



National action plan for the promotion of renewable energies

2009-2020

In accordance with Article 4 of European Union Directive 2009/28/EC



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1. SUMMARY OF NATIONAL RENEWABLE ENERGY POLICY

Since 2007, France has put in place an ambitious strategy for the development of renewable energies within its territory. A major national consultation, the "Grenelle Environment Forum", was held from July to November 2007 and led to the emergence of priority targets in terms of controlling energy consumption and promoting renewable energies. It brought together all interested parties (State, local authorities, employers, Trade Unions and associations) and has been unanimously recognised as a solid starting point for later decisions in terms of sustainable development in the territory.

Following this consultation, a working group met to establish a reference scenario to achieve the target of 23% of renewable energies in the total final energy consumption. The main determining factors in this scenario are, firstly, major efforts to control energy consumption, particularly in buildings where the scenario provides for a reduction of 38% in consumption by 2020, and, secondly, strong penetration by renewable energies with a targeted additional production of 20 megatonnes of oil equivalent (Mtoe) compared to 2006, or an approximate doubling in production of renewable energies by 2020.

Regarding the control of energy consumption, residential and tertiary buildings have been identified as the biggest sources. Around 40% of primary energy is consumed to heat or light these buildings. A large-scale thermal renovation project driven by various financial incentives is in progress. The scheme provides for the insulation of the entire building stock and the installation of several million heating devices and renewable energy production systems (heat pump, wood-fired heating, solar heating, photovoltaic).

Regarding medium and large scale facilities for renewable energy production, the choice has been made to consider all sources of renewable energy, in order to position France as a major actor in all production technologies. Various incentives and aid schemes have been established: financial aid for research and development projects, aid for the creation of industrial demonstrators, aid for the installation or purchase of equipment, soft loans, etc. France intends to position itself as the leader in technologies as diverse as wind power, maritime energies, solar photovoltaics and thermodynamic, the production of biogas units, etc.

From a socio-economic point of view, this means both developing industrial sectors of excellence and creating several hundred thousand jobs, particularly in the fields of building renovation and the installation of renewable energy production equipment. In terms of employment, the achievement of these targets implies accepting three major challenges, as is the case with the other sectors concerned by "green growth":

- support for the emergence of new trades or activities,
- support for the changes experienced by trades in certain sectors,
- orientation and qualification of labour towards developing sectors.

From a geopolitical viewpoint, while this energy policy has the aim of reducing national greenhouse gases, the search for greater security of supply and a reduced dependency on imports of fossil fuels is also a priority target. Through increased use of biofuels, the maintenance of nuclear power stations and the rise in renewable energies, the policy also aims to reduce dependency on fossil energies as much as possible. This reduction of dependency is a long term target, and 2020 only represents an intermediate stage..

Finally, France has chosen a reasoned and organised approach to the development of renewable energies. The development of renewable energies must be linked to other major problems:

- air pollution, with in particular strict regulation of those facilities using biomass in terms of particulate emissions;
- energy sector life expectancy, particularly those relating to material production or plant chemistry, which already use biomass or which intend to increase its use;
- landscape impact, particularly in terms of strict regulation governing the location of wind-turbines and a financial incentive in favour of photovoltaic installations integrated into buildings;
- land use conflicts, particularly regarding work on different agricultural uses of land and increased vigilance relating to the establishing of photovoltaic facilities and land-based wind-turbines, particularly in agricultural areas;
- architectural impact, particularly regarding an adaptation of the thermal requirements for buildings according to their architectural character.

While the targets for renewable energy production for 2020 were defined at national level, the establishment of production methods has largely been delegated to local level, with heavy involvement of the territory's local and regional authorities both to promote new technologies and to provide examples. The territory's local and regional authorities and decentralised services, particularly at regional level, are the main principals in terms of the construction of public buildings (colleges, schools, hospitals, etc.) and are responsible for implementing and monitoring compliance with local town planning regulations.

2. EXPECTED FINAL ENERGY CONSUMPTION: 2010-2020

Following the Grenelle Environment Forum, the working group drew up several scenarios, taking into account as appropriate efforts in terms of controlling energy demand and efforts to promote renewable energies. These scenarios have served as the basis for the definition in 2008 of the renewable energy development strategy with high environmental quality, and then for the creation of the Multi-annual Investment Programming for energy production (PPI), presented to Parliament in 2009.

This action plan includes to a large extent the targets confirmed in the PPIs. In particular, it includes:

- a so-called "reference" scenario which defines the trajectory that would have been followed from 2008 to 2020 if no measures in favour of energy efficiency and the development of renewable energies had been undertaken.
- an "increased energy efficiency" scenario, also called the "Grenelle scenario", which combines efforts in terms of energy efficiency and of penetration of renewable energies.
- The figures presented take account of the calculation methods specific to Directive 2009/28/EC and are therefore different from the energy scenarios and reports issued by the Observation and Statistics Office (SOeS) or in other national documents (Climate Plan, etc.).

Methodological details

The strategy for the development of renewable energies, which combines tariff provisions, regulations, incentives and communication campaigns, was defined and to a large extent put in place during 2008. This is why, contrary to the demands of the Directive, this action plan includes in the "increased energy efficiency" scenario, not a scenario that takes account of all of the measures adopted from 2009, but one which takes account of all of the measures adopted from 2008. To respect *sensu stricto* the demand of the European Commission would not make sense in the particular French case because it would mean excluding from the "increased energy efficiency" scenario the majority of the measures for the promotion of renewable energies.

Following the massive development of nuclear energy during the 1970s, France has a large proportion of housing electrically heated by Joule heating. No reliable statistics today distinguish accurately the share of electricity consumed to heat these homes from the share of electricity consumed for other uses (lighting, industrial processes etc.). The same applies to electricity consumption linked to cooling of buildings. As requested in the national action plan template provided by the European Commission, the electricity used to produce heat or cold is thus accounted for in the final energy consumption for the "electricity" sector, and not in that of the "heating and cooling" sector. The electricity consumed to run tramways, metros and trains, together with electric cars is, however, extracted from the "electricity" sector to be accounted for in the "transport" section.

Table 1: Estimated final gross energy consumption for France for heating and cooling, electricity and transport until 2020, taking into account the effects of measures in the fields of energy efficiency and energy savings from 2010 to 2020 (in ktoe)

	2005	2008		2010		2011		2012		2013		2014	
	Base year	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency
1. Heating and cooling	68 949	70 979	67 159	72 333	65 966	73 009	65 369	73 686	64 773	74 363	64 176	75 040	63 580
2. Electricity	45 317	46 554	45 636	47 378	45 849	47 790	45 955	48 202	46 062	48 615	46 168	49 027	46 275
3. Transport in accordance with Art. 3(4)a	45 080	52 300	45 412	53 100	45 700	53 500	45 300	53 900	45 000	54 300	44 700	54 700	44 300
4. Final gross energy consumption	166 689	176 803	165 177	179 877	164 349	181 423	163 400	182 970	162 553	184 518	161 704	186 064	160 758
5. Final consumption in the aviation sector	7 343	6 970	6 970	7 066	6 834	7 124	6 776	7 182	6 718	7 240	6 660	7 297	6 603
6. Reduction for the aviation limit Art.5 (6)	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL consumption after reduction for the aviation limit	166 689	176 803	165 177	179 877	164 349	181 423	163 400	182 970	162 553	184 518	161 704	186 064	160 758

	2015		2016		2017		2018		2019		2020	
	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency	Reference scenario	Increased energy efficiency
1. Heating - cooling	75 716	62 983	76 393	62 386	77 070	61 790	77 747	61 193	78 423	60 597	79 100	60 000
2. Electricity	49 439	46 381	49 851	46 487	50 263	46 594	50 676	46 700	51 088	46 807	51 500	46 913
3. Transport in accordance with Art. 3(4)a	55 100	44 000	55 500	43 700	55 900	43 400	56 300	43 000	56 700	42 800	57 500	42 100
4. Final gross energy consumption	187 610	159 909	189 157	159 060	190 704	158 213	192 252	157 264	193 798	156 517	195 745	155 268
5. Final consumption in the aviation	7 355	6 545	7 413	6 487	7 471	6 429	7 529	6 371	7 587	6 313	7 645	6 255
6. Reduction for the aviation limit Art.5 (6)	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL consumption after reduction for the aviation limit	187 610	159 909	189 157	159 060	190 704	158 213	192 252	157 264	193 798	156 517	195 745	155 268

Methodological note regarding transport

The expected gross energy consumption figures for the transport sector are based on the following hypotheses:

- Reduction in the consumption of fossil fuels between 2010 and 2020.
- Ligno-cellulosic biofuels present from 2017. However, the calculations have assumed that biofuels remain first generation to a large extent.
- The third row of the table only includes the consumption of petrol, diesel, biofuels and electricity consumed by road and rail transport. The electricity contribution produced from renewable energy sources for road transport has been multiplied by 2.5. This row does not take aviation into account.

The energy consumption in the aviation sector (row 4 of table 1) is less than the limit of 6.18%. There is therefore no reduction to apply.

The fifth row is not the total of rows 1 to 4. This row represents the final consumption in the aviation sector but does not take into account the multiplicative factor of 2.5 for the electrical energy of road transport.

3. RENEWABLE ENERGY TARGETS AND TRAJECTORIES

3.1. Overall French targets

France plans to meet the binding target imposed by Directive 2009/28/EC without resorting to the cooperation mechanisms permitting a part of the renewable energy production efforts to be made via another member country (statistical transfer or joint projects) or via a country that is not a member of the European Union (joint projects). However, France has reaffirmed its commitment in favour of the Mediterranean Solar Plan (MSP). This plan may lead it to put in place cooperation mechanisms (joint projects) with non-member Mediterranean rim countries. In this case, the contribution of additional renewable energies would permit France to exceed its target of 23% of energy produced from renewable resources in the gross final energy consumption in 2020.

The ten-year estimation being an exercise subject to numerous uncertainties, it is difficult to estimate to what extent France will be able to use the cooperation mechanisms in the context of the MSP. Therefore this national action plan does not fix a target superior to the 23% target imposed by Directive 2009/28/EC and does not take into account the contribution of renewable energies via one or more joint projects with Mediterranean rim countries.

Table 2: Overall French targets concerning the share of energy from renewable resources in the final gross energy consumption in 2005 and in 2020.

(A) Share of energy from renewable resources in the gross final energy consumption in 2005 (S 2005) (%)	9.6%
(B) Share of energy from renewable resources in the gross final energy consumption in 2020 (S2020)(%)	23%
(C) Expected total adjusted energy consumption in 2020 (from Table 1, last cell) (ktoe)	155 268
(D) Expected quantity of energy from renewable resources corresponding to the 2020 target (product B x C) (ktoe)	35 711

3.2. Sectoral targets and trajectories

In terms of effort, the main source of improvement is that of thermal performances of residential and tertiary buildings. The Grenelle Environment Forum provides for a reduction of 38% in consumption by housing by 2020. This considerable reduction in energy consumption is essential to achieve a significant share of renewable energy by 2020.

In terms of renewable energies, the 2020 target is an additional production of 20 Mtoe compared to 2006. All sources of renewable energy are to be mobilised.

Heating and cooling

The Multi-annual Investment Programming for heat production (heating PPI) for the period 2009-2020 provides for a significant increase in the production of heat from renewable resources; an increase that is associated with a reduction of nearly 19% in heating and cooling consumption between 2005 and 2020 (from 73.8 Mtoe to 60 Mtoe).

The heat production targets by sector are defined in the ministerial order of 15 December 2009 relating to the heating PPI. These are detailed in paragraph 5 of this plan. Heat produced from biomass in the residential, tertiary and industrial sectors is the main source of renewable

heat and the main contributor to the growth of the share of renewable heat in heat production, ahead of heat pumps, solar heating and geothermal energy (excluding heat pumps).

Pending agreement by the Commission and the Member States on an exact definition of renewable origin cold and its accounting, the cooling sector is only discussed qualitatively in this plan. The targets for renewable energy production in other sectors (heating, electricity and transport), will enable France to achieve the overall target of 23% of the share of energy produced from renewable resources in its gross final energy consumption in 2020.

Transport

In the transport sector, the two sources for the use of renewable energies are:

- Firstly, the increased use of biofuels with a consumption target of 10% of renewable energies by 2020, with biofuels making the largest contribution.
- Secondly the commissioning of electric vehicles, the electricity used resulting in part from renewable resources according to the evolution of the national electric mix. The target is to commission 450 000 electric vehicles by 2015 and 2 million electric vehicles in 2020. The corresponding annual consumptions of final electricity are of 1 TWh and 4 TWh respectively.

Electricity

France has a nuclear power and hydroelectric system that makes its electricity one of the lowest in greenhouse gas emissions in the world. However, the Multi-annual Investment Programming for electricity (electricity PPI) presented in 2009 contains a substantial increase in the share of renewable electricity produced in 2020 in order to cope with increased consumption and to position France as a leader in terms of renewable energies. Electricity is the only energy vector whose use should increase by 2020 (from 45.3 Mtoe in 2005 to 46.9 Mtoe in 2020), the main causes being the increase in electronic uses and the appearance of new uses such as electric cars and heat pumps.

Targets, detailed in paragraph 5 of this plan, have been defined for each production sector. Wind power and biomass are the two main additional sources identified, the main source remaining water power.

For emerging technologies such as solar power and maritime energy, significant efforts in research and development (R&D) are required to position France as a leader in these energies of the future whose potential will be fully exploitable from 2020. France thus chooses to diversify its energy mix to the maximum, and to include all technologies.

Table 3: French targets and estimated trajectory of energy from renewable resources in the heating and cooling, electricity and transport sectors.

	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RES- H&C ¹ (%)	13.6%	14.9%	17%	18%	19%	20.5%	22%	24%	25.5%	27.5%	29%	31%	33%
RES - E ² (%)	13.5%	14%	15.5%	16%	17%	18%	19%	20.5%	21.5%	23%	24%	25.5%	27%
RES - T ³ (%)	1.2%	5.6%	6.5%	6.9%	7.2%	7.5%	7.6%	7.7%	8.4%	8.8%	9.4%	10%	10.5%
Overall RES share (%)	9.6%	11.4%	12.5%	13.5%	14%	15%	16%	17%	18%	19.5%	20.5%	22%	23%
<i>Share resulting from cooperation mechanism (%)</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>Surplus for cooperation mechanism (%)</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Following part B of Annex I to the Directive				2011-2012		2013-2014		2015-2016		2017-2018			2020
Minimum trajectory of RES (%)				12.2%		13.5%		15.5%		18.3%			23%
Minimum trajectory of RES (ktoe)				20 441		22 196		25 926		29 707			35 617

¹ Share of energy produced from renewable resources in the heating and cooling sector: final gross energy consumption from renewable resources for heating and cooling (as defined in Article 5(1)b and (4) of Directive 2009/28/EC) divided by the final gross energy consumption for heating and cooling. Row (A) from Table 4a divided by row (1) of Table 1.

² Share of renewable energy sources in the gross final consumption of electricity produced from renewable energy sources (as defined in Articles 5(1)(a) and (3) of Directive 2009/28/EC) divided by the total gross final electricity consumption. Row (B) from Table 4a divided by row (2) of Table 1.

³ Share of energy produced from renewable resources in transport: share of final energy consumed in transport (as defined in Article 5(1)(c) and (5) of Directive 2009/28/EC) divided by the consumption in the transport sector of 1) petrol; 2) diesel; 3) biofuels used in road and rail transport and 4) electricity in land transport (cf. row 3 of Table 1). Row (J) from Table 4b divided by row (3) of Table 1.

Methodological notes

Table 3

From 2010, the percentages have been rounded to take into account the inherent uncertainty in any prospective exercise.

Tables 4a and 4b

Regarding the final gross electricity consumption produced from renewable resources (row (B) of Table 4a), the value is the total production of renewable electricity from Table 10a from which is subtracted the electricity produced by pumping. The share of renewable electricity used in transport is thus included.

The expected final gross energy consumption produced from renewable resources in the transport sector (row (C) of Table 4a) takes into account the share of renewable origin electricity used to power electric vehicles (trains, tramways, cars, etc.) and the gas produced from renewable energy sources and the biofuels that satisfy the sustainability criteria required by the Directive.

Row (H) only takes into account electricity of renewable origin used to power electric vehicles (trains, tramways, cars, etc.).

Row (I) does not take into account biofuels that do not meet the sustainability criteria required by the Directive.

