarantee fund for energy efficient renovation
 - Energy voucher and remote displays for households in fuel poverty
- Decree No 2016-555 of 6 May 2016 on the energy voucher
- Order of 7 June 2016 on the evidence that the Services and payment agency (Agence de services et de paiement) can request from legal persons and bodies accepting energy vouchers under Article R.124-4(II) of the Energy Code
- Decree No 2016-1618 of 29 November 2016 on the offer, by electricity and natural gas suppliers, to provide consumption data, expressed in euros, through a remote device
 - Public sector
- Decree No 2016-412 of 7 April 2016 on taking account of energy performance in certain public contracts
- Decree No 2016-1821 of 21 December 2016 on positive energy and high environmental performance construction under the project management of the State, its public institutions or local and regional authorities
 - Local climate-air-energy plan
- Decree No 2016-849 of 28 June 2016 on the local climate-air-energy plan
- Order of 4 August 2016 on the local climate-air-energy plan
 - Plot ratio bonus
- Decree No 2016-856 of 28 June 2016 laying down the conditions to be met in order to exceed the permitted development rules laid down in Article L.151-28(3) of the Town Planning Code
- Order of 12 October 2016 on the conditions to be met in order to exceed the permitted development rules laid down in Article L.151-28(3) of the Town Planning Code
 - Businesses
- Decree No 2016-141 of 11 February 2016 on the electricity-intensive status and on the reduction in the public transmission network access tariff granted to high electricity-consuming sites
- Order of 20 May 2016 on the data to be provided and user categories for the computer platform provided for by Article L.233-1 of the Energy Code
 - Cogeneration
- Decree No 2016-682 of 27 May 2016 on the purchase obligation and additional remuneration provided for by Articles L.314-1 and L.314-18 of the Energy Code and supplementing the provisions of the same Code on invitations to tender and compensation for public electricity service charges
- Decree No 2016-691 of 28 May 2016 defining the lists and characteristics of the installations referred to in Articles L.314-1, L.314-2, L.314-18, L.314-19 and L.314-21 of the Energy Code

- Decree No 2016-944 of 11 July 2016 laying down various provisions adapting the Energy Code to European Union law on electricity generation from renewable sources or cogeneration
- Order of 20 July 2016 laying down the technical characteristics of high-efficiency cogeneration installations
- Order of 17 August 2016 adopted pursuant to Article L.311-13-6 of the Energy Code
- Order of 3 November 2016 laying down the conditions of purchase and of the additional remuneration for electricity generated by installations for the cogeneration of electricity and heat recovered from natural gas located within mainland metropolitan France and offering a particular level of energy efficiency
 - Demand-side management
- Decree No 2016-1132 of 19 August 2016 amending the provisions of the regulatory part of the Energy Code on the demand-side management of electricity consumption
 - Transport
- Decree No 2016-144 of 11 February 2016 on the payment of a bicycle kilometrage allowance by private employers
- Decree No 2016-179 of 22 February 2016 on the terms of application of the tax reduction for making available a fleet of bicycles provided for in Article 220 undecies A of the General Tax Code
- Decree No 2016-968 of 13 July 2016 on facilities for the recharging of electric or plug-in hybrid electric vehicles and on infrastructures allowing the parking of bicycles during the construction of new buildings
- Order of 13 July 2016 on the application of Articles R.111-14-2 to R.111-14-8 of the Construction and Housing Code
- Decree No 2016-1184 of 31 August 2016 introducing, on a trial basis, payment of the bicycle kilometrage allowance provided for in Article L.3261-3-1 of the Labour Code for journeys made by bicycle by officials from the ministries responsible for sustainable development and housing and their public institutions between their habitual residence and their place of work
- Order No 2015-1495 of 18 November 2015 on the creation of public utility easements for cable transport in urban environments
- Decree No 2016-1980 of 30 December 2016 on aid for the purchase or leasing of low-emission vehicles
- Order of 30 December 2016 amending the Order of 30 December 2014 on the procedures for managing aid for the purchase and leasing of low-emission vehicles
- Decree No 2016-565 of 10 May 2016 implementing Article 45 of Act No 2015-992 of 17 August 2015 on the energy transition for green growth
- Decree No 2016-858 of 29 June 2016 on air quality certificates
- Order of 29 June 2016 on the procedures for the issue and display of air quality certificates
- Order of 29 June 2016 setting the rate of the fee for the issue of the air quality certificate
 - Provision of data
- Decree No 2016-447 of 12 April 2016 on the provision of energy meter data by energy system operators to owners or managers of properties
- Decree No 2016-972 of 18 July 2016 on the confidentiality of information held by gas operators and by public electricity transmission or distribution system operators
- Decree No 2016-973 of 18 July 2016 on the provision to public authorities of data on the transmission, distribution and generation of electricity, natural gas and biomethane, oil products, and heating and cooling
- Order of 18 July 2016 laying down the procedures for submitting data on the transmission, distribution and generation of electricity, natural gas and biomethane, oil products, and heating and cooling