Table 4a: Calculation table for the renewable energy contribution of each sector to the final energy consumption(ktoe)

	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
(A) Expected gross final RES consumption for heating and cooling	9 397	10 021	11 124	11 670	12 222	13 165	14 100	150 408	15 980	16 920	17 860	18 790	19 732
(B) Expected final gross electricity consumption produced from RES	6 118	6 407	7 073	7 386	7 791	8 297	8 836	9 407	10 008	10 641	11 306	12 002	12 729
(C) Expected final consumption of energy produced from RES in the transport sector.	544	2 564	2 898	2 992	3 112	3 121	3 150	3 215	3 387	3 561	3 745	3 927	4 062
(D) Expected total RES consumption ⁴	15 918	18 825	20 912	21 856	22 913	24 362	25 846	27 402	29 088	30 816	32 576	34 357	36 121
(E) Expected transfer of RES to other Member States	0	0	0	0	0	0	0	0	0	0	0	0	0
(F) Expected transfer of RES resulting from other Member States and from third countries	0	0	0	0	0	0	0	0	0	0	0	0	0
(G) Expected consumption of RES corrected for the target (D)-(E)+(F)	15 918	18 825	20 912	21 856	22 913	24 362	25 846	27 402	29 088	30 812	33 241	34 360	36 121

⁴ According to Article 5(1) of Directive 2009/28/EC, gas, electricity and hydrogen resulting from renewable energy sources are only taken into consideration once.

Table 4b: Calculation table for the share of renewable energy in transport (ktoe)

	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
(C) Expected consumption of RES in the transport sector ⁵	544	2 564	2 898	2 992	3 112	3 121	3 150	3 215	3 387	3 561	3 745	3 927	4 062
(H) Expected electricity consumption resulting from RES in the road transport sector ⁶	0	0	0	0	10	10	21	31	41	51	71	90	110
(I) Expected consumption of biofuels produced from wastes, residues, non-food cellulosic material or from ligno-cellulosic material in the transport sector. ⁷	0	0	50	120	120	200	200	200	200	200	200	200	200
(J) Expected contribution of RES to transport for the RES-T target $(C)+(2.5-1)\times(H)+(2-1)\times(I)$	544	2 564	2 948	3 112	3 247	3 336	3 382	3 372	3 649	3 838	4 052	4 262	4 427

⁵ Contains all RES used in transport, including electricity, hydrogen and gas produced from renewable energy sources and excluding biofuels that do not meet the sustainability criteria (Article 5(1), last sub-paragraph).

⁶ Actual values without using the multiplication factors.

⁷ Actual values without using the multiplication factors.

4. MEASURES FOR ACHIEVING THE TARGETS

4.1. Overview of all policies and measures to promote the use of energy from renewable resources

Table 5: Overview of all policies and measures

Name and reference of the measure	Type of measure	Expected results	Target group and/or activity	Existing or planned	Start and end dates of the measure
1. Modification of administrative process	Regulatory	Simplification for small renewable electricity or heating production projects; better environmental consideration for large projects (photovoltaics, wind power, biomass)	Individuals, Investors	Existing, modification in progress	Progressive since 2001 Creation of simplified ICPE regime in 2010
2. Sustainable Development Income tax credit	Financial	Increase in the number and quality of energy performance projects 3 million homes equipped with wood-fired heating, 2 million with heat pumps, 4 million with solar heating by 2020	Individuals	Existing	2005-20 12
			Individuals	Existing	1999
3. Reduced rate VAT (work on homes more than 2 years old): for renewable energy production equipment in the existing residential sector.	Financial	Increase in the number and quality of energy performance projects 3 million homes equipped with wood-fired heating, 2 million with heat pumps, 4 million with solar heating by 2020	Individuals	Existing	1 April 2009 - 31 December 2013 for the zero rate eco-loan
4. Zero rate eco-loan for work to improve the overall energy performance of homes	Financial				
5. ANAH aid	Financial	Increase in the number and quality of thermal renovations in small households	Individuals	Existing, increase in progress	2007-/-
6. Plan for the renovation of social housing and public buildings	Financial	Thermal renovation of all of these homes by 2020	Council housing managers, State, local and regional	In progress	2009- 2020

Name and reference of the measure	Type of measure	Expected results	Target group and/or activity	Existing or planned	Start and end dates of the measure
7. Energy Saving Certificates	Regulatory	Increase in the number of activities enabling energy savings or the production of renewable heating, in construction and industry	Energy suppliers	Existing	2005-/-
8. Thermal Regulation 2012	Regulatory	Reinforcement of thermal standards for new construction	Individuals, any actor in building and construction	Definition in progress	2011-2012 or 2013 depending on type of building
9. Energy Performance Diagnosis	Regulatory	Better information for the purchaser, occupant and visitors	Individuals, property companies	Existing	2007-/-
10. FAR bonus	Regulatory	Incentive for energy performance	Individuals	Existing	2005-/-
11. Qualification/certification programmes	Regulatory - non binding	Improvement of the quality of the buildings' thermal renovations and renewable energy production equipment	Construction professionals	Existing – to come	Reinforcement planned 2010 -2011
12. Energy Information Spaces	Information	Increase in the number and quality of thermal renovation projects 3 million homes equipped with wood-fired heating, 2 million with heat pumps, 4 million with solar heating by 2020	Individuals	Existing	2000-/-
13. ADEME Campaigns	Information	Awareness of global warming and thermal renovation	Individuals	Existing	2009-2010
14. Accelerated and exceptional depreciation	Financial	Increase in the number of projects and the installed capacity	Companies – all RE technologies	Existing	Start: 1992, 2002, 2005, 2008 depending on the technologies end: -
15. Regional Climate Air and Energy Plans	Planning	Identification and use of potential renewable energies	Local and regional authorities	To come	2010-2011
16. Heat Fund	Financial	Finance 5 400 ktoe of renewable origin heat production by 2020	Collective, tertiary and industrial sectors	Existing	First period from 2009 to 2011

Name and reference of the measure	Type of measure	Expected results	Target group and/or activity	Existing or planned	Start and end dates of the measure
17. Reduced rate VAT for district heating networks using more than 50% RE	Financial	3.2 Mtoe renewable heat by heating networks in 2020	Planners, investors – heating networks	Existing	2009-/-
18. Classification of district heating networks	Regulatory	3.2 Mtoe renewable heat from heating networks in 2020 + development of cooling networks	Planners, final users – heating networks	Existing, modification planned	1997-/-
19. Extension of the concession period (public service delegations)	Financial	3.2 Mtoe renewable heat from heating networks in 2020	Planners, investors – heating networks	Planned	2010-/-
20. Energy Performance Plan for Farms	Financial	Achieve a rate of 30% of farms with low energy dependency by 2013 + development of REs	Farms	Existing	2009-2013
21. Aid for the construction or redevelopment of commercial greenhouses and greenhouses in the ornamental and nursery horticulture sector	Financial	Development for REs for commercial greenhouses and greenhouses in the ornamental and nursery horticulture sector	Farms	Existing	
22. Support plan for waste policies	Financial	Support the development of methanisation in the treatment of waste (among others)	Farms	Existing	2008-/-
23. Tariffs for the purchase of electricity produced from renewable energy sources	Financial	Increase in the number of projects for the production of renewable electricity	Individuals, investors	Existing	2000-/- modified from 2006 to 2010 depending on the technologies
24. Negotiable certificates	Financial	Increase in the number of projects for the production of renewable electricity	Investors	Existing	Review of provision planned in 2010

Name and reference of the measure	Type of measure	Expected results	Target group and/or activity	Existing or planned	Start and end dates of the measure
25. Calls for projects for the production of renewable electricity	Financial	Increase in the installed capacity for the production of renewable electricity (wind power, offshore wind power, biomass, photovoltaic, maritime energies)	Investors	Existing for biomass and photovoltaic To come for offshore wind power Considered for maritime energies Annual periodicity for biomass and biogas	2005- 2020
26. ADEME demonstration funds	Financial	R&D stimulation	Investors, researchers	Existing	2009-2013
27. NRA	Grants	R&D stimulation	Researchers	Existing	2009-/-
28. Hubs of competitiveness	Grants	R&D stimulation	Public-Private-Partnership	Existing	2005-/-
29. General tax on polluting activities (TGAP)	Fiscal	Achievement of biofuel incorporation targets	Fuel distributors	Existing	2005-/-
30. Partial exoneration from the Domestic Consumption Tax (TIC)	Fiscal	Reduction of additional cost for manufacturing biofuels	Fuel producers	Existing	2002-/-
31. Renovation of river channels and port facilities	Infrastructures	Substitution of goods transport by road with non-road transport	Transport/distribution companies	Being developed	2010-/-
32. Construction of 2 000 km of railway	Infrastructures	Substitution of goods transport by road with rail transport	Companies for rail transport of passengers and goods	Being developed	2010-/-

Name and reference of the measure	Type of measure	Expected results	Target group and/or activity	Existing or planned	Start and end dates of the measure
33. Construction of automatic underground train ring route in the Ile de France	Infrastructures	Increase in public transport	Individuals	Being developed	2010-/-
34. Construction of 1500 km of reserved lane public transport outside the Ile de France	Infrastructures	Increase in public transport	Individuals	Being developed	2010-/-
35. Scrapping premium	Fiscal	Accelerated renewal of vehicle fleet	Individuals	Existing	2008-2010
36. Environmental bonus	Fiscal	Purchase of vehicles that consume less	Individuals	Existing	2010-/-

4.2. Specific measures to fulfil the requirements under Articles 13, 14, 16 and Articles 17 to 21 of Directive 2009/28/EC

4.2.1. Administrative procedures and spatial planning (Article 13(1) of Directive 2009/28/EC)

4.2.1.1. National measures

The authorisation procedures for energy production installations are drafted and applied at national level by the Ministry of Energy. The cases are mainly examined by the decentralised State services at departmental and regional level depending on the regulatory aspects considered. The authorisation procedures include aspects relating to:

- town planning with the application for planning permission or prior declaration of building work;
- electricity regulations . Any electricity production facility must be the subject of a notification according to the electricity regulations: prior declaration, or application for authorisation to operate if the power rating of the facility is greater than 4.5MW;
- the environment, under the regulations relating to the protection of the water resource or by the execution of environmental evaluations. Where necessary, this will involve the execution of impact studies, impact studies specific to the regulations on installations classified for the protection of the environment, or impact assessment for Natura 2000 sites;
- the regulations relating to mines in the case of geothermal energy.

These procedures, sometimes considered lengthy, ensure the compatibility of the projects with the other architectural, landscape and environmental requirements. However, as is described below, the procedures are proportionally adapted to the characteristics (size, installed power, environmental impact) of the renewable energy production facilities.

The Regional Directorates for the Environment, Land-use Planning and Housing (DREAL – regional levels of the Ministry of Ecology, Energy, Sustainable Development and Sea – MEEDDM) inform and accompany the project sponsors in the administrative process. The Internet site of the General Directorate for Energy and Climate (DGEC), and the Internet site of the Environment and Energy Management Agency (ADEME) describe the applicable administrative procedures, particularly in relation to domestic production methods. Finally, the Energy Information Spaces described in paragraph 4.2.4. are also required to provide project sponsors with the necessary information in terms of administrative procedures.

Procedures relating to territorial planning

Since the law of 12 July 2010 on the national commitment to the environment (also called the "Grenelle II law"), renewable energy development has been based on three strategic documents:

- **A regional plan for the climate, air and energy (SRCAE)**, developed jointly by the State and the regional authorities. In particular, this plan defines, for 2020 and by geographical area, qualitative and quantitative regional targets for the valorisation of potential territorial renewable energy, taking into account the national targets. In practice, this means identifying all sources for the production of renewable energies and of energy savings according to socio-economic and environmental criteria, and defining, in association with the local stakeholders (infra-regional authorities, companies, citizens), the level of regional contribution in achieving the targets set by France. These plans represent a strategic planning tool to guide the activities of local and regional authorities.

The Grenelle II law provides for a regional wind power plan to be appended to the regional climate, air and energy plan and for it to define the parts of the territory suitable for the development of wind power. It provides that the wind power development zones which will be created or modified following the publication of these regional wind power plans should be situated within the parts of the regional territory identified as suitable. Failing the publication of such a plan in a region before 30 June 2012, the regional prefect will draw up the draft plan and adopt it before 30 September 2012.

- **Territorial climate and energy plans**, drawn up by the territorial authorities at all territorial levels. These plans are mandatory for communities of more than 50 000 inhabitants. They link to regional climate, air and energy plans and collect together the operational measures defined in the context of the plan guidelines. These measures include all activities relating to the management of energy and to the development of renewable energies. The planning documents (local town planning and urban master planning (SCOT)) should then take into account these climate and energy plans.
- **A regional plan for the connection of renewable energies to the grid**, which will enable anticipation of reinforcements required to the electricity networks in order to receive all renewable electricity production.
- In addition, and for territories specific to national concerns, the Grenelle II law provides for the development by the State of spatial planning and sustainable development directives (DTADD) that will include targets and guidance, particularly relating to energy performance.

Procedures relating to planning law

Planning permission is an authorisation linked to town planning rules and applicable to constructions or works modifying land use or existing constructions. In the case of facilities for the production, transport, distribution or storage of energy, the construction or modification of a building is subject to planning permission, which is granted by the mayor ("municipality" jurisdiction planning permission), except for energy production facilities which are not mainly intended for the applicant; in this case the planning permission is granted by the prefect of the department (Article R.422-2 of the Town Planning Code, "State" jurisdiction planning permission).

In certain circumstances specified below, only a prior declaration is necessary in place of a planning permission. The prior declaration is addressed to the competent authority (the mayor in the majority of cases), which verifies compliance with town planning law.

Jurisdiction for planning permission

If the planning permission is of "municipality" jurisdiction, the case is considered under the direction of the mayor. The mayor may instruct to consider the case: the municipal services, the services of another authority or, where the municipality has fewer than 10 000 inhabitants, the Departmental Directorate for Territories (and Sea) (DDT(M)).

If the planning permission is of EPCI jurisdiction (public inter-municipality cooperation institution), the case is considered under the direction of the EPCI president. The mayor may instruct to consider the case: the municipal services, the services of another authority or, where the EPCI has fewer than 10 000 inhabitants, the DDT(M).

If the planning permission is of "State" jurisdiction, the case is considered by the DDT(M).

The fact that a work is located in the protected area of a historic monument does not alter the jurisdiction of the case. The competent service (DDT(M), town hall or EPCI) requests the opinion of the "Bâtiments de France" architect in the context of considering the planning permission.

The time scales for consideration for planning permissions are specified in the Town Planning Code (Articles R.423-23 to R.423-37) and run from two months to one year, from reception by the competent authority of a complete case file, or, when the planning permission may only be granted after a public inquiry, from reception by the competent authority of the report of the investigating commissioner or the inquiry committee (Article R.423-20 of the Town Planning Code).

Unless otherwise stated, the planning permission can be combined with other authorisation procedures specific to energy production, transport, distribution and storage facilities as described below.

Authorisation according to the electricity regulations

Any new electricity production facility must be the subject of an authorisation to operate issued by the Energy Minister, as required by Law no. 2000-108 of 10 February 2000 relating to the modernisation and development of the public electricity service.

Facilities whose installed power rating by production site is less than or equal to 4.5 megawatts (MW) are deemed authorised by simple prior declaration to the Energy Minister, who verifies the compliance of the declaration.

Procedures relating to environmental evaluation as required by the Environmental Code

The Environmental Code (Article L.122-1) specifies that any study prior to the execution of redevelopment or works that require administrative authorisation (for example, planning permission or Installations Classified for the Protection of the Environment regime) and which, due to the magnitude of their dimensions or their impacts on the natural environment, may harm the latter, must include an environmental impact study in the file transmitted to the authority in charge of authorising or approving these redevelopments or works. This study, which may relate to impacts in terms of landscape, noise, air quality, fauna and flora etc., is then forwarded for review by the authority in charge of considering the administrative authorisation to the State administrative authority competent in environmental matters. The list of projects, redevelopments or works subject to the systematic execution of an impact study is set by the Environmental Code.

Evaluation of Natura 2000 impacts (L.414-4 of the Environmental Code)

Programmes or plans for works, projects or renovations, the nature of whose execution is such as to affect a Natura 2000 site, are the subject of an environmental impact evaluation regarding the site conservation targets.

Impact evaluation as required by the law on water

Depending on the dangers that they present and their effects on the water resource and aquatic ecosystems, facilities, projects, works or activities are subject to an authorisation or declaration procedure, the thresholds of which are defined by a nomenclature. Those facilities not appearing on the Installations Classified for the Protection of the Environment (ICPE) nomenclature are subject to these provisions. The authorisation is granted on the basis of a file including an impact study, and after a public inquiry.

Where appropriate, the Environmental Code provides for the impact study to take the place of these different evaluation documents if it contains all of the necessary elements.

The Installations Classified for the Protection of the Environment regime

In the context of the management of the prevention of pollution and industrial risks, the legislation relating to the Installations Classified for the Protection of the Environment (ICPE) constitutes the legal basis for French industrial environment policy. This was developed and codified in Book V of the Environmental Code. With the exception of nuclear facilities and mines (which are covered by other legislation), it targets all industrial activities, intensive farming and waste processing activities.

The classified installation legislation puts in place a system where industrial activities covered by this legislation are listed in a nomenclature which subjects them to an authorisation regime; one of either declaration or registration.

- Declaration relates to less polluting or less dangerous activities. It consists of informing the prefect of the department of the activity and of respecting the standard provisions, particularly relating to monitoring and maintenance of the facilities.
- Authorisation relates to more polluting or more dangerous activities. While the provisions for declaration are standardised, those for authorisation are drawn up on a case-by-case basis. All projects or works subject to authorisation must have been the subject of a public inquiry (procedure regulated by Articles L123-1 and following of the Environmental Code), an impact study and a danger analysis. Authorisation is issued by decree of the prefect of the department after consideration of the case, carried out by the decentralised State services (DREAL for the inspection of facilities classified as industrial, the Departmental Directorate of Veterinary Services (DDSV) for agricultural sites, or the Interdepartmental Classified Installation Technical Inspection Service (STIIC) for classified facilities in Paris and its immediate surroundings:
 - one-month long public inquiry
 - opinion of the town councils concerned
 - technical opinion of the decentralised State services concerned.

The entire procedure takes on average 10 to 12 months between the date of deposit of a case file judged to be complete and the signature of the prefectural decree. The costs of establishing the file, publication fees and inquiry expenses are borne by the applicant.

Registration is a new intermediate IPCE classification category. Created by ordinance no. 2009-663 of 11 June 2009, this relates to those facilities presenting serious danger or disadvantage to the interests stated in Article L. 511-1 of the Environmental Code, whose risks are well-known, and which may, in principle, be prevented by compliance with general

provisions. This regime is not applicable to certain categories of polluting facilities (Directive 2008/1/EC⁸) or subject to systematic evaluation of environmental impacts (Directive 85/337/EC⁹, Annex I). This regime subjects the projects to public consultation, but not to impact study or danger analysis. Through their environmental knowledge, the prefect may take the reasoned decision to consider under the authorisation procedure a case covered by the registration regime (in particular with an impact study and a public inquiry). The possible grounds are stated in Article L.512-7-2 of the Environmental Code (failure to comply with general provisions, environmental sensitivity of the area affected by the project according to Annex III of Directive 85/337/EC, cumulative impacts of the project with other neighbouring projects).

Annex 1 specifies in detail the administrative procedures applicable to each type of renewable energy production facility.

4.2.1.2. Local measures

In the Ile-de-France, an area of special protection against atmospheric pollution was created in 1997 by order of the Minister for the Environment, regulating the installation of biomass boilers both for individuals and companies.

The planning documents (land use plan – POS – or local plans – PLU) defined at local level sometimes contain certain specifications that are incompatible with projects for renewable energy production facilities (particularly solar panels). However, under the Grenelle II law, any town planning rule having the aim or effect of prohibiting the installation of domestic solar heating or photovoltaic systems or of any other domestic renewable energy system may be rendered ineffective, in areas not subject to a particular classification.

Without awaiting the implementation of the previously mentioned Grenelle II law, Decree no. 2009-722 of 18 June 2009 enables local authorities to employ the simplified modification procedure for planning documents to "*remove rules whose aim or effect would be to prohibit the installation of domestic solar heating or photovoltaic systems*".

4.2.2. Technical specifications (Article 13(2) of Directive 2009/28/EC)

Various incentives have been put in place to encourage the development of renewable energies. Thresholds and conditions of entitlement vary: some mechanisms such as the sustainable development tax credit and the zero rate eco-loan are based on performance requirements formulated by standards. Other, less specific requirements apply to a type of facility without applying performance criteria. In order to permit an overall understanding of the measures, the detail of these technical specifications has been included in the presentation of the measures in paragraphs 4.3, 4.4 and 4.5.

4.2.3. Buildings (Article 13(3) of Directive 2009/28/EC)

The building sector has been identified as the main source of energy savings and of the installation of widespread means of renewable energy production. Law no. 2009-967 of 3 August 2009 relating to the implementation of the Grenelle Environment Forum (called "Grenelle I") sets a 38% target for the reduction of energy consumption by the existing building stock by 2020.

⁸ Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 relating to the integrated prevention and reduction of pollution.

⁹ Council Directive 85/337/EEC of 27 June 1985 concerning the evaluation of the environmental impacts of certain public and private projects.

This target requires substantial actions to the entire housing stock and in particular to private and social housing, public and tertiary buildings. Specific measures targeting different sectors are combined with global measures concerning all buildings. More particularly, all buildings belonging to the State and its government-owned corporations will be subject to an audit in 2010 with the aim of initiating their renovation by 2012 and in particular of dealing with their less energy efficient areas.

In addition to incentives aimed at individuals and companies, and while respecting their freedom of administration, the State encourages local and regional authorities to initiate a programme of renovation of their buildings in terms of energy savings under the same conditions and at the same rate as for buildings belonging to the State.

4.2.3.1. Specific measures

Public buildings

The target set in the Grenelle I law is a reduction of at least 40% in energy consumption and of at least 50% in greenhouse gas emissions in a period of 8 years, which implies an increased use of renewable energies. The buildings concerned are those belonging to the State (50 million m²) and its government-owned corporations (70 million m²). Grenelle commitment no. 5 adds to this compliance with accessibility requirements by 2015 at the latest.

As a result, the government decided to initiate a major State property renovation programme from 2008. All buildings must be the subject of a technical audit by 2010 and the works must have been initiated by 2012. There is, however, no obligation to use renewable energy, the emphasis being on the overall energy performance.

Additionally, in order to promote the development of renewable energies in public buildings, the Grenelle II law provides, in its Article 88, for the extension to the departments, regions and government-owned inter-municipal cooperation bodies of the possibility to sign up to the obligatory purchase prices presented in paragraph 4.4. Regarding photovoltaic power, paragraph 2 of Article 88 opens this possibility to any legal person, whatever their aim.

Social housing

The Grenelle I law establishes a rehabilitation programme for social housing, beginning with the 800 000 largest energy consumers. By 2020, these must reduce their primary energy consumption below 150 kWh_{PE}/m² per year. Over the first two years of the programme, starting in 2009, 100 000 units of social housing must be renovated.

To encourage this, financial incentives have been put in place for social landlords. The social housing eco-loan, on average 12 000 euros at a fixed rate of 1.9% over 15 years, is granted to social landlords owning housing classified as E, F or G on the A to G scale of energy performance diagnosis¹⁰.

Finally, social landlords as a group have committed to leading by example, and have imposed upon themselves the achievement of low consumption level (50 kWh_{PE}/m² per year) from 2011 for the construction of new housing.

As for public buildings, the use of renewable energies is not imposed, but is promoted, particularly regarding wood-fired heating systems and district heating networks.

¹⁰ This energy performance diagnosis includes heating, cooking, domestic hot water production and ventilation but does not include specific uses. Class A includes housing with a primary consumption of less than 50 kWh_{PE}/m² per year; class B is between 50 and 90 kWh_{PE}/m² per year; and class C between 90 and 150 kWh_{PE}/m² per year.

Private housing

It is planned to encourage major renovations of existing housing, in order to achieve 400 000 major renovations per year from 2013.

In order to achieve these targets, the State desires to put in place effective incentive provisions to encourage individuals to carry out energy saving works in their homes.

Therefore, two provisions were targeted in Law no. 2008-1425 of 27 December 2008, relating to finances for 2009:

- Article 99 of the law created a zero rate eco-loan for energy performance improvement works in housing. This provision is intended to enable the financing of major works to improve overall energy performance in main residences. The details of the implementation methods are specified in 4.3. The target is the putting in place of 200 000 loans for the period 2009/2010. At 31 March 2010, around 100 000 loans had been granted.
- Article 109 of the Law adjusted the sustainable development income tax credit which was inaugurated in 2005, in particular by prolonging its application, which should have ended on 31 December 2009, until 31 December 2021, and by extending its field of application. This tax credit finances, within the limit of a multi-annual overall ceiling, the expenses for the acquisition of materials and equipment installed in main residences (efficient boilers, heat pumps, thermal insulation materials, etc.). The means of claiming this tax credit are described in 4.3.

There is currently no obligation for an individual to carry out thermal renovation. Similarly there is no obligation to install renewable energy production equipment in homes.

Energy poverty and energy performance of housing

The 2006 national housing survey estimates that 3 400 000 households allocate more than 10% of their resources to pay their energy bills. Among these households, 87% are housed in private stock, 62% are owner-occupiers, 55% live in rural municipalities of less than 20 000 inhabitants, and 55% are over 60 years old. The national commitment to abolishing energy poverty, launched on 26 January 2010 in the context of the Environmental Solidarity Pact, aims to rehabilitate the housing of 300 000 small owner-occupiers in situations of serious energy poverty, particularly in rural areas. The amending finance law of 9 March 2010 launched the future investment programme. The government decided to dedicate, within the "sustainable development" segment, future investments of 500 million euros to the thermal renovation of energy-consuming private housing for the lowest income owner-occupiers. The latter, for essentially social and financial reasons, find it hard to become involved in investment decisions and are unable to take advantage of the fiscal and financial provisions put in place by the government, in particular the sustainable development tax credit and the zero rate eco-loan. For this already fragile population, this results in high exposure to energy price fluctuations and in a deterioration of their living conditions leading to sanitary and social misery.

This 500 million euro measure will enable the financing of the thermal renovation of the homes of 300 000 small owner-occupiers. It will principally enable an improved global energy performance for these renovated private homes, but will also finance the installation of renewable energy systems.

Private tertiary sector

The Grenelle II law specifies obligations for tertiary buildings to improve their energy performance within eight years from 1 January 2012.

The development of a Council of State decree will determine, firstly, the categories of buildings or parts of tertiary buildings, that will be subject to this obligation for works and, secondly, the obligation methods, as a function of the destination of the building, together with

the thermal characteristics or the energy performance to be achieved.

4.2.3.2. General measures

Feasibility studies of energy supply

From 1 January 2008, the client for a construction or heavy renovation project¹¹ of a total net floor area in excess of 1000m² must carry out, prior to applying for planning permission, a technical and economic feasibility study for the construction's various energy supply solutions (Article L. 111-9 of the Construction and Housing Code introduced by the law of 13 July 2005).

This measure is aimed at promoting the use of renewable energies and more efficient systems. Guided by the conclusions of this study, aimed in particular at reasoning on the basis of energy, environmental and economic indicators, the client is free to choose the construction's energy source(s).

The application methods for these feasibility studies are defined by decree no. 2007-363 of 19 March 2007 and the order of 18 December 2007 relating to feasibility studies for energy supplies of new buildings and new parts of buildings and for the renovation of certain existing buildings in metropolitan France. The systems to be studied by the feasibility study are listed in the order of 18 December 2007.

Prior to submitting the application for planning permission, or, where the renovation works do not require planning permission, prior to acceptance of the quotes or to the procurement exercise related to these works, the client:

- chooses a system from among those defined below, or another energy supply system. The building project equipped with the chosen system is called the "intended system". The building projects equipped with other systems defined below are then called "variants";
- carries out a technical and economic feasibility study comparing the intended system with at least the following variants, or combinations thereof:
 - solar heating systems;
 - photovoltaic solar systems;
 - wood-fired or biomass heating systems;
 - wind-powered systems;
 - connection to a heating or cooling network shared by several buildings or on a district scale;
 - geothermal heat pumps;
 - other heat pumps;
 - condensing boilers;
 - combined heating and electricity production systems (cogeneration)

In the case where the works are renovation works relating only to the building envelope, only the following variants are to be considered in the study:

- solar heating systems;
- photovoltaic solar systems;
- wind power systems.

¹¹ The investments undertaken during the renovation must represent more than 25% of the value of the project.

Energy performance of new housing

Thermal Regulation 2005 and high energy performance labels

The first thermal regulation (RT) for new buildings was put in place in the 1970s. It has been progressively reinforced and the applicable version in 2010 is RT 2005. No obligation to use renewable energies is contained in the order defining the requirements of RT 2005. However, the Th-CE 2005 calculation method enables the physical accounting in conventional consumption of the different renewable energies used within a building, with the exception of wind power. The production of domestic hot water, electricity or heating through renewable energies sources is thus taken into account in the calculation of the conventional consumption of the building.

The "haute performance énergétique" ("high energy performance") label confirms that the building achieves an overall energy performance level higher than regulatory requirements, verified by minimum inspection methods.

This label has five levels:

1. HPE 2005 for constructions whose conventional consumptions are at least 10% lower than the RT 2005 reference consumption and for housing at least 10% lower than the maximum authorised consumption.
2. THPE 2005 for constructions whose conventional consumptions are at least 20% lower than the RT 2005 reference consumption and for housing at least 20% lower than the maximum authorised consumption.
3. HPE RE 2005, based on the requirements of the HPE 2005 label accompanied by requirements for the installation of renewable energy equipment:
 - That the heating, and where appropriate the domestic hot water production, is furnished by a boiler using biomass, and in particular using wood;
 - That the building is connected to a heating network supplied by at least 60% wood or biomass, which provides a response to local and regional authorities who are making efforts to produce heat with renewable fuels.
4. THPE RE 2005 for constructions whose conventional consumptions are at least 30% lower than the RT 2005 reference consumption and for housing at least 30% lower than the maximum authorised consumption, accompanied by requirements for the use of renewable energy equipment (solar heating collectors, photovoltaic collectors, wind-turbines) or very efficient heat pumps.
5. BBC 2005: low energy consumption building This level is aimed at buildings with a much lower consumption than the regulatory energy consumption with:
 - A requirement level set for residential buildings at $50 \text{ kWhPE/m}^2 \text{ per year}$ in primary energy and taking into account consumption for all uses (heating, cooling, domestic hot water production, ventilation and lighting), and based on the climatic zone and altitude of the construction project;
 - An energy performance improved by at least 50% compared to the regulatory performance for tertiary buildings.

It reflects the spirit of the German "Passivhaus" and Swiss "Minergie" labels, but with requirements and techniques appropriate to the French climate and to each climatic zone. By their names, the HPE RE and THPE RE levels enable the valorisation of the renewable energy production, and encourage project sponsors to achieve a level of excellence. However, the most requested label is the most ambitious: the low consumption level (BBC). Through this label and its target of $50 \text{ kWhPE/m}^2 \text{ per year}$ in primary energy, taking into account consumption for all

uses, the use of renewable energies, even if it is not made mandatory, is strongly favoured and it can be observed that a large number of applicants for this label integrate a renewable energy source.

Developments in thermal regulations: RT 2012

For new constructions, the Grenelle I law set the target of widespread low consumption buildings by 2012 and positive energy buildings by 2020.

The current thermal regulations, known as RT 2005, will be reinforced so that all new constructions have a conventional primary energy consumption lower than a threshold of 50 kWh/m² per year on average (energy performance level equivalent to the "low consumption building" level of the RT 2005 labels).

The challenge in developing RT 2012 is to limit the primary energy consumption of new buildings while at the same time creating;

- significant technological and industrial development for all sectors of construction and equipment;
- a very high level of energy quality in construction, independent of the choice of energy system;
- a technical and economic balance between the different energies used for heating and domestic hot water production.

In addition to this main objective, the aim is to avoid stifling innovation and creativity, by leaving the client with significant freedom in the optimisation of their building both on the architectural and technical level.

The work to prepare the new thermal regulations for new buildings, known as RT 2012, are now complete, after 2 years' work and a large-scale consultation, according to the Grenelle Environment Forum model.

RT 2012 will apply:

- on 1 July 2011 for the tertiary sector, public buildings and National Urban Renewal Agency (ANRU) areas;
- and on 1 January 2013 for the residential sector.

RT 2012 is above all a regulation comprised of targets. **It therefore comprises three requirements for results relating to overall performance:** bioclimatic needs, primary energy consumption and summer comfort.

- *Bioclimatic needs $B_{bio} < B_{bio\ max}$* : this requirement defines a simultaneous limitation of energy requirements for components linked to construction (heating, cooling and lighting), thereby imposing its optimisation independently of the implemented energy systems.

- *Consumption of primary energy $C < C_{max}$* : this requirement is based on the consumption for heating, cooling, lighting, domestic hot water production and for auxiliary equipment (pumps and ventilators). In compliance with the Grenelle I law, C_{max} is 50 kWh/m² per year of primary energy on average, adjusted according to the geographic location, altitude, building use type, average surface area of housing and greenhouse gas emissions.

- Regarding greenhouse gas emissions, only dendroenergy and the least CO₂ emitting heating networks will be subject to an adjustment of this requirement, limited to a maximum of 30%;
- The C_{max} consumption requirement will be increased by 7.5 kWhPE/m² per year in multi-occupation housing, temporarily until 1 January 2015.