ANNEX 4: Assessment methods

(a) Air-energy-climate forecast scenarios: method used to estimate energy consumption by 2020

This section is intended to shed light on how the results presented in Section 2.2.3 on page 14 have been obtained.

Macroeconomic framework of the exercise

All the assumptions made are described in a summary report available via the following link: http://www.themavision.fr/upload/docs/application/pdf/2016-03/synthese_scenarios_2014-15_mis_en_ligne_2016-03-17_17-50-30_662.pdf

The following paragraphs set out the main assumptions of the macroeconomic framework.

Change in GDP

The change in the average annual growth rate (AAGR) of the gross domestic product (GDP) of European Union countries (except for France) is based on the European Commission's recommendations.

For France, the MEEM has used the following histories of the GDP AAGR, which are similar to those in the European Commission's recommendation (EU Reference Scenario 2013), which indicate an average AAGR of 1.7 % over the 2015-2035 period.

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035
TCAM du PIB	0.7%	1.6%	1.9%	1.7%	1.5%

Source : Commission européenne, DGEC, Seureco/Erasmus

[Key to figure:]

TCAM du PIB	GDP AAGR
Source : Commission européenne, DGEC, Seureco/Erasmus	Source: European Commission, DGEC (Directorate-General for Energy and Climate), SEURECO/ERASME

Demography

For this exercise, the latest update of the INSEE scenarios has been used. For the overseas departments, regions and collectivities, the data also come from INSEE (projections dating from 2010, historical data updated in 2014):

Milliers	2010	2015	2020	2025	2030	2035
France Métropolitaine	62 881	64 514	65 962	67 285	68 532	69 705
Réunion	821	860	905	945	983	1 016
Martinique	394	388	394	399	402	403
Guadeloupe	403	407	409	410	410	408
Guyane	229	267	313	364	419	478
Nouvelle Calédonie	249	265	287	310	334	359
Mayotte	203	233	275	324	382	451
Autres COM	292	310	346	386	430	480
Total France	65 472	67 244	68 891	70 423	71 892	73300

Source : INSEE, Projections de population à l'horizon 2060, Insee Première N° 1320 - octobre 2010

[Key to figure:]

Milliers	In thousands
France Métropolitaine	Metropolitan France
Réunion	Réunion
Martinique	Martinique
Guadeloupe	Guadeloupe
Guyane	French Guiana
Nouvelle Calédonie	New Caledonia
Mayotte	Mayotte
Autres COM	Other overseas collectivities
Total France	France Total
Source : INSEE, Projections de population à l'horizon 2060, Insee Première N° 1320 - octobre 2010	Source: INSEE, Projections de population à l'horizon 2060 (Population projections to 2060), Insee Première No 1320 - October 2010

Exchange rate

The projection exercise is based on the European Commission's recommendations for the 2014-2015 projections, i.e. a rate of 1.3 USD/EUR remaining constant over the entire modelling period 2015-2035.