- Summer comfort $T_{ic} < T_{ic\ ref}$: the regulations impose that the hottest temperature achieved in the premises, during a sequence of five very hot summer days, does not exceed a threshold.

In addition, RT 2012 provides for certain average requirements, limited to those strictly necessary, to reflect the stated willingness to achieve significant penetration of a particular practice.

- To guarantee the quality of implementation: treatment of significant thermal bridges and treatment of air-tightness of the housing envelope
- To guarantee housing comfort: minimal surface area of picture windows and sun-blinds
- To accelerate the development of renewable energies and efficient energy systems: use of renewable energies or of very efficient systems (thermodynamic or micro-cogeneration domestic hot water production systems) in private houses

Following the first feedback from experience on low consumption buildings, a mandatory use of renewable energies in new buildings is considered. This will involve:

- For single family houses, imposing on the client the choice between:
 - either the use of a solar heating domestic hot water production system;
 - or the use of a system to take advantage of 5 kWh/m² per year of renewable energies calculated according to the Th-BCE 2012 method. It should be noted that the Th-BCE 2012 calculation method used in RT2012 enables, as does the Th-CE 2005 method in RT 2005, the physical accounting in conventional consumption of the different renewable energies used within a building;
 - or connection to a heating network more than 50% supplied by a renewable or recuperated energy.

An alternative is considered to this obligation in the case where the house is fitted with one of the following very efficient systems: thermodynamic or micro-cogeneration domestic hot water production.

- For multi-occupation residential buildings and for the tertiary sector: accompany the distribution of renewable energies by specific labels, on a voluntary basis, specifically enabling the promotion of renewable energies.

- For correct usage of the building: measurement or estimation of the energy according to the main uses and information from the occupants.

- For overall energy quality: local production of energy will not be taken into account above the auto-consumption level (12 kWhEP/m² per year, as in the current BBC label).

The FAR bonus

As introduced in Articles L.128-1 and L.128-2 of the Town Planning Code by Article 30 of the programme Law no. 2005-781 on the guidelines for energy policy and in Articles R.111-21 and 22 of the Construction and Housing Code, the order of 3 May 2007 defines the criteria for authorisation to exceed the floor area ratio (FAR) by 20%. This measure may be applied both to new constructions and to extensions to existing constructions, provided, however, that the municipal council or the public inter-municipality cooperation institution concerned has deliberated on the question; that there is a local town plan which sets a FAR, and that it has indicated the areas concerned. The publication of the order of 3 May 2007 in the Official Journal of 15 May 2007 allows municipalities to deliberate immediately on the implementation

of this procedure.

To benefit from bonuses, new constructions of multi-occupation residential developments, groups of single family houses, or tertiary buildings must correspond to the criteria for level THPE RE or BBC of the "high energy performance" label. The client must attach to the planning permission application a document drawn up by a body approved to issue the HPE label, certifying that the project, at the planning permission stage, complies with the required performance criteria, and that the applicant is committed to obtain the corresponding label.

For new isolated single family houses, permission to exceed the FAR may be granted on two conditions: a consumption level at least 20% less than the reference consumption resulting from the application of RT 2005 and compliance with one of the four conditions relating to the use of renewable energies or of efficient heat pumps.

For existing constructions, the conditions apply to the building and its extension, to comply with the target for restricting energy consumption. High ceilings beneath lost roof space in the building and its extension must be sufficiently well insulated. The building must be the subject of works for the installation of renewable energy equipment or heat pump such that all premises comprised of the existing part and the extension belonging to the same owner comply with one of the set conditions.

In the two latter cases, the client must attach to the planning permission application their commitment to install renewable energy production equipment, together with a document drawn up by a diagnostician approved to draw up an energy performance diagnosis, certifying that the conditions are present at the planning permission stage.

ANAH aid

This aid, specifically aimed at small households, is described in detail in paragraph 4.4.

Table 6 Estimated share of renewable energy in the building sector (%)

	2005	2010	2015	2020
Residential sector	18%	22%	28%	36%
Tertiary sector	6%	9%	14%	23%
Commercial sector	Incorporated into the tertiary sector			
Public sector	Incorporated into the tertiary sector			
Industrial sector	No data specific to industrial sector buildings			
TOTAL	12%	16%	22%	32%

Table 6 has been completed with the available statistics. There are, in fact, no specific statistics in the scenarios for French final energy consumption development:

- for the consumption of buildings in the whole public sector, which is incorporated into the tertiary sector,
- for the consumption of the commercial sector, which is also incorporated into the tertiary sector,
- for the consumption of buildings in the industrial sector, these being hard to differentiate from consumption linked to industrial production, or being incorporated into the tertiary sector in the case of office buildings.

The hypotheses employed are the following:

- the energy consumption by sector and by energy result from the scenarios developed for the

heating PPI report.

- for electricity, the percentage of RE in Table 3 has been considered.

4.2.4. Information provisions (Article 14(1), (2) and (4) of Directive 2009/28/EC)

From the start of the 2000s, the ADEME has been entrusted by the French government with the development and coordination of a local information network; the "Energy Information Spaces" (EIE) in partnership with local authorities, professional organisations and associations.

Objectivity, impartiality and independence underpin the approach of the EIEs. On these grounds, the financed advisers and structures are committed to a charter guaranteeing that the information supplied is free, of general interest and independent of energy and equipment suppliers.

With the exception of two regional councils, most regions have registered in their State-Region Project Contracts (CPER - *cf.* paragraph 4.4) a support programme for the EIE system in close collaboration with the ADEME regional management concerned.

The summary of the report of the Grenelle Environment Forum Group 1, "Combat climate change and control energy demand", has reiterated the importance of supporting actions with widespread communication and awareness initiatives regarding the energy stakes.

EIE operation

The ADEME ensures the leadership and coordination of the programme at the national and regional level via its regional directorates. Within each of these directorates, an EIE coordinator directs the EIE network in their territory, ensuring the correct implementation of the EIE action programmes and good visibility for the network, and also promoting partnerships with local and regional authorities.

The structures participating in the development of the network as supports of the EIE programme are various: environment and renewable energy associations (43%), associations in the housing field (35%), territorial structures (15%) and local consumer associations (7%).

At the end of 2009, the Energy Information Spaces (EIE) network had 235 centres hosted by more than 450 energy information advisers, the target being to achieve 500 advisers by the end of 2010.

The activities of the Energy Information Spaces fall under two complementary but distinct functions:

- "Advisory" functions, which consist of receiving and handling requests for information and advice. These may be submitted in writing, by telephone or by direct contact. The EIEs provide particular days and hours reserved for the general public.
- "Hosting" functions, which consist of developing intervention programmes and participating in events such as fairs, exhibitions, visits to facilities, etc. Aimed at different categories of potential applicants, these hosting activities have the aim of ensuring the widest possible broadcast of awareness and information messages.

Through these actions, the energy information advisers address consumers to make them aware of energy control, and to advise them on the measures required to reduce energy consumption in their homes. More than 4.3 million people have been informed over the period 2004-2007, most of the consultations relating to particular projects relating to housing and major renovations. Professionals can also consult the EIEs.

The ADEME produces communication and advice tools (consumer guides) and makes them available to the EIE supporting structures. The national housing agency, together with the various national and local stakeholders (local and regional authorities, cooperatives, associations, etc.) regularly publish guides aimed at improving thermal performance and the

installation of means of renewable production.

Finally, it should be noted that the energy information advisers do not become directly involved with the developers and architects, who have their own information and training networks.

4.2.5. Certification of installers (Article 14(3) of Directive 2009/28/EC)

France already has qualification systems that can be used as a basis to comply, by the end of 2012, with the different requirements of the European Directive, particularly regarding the content and validation of training.

Qualit'EnR

A voluntary approach was adopted by professionals several years ago with the support of the ADEME, to propose that installers of renewable energy production systems commit to complying with a quality charter based on professional rules and on the quality of the information, advice and services provided to consumers. The first charter was established for solar heating installations. The "Qualisol" designation managed by the ADEME was later transferred to Qualit'EnR.

This association was founded in 2006 as a professional initiative of: the CAPEB (Confederation of Artisans and Small Building Companies), ENERPLAN, (Professional solar energy association), the UCF (French Climatic Union - FFB), the UNCP (National Union of Roofing and Plumbing - FFB) and the SER (Renewable Energy Union). This association, whose aim is to unite renewable energy equipment installers behind a common quality approach, has since extended its approach to the photovoltaic (QualiPV) and dendroenergy and biomass (Qualibois) sectors, as well as to heat pumps (Qualipac).

This system is based on a designation issued to the company, which must include a technical referee. This may be an employee or the manager, who must fulfil at least one of the following four requirements:

- A) Rationale for implementation of facilities¹²,
- B) Training according to the standard for the relevant designation in a training centre approved by Qualit'EnR or with an industrial operator who has signed the "EFIQUA" charter corresponding to the relevant designation, and having succeeded in the validation questionnaire,
- C) Validation of acquired experience, or dedicated training of at least 350 hours in the relevant trades (Certificate of Professional Qualification),
- D) Success in the validation questionnaire for the relevant designation during a session organised by Qualit'EnR.

The qualifications are open to European companies if they satisfy the same requirements as French companies. Their application, written in French, is considered under the same conditions as those applied to French companies, subject to necessary adaptations and provision of the necessary equivalences.

The Qualit'EnR association participates in the European Qualicert project. This unites installer associations and their members, industrial associations in the renewable energy field, and public authorities represented by national energy agencies (the ADEME for France). It aims to develop a joint European approach for certification systems that will be recognised by all the Member States. In this context, Qualit'EnR is in charge of coordinating the first stage of the project, which is to identify European certification and qualification systems.

¹² The number of installations requested and the time period considered vary according to the designation.

QUALIBAT

Other qualification systems for companies exist, and in particular QUALIBAT. QUALIBAT is a private law body created in 1949 by the Minister for Construction and by professional organisations of business people, architects and clients. The QUALIBAT qualification is divided according to a specific nomenclature relating to all construction trades. Some qualifications relate to renewable energies:

- Dendroenergy thermal installations (5391 - 5392)
- Solar thermal (5371 - Solar water heater, 5372 - Combined or heating only solar systems, 5373 - Solar heating installations)
- Geothermal heat pumps: (5381 – 5382)
- Overall, the "Thermal installations" (5311 to 5314), integrate heat pumps, solar heating and dendroenergy.

In addition to their fiscal, financial and social situation, the companies' technical competence is evaluated:

- by written application for human and material resources (identity and professional training of the technical manager and the technical and assessment personnel, details of the company's human and material resources)
- by presentation of the list of projects carried out during the previous four years which correspond on the technical level to the definition of the qualification mentioned in the nomenclature. The verification of some of the projects presented by the company is carried out directly by QUALIBAT, who obtain the assessment of clients and project managers on the list.
- by the presentation of three reference projects that are particularly representative of the qualification, including at least for each one the nature of the work carried out and the assessment of the service issued by the client, the project manager in charge of monitoring the work, or the technical controller.

If the request of the company is judged to conform to the requirements of the standard, the qualification is granted for a period of four years. Should the company be unable to present project references, or where these are judged to be insufficient, the qualification may be granted, on a provisional basis, for a period of two years.

The financial, human and material capacity of the company, together with its fiscal and social situation and its guarantees in terms of insurance are monitored annually in writing.

On the expiry of the qualification, renewal takes place by the creation of a case file corresponding to that required in the context of an initial application, modified in that only two reference projects are required. According to QUALIBAT, the decision to award or renew the qualification is only granted for 50% of applications.

QUALIBAT works with the ADEME towards a convergence of qualification standards with other existing systems, in particular Qualit'EnR.

Qualiforage

The ADEME, the Geological and Mining Research Bureau (BRGM¹³) and the EDF have initiated a quality commitment system for vertical geothermal bore drillers by putting in place the QUALIFORAGE label. Companies adhering to this label are in particular committed to carrying out works according to good practice, to a quality standard defined in a reference

¹³ The BRGM is the reference government-owned corporation in the field of geosciences. It falls under the dual supervision of the Minister of Higher Education and Research and the Minister of Ecology, Energy, Sustainable Development and Sea.

specification, and to taking out decennial insurance for executing bores. Around 70 drillers are currently participating in this system.

4.2.6. Electricity network infrastructure development (Article 16(1) and Article 16(3) to (6) of Directive 2009/28/EC)

In order to anticipate the significant progress of renewable energies, and in particular wind power and diffuse and intermittent photovoltaic, several measures are being prepared which fall within the scope of research for a more efficient electricity network, also known as a "smart grid".

National legislation

The main current legislative texts are:

- Law no. 2000-108 of 10 February 2000;
- Law no. 2009-967 of 3 August 2009, called "Grenelle I law";
- Law no. 2010-788 of 12 July 2010, called "Grenelle II law".

Development and integration of renewable energies

The electricity PPI, published by the order of 15 December 2009, states national production targets by sector. The legislation is in the process of development in order to present these national targets at local level.

In addition, the Grenelle II law provides for the development, by 2011, by the decentralised State services and the local and regional authorities, of regional plans for climate, air and energy which will detail by sector the regional targets for 2020 and from which will be developed regional plans for connection to the renewable energy network. The plans for connection of renewable energies will identify the works required to the network for the connection of renewable energy production (works that are existing, to be reinforced or to be created) and will reserve the corresponding capacity for these renewable energies for a period of 10 years. In addition, in the context of current legislation, the Wind Power Development Zones (ZDE – Article 10-1 of the Law of 10 February 2000) are established, taking into account in particular the criteria linked to carrying capacities on the network.

Finally, the plan for the development of the public transport network, provided for in Article 14 of the Law of 10 February 2000, is developed by RTE (the electricity transport network) which submits it every two years to the Energy Minister, after receiving the regulator's opinion. This plan is aimed in particular at identifying areas of fragility in the network and studies in detail the areas subject to particular balance constraints: currently these are Brittany and the Provence Alpes Côte d'Azur region.

Intelligent networks

Intelligent networks and the tools based on information technologies are intended to ensure the balance and therefore the security of the electrical system in an environment where an increasing share of the production supply will be based on intermittent methods (wind power, solar photovoltaic, etc.). They must make it possible to:

- Control the supply-demand balance by measuring in real time the renewable-origin production level;
- Improve the reliability of networks in the presence of decentralised production and optimise their operation;
- Adapt the operation, network automation and production facility management in order to

optimise the performance of the system.

RTE has developed and put into service a tool called IPES (Insertion of Wind Power Production into the Operation of the French Electrical System), whose function is to offer a method for the monitoring and control of wind farms. IPES is being adapted to take into account photovoltaic parks.

Storage facilities together with intermittent production facilities must provide a useful contribution to the services, systems and management of points of consumption. But they must, in the first instance, allow producers to reduce the intermittent and unpredictable nature of the production of renewable energies.

These new technologies, systems and architectures must be validated in real situations by large-scale demonstrators (SmartGrid demonstrators) permitting their technical, economic, environmental and societal validation in addition to replicability.

A close collaboration between several European network managers (distributors and transporters) is already in progress on this subject in order to deal with the technical and financial obstacles. Their common approach was presented to the European Commission, regulators and Member States in Florence on 15 May 2009 (EEGI: European Energy Grid Initiative).

Reinforcement of interconnections

A reinforcement of interconnections with the countries adjoining France is being planned to increase the capacity for exchange. Several interconnection projects are being studied:

- Between France and Spain: A project for the creation of a high voltage direct current link of around 2 000 MW named Baixas-Santa-Llogaia. This line should enable an additional transit capacity of 1 400 MW. The project will be put into service at the end of 2013.
- Between France and Italy:
 - The optimisation of the existing network should permit an increased transit capacity by 600 MW. The project should be put into service in 2012;
 - Project for the creation of a high voltage direct current link. This line should permit an additional transit capacity of 1 000 MW and should be put into service in 2017.
- Between France and Belgium: the optimisation of the existing network should permit an additional transit capacity of 400 MW. This additional capacity should be effective by the end of 2010.

In addition, network and/or feasibility studies aimed at increasing the interconnection capacities between France and Great Britain and France and Belgium are in progress. Their still early state of progress does not allow an accurate estimate of the expected transit capacities.

Procedures for the authorisation of infrastructures

The establishment of network infrastructures destined to evacuate the renewable origin production adheres to the administrative procedures common to all works for the transport or distribution of electricity. It results in lead times for these projects which are considerably longer than the lead times for the production methods, particularly regarding land-based wind farms. Where the electrical projects are high voltage, the delay may be even longer. These lead times, considered to be too long by various stakeholders, are nevertheless necessary in order to ensure good local acceptance and to determine the solutions presenting the best balance in economic and environmental terms (particularly landscape impact).