The appreciation of the Chinese currency is set at 20 % by 2030 (i.e. 6.5 CNY/EUR from 2030) with a fixed exchange rate between countries in the euro area and those outside the euro area being taken into account.

International energy prices

The international prices used for the import of energies into Europe follow the European Commission's recommendation for the 2014-2015 scenario forecasting exercise. They are therefore similar to those used in the Commission's Impact Assessment publication of January 2014. These prices are based on the PROMETHEUS projections and common assumptions of the WEO 2012 (publication of the International Energy Agency). The international energy prices (outside Europe) are based on the New Policy scenario forecasts of the WEO of the International Energy Agency.

The end consumer price modelling considers that the taxation rate (excluding carbon tax and specific tax for modelling, for example, CEEs) remains constant over the projection. The variation in the end consumer price follows the variations in the import price.

		Prix d'import, UE					
		2010	2015	2020	2025	2030	2035
Pétrole (Brent)	C2010/bep constant*	60.0	77.0	88.5	89.2	93.1	95.9
Charbon (CIF ARA 6000)	C2010/bep constant*	16.0	15.0	(19.0-)22.6	(19.7-)23.7	(20.0-)24.0	(20.4-)25.5
Pétrole (Brent)	C2010/GJ constant*	9.3	11.9	13.7	13.8	14.4	14.8
Charbon (CIF ARA 6000)	C2010/GJ constant*	2.5	2.3	(2.9-)3.5	(3.0-)3.7	(3.1-)3.7	(3.2-)3.9
Gas (PCI, CIF moyen import UE)	C2010/bep*	37.9	50.0	61.5	58.9	64.5	65.7
Gas (PCI, CIF moyen import UE)	C2010/GJ*	5.9	7.7	9.5	9.1	10.0	10.2

Source : Commission européenne

		Prix d'import, \$2011					
		2011	2015	2020	2025	2030	2035
Gaz naturel Etats-Unis	mBtu	4.0	5.0	5.0	6.0	7.0	8.0
Gaz naturel Japon	mBtu	15.0	15.0	14.0	15.0	15.0	15.0
Imports OCDE charbon vapeur	tonne	123.0	109.0	112.0	113.0	114.0	115.0

Source : Agence Internationale de l'Énergie, WEO 2012 « New Policy Scenario »

[Key to figures:]

Prix d'import, UE	Import price, EU
Pétrole (Brent)	Oil (Brent)
Charbon (CIF ARA 6000)	Coal (CIF ARA 6000)
Gas (PCI, CIF moyen import UE)	Gas (PCI, CIF EU import average)
€2010/bep constant	€2010/boe constant
€2010/GJ constant	€2010/GJ constant
€2010/bep	€2010/boe
€2010/GJ	€2010/GJ
Source : Commission européenne	Source: European Commission
Prix d'import, \$2011	Import price, \$2011
Gaz naturel États-Unis	United States natural gas
Gaz naturel Japon	Japan natural gas
Imports OCDE charbon vapeur	OECD steam coal imports
mBtu	MBtu
Tonne	Tonne
Source : Agence Internationale de l'Énergie, WEO 2012 « New Policy Scenario »	Source: International Energy Agency, WEO 2012, New Policy Scenario

ETS and non-ETS carbon price

For the carbon prices in the ETS sectors, the price history of the reference scenario used by the European Commission in the impact assessment of the 2030 Framework for energy and climate from January 2014 has been used:

		2015	2020	2025	2030	2035
Prix carbone ETS	€2010/tCO₂ constant	7	10	14	35	57

Source : Commission européenne

[Key to figure:]

Prix carbone ETS	ETS carbon price
€2010/tCO ₂ constant	€2010/tCO ₂ constant
Source : Commission européenne	Source: European Commission