Thus, the average time to obtain all authorisations necessary for the construction of a new

link is from 24 to 56 months depending on the type of link. As regards the connections, these time scales are counted from the acceptance by the client of the technical and financial proposal made. These time scales do not include those necessary for any public debate which may be implemented for all links of 400 kV longer than 10 km and links of 225 kV with an aerial length greater than 15 km. For these, an additional 18 months must be assumed. The duration of the project is then from one to three years.

As regards the authorisations, these are currently regulated by Articles 49 and 50 of the modified decree of 29 July 1927. A reform of the decree of 29 July 1927 is currently in progress. The current versions of the draft decree contain changes to procedures, but these changes will only lead to a minor reduction in time scales. However, it should be noted that the new simplified administrative procedure which is expected to replace Articles 49 and 50 only calls for a consultation of the mayor, and that the mayor's opinion does not have to be reasoned. Local considerations (the desire to construct any new line underground, etc.) may therefore lead to a more frequent recourse to the decision of the prefect and thus to prolonging the administrative delays.

A decree of 1 April 2009 has, in addition, modified certain procedures, particularly for underground links of voltage less than 225 kV and those of 225 kV with a length of less than 15 km with the aim of simplifying these projects. However, this has not resulted in a noticeable reduction in lead times.

Finally, it should be noted that network infrastructure projects, posts and lines, are subject to a consideration procedure specific to each project. No formal coordination exists between the procedures applicable to production projects and to those relating to their connection works.

Reserved or priority connections for renewable energies

In the current legal context, carrying capacities are made available to all applicants according to a non-discriminatory procedure implemented by each network manager and based on the rule of "first come, first served". This procedure is public, and disputes are handled by the regulator's dispute settlement committee.

The previously mentioned Grenelle II law provides, in its Article 71, for the development of regional network connection plans for renewable energies. These plans should define the transformation points which exist or which must be created between the public distribution and transport networks, together with the connection links to the public transport network, to achieve the targets defined by the regional plans for the climate, air and energy provided for by the same law. The production carrying capacities expected in these plans will be reserved for a period of ten years for the benefit of facilities for the production of electricity from renewable energy sources. In addition, the law provides for the putting in place of a system of cost pooling so that new producers only have to support a part of the costs of the network projects carried out in anticipation to create carrying capacity.

As for sea-based wind power, this should develop on the basis of specific calls for tender that will enable pooling of the connection in a given area, in order to reduce the cost and the environmental impact.

Limitations of the network for the integration of renewable energies

There are currently in metropolitan France renewable energy production facilities which are ready to be connected but which cannot be, or which have limited input due to insufficient network capacity. A large number of renewable energy electricity production projects await reinforcement of the transport network to be able to be commissioned or to increase their production capacities, the potential time scale for reinforcement of the transport network being several years. In the Overseas Departments and Corsica, taking into account plans for

the rapid development of photovoltaic and wind power, the maximum capacity for the incorporation of intermittent renewable energies may be reached by 2015. This maximum capacity, today admissible for the stability of island networks, is equal to 30% of the maximum power demand. To increase the share of renewable energies in these territories and to aim for energy autonomy by 2030, it will be necessary to implement storage methods that are today not available on this scale.

Acceptance and sharing of network adaptation costs

The rules for sharing the connection costs between producers and network managers are subject to the Law of 10 February 2000 (Articles 4, 14 (for transport), 18 (for distribution) and 23-1 in particular), and decree no. 2007-1280 of 28 August 2007 relating to the consistency of works for the connection and extension of connections to public electricity networks. These rules are implemented by network managers under the control of the regulator who may also give his opinion on draft regulations.

The division of connection and technical adaptation costs between producers and network managers corresponds in principle to the concept of "shallow cost" expressed in Article 4 of the Law of 10 February 2000. In this context, upstream network reinforcements are covered by the network use price (which is revised every four years), and the producers finance the works created for their connection, together with extensions. These principles are defined by the Law of 10 February 2000 and the decree of 28 August 2007 relating to the consistency of works for the connection and extension of connections to public electricity networks.

The investments corresponding to works for connection and extension are provided by the managers, and the corresponding amounts are repaid by the producers according to a contractually established schedule. In this context, the creation of a source point to integrate production is entirely paid by the first producer. In the case of connections to the public distribution network, the price also includes a reduction by 40% of the price charged to the producer.

Thus, the creation of a source point to integrate production is currently entirely paid by the first producer. Producers who connect after an initial connection benefit from the prior existence of the source point. However, if the first connection is made to the existing network, without creation or reinforcement, the following producer receives no benefit; on the contrary there may exist network constraints limiting the input capacities for the network. In the current regulatory framework, only a common and concurrent application for connection from several producers may allow sharing of the costs of connection to the transport network. The current provisions may constitute a brake to producers setting up in areas where carrying capacities are exhausted. On the distribution networks, the first to arrive must pay 60% of the cost for reconstitution of this capacity, from which those following benefit at no extra cost.

The Grenelle II law provides the possibility to make the development of renewable energy production more attractive in areas where the network is constrained. It provides for the costs of establishing new carrying capacities for electric renewable energies to be pooled between renewable energy producers setting up within the area.

Information and connection calendar

The regulations provide for the transport network manager (GRT) to supply, within a three-month period, a technical and financial proposal (PTF) for connection which contains specific price and lead time elements. The procedure for developing these PTFs is the subject of a consultation organised by the transport network manager, then of an approval by the regulator. The latter is responsible for checking the implementation of this procedure by the GRT. The regulator approves on an annual basis the GRT's investments, among which are included reinforcements of the networks linked to producer connections.

The development procedure for the PTFs is presented in the GRT's reference technical documentation, which is public and available on their Internet site.

The methods used by the GRT to establish these PTFs are also presented in the GRT's reference technical documentation.

The specific case of connection procedures is the subject of two separate communications from the Energy Regulation Commission (CRE) dated 11 June 2009. These deliberations fix the framework in which the network manager connection procedures must take place.

Regarding the costs of connection, the general principle is that of the quote. However, small-scale producers (up to 12 kVA per phase) are subject to simplified invoicing according to a schedule approved by the CRE which does not include the contribution, where required, to reinforcement of the networks.

4.2.7. Electricity network management (Article 16(2), (7) and (8) of Directive 28/EC/2009

Priority or guaranteed network access for renewable energies

All producers have a right of access to the network that is guaranteed by law. A refusal of access by the network manager may be sanctioned by the regulator, if it is not based on objective, non-discriminatory and published criteria. These criteria may only be based upon imperatives linked to the correct accomplishment of public service assignments and on technical motives related to the safety and security of the networks, and to the quality of their operation. Producers have the right to obtain a PTF under the conditions of the reference technical documentation.

In addition, a capacity reserved for 10 years will be set aside for the production resulting from renewable energies in the context of the developments laid down by the Grenelle II law.

Insertion of renewable energies into the networks

The production from renewable energies benefits from the obligatory purchase regime laid down in Article 10 of the Law of 10 February 2000 (*cf.* paragraph 4.3), and as a result of this, all production from renewable energies under this mechanism is thus considered to be sold, transported and distributed, with reservations for imperatives of safety and maintenance and except when this production, by its intermittent character, adversely affects the safety of the network (e.g.: threshold of 30% of intermittent power in the Overseas Departments). Due to the obligation to purchase, renewable energies are thus not dependent on market conditions: the stakeholders liable to contract the obligation to purchase, (EDF Obligation to Purchase and local distribution companies), purchase from the producers the renewable-origin electricity produced and promote it on the market as best they can, the difference between the market price and the purchase rate being compensated via the CSPE (contribution to the public electricity service).

To optimise the acceptance by the market of intermittent renewable energies, the transport

network manager, under the control of the regulator, proposes the implementation of exchange regimes that are closer to real time (from one day forecasts to infradiurnal forecasts and reprogramming of facilities). Thus, since summer 2010, stakeholders on the market may modify their programmes on an infradiurnal basis over 24 windows and with a neutralisation period which is reduced to one hour. This modification is particularly important for energy sources which are fatally dependent on meteorological conditions.

In addition, at the end of 2009 RTE set in place a system which facilitates the injection of wind power production into the electricity system (known as IPES), enabling an improvement in production forecasting. The producers of renewable energies may connect their operations centre to this system, as laid down by regulations, in order to improve their forecasts and production visibility. This production forecasting tool for the wind power sector enables network managers to better control the overall impact of this intermittent production without substituting themselves in the role of producer.

In parallel with the improvement of the interconnection capacities mentioned in paragraph 4.2.6, the improvement of cooperation between adjacent network managers is also such as to enable better injection of renewable energies. On this subject, RTE is participating in discussions and coordination work within ENTSO-e. RTE also initiated the creation of Coreso, the first European centre for technical cooperation between GRTs (France/Belgium/UK).

Regarding demand-related actions, discussions are in progress to enable the development of curtailment offers, particularly with the increased participation of curtailment actors in the adjustment mechanism.

In terms of communication, to promote the establishment of projects in areas where the existing network is adapted to evacuate production without constraint, in particular of renewable energies, the transport network manager makes available to project sponsors specific information concerning the power which can be accepted at each point without curtailment. This information allows project sponsors to optimise their location in order to benefit from existing capacities and thus from a connection at the earliest opportunity.

Competences and information from the energy regulation authority

The law provides that the CRE shall supply an opinion on draft regulations and that these opinions should be made public.

The CRE has competence to monitor the correct operation of the electricity market.

Prices for the transport and distribution of electricity

The price structure for the use of public networks for the transport and distribution of electricity provides that for access to the network, producers pay according to the voltage range to which they are connected (injection component of 19 euro cents/MWh at 225 kV and 400 kV). The price structure does not vary according to the primary energy source.

The producers connected to the network at lower voltage ranges (90, 63, 20 kV and 380V) do not pay an injection component; this means that they do not participate in the financing of the costs of development and operation of the networks.

4.2.8. Biogas integration into the natural gas network (Article 16(7), (9) and (10) of Directive 2009/28/EC)

The National Agency for Sanitary Safety (ANSES) submitted in October 2008 a report on the evaluation of sanitary hazards linked to the injection of biogas into the natural gas network. It concluded that there were no specific sanitary hazards linked to the injection into

the network of certain types of purified biogas, compared to natural gas, which helped initiate the debate on the injection of biogas into the natural gas network.

The Grenelle II law provides for the principle of injection of biogas into the natural gas networks, the obligation to purchase biogas injected by natural gas suppliers at a preferential rate being fixed by legal order, together with the establishing of a compensation system for suppliers taking into account the extra costs linked to the obligation to purchase.

No assessment of the need to extend the gas network infrastructure to facilitate the integration of gas from renewable energy sources has yet been carried out. The injection of biogas into the networks is an infant sector. Connection studies are currently being carried out on a case by case basis. An assessment of experience gained is thus necessary before examining this hypothesis.

Regarding the technical rules relating to connection to the network, a technical specification has been established by the operator of the dominant network. This specification is available on line, on the French Gas Association (AFG) website¹⁴. In terms of connection prices, these were established by the operator of the distribution network and will be proposed to the regulator when the legislative and regulatory system has been agreed (*cf.* paragraph above). In both cases, as for the technical provisions, this information will be published on the Internet site of the network operator(s) and, for prices, on the Internet site of the Energy and Climate Directorate as well.

It is therefore now possible to proceed with this injection while respecting the technical provisions of the distributors or transporters of natural gas and the provisions relating to the origin of the waste. At present, projects for the injection of biogas into the network may be the subject of Heat Fund support. Discussions are under way to put in place a more specific system to develop this emerging sector.

4.2.9. District heating and cooling infrastructure development (Article 16(11) of Directive 2009/28/EC)

4.2.9.1. District heating infrastructures

Heating networks have an essential role to play in the context of the targets for the development of renewable energies and of the promotion of recuperated energy as they allow the use of "difficult" energies:

- biomass in all its forms for which the heating network enables the concentration in a single point of the storage requirements and handling of the fuel, to automate these operations and to better treat the smoke emissions;
- geothermal energy for which the drilling investments are very high and can only be written off over a very large number of users;
- incineration of household waste, which, due to the distance from residential areas and the quantity of heat produced, cannot be used by a single customer.

Facilities and production

The key figures resulting from the branch survey based on the 2008 data from heating networks report:

- 414 heating networks;
- A total installed power rating of 17 GWh and a "guaranteed" power rating, i.e. that provided by external sources (in particular waste incineration plants), of 2.7 GW.

¹⁴ <http://www.afgaz.fr/site/page-services-294.html>

- 209 heating networks equipped with cogeneration, representing an electric power of 1.7 GW and a thermal power of 2.2 GW;
- A supplied thermal production of more than 24.3 GWh which represents in the order of 5% of the heat consumed in the residential-tertiary sector.
- 3 201 km of pipes and 23 240 supply points serving different types of users (residential and tertiary for the most part, but also industrial) representing 2.1 million equivalent housing units (1.2 million housing units are actually connected).

The production of heat and electricity has been roughly constant for several years, excepting climatic variation.

Division by energy type

Only 35% of networks, producing 15% of the total heat, are single energy; 42% of these, producing 29% of the total heat, are dual energy (above all heavy fuel oil and gas, but also heat resulting from household waste incineration plants (UIOMs) and geothermal), while the others (23%) are triple or multi-energy and produce 56% of the final energy. 44% of the total incoming energy is allocated to cogeneration facilities for the heating networks.

The division by energy type of the heating networks resulting from the latest branch survey on the 2008 data is as follows:

- Fossil energies: 67% (Natural gas: 49%, Coal: 10%, Heavy fuel oil and high viscosity fuel: 7%);
- Renewable and recuperated energy: 29% (UIOM: 21%, Geothermal: 3%, Biomass: 3%, Industrial heating: 1%, Recuperated gas: 1%);
- Other energies: 4% (Other networks: 3%, External cogeneration: 1%).
- Renewable and recuperated energies represent 29% of the networks' energy mix.
- By decreasing order of importance, they include:
- UIOMs (household waste incineration plants): renewable and recuperated heat resulting from UIOMs accounts for 21% (half being considered as renewable energy and the other half as recuperated energy). Of the 130 UIOMs in existence, 44 supply heating networks.
- Geothermal: there are 33 geothermal heating networks, of which 28 in the Ile-de-France. Renewable geothermal heat accounts for 3% of total energy. The average power per unit is 8 MWth. These geothermal networks are multi-energy.
- Biomass: there are 55 heating networks using biomass of which 13 use wood in their energy mix to less than 30%, 12 at 30% to 80% and 30 to more than 80%. Wood fuels are of three sorts: by-products of the wood industry (65%), wood waste (25%) and wood chips (10%).

Share of cogeneration

209 networks include cogeneration equipment. Cogeneration equipment is essentially fed by gas. Coal, biomass and, to a lesser extent, recuperated gas, are also used in cogeneration systems installed on heating networks. Overall, cogeneration and UIOMs provide 50% of the energy mix for heat production by the networks.

Cogeneration facilities are always associated with a facility for the production of heat alone (for the winter peak and for the period of the year where cogeneration does not operate).

Customers for heating networks

Nearly 58% of the heat supplied, or 14 555 GWh, goes to residential properties. The remainder is essentially intended for the tertiary sector and industry (of which 15% to

hospitals and educational establishments).

Heating networks serve 1.2 million homes. More than half of these homes are social housing; they represent 17% of all social housing. A third of the heat sold by heating networks supplies social housing.

District heating networks supply above all the large, dense residential areas on the edges of towns. In a general manner, the more dense the residential area served, the lower the cost of transport, but the higher the cost of laying the pipes.

Examples of district heating networks

The largest French network is that operated in Paris by the Paris District Heating Company (CPCU): 437 km of pipes, 5 340 buildings connected and a third of the collective heating in Paris, distributing around 0.5 Mtoe of produced heat, nearly half from incineration plants and the remainder from conventional energies, 27% of the total heat being produced by cogeneration. It is the only French network where the heat is transported in vapour form.

The second largest network is that in Grenoble. This has a capacity of 529 MW of thermal energy, to which are added 12 MW of electric power. The length of the network is 150 km, production being 754 GWh (or 65 ktoe). This network is supplied to 54% by fossil energies (of which 25% is used by the cogeneration), 35% by UIOM heat or the incineration of meat and bone meal, and for the remaining 11% from biomass (essentially wood), this ratio starting at 6% in 2005 to move towards 14% in 2009.

Development of heating networks

Heating networks enable the optimal recovery of certain renewable energies and the use of waste heat, the Grenelle Environment Forum setting at 3.2 Mtoe the volume of renewable energy to be mobilised via heating networks in 2020, particularly from the following energy sources:

- Biomass: 1200 ktoe;
- Deep geothermal: 500 ktoe;
- Renewable energy share of Household Waste Incineration Plants, waste wood: 900 ktoe (cf. paragraph 4.6.1).