In each of the scenarios, the carbon tax introduced on 1 January 2014 has been used for the non-ETS sectors, with 2014, 2015 and 2016 rates corresponding to the framework defined in the Finance Law for 2014. Beyond 2016, the rate remains constant:

		2015	2020	2025	2030	2035
Prix carbone hors ETS	€2010/tCO₂ constant	14.5	22	22	22	22

Source : DGEC

[Key to figure:]

Prix carbone hors ETS	Non-ETS carbon price
€2010/tCO ₂ constant	€2010/tCO ₂ constant
Source : DGEC	Source: DGEC

After the scenarios were produced, the Law on the energy transition for green growth introduced the principle of an increase in the carbon component of the TICPE, with a target value of EUR 56 per tonne of CO₂ in 2020 and EUR 100 per tonne of CO₂ in 2030 (Article 1 of the Law).

		2015	2020	2025	2030	2035
Prix carbone hors ETS	€2015/tCO₂ constant	14,5	56	-	100	-

[Key to figure:]

Prix carbone hors ETS	Non-ETS carbon price
€2015/tCO ₂ constant	€2015/tCO ₂ constant

These values were used at the end of the exercise in a variant of the AMS2 scenario in order to assess the macroeconomic impact of the increase in the carbon component.

Sectoral value added in France

The sectoral projections of the AAGRs of the value added for a range of industries come from the NEMESIS model of SEURECO/ERASME, which is set to follow the aggregate value added path recommended by the European Commission.

TCAM valeurs ajoutées	2010-2015	2015-2020	2025-2020	2030-2025	2035-2030	2015-2035
Agriculture	0.7%	1.2%	1.4%	1.1%	0.9%	1.1%
Métaux primaires	1.5%	2.2%	2.6%	1.9%	1.6%	2.0%
Chimie	1.8%	2.1%	2.3%	1.8%	1.6%	1.9%
Minéraux non-métalliques	1.1%	2.6%	2.9%	2.4%	2.1%	2.2%
IAA	0.4%	1.2%	1.4%	1.0%	0.8%	1.0%
Équipement	1.7%	2.3%	2.7%	2.1%	1.9%	2.1%
Autres Industries	0.7%	1.4%	1.6%	1.2%	1.0%	1.2%
Énergie	-0.1%	1.5%	0.6%	0.4%	0.1%	0.5%
Mines	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Construction	0.2%	2.5%	2.8%	2.4%	2.1%	2.0%
Bureaux	0.5%	1.5%	1.9%	1.6%	1.5%	1.4%
Commerces	0.1%	1.3%	1.7%	1.4%	1.3%	1.2%
Santé	1.5%	1.4%	1.5%	1.5%	1.5%	1.5%
Autres services	1.2%	1.7%	1.9%	1.8%	1.7%	1.7%

Source : Commission Européenne, Seureco/Erasmé

[Key to figure:]

TCAM valeurs ajoutées	Value added AAGR
Agriculture	Agriculture
Métaux primaires	Primary metals
Chimie	Chemical
Minéraux non-métalliques	Non-metallic minerals
IAA	Agri-food
Équipement	Equipment
Autres industries	Other industries
Énergie	Energy
Mines	Mining
Construction	Construction
Bureaux	Offices
Commerces	Shops

Santé	Health
Autres services	Other services
Source : Commission Européenne, Seureco/Erasmus	Source: European Commission, SEURECO/ERASME

Allowances allocated free of charge in ETS sectors

As regards changes in the proportion of allowances allocated free of charge in ETS sectors, the DGEC makes the following assumptions, which apply to each of the scenarios:

- For the 2021-2035 period, continuation of the rate of reduction of the ETS ceiling defined for the 2013-2020 period.
- Among the sectors receiving allowances free of charge, there are two types, namely those on the list of exposed sectors and other sectors:
 - Continuation to 2035 of the current list of sectors exposed to a significant risk of carbon leakage after 2020.
 - Abolition of the allowances allocated free of charge to other sectors in 2027.
 - Cross-sectoral correction factor (for exposed sectors and other sectors) calculated on the basis of the continuation of the ratio defining the maximum proportion of allowances allocated free of charge over the 2013-2020 period (Article 10a(5) of Directive 2003/87/EC, i.e. around 50 %).

Implementation of the study and methodological approach

The study is managed by the DGEC, in collaboration with the Commissariat Général au Développement Durable (CGDD) (Commissariat-General for Sustainable Development) and the Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME) (Environment and energy management agency). The DGEC, the Service climat et efficacité énergétique (SCEE) (Climate and energy efficiency service) and the Département de lutte contre l'effet de serre (DLCES) (Department for the fight against the greenhouse effect) are responsible for technical coordination.

The projections and modelling work as well as the macroeconomic assessment are carried out by a group of service providers comprising:

- Enerdata: modelling, projection of the final energy demand using the Med-Pro and POLES models, costing of measures for the macroeconomic assessment carried out by Seureco;
- Énergies Demain: expert assessment and modelling of the building sector, support and assistance with, in particular, ensuring the coherence of the results with the equipment stock data resulting from the SceGES model used by the DGEC in its climate policy evaluation exercises;
- CITEPA: expert assessment and modelling of GHG emissions, air pollutants and non-energy emissions (agriculture, waste and LULUCF);
- ARMINES: expert assessment and modelling of fluorinated gas emissions;
- SEURECO/ERASME: support with the macroeconomic framework and assessment of the macroeconomic impacts of scenarios.

The Institut Français du Pétrole Energies Nouvelles (IFPEN) (French institute for oil and new energies) is also involved in the exercise: it produces the modelling for the refining sector. The ADEME is also involved in the macroeconomic modelling.

The energy demand projections made in this study are mainly based on modelling work carried out using two models in conjunction:

- The Med-Pro model is a techno-economic energy demand model of the 'bottom-up' type. It allows a thorough investigation of the final energy demand per sector, use and form of energy, while explicitly taking into account standard-based and regulatory policies and measures on energy efficiency and support for the direct use of renewable energies (RE).
- The POLES model allows comprehensive energy statements to be constructed that are consistent with the European and global context and that take explicit account of the economic instruments of public policy and the behaviour of those involved in energy supply.

The macroeconomic modelling is carried out using the NEMESIS model of SEURECO/ERASME (this model has particularly been used to produce the report on 'Les secteurs de la nouvelle croissance' (The new growth sectors) for the Centre d'Analyse Stratégique (CAS) (Strategic analysis centre)) and the ThreeME model of the ADEME.

The work on the energy, GHG emission and air pollutant projections is carried out jointly and in integrated fashion to ensure the maximum possible methodological consistency. The proposed projections extend from 2015 to 2035 in 'time steps' of five years and cover metropolitan France and the overseas departments, regions and collectivities. The projections for the overseas territories are, however, made in a different and less detailed manner from the projections for metropolitan France.

(b) Bottom-up assessments

The following measures (RT 2012, work undertaken, high-speed lines, improvement of the performance of new vehicles and TICPE) have been assessed as part of the RMS 2017. The method used is described in detail in this report submitted to the European Commission (France's report under Article 13(1) of Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions, MEEM, 2017).

The assessments of the CIDD/CITE, interest-free eco-loan, interest-free social housing loan and mobile test beds have not been updated since the NEEAP 2014.

(c) Top-down assessments

The energy efficiency indicator calculations pursuant to the ESD, which are based on the methods recommended by the European Commission, are detailed in the table entitled 'ESD savings calculation', submitted to the European Commission with this report.