The heating PPI highlights in particular two imperatives linked to this target: it is necessary to compensate for the reduction in unit consumption in the building sector due to progress in energy efficiency by an extension in connections, and the scale of this extension will depend on the share of renewables in the network energy mix.

While heating networks offer strong potential for the development of renewable and recuperated energies by the substitution of renewable energies for fossil energies, these operations are cumbersome and complex, both technically and financially.

The process of significant development in renewable and recuperated heating in heating networks is complex but achievable. It has the advantage of a long life-expectancy from the point at which it is completed, as it essentially affects the residential and tertiary sectors. The process is complex because it involves the reconciliation of three separate developments:

- The substitution of renewable and recuperated energies for fossil energies (coal to begin with, but also heavy fuel oil and natural gas) today used at a level of 1.8 Mtoe in the networks.
- Heating savings in existing buildings already supplied by networks through operations or

services (insulation, improved management, etc.).

- Extensions of the networks, either in newly urbanised areas or existing residential areas. This assumes replacing existing fossil energies, generally gas or fuel oil, in collective heating systems.

The extension of "capillary" networks has two aims:

- To replace the demand for heating saved by programmes for the insulation of existing buildings and avoid the deterioration of the economic balance of the network.
- To ensure newly connected buildings have access to renewable and recuperated heat (either by substitution of the conventional energies in place or by avoiding the installation of non-renewable heating for new buildings).

The three phases in the development of networks must be conducted jointly in the context of a development programme for renewable and recuperated heat, established between heating professionals and the authorities in the conurbation concerned.

In addition, the aim of renewable and recuperated heat in the networks must be reconciled with the use of classic boilers (fuel oil/gas) to provide for peak heating demand (a few dozen days per year).

Professionals envisage a possible doubling of the number of equivalent housing units connected to heating networks by 2020 (on condition of very strong support); however, they consider that it will be difficult to go beyond a contribution of 50% of renewables in the inputs to heating networks (particularly due to load curve management). By using this figure of 50% as input data, the achievement of targets on renewables via heating networks thus imposes a quadrupling of the number of connections and reaching 8 million connected equivalent housing units in 2020.

An intermediate scenario would consist of connecting 6 million equivalent housing units to heating networks 75% supplied by renewable energies.

Incentive measures are thus implemented for the creation of new heating networks and for the extension of existing efficient networks; in other words, those using renewable and recuperated energies. The measures put in place since 2007 are described in paragraph 4.4.

In addition, network aid is also aimed at guaranteeing final clients with a lower price for the heat supplied than that of conventional energies, and also one that is more stable in the future. These final clients are, to a vast majority, social housing and public tertiary establishments (hospitals, retirement homes, schools, etc.), which contribute to social cohesion and the prevention of energy poverty.

Finally, these heating networks enable local and regional authorities to be implicated in the territorial energy context and to guarantee the use of local renewable energies which create employment.

4.2.9.2. Urban cooling infrastructures

In a dense urban context, the district cooling network enables pooling of cooling supply needs with production equipment that is more efficient in energy terms than decentralised equipment. It also enables continuous adaptation to supply needs and flexibility of adaptation in the supply points in comparison to the risk of obsolescence in independent facilities.

In addition, the power generated enables the design of systems integrating natural renewable resources such as rivers and the sea.

Finally, the environmental advantages of cooling networks are numerous:

- Reduction of sanitary hazards linked to Legionella infections (the sanitary hazard is reduced in particular in the case of production sites using river or sea water without water

cooling towers but also for sites with towers by better monitored centralised equipment with frequent analyses of decentralised facilities)

- Reduction in refrigerant liquids (cooling network sites are generally equipped with detectors and refrigerationist response teams responsible for seeking leaks)
- Reduction in noise pollution (production of centralised cooling enables the reduction of the number of independent facilities).
- Reduction in visual pollution (in particular the "plume" from water cooling towers in the case of the use of river or sea water sites).
- Reduction in water consumption (the use of sites cooled by river or sea water does not consume water compared to sites with water cooling towers).
- Reduction in heating of the air (independent facilities raise the air temperature and contribute to raising the temperature in the streets: urban heat island).
- Reduction in waste water emission into the environment

Facilities and production

The key figures resulting from the branch survey based on the 2008 data from cooling networks report:

- 13 cooling networks;
- A total installed power rating of 620 MW;
- A supplied thermal production of more than 894 GWh;
- 128 km of pipes and 841 supply points serving different types of users (tertiary for the most part, but also industrial), representing more than 80 000 equivalent housing units.

Division by energy type

77% of cooling networks, producing 51% of final refrigerant energy, are single energy; 23%, producing 49% of the final energy are dual energy.

The division by energy type of the cooling networks resulting from the latest branch survey on the 2008 data is as follows:

- Natural gas: 15 GWh (1%);
- UIOM: 26 GWh th (3%);
- Compressor cooling: 255 GWh e (95%);
- Cooling absorption: 8 GWh th (1 %).

Example of district cooling network

In Paris, the company Climespace produces and distributes refrigerant energy by network to respond to the air conditioning needs of Parisian buildings (hotels, department stores, offices, museums, etc.).

475 customers are supplied, and 500 buildings connected, mainly offices. With a length of 70 km, the iced water network is the first in Europe.

The cooling production centres are more than 50% cooled by water from the Seine: the "Bercy" (44 MW), "Canada" (52 MW) and "Palais de Tokyo" (52 MW) centres, the others by water cooling towers: the "Les Halles" (42 MW), "Opéra" (35 MW), "Auber" (26 MW), and "Etoile" (8MW) centres.

The production centres essentially consume electricity for the compressor motors.

Development of cooling networks

Apart from their environmental virtues and energy efficiency, district cooling networks are likely to mobilise renewable energies, particularly when the refrigeration units are cooled by sea or river water but also by the direct use of a naturally cold water source such as sea water pumped from depth or river water in winter to cool the network by avoiding the use of compressors (*free cooling*).

The solutions for cooling buildings by cooling networks in particular using sea or river water deserve therefore to be encouraged with a view to the advantages of this cooling system; an initial measure aimed at exempting the networks concerned from the tax on the holders of water intake works will enter into force in 2010.

4.2.10. Biofuels and other bioliquids — sustainability criteria and verification of compliance (Articles 17 to 21 of Directive 2009/28/EC)

An analysis project was carried out between January and July 2009 by the Agriculture, Ecology and Energy Ministries to identify the technical, administrative and financial choices open to the State and to economic operators in establishing the sustainability system for biofuels provided for by Directive 2009/28/EC on the promotion of renewable energies and by Directive 2009/30/EC relating to fuel quality.

On the national level, the principle of sustainability of biofuels has been introduced into the legislation: the Grenelle I law states, in its Article 21, that "*The production in France of biofuels is subject to energy performance and environmental criteria including in particular their effects on soils and water resources. France will support, at a European and international level, the establishing of a mechanism for the certification of biofuels taking into account their economic, social and environmental impact. Priority will be given to development and research on second and third generation biofuels.*"

The Member States must incorporate Directive 2009/28/EC no later than 5 December 2010.

For the incorporation of the Directive, the State will propose the legislative and regulatory measures necessary.

In particular, an order will include the Directive's definition of sustainability criteria, nominate the public representative and define their tasks, and indicate the general law measures which must be taken in application of Article 18-3 of the Directive, together with the arrangements for regulating the transitory phase.

The State will form the arrangements for granting tax exemptions for biofuel producers and fuel distributors in the light of the sustainability criteria defined by the Directive.

The sustainability criteria defined by the Directive are as follows:

- the reduction of greenhouse gas emissions from the production of the raw material up to the consumption of the biofuels;
- the restriction of the use of land for the production of biofuels (land with high biodiversity value and land representing significant carbon storage).

The State will require economic operators to provide proof of sustainability of biofuels. The economic operators have available three methods to do this:

- (1) By supplying the national authority with data, complying with the requirements of the State in the context of a national system;
- (2) By putting in place one or more "voluntary schemes" recognised by the Commission;

(3) In conformity with the terms of a bilateral or multilateral agreement concluded by the European Union and recognised by the Commission.

To respond to the requirements for the sustainability of biofuel production, the economic operators must ensure a sufficient level of independent verification of the information they will submit to the State. The traceability of the sustainability of biofuel production must be based on the mass balance method defined by the Directive.

In this context, the French regulations will define the arrangements for the framing of the independent verification which the economic operators must put in place (approval or accreditation of the certification bodies) and define the State's responsibility for verifying the information submitted to it by the economic operators. To do this, the State will equip itself with an information system accessible to the economic operators.

The State intends to entrust the task of verification and creation of the project report which must be submitted to the Commission every two years; the first from 31 December 2011 (according to Article 22 of Directive 2009/28/EC), to a national public representative. This representative must demonstrate agricultural and industrial skills, firstly for the processing of the agricultural raw materials and secondly for the incorporation of biofuels into the fossil fuel (petroleum), the distribution of the fuels and knowledge of the process of certification and quality control.

Such a national public representative does not currently exist. Discussions have been initiated to analyse whether the existing government-owned corporations could carry out tasks related to the management, control of the information chain and reporting of results as to the sustainability of incorporated biofuels.

The nomination of this management operator may take place at the end of 2010.

National legislation relating to land use in order to verify compliance with Article 17(3-5) of Directive 2009/28/EC

The sustainability criteria announced in sub-paragraphs 3 to 5 of Article 17 of Directive 2009/28/EC are based on a set of environmental conditions excluding certain areas (primary forests and wooded areas of indigenous species; areas affected by the law for the protection of nature; high biodiversity value grasslands; wetlands; forested areas; peat bogs).

Currently, France has an inventory of each of these zones defined by an environmental challenge; in addition, changes in land use are the subject of specific regulatory measures, the implementation of which is ensured by the Spatial Planning Minister.

The areas of environmental challenge of interest in terms of the sustainability criteria of Directive 2009/28/EC are listed in the table below:

<i>Articles of Directive 2009/28/EC</i>	<i>Areas</i>	<i>Regulatory reference</i>
Art. 17- 3 b) <i>i</i>	Natura 2000 zones (sites of community importance and areas of special protection)	Articles L.414-1 to 414-7 of the Environmental Code (EC)
	Biotope protection orders	Articles L.411-1 and 411-2 and R.411-15 to 411-17 of the EC
	Coastal Protection Agency land	Articles L.322-1 to 322-14 of the EC
	National parks	Articles L.331-1 to 331-15 of the EC
	Regional natural parks	Articles L.333-1 to 333-4 of the EC
	Wooded areas and state forests subject to regulations	Articles L.133-1, R.133-5 and L143-1 of the Forestry Code
	Nature reserves and voluntary nature reserves	Article L.332-1 to L.332-19 of the EC
	Hunting and wild animal reserve	Article L.422-27, R.422-82, R.422-86, R.422-90 and R.422-91 of the EC
Art. 17- 3 b) <i>ii</i>	National hunting and wild animal reserves	R.422-92 and R.422-93 of the EC
	Biosphere reserves (UNESCO)	
	RAMSAR sites	Ramsar convention of 2 February 1971
Art. 17- 4a	Wetlands	Articles L.211-1, R.211-108 and 211-109, R.214-1 to R.214- 56 of the EC
	Wetlands of particular environmental interest	Article L.211-3 of the EC, Articles R.114-1 to R.114-10 of the Countryside Code

The forested areas, wetlands and peat bogs are not yet subject to exhaustive cartographic identification.

This complete inventory of environmental information, to a large extent geo-referenced, is not

yet accessible to economic operators via a coherent and computerised geographical information system which would permit the definition, for a given geographic point, of all the environmental challenges that could be identified. It is not therefore currently possible to supply rapidly to all of the biofuel producers who request them the cartographic documents permitting them to prove a priori compliance of the biofuels in respect of these sustainability criteria.

In the context of the implementation of Directive 2009/28/EC, it is however intended to finalise in the short term the deployment of the national environmental information system, initiated in 2006, in order to guarantee to economic operators reliable and secure computer access to the required environmental information to verify conformity to the spatial aspects of the sustainability criteria.

Details of the classification of protected areas

The environmental areas identified by Directive 2009/28/EC relate to regulatory categories used in France, listed above, which fall under international and community protection regimes.

Procedure relating to changing the status of land

In the context of the approval of the sustainability criteria of Directive 2009/28/EC as national law, a procedure relating to the monitoring of land status change will be put in place.

In addition, the CAP makes it possible already to identify cultivated areas on the basis of the declarations of farmers, but this system does not currently permit the identification of the destination of the crops.

Compliance with good agro-environmental practices and with the environmental cross-compliance requirements laid down by Article 17(6) of Directive 2009/28/EC

The provisions made as required by the Common Agricultural Policy in 1992, then in 2003, render ineligible for community aid that land which was not already declared and referenced in a parcel register. Apart from these declarations of areas, the aid granted to producers as required by the Common Agricultural Policy is subject to conditions relating to production and respect of environmental challenges, which are the subject of specific checks.

Currently, the environmental criteria for the conditionality of Common Agricultural Policy aid are checked at the level of the raw material producer.

Voluntary "certification" systems for the sustainability of biofuels and bioliquids

As previously indicated, the State will require economic operators to provide proof of the sustainability of biofuels. The economic operators have available three methods to do this:

- (1) By supplying the national authority with data, complying with the requirements of the State in the context of a national system;
- (2) By putting in place one or more "voluntary schemes" recognised by the Commission;
- (3) In conformity with the terms of a bilateral or multilateral agreement agreed by the European Union and recognised by the Commission.

4.3. Support schemes to promote the use of energy from renewable resources in the electricity sector

4.3.1. Regulation

For each electricity production sector, the Multi-annual Investment Programming for electricity production contains targets to be achieved. However, the choice has been made not to make these targets binding, but to put the emphasis on incentives.

For example, the electricity suppliers are not forced to incorporate a minimum share of renewable energy into their offers. Similarly, there is no regional or communal constraint on the use or production of renewable energies.

While there is no regulatory obligation as to the production of renewable energies, the thermal regulation of buildings as described in 4.2.3. is a tool which may nevertheless contribute to the development of electricity microproduction methods. Even if a minimum share of renewable energy production is not currently imposed, it encourages project sponsors to install these methods to comply with overall performance thresholds expressed in [kWhPE/m² per year](#) of primary energy consumed (the production of energy from renewable resources is to be subtracted from the quantity consumed). The low consumption level (50 kWhPE/[m² per year](#) of primary energy for housing) planned for 2011-2013 should thus stimulate the installation of renewable electricity production methods.

4.3.2. Financial support

There exist today large disparities in maturity between the renewable energy production sectors. The incentive mechanisms put in place are consequently different according to the sector and should be subjected to periodic adaptations to take into account technical and economic developments.

For mature and capitalistic technologies, such as water power and land-based wind power, the purchasing prices are thus particularly suitable and are aimed at protecting investors against the risk of electricity price fluctuations and at ensuring them a guaranteed return on their investment. Where there are particular technical or environmental criteria, as is the case for biomass (particulate emission during combustion and biomass supply) or sea-based wind power (connection sharing), the use of calls for tender is preferred. For largely decentralised sectors such as photovoltaic, the incentives are principally aimed at reducing the initial investment while at the same time ensuring good integration and use of equipment (integration into the built environment). More global measures such as the zero rate eco-loan make it possible to encourage project sponsors to carry out complete renovations and to combine energy efficiency and renewable energy production.

Other means of support may, in time, be considered to permit an additional mobilisation of forest biomass, as indicated in paragraph 4.6.1.

Purchase price

The main tool for the support of electricity production facilities, the obligation to purchase electricity concerns all methods of renewable production, and in particular the photovoltaic, wind power and biomass sectors. The associated regulatory texts are [Article 10 of Law no. 2000-108 of 10 February 2000](#), decree no. 2001-410 of 10 May 2001, decree no. 2000-1196 of 6 December 2000, together with, for each sector, the price decree describing the purchase prices and attribution conditions issued by the Energy Minister.

The bodies responsible for the obligation to purchase are the electricity distributors (EDF or

local distribution companies). The contribution to the public electricity service, paid by all electricity consumers, makes it possible to compensate the electricity distributors for the extra costs linked to the obligation to purchase for renewable origin electricity.

Regarding technical specifications, certain purchase prices are modified according to performance criteria: this is particularly the case for biomass where an energy efficiency bonus together with a bonus depending on the biomass type used may be granted. As regards, photovoltaic, a highly incentive bonus for integration into constructions and a bonus for simplified integration into constructions have been in place following the price review in January 2010. The criteria for granting these integration bonuses are binding and are described in the order of 12 January 2010 relating to facilities using radiant solar energy.

The obligation to purchase is opened by Grenelle II law to local and regional authorities and to government-owned corporations that depend directly from them.