ANNEX 5: Implementation of Article 7 of Directive 2012/27/EU through the energy savings certificates scheme

(1) Energy savings to be made over the period

Under Article 7(1) of Directive 2012/27/EU, France must make annual savings of 1.5 % of energy sales to end consumers compared to the average for 2010-2012. In order to calculate energy sales, the self-generation of electricity and of the renewable part of renewable thermal energy has been deducted from the non-climate-corrected final energy consumption.

In Mtoe	2010	2011	2012
Final energy consumption (not CCV*): total excluding bunkers (source: energy statement 2012)	159.41	148.67	153.47
Transport-related consumption (not CCV*): total excluding bunkers (source: energy statement 2012)	49.40	49.56	49.18
Estimate of actual energy consumption, including self-consumption	110.01	99.11	104.29
Electricity self-generation (source: generation survey)	0.94	0.77	0.76
Thermal renewable energy self-generation (solar, heat pump, wood energy)	4.29	3.63	4.32
Final actual energy consumption minus self-consumption	104.78	94.71	99.21
Average 2010-2012	99.56		

(*) Not CCV: not corrected for climate variations.

The annual target is therefore 1.493 Mtoe, i.e. a total 41.8 Mtoe over the entire 2014-2020 period.

During the second period of the energy savings certificates scheme (between 31 December 2010 and 31 December 2013), 295 TWh cumac of CEEs were granted for standard and specific operations. In view of the average updated life span of operations of 13.4 years, the 2011-2013 period will enable total savings of 176 TWh between 2011 and 2020, i.e. 15.1 Mtoe.

Taking into account operations carried out in the second period of the energy savings certificates scheme and excluding energy consumption in the sector subject to the ETS from the calculation basis, all within the limit of 25 % flexibility, this leads to an energy savings target for France under Article 7 of 31.36 Mtoe, i.e. 365 TWh, over the entire 2014-2020 period (which corresponds to an annual target of 1.12 Mtoe).

In the context of Article 7, France will mainly use the obligation on energy sellers to prove energy savings operations (energy savings certificates scheme).

The energy savings included under this measure are quantified in the annual report (see Annex 3).

(2) Energy savings certificates (*Certificats d'économies d'énergie – CEE*)

(a) Calculation of energy savings

Two ways to obtain CEEs

Standard operations sheets, defined by order, have been produced for the most common operations to facilitate the setting-up of energy saving measures. These are classed by sector (residential, tertiary, industrial, agricultural, transport, networks) and define the fixed amounts of energy savings in kWh_{cumac} and the life span of the operations. These operations correspond to 'expected savings' and are regularly updated. The list of standard operations sheets is available on the internet.

These standard operations sheets are produced by thematic expert groups managed by the Association Technique Energie Environnement (ATEE) (Energy environment technical association), which bring together all stakeholders. The sheets are then assessed by the ADEME and validated by the Ministry of Energy.

Energy savings made other than through standard operations can be valued through specific operations. These are uncommon operations that cannot be standardised, in particular as regards defining the fixed volume of CEEs to be issued. These involve 'estimated savings'.

The applicant must follow six steps for a specific operation:

1. Carry out an energy diagnosis.
2. Identify the situation before the operation.
3. Determine the reference situation and reason the choice made.
4. Determine the forecast situation after the operation, including theoretical before and after energy statements.
5. Justify the amount of certificates applied for and in particular the choice of life span of equipment.
6. Justify the return on investment time (RIT) calculation.

The ADEME and the Pôle national des certificats d'économies d'énergie (National centre for energy savings certificates) ensure the validity and veracity of the energy savings applied for.

Additionality of the scheme

In accordance with Section 2 of Chapter I of Title II of Book II of the Energy Code, the scheme respects two main principles in order to ensure its additionality:

1. Only measures that go further than the regulations in force at the beginning of the period can result in CEEs being issued.
2. The reference situation for calculating the fixed energy savings corresponds to the technical and economic state of the product or service market on the latest date for which data are available and incorporating the effect of regulatory changes (in particularly European Union regulations on the ecodesign of energy-related products). In the case of work to improve the thermal performance of the building envelope or integral heating systems of an existing building, the reference situation of the energy performance takes into account the general state of buildings of the same type and the level of performance of the materials or equipment used on the latest date for which data are available.

Where a person undertakes measures as part of a specific operation aimed at making energy savings, those measures may be taken into account for the issue of energy savings certificates only if the savings made take longer than a minimum return time (three years) to offset the cost of the investment.

Active and motivating role of obligated parties

When applying for certificates, obligated parties must prove that they have played an active and motivating role. In order to prove this, they must be able to produce, in the event of an inspection:

- a description of the applicant's active and motivating role;
- evidence that this contribution is direct and was made before the operation started;

- a sworn statement signed by the beneficiary of the energy savings operation confirming the applicant's active and motivating role in the performance of this operation.

Treatment of double counting

Where an operation is the subject of multiple applications, it gives rise to the issue of only one CEE at most. Applications are systematically checked in this respect.

(b) Monitoring, verification and inspection

Pôle national des certificats d'économies d'énergie (PNCEE) (National centre for energy savings certificates)

The Pôle national des certificats d'économies d'énergie is a national service attached to the Directorate-General for Energy and Climate. It is responsible for monitoring, verifying and inspecting energy savings certificates and in particular for:

- examining applications for energy savings certificates and issuing certificates;
- conducting inspections, recording infringements and ordering specific penalties for those infringements;
- managing and setting individual obligations;
- carrying out the administrative reconciliation at the end of each three-year period;
- ensuring communication and information on the scheme;
- informing prefects and decentralised services about actions in their areas.

Applications for energy savings certificates and inspection by the PNCEE

The list of evidence to be provided by the applicant in support of a CEE application is established and defined by the Order of 4 September 2014 listing the information required in applications for energy savings certificates and the documents to be filed by applicants.

Inspection of the scheme

The Pôle national des certificats d'économies d'énergie conducts frequent *a posteriori* inspections by sampling, which are accompanied by a broad range of penalties in the event of infringement, ranging from cancellation of the 'non-conforming' CEEs, through financial penalties or refusal of current applications, to loss of eligibility.

These inspections can be carried out before and up to six years after the CEEs are issued. The inspected sample includes all types of operators and sheets:

- all types of operators eligible for the scheme are represented in the sample (obligated parties, social housing providers, local authorities, semi-public companies, etc.);
- all standard operations sheets are represented in the sample.

The aim of the inspections is twofold:

- assess the 'overall' conformity of the measures undertaken by applicants in relation to the regulatory framework of the CEE scheme: contribution made to beneficiaries (active and motivating role), compliance with performance requirements for operations, etc.;
- target certain operations or types of operation that pose a greater risk of non-conformity.

Various infringements giving rise to penalties have been recorded, with feedback having been given on these to those involved in the CEE scheme: infringements in the process used by applications (active and motivating role, sworn statements, provisions of standard sheets), infringements in the implementation of standard sheets (terms of application, evidence of performance), other discrepancies (parameters, documents, work).

(c) References of laws and regulations

Articles L.221-1 to L.222-9 of the Energy Code define the energy savings certificates scheme.

The operational procedures for the third period of energy savings obligations are now codified in the regulatory part of the Energy Code (Articles R.221-1 to R.221-25 for the operation of the scheme, and Articles R.222-1 to R.222-12 for the administrative and criminal penalties), supplemented by orders, of which the main ones are:

- amended Order of 29 December 2014 on the implementation procedures for the third period ('Implementation procedures' Order);
- amended Order of 4 September 2014 listing the information required in applications for energy savings certificates and the documents to be filed by applicants ('Application dossier' Order);
- amended Order of 22 December 2014 defining standard energy savings operations ('Standard operations' Order).