The obligation to purchase is entered into for a duration of 15 to 20 years according to the technologies and their degree of maturity. For each sector, the level of purchase prices is periodically reviewed in order to remain in line with the maturity of the sector and the reduction in production costs. The mechanism is financed by the contribution to the public electricity service: the excess electricity purchased by the energy suppliers is distributed over the electricity bills of all users prorata with their consumption.

For the sake of brevity, the table below resumes the main characteristics of purchase prices together with their past development. The details of attribution conditions are provided in the price decrees.

It should be noted that a review of these purchase prices is being studied for biogas.

Summary table for purchase prices for renewable origin electricity

Sector	Orders regulating the purchase of electricity	Duration of contracts	Example of prices for facilities in service at the date of publication of the orders
Water power	1 March 2007	20 years	- 6.07 euro cents/kWh + bonus between 0.5 and 2.5 euro cents/kWh for small facilities + bonus between 0 and 1.68 euro cents/kWh in winter depending on production regularity. - 15 euro cents/kWh for sea water energy (wave energy, tidal energy or ocean current energy)
	25 June 2001	20 years	5.49 to 6.1 euro cents/kWh (36 to 40 euro cents/kWh) according to the power rating + bonus between 0 and 1.52 euro cents/kWh (10 euro cents/kWh) in winter according to production regularity
Geothermal	10 July 2006	15 years	- Metropolitan France: 12 euro cents/kWh , + energy efficiency bonus between 0 and 3 euro cents/kWh - Overseas department and region: 10 euro cents/kWh , + energy efficiency bonus between 0 and 3 euro cents/kWh
	13 March 2002	15 years	7.62 euro cents/kWh (50 euro cents/kWh) + energy efficiency bonus between 0 and 0.3 euro cents/kWh (2 euro cents/kWh)
Wind power	17 November 2008		- land-based wind power: 8.2 euro cents/kWh for 10 years, then between 2.8 and 8.2 euro cents/kWh for 5 years depending on the sites. - sea-based wind power: 13 euro cents/kWh for 10 years, then between 3 and 13 euro cents/kWh for 10 years depending on the sites.
	10 July 2006	15 years (land-based) 20 years (sea-based)	- land-based wind power: 8.2 euro cents/kWh for 10 years, then between 2.8 and 8.2 euro cents/kWh for 5 years depending on the sites. - sea-based wind power: 13 euro cents/kWh for 10 years, then between 3 and 13 euro cents/kWh for 10 years depending on the sites.
	08 June 2001	15 years	8.38 euro cents/kWh (55 euro cents/kWh) for 5 years, then 3.05 to 8.38 euro cents/kWh (20 to 55 euro cents/kWh) for 10 years depending on the sites.

Sector	Orders regulating the purchase of electricity	Duration of contracts	Example of prices for facilities in service at the date of publication of the orders
Photovoltaic	12 January 2010 and modification of 15 January 2010	20 years	- facilities integrated into constructions: 58 euro cents/kWh or 50 euro cents/kWh according to the use of the building - simplified facilities integrated into constructions: 42 euro cents/kWh. - other facilities Overseas Departments, Mayotte: 40 euro cents/kWh; Metropolitan France: 31.4 euro cents/kWh adjusted by +0% to +20% according to the average sunshine of the area of establishment.
	10 July 2006	20 years	- Metropolitan France: 30 euro cents/kWh , + bonus for integration into the construction of 25 euro cents/kWh - Corsica, Overseas Departments, Mayotte: 40 euro cents/kWh , + bonus for integration into the construction of 15 euro cents/kWh
	13 March 2002	20 years	15.25 euro cents/kWh in continental France and 30.5 in Corsica and Overseas Departments (1euro/kWh and 2 euros/kWh)
Cogeneration	31 July 2001	12 years	6.1 to 9.15 euro cents/kWh (approximately 40 to 60 euro cents/kWh) according to the price of gas, the duration of operation and the power rating.
Household waste except for biogas	02 October 2001	15 years	4.5 to 5 euro cents/kWh (29.5 to 32.8 euro cents/kWh) + energy efficiency bonus between 0 and 0.3 euro cents/ kWh (2 euro cents/kWh)
Combustion of non-fossil vegetable material (biomass)	28 December 2009	20 years	4.5 euro cents/kWh + optional bonus between 8 and 13 euro cents/kWh granted according to the power rating, resources used and efficiency, and adjusted according to the latter
	16 April 2002	15 years	4.9 euro cents/kWh (32.1 euro cents/kWh) + energy efficiency bonus between 0 and 1.2 euro cents/kWh (7.8 euro cents/kWh)
Raw or processed animal waste (meat and bone meal)	28 December 2009	20 years	4.5 euro cents/kWh + optional bonus between 8 and 13 euro cents/kWh granted according to the power rating, resources used and efficiency, and adjusted according to the latter
	13 March 2002	15 years	4.5 to 5 euro cents/kWh (29.5 to 32.8 euro cents/kWh) + energy efficiency bonus between 0 and 0.3 euro cents/kWh

Sector	Orders regulating the purchase of electricity	Duration of contracts	Example of prices for facilities in service at the date of publication of the orders
Biogas	10 July 2006	15 years	between 7.5 and 9 euro cents/kWh according to the power rating, + energy efficiency bonus between 0 and 3 euro cents/kWh
	3 October 2001 (valid for landfill biogas only)	15 years	4.5 to 5.72 euro cents/kWh (29.5 to 37.5 euro cents/kWh) according to the power rating + energy efficiency bonus between 0 and 0.3 euro cents/ kWh (2 euro cents/kWh)
Methanisation	10 July 2006	15 years	between 7.5 and 9 euro cents/kWh according to the power rating, + energy efficiency bonus between 0 and 3 euro cents/kWh , + methanisation bonus of 2 euro cents/kWh .
	16 April 2002	15 years	4.6 euro cents/kWh (30.2 euro cents/kWh) + energy efficiency bonus between 0 and 1.2 euro cents/kWh (7.8 euro cents/kWh)
Other installations of less than 36kVA	13 March 2002	15 years	7.87 to 9.60 euro cents/kWh (51.6 to 63 euro cents/kWh) resulting from "blue" tariff for domestic customers

Calls for projects for the production of renewable electricity

Calls for national or regional projects are useful mechanisms to generate momentum in a particular sector. The administration of national calls for projects is entrusted to the Energy Regulation Commission (CRE) and monitoring of projects is done in collaboration with the Energy Minister. National calls for projects since 2003 have related to:

- 2003 and 2005: construction of biomass centres,
- 2005: construction of land-based wind farms,
- 2006: construction of cogeneration biomass centres,
- 2009: construction of cogeneration biomass centres and construction of land-based photovoltaic centres in each French region (total power 300 MW).

Other calls for projects are being prepared, in particular for the construction of biomass centres (call for projects renewable each year) and the construction of land-based wind farms in the Overseas Departments and Corsica (with forecasting and storage system) and of sea-based wind farms (installation of significant power levels, in selected areas, optimising connection conditions).

The case of biomass illustrates the potential in calls for projects in terms of performance requirements. Each call for projects is the occasion to specify, in the technical specification, the performance criteria to be achieved. The current call for projects has therefore emphasised the securing of the heat outlet, which maximises the energy performance of the projects, and of the biomass supply system. These two measures enable savings in resources and the anticipation of possible use conflicts. It is planned to renew annually the call for projects for the construction of biomass centres, adapting the specification to technological progress, to the maturity of the sector and to the sources of biomass available (wood waste, slurry, green algae, etc.).

Sustainable development Income tax credit

The 2005 finance law led to a complete recasting of the income tax credit for expenditure on equipment for main residences, intended to refocus this system on more efficient equipment in energy terms and on equipment using renewable energies. This measure, which promotes widespread distribution of sustainable energy equipment, contributes to the achievement of the ambitious French targets in terms of energy savings and renewable energies. It falls within the strategy implemented to reduce by a factor of four our greenhouse gas emissions by 2050. The 2006 finance law, the 2009 finance law and the third amending finance law for 2009, in particular, have completed the initially planned measures. In particular, regarding equipment for the production of energy from renewable resources, those eligible are: heating appliances operating on wood or other biomasses, heating or domestic hot water equipment operating on solar or water-power energy, heat pumps for heating or domestic hot water with the exception of air/air heat pumps, equipment for the production of electricity operating on solar, wind or water power, or biomass.

Created in 2005, the tax credit was initially conceived until 2009. It has been extended until 2012.

The results of the Sustainable development tax credit for 2009 are described in Annex 2.

Beneficiaries

The benefit of the tax credit is granted to tax payers, natural persons, who pay expenditure for equipment for their main residence. The tax advantage applies without distinction to tax payers who are owners, tenants or non-paying occupants of their main residence. For some equipment, the housing must fulfil an age condition.

The supply and installation of the equipment must, in principle, be carried out by the same company and be the subject of an invoice showing the performance characteristics required to benefit from the tax advantage. The list of eligible equipment, together with the technical criteria required, are published in a ministerial order which is regularly updated.

The tax credit applies to the purchase price of these equipments, materials and appliances such as is evidenced by the invoice supplied by the company having carried out the works. In the case of additional public aid for the acquisition of the equipment (regional council, general council, ANAH, etc.), the calculation of the tax credit is made based on the expenditure for the acquisition of the equipment, with deduction made for the public aid.

Since 1 January 2009, the field of application for the tax credit has been extended to lessors on the condition that they undertake to rent the property concerned, unfurnished, for main residential use, for a minimum period of five years, to persons other than their partner or a member of their tax household.

Eligibility ceiling

The ceiling for eligible expenditure, fixed at €8 000 for a single person and €16 000 for a couple subject to joint taxation, plus €400 per dependant, is assessed over a period of five consecutive years between 1 January 2005 and 31 December 2012.

The ceiling for eligible expenditure relating to rented housing is fixed at €8 000 per property and is assessed taking into account for each property all expenditure carried out over the multi-annual period 2009-2012. In a single tax year, the tax credit may only be applied to the eligible expenditure limit related to three rental properties.

Technical specifications

The sustainable development tax credit targets a range of efficient products. The products concerned are heating regulation and programming appliances for heating equipment, thermal insulation materials, appliances for heating and domestic hot water production from renewable energies and appliances for renewable electricity production .

The conditions for the granting of the tax credit for equipment for the production of energy from renewable resources are based on their energy and environmental performance. Eligible equipment must correspond to performance criteria. The following criteria are given as an example:

- in terms of heating or domestic hot water supply equipment operating on solar energy, it is required that the solar collectors correspond to CSTBat or Solar Keymark certification or equivalent based on European standards.
- in terms of heating or hot water production equipment operating on wood or other biomasses, an energy efficiency superior or equal to 70% is required, and a rate of carbon monoxide (CO) of less than or equal to 0.3%, according to the testing standards in force. These standards vary according to the type of appliance: standard NF EN 13240 or NF D 35376 or NF14785 or EN 15250 for stoves, standard NF EN 13229 or NF D 35376 for closed hearths and inserts, standard NF EN 12815 or NF D 32301 for cookers used as a means of heating,
- in terms of boilers operating on wood or other biomasses, an energy efficiency greater than or equal to 80% (manual loading) or 85% (automatic loading) is required, according to

- standard NF EN 303.5 or EN 12809 and of which the power rating is less than 300 kW,
- in terms of systems for supplying electricity from solar energy, it is required that they respect standards EN61215 or NF EN 61646,
- in terms of heat pumps, their performance coefficient must be at least 3.4, according to the reference for the testing standard 145 11-2.

These attribution conditions are reviewed periodically according to technological advances and the distribution of equipment.

Recent developments in the tax credit regarding equipment for the production of energy from a renewable resource

The tax credit is intended to promote the installation of the most efficient systems and for which the market has not yet arrived at maturity.

In this context, two main developments in the fiscal arrangements at 1 January 2009 have taken place:

- air/air heat pumps have been excluded from the tax credit,
- the rate of the tax credit is reduced from 50 to 40% for heat pumps other than air/air, boilers and heating equipment operating on wood or other biomasses.

The main developments in the fiscal arrangements at 1 January 2010 are as follows:

- the rate of the tax credit is reduced from 40 to 25 % for aerothermal heat pumps other than air/air, and for wood-fired heating equipment, given the maturity of these sectors.
- the rate of the tax credit is raised from 25 to 40% in the case of the replacement of a wood-fired or other biomass boiler or of independent heating or hot water production equipment operating on wood or other biomasses by a material equivalent, with a view to reducing the polluting emissions of the boiler stock,
- the rate of the tax credit is fixed at 40% for geothermal heat pumps, the expenditure for the installation of the underground heat exchanger is now included in the basis for the tax credit, in order to stimulate this stagnant market,
- thermodynamic domestic hot water equipment is now included in the tax credit (40%),
- photovoltaic equipment still benefits from a 50% rate of tax credit.

The zero rate eco-loan

The zero rate eco-loan enables improvement in the profitability of projects to reduce energy consumption or to incorporate renewable energy production systems. Set up in the 2009 finance law, the zero rate eco-loan concerns owner-occupiers, lessors, non-commercial companies not subject to company tax and of which at least one of the associates is a natural person. The property must have been completed before 1 January 1990 and be used or be intended to be used as a main residence. All individual may benefit from these loans for projects in their main residences, including properties in shared ownership and rental properties. In the case of properties in shared ownership, the zero rate eco-loan can finance the work on the shared and private parts of the property. The ceiling for the repayable advance granted to a household by the bank is set at €30 000 per property. The duration of the repayment varies between 3 and 10 years, and up to 15 years on proposal by the partner bank.

The zero rate eco-loan can be combined with other support arrangements, in particular energy saving certificates, and the zero rate loan granted for acquisition-renovation operations. The zero rate eco-loan also completes the range of financial incentives that already exists for building renovations, such as the "sustainable development" tax credit or the sustainable development account. On a temporary basis until the end of 2010, and on a means-tested basis, it is possible to combine the sustainable development tax credit and the zero rate eco-loan.

The first elements of the monitoring arrangements are presented in Annex 2.

Process

The zero rate eco-loan operates via an agreement signed between the Energy Minister, the ADEME and a network of partner banks. After having identified the works to be carried out with the company or artisan chosen, the project sponsor approaches one of the partner banks and presents it quotes relating to the chosen operation. The bank grants the zero rate eco-loan under the classic conditions for granting a loan. Upon award of the loan, the borrower has a period of two years to carry out the works and transmit to the bank all elements proving that the work has been done in accordance with the detailed quotes. At the end of the works, the borrower must make a return visit to the bank equipped with the paid invoices. The State compensates the bank for the absence of interest received by granting a tax credit.

Attribution conditions

The zero rate eco-loan enables the financing of energy saving works and any costs resulting from this work in order to make the property more energy efficient, more comfortable and less emitting of greenhouse gases. It concerns:

- the cost of the supply and fitting of equipment, products and works necessary to the execution of the eligible work,
- the cost of the removal and disposal of existing works, products and equipment,
- the costs of project management and studies relating to the work,
- the project owner's insurance costs, if any, taken out by the borrower,
- costs for work required inseparably linked to the eligible work.

To benefit from the zero rate eco-loan, it is necessary:

- either to implement a "combination of works" comprising at least two activities enabling a significant improvement in the energy performance of the property,
- or to achieve a minimum level of "overall energy performance" for the property (in the context of an energy study carried out by a design office),
- or to implement work for the rehabilitation of non-collective sanitation systems by systems not consuming energy.
- The overall thermal approach of the property consists of reducing the theoretical consumption of the building to fall below the following thresholds:
- an energy consumption of less than 150 kWhPE/m² per year, if the property consumes, before the work, more than 180 kWhPE/m² per year,
- an energy consumption of less than 80 kWhPE/m² per year, if the property consumes, before the work, less than 180 kWhPE/m² per year.

A "*combination of works*" is a set of coherent work whose simultaneous execution provides a noticeable improvement in the energy efficiency of the property. The works, carried out by professionals, must be chosen from at least two of the following categories:

- efficient insulation of the roof,
- efficient insulation of the exterior walls,
- efficient insulation of the exterior windows and doors,
- installation or replacement by an efficient heating or domestic hot water production system,
- installation of a heating system using renewable energies,
- work for the installation of domestic hot water production equipment using a renewable energy source.

To compose a combination of works eligible for the zero rate eco-loan, the equipment and material used must correspond to specific minimum technical characteristics virtually identical

to those for the tax credit¹⁵.

Other fiscal exemption and degressive or exceptional depreciation

In parallel with the tax credit, it is possible under certain conditions to benefit from fiscal exemption and specific allowances. Thus, the owners of photovoltaic facilities of a power rating less than 3 kW are exempt from fiscal procedures related to the resale of electricity generated and in particular do not pay income tax on this electricity sale.

Farmers benefit from advantageous fiscal regimes enabling them to avoid paying the whole of the income tax associated with the resale of electricity (produced by a biomass centre or a photovoltaic facility).

Finally, Articles 39 AA and 39 AB of the General Tax Code provide that renewable energy production equipment may be the subject of degressive or exceptional depreciation over 12 months. The item is depreciated over 12 months, thus more rapidly than is justified by the wear in economic terms, which permits the deduction of annual investments higher than that of the degressive depreciation. The list of materials concerned is set by Article 2 of Article 4 of the General Tax Code:

- geothermal or air/water heat pumps for which the performance coefficient is higher than or equal to 3,
- condensing turbine for the production of electricity from steam coming principally from the incineration of industrial or household waste,
- material enabling the recuperation of solar energy for preheating of fluid, the preparation of boiler water, of domestic hot water and its storage, for the production of electricity, its storage and its connection to the network,
- material enabling the use of water power, wind power or geothermal energy, its storage and connection to the electric or heating network,
- material enabling the use of tidal, wave and thermal energy from the sea and its storage,
- material for exploiting biomass (boilers with auxiliary equipment and storage and fuel supply equipment, forestry equipment used exclusively for the production and preparation for wood for energy use, digesters and thermal or electric production equipment associated with the use of biogas), other material for the thermo-chemical conversion of biomass, other types of equipment for the thermal and electrical use of biofuels,
- networks for the recuperation and collection of biogas with a view to its use as energy,
- material for the connection of a heating network classified in the sense of the [Law no. 80-531 of 15 July 1980](#) relating to energy savings and to the use of heat, material for the connection of a heating network using predominantly geothermal energy.

Other than geothermal or air/water heat pumps which must have a performance coefficient greater than or equal to 3 according to testing standard 14511-2, the equipment is not backed by any normative or performance specifications: they are applicable to all equipment entering into the types of equipment considered for exemption or depreciation.

¹⁵ With the exception of:

- heat pumps for which the performance coefficient is 3.3,
- independent wood-fired appliances for which the minimum CO rate is tightened from 0.6 to 0.3%, wood-fired boilers for which the minimum return is increased from 70 to 80% (manual loading) and 75 to 85% (automatic loading).

Systems to guarantee the production of renewable origin electricity

Origin guarantee system

Under the provisions of Directive 2001/77/EC relating to the promotion of electricity produced from renewable energy sources on the internal electricity market, a system for the issuing of guarantees of origin is provided for by Article 33 of the programme law no. 2005-781 of 13 July 2005, which lays down the guidelines for energy policy. This law is completed by decree no. 2006-1118 of 5 September 2006 relating to guarantees of origin for electricity produced from renewable energy sources or by cogeneration.

The issue of these guarantees has been entrusted to bodies which measure the injection of the quantities of electricity concerned into public transport or distribution networks. It is thus the electricity transport and distribution network managers who have been nominated to issue in a reliable, efficient and neutral manner these guarantees of origin. It is pointed out that the transport or distribution network managers carry out the same function, each one managing a network level depending on the voltage levels concerned.

These bodies guarantee equal treatment for all producers. The issuing procedure enables any electricity production facility to benefit from guarantees of origin. No threshold for quantity produced is set for requesting a guarantee. The request for a guarantee of origin is addressed to the distribution or transport network manager according to whether the facility is connected to a distribution or transport network. Where the facility is not connected to a network or where the electricity is auto-consumed, the transport network manager is the recipient of the request and defines in agreement with the applicant the counting methods.

The reliability of this system results in particular from the arrangement whereby the dates of the start and end of production periods for which guarantees of origin may be requested must coincide with the dates for reading the counting data for the network access contracts, which facilitates checking for the body that issues the guarantees of origin. The network managers concerned are best situated to verify these criteria.

The guarantees of origin thus issued are entered into a national register for guarantees of origin managed by the single manager for the electricity transport network. The elements of this register are accessible to the public on the transport network manager's Internet site¹⁶.

The cost of issuing a guarantee of origin is set by the State (Article 10 of decree no. 2006-1118 of 5 June 2006, order of 26 September 2006 published in JORF (Official Journal of the French Republic) on 30 September 2006, which sets the price for issuing guarantees of origin) and it is a function of the real cost supported by the operator on the basis of the costs incurred by the network managers.

The guarantees may be transferred by agreement between actors independent of the route of the electricity produced (separation of the physical flow from the flow of the guarantee of origin), until a final user who is generally a supplier. The transport network manager has available an information system enabling him to register these transfers of guarantees of origin between actors, in order to know in a reliable and rigorous manner the name of the final user. When a guarantee is declared used, the register is updated with the legal denomination of the final user.

It should be noted that this system is not open to electricity producers wishing to benefit from the purchasing obligation to the extent that the purchaser of electricity in the context of the purchasing obligation is subrogated in the producer's rights to request a guarantee of origin.

¹⁶ http://grte/lang/fr/clients_producteurs/services_clients/garantie_registre_pop.jsp

RECS certificates

The RECS (Renewable Energy Certificate System) is a harmonised European system of traceability and certification for electricity of renewable origin. It is a sub-set of the "European Energy Certificate System" (EECS), resulting from a private initiative and which aims at tracing electricity throughout Europe.

The RECS is administered in each country (geographical area) by a single issuing institution (Observ'ER in France). After opening an account with the issuing institution, the producer sends a request for a certificate to the issuing institution no later than three months after the production of the electricity that is the subject of the request for certification. In France, according to Observ'ER, the request must be accompanied by evidence of the production supplied by the transport or distribution network manager; this evidence is verified by Observ'ER. Once the request has been approved, Observ'ER credits the producer's account with the corresponding RECS certificates.

Installations under fixed rate purchasing obligation may use electricity produced by the issuing of RECS certificates. This system is the basis of the "green offers" made by certain electricity suppliers to particular industrial customers.

Development of the arrangements

Directive 2009/28/EC sets conditions for the development of the guarantees of origin for electricity from renewable origins. Discussions are under way to define a system compatible with the requirements of the Directive and should be complete by 2012. In particular this involves finding a solution to avoid double issues (by the national system for the guarantee of origin and of RECS certificates) and to key in the electricity certification with the "feed-in tariffs".

Demonstration funds¹⁷

Created in July 2008, the Research demonstration funds are a commitment from the Grenelle Environment Forum. They are managed by the ADEME and are intended to support experimentation in still developing technologies through the creation of demonstrators, sometimes of reduced size but sufficiently large to be representative of use conditions in an industrial environment. It has 400 million euros over the period 2009-2012, of which 75 million euros of repayable advances and 325 million euros of subsidies.

Operation

The control of the funds is guaranteed by a management committee in charge of identifying strategic sectors. When an area is identified, a roadmap is created to clarify the vision for the development perceived by the stakeholders. This is followed by a call for expressions of interest (CEI) which constitutes the specification to be followed. The selection of projects is carried out by an advisory committee which includes, in addition to the finance and research ministries and agencies, qualified persons and experts.

The aid distributed during the calls for expressions of interest may take the form of subsidies or repayable advances limited by the competition rules imposed by the European Union.

Calls for expressions of interest

Several CEIs have already been launched. Concerning the production of renewable electricity, a CEI concerning the production of electricity from maritime technologies was launched in 2009, together with a CEI on intelligent networks. A CEI concerning the

¹⁷ Reference of the notification to the European Commission: State Aid N 397/2007- ADEME research aid regime, for development and innovation authorised by decision of the Commission of 31 January 2008

production of electricity from innovative photovoltaic devices and a CEI concerning the production of electricity from solar thermodynamic centres are being prepared and should be launched in 2010.

Discussions are in progress to determine other strategic sectors where calls for expressions of interest could be carried out.

Reduced rate VAT (renovation work in housing more than two years old)

The Tax Instruction of 8 December 2006 published in the Bulletin Officiel des Impôts (BOI) 3-C-7-06 and exemption no. RES 2007-50 of 4 December 2007 state that the mechanism for reduced rate VAT described in 4.4 applies to photovoltaic facilities when the installed power rating is less than 3kWc. Above this power rating, the normal VAT rate of 19.6% applies. In the case of multi-occupation housing, this threshold of 3kWc is considered per housing unit.

Aid for renewable electricity production systems not connected to the network

In 10 years, more than 5 000 homes have been supplied with electricity through photovoltaic solar energy. To this figure should also be added numerous other applications: telecommunication relays, mountain refuges, pumping stations, etc.

Aid for the electrification of an isolated site concerns main residences and buildings for professional or tourist uses. When the cost of electrification is less than that of connection to the network, it is possible to benefit from specific aids. These come either from FACE (Fonds d'Amortissement des Charges d'Electrification, the Fund for the Amortisation of Electrification Costs, funded by the State) if the site is in a rural area, or the ADEME if the site is in an urban area. This aid is determined according to the cost of the installation and the cost of the connection and may attain up to 95% of the cost of the installation.

Energy Performance Plan for farms (PPE)¹⁸

The energy performance plan for farms, launched by the Minister of Agriculture and Fisheries on 3 February 2009, enables farmers to take part in achieving the Grenelle Environment Forum targets. This plan for energy saving and the production of renewable energies aims to support the execution of specific actions and investments enabling farms to better respond to environmental requirements and to the guidelines of the Grenelle Environment Forum. The challenge for the plan for farms is to act directly on direct energy consumption (petroleum products, electricity) and indirect energy consumption (energy used for the manufacture of inputs, material and buildings), in order to initiate a reduction in consumption and therefore in the energy bill and greenhouse gas emissions.

The PPE is thus aimed at increasing the number of low energy dependence farms. It is divided into 8 areas:

- Area 1 - Better evaluate the energy balance sheet for farms
- Area 2 - Broadcast energy diagnoses on a massive scale
- Area 3 - Improve the energy efficiency of agricultural equipment
- Area 4 - Improve the energy efficiency of agricultural production
- Area 5 - Promote the production of renewable energy
- Area 6 - Take into account the specifics of the Overseas Departments
- Area 7 - Promote research and innovation

¹⁸ Notified to the European Commission in the context of the PDRH (French rural development programme) 200720 13 under measure 121 C and 125 C which benefit from joint financing from the EAFRD

- Area 8 - Organise the national monitoring of the plan and its territorial implementation and communicate regarding the improvement of energy performance.

Areas 1 to 4 translate into aid for the execution of an energy performance diagnosis. It includes an inventory of direct and indirect energy consumption. It enables the identification of progress margins and the actions that farms can carry out to improve the energy performance of their operation, their production, their material and their buildings. These actions may include:

- the adoption of practices which are more energy efficient (adjust the use of agricultural machinery, choose crops which consume less energy and nitrogenous fertilisers, etc.);
- the choice of equipment (machinery and buildings) that require less energy;
- the opportunity for some farms to produce their own renewable energy.

The energy performance diagnosis must be carried out on the operation by competent persons who are registered on a departmental list, based on a specification that has been approved by the administration. The target of the energy performance plan is to carry out 100 000 diagnostics by 2013.

Depending on the recommendations of the diagnosis, aid for investments may be granted, and in particular aid for investments aimed at producing renewable energies.

Area 5 of the PPE, "promotion of the production of renewable energy" provides for aid for investments for the installation of solar water heaters, biomass boilers, thermal exchangers and heat pumps, and for methanisation units and equipment linked to the production of electricity on an isolated site not connected to the network (small wind farms and photovoltaic panels). Regarding the subsidised equipment, this plan will also be referred to in paragraph 4.4 (production of renewable heat) and in paragraph 4.6 (production of biogas).

4.4. Support schemes to promote the use of energy produced from renewable resources in the heating and cooling sector

Following the Grenelle Environment Forum, France has put in place an overall policy of support for the development of renewable thermal energies, by sector, use and technology, mainly based on investment aid¹⁹. The development of renewable energies may only be of "high environmental quality". As an example, support for the development of wood energy is based on strict measures promoting the conservation or improvement of air quality, by the support of efficient technologies in terms of pollutant emissions.

In the residential sector, particularly in individual housing, measures for aid for investment support renewable heat production equipment (Sustainable Development tax credit, zero rate eco-loan, thermal renovation aid). More general measures, such as reduced rate VAT for work in existing buildings, are not specific to renewable energies and to energy efficiency works, but nonetheless enable strong support for their development.

In the collective housing (in addition to the aid previously mentioned), tertiary, agricultural and industrial sectors, different arrangements for financial aid are available depending on the size of the installations: degressive or exceptional depreciation of renewable energy production material, ADEME and regional aid in the context of State-Region Project Contracts, Heat Fund support for larger scale operations, "biomass" calls for tender and the electricity purchase price schedule for the production of cogeneration heat and electricity from biomass, the Support plan for waste policies (ADEME) for the development of methanisation facilities. The agriculture sector also benefits from specific support measures, particularly through the energy performance plan for farms.

¹⁹ One of the main obstacles to the development of renewable thermal energies is their higher investment cost than conventional energies, even though their global cost may be of interest economically.

Moreover, heating networks have an important role to play in the development of renewable origin heat and are the subject of specific support described in paragraph 4.4.2.

Finally, the system of energy saving certificates, which is based on an obligation to make energy savings imposed on energy vendors, is a cross-cutting measure that supports mobilisation in favour of energy savings and renewable energies.

Other means of support may, in time, be considered to permit an additional mobilisation of forest biomass, as indicated in paragraph 4.6.1.

4.4.1. Financial measures

Zero rate eco-loan

The zero rate eco-loan system is presented in detail in paragraph 4.3.

Tax credit

The tax credit system is presented in detail in paragraph 4.3.

ANAH aid

In 2008, the national housing agency (ANAH) put in place an aid scheme specific to the thermal renovation of older properties occupied by small households. Granted on a means-tested basis, this aid targets work relating to insulation and changing heating systems, including the installation of equipment for the production of renewable energy, and reaching 20 to 35% of the total cost of the work. 70% of the amount of the aid may be advanced to facilitate the financing of the project.

Several conditions must be fulfilled:

- the applicant must own the property,
- the property must be the main residence of the applicant and must have been completed for at least 15 years,
- the applicant must undertake to remain at least six years in the property,
- the applicant must meet a means-test which varies according to the size of the household (example: income of less than 29 000 euros per year for a family in Ile de France),
- the work must be carried out by professionals.

The aid must have been approved by the housing improvement commission, which verifies in particular the relevance and the cost of implementation of the work planned.

This thermal renovation aid may be coupled with other arrangements and particularly with the aid granted by the ANAH in the context of action to combat unfit housing. They may also be requested in the context of the Programmed operations for the improvement of housing (OPAH) which targets the most deprived rural and urban areas.

Reduced rate VAT (renovation work in housing more than two years old)

Some types of work for the improvement of the energy performance and for efficient heating equipment benefit from a reduced VAT rate at 5.5% instead of 19.6%, in addition to other arrangements (sustainable development tax credit, zero rate eco-loan, energy saving certificates). This system, implemented in 1999, concerns all natural or legal persons (owner-occupiers, lessors, tenants, non-paying occupants, etc.) It relates to premises used in total or in part for housing. It applies to main, secondary, or rental residences completed for more than

two years. Work on the normal outbuildings and facilities of these premises also benefit from VAT at 5.5% (enclosed and non-enclosed balconies, terraces, cellars, private garages).

All renewable energy production equipment (solar thermal or photovoltaic panels, heat pumps, biomass boilers, etc.) are eligible for reduced rate VAT provided they adhere to all the conditions to benefit from the reduced rate. There are no specific technical criteria for the equipment. Some less efficient systems are, however, excluded from the arrangement (Article 30-00 A of Annex IV of the General Tax Code), and in particular air conditioning systems and air-air heat pumps since 1 January 2010.

Heat Fund

Launched in December 2008, the Heat Fund was implemented in order to support the production of heat from renewable resources and recuperated energy. This system of support for investment is one of the commitments of the Grenelle Environment Forum and is made concrete by Article 19(4) of the Grenelle I law. It has a budget of around one billion euros for the period 2009-2011²⁰.

The aim of the Heat Fund is to support, between 2009 and 2020, the production of renewable heat up to 5.5 Mtoe, or more than a quarter of the renewable energy production target set by the Grenelle Environment Forum (an additional 20 Mtoe by 2020).

The Heat Fund mainly supports the development of the use of biomass (forestry, agriculture, production and thermal recovery of biogas, etc.), geothermal energy, heat pumps and solar thermal²¹. The sectors concerned are collective housing, tertiary, agriculture and industry. By encouraging the heating networks to resort to renewable energies, the Heat Fund will also have an important impact in social terms (reduction and stabilisation of heating bills of essentially social housing) and in terms of diversification of energy supply.

Intervention methods

The Heat Fund is managed by the ADEME and takes the form of a subsidy.

The Heat Fund intervention methods are:

- for large scale biomass facilities (production of renewable heat greater than 1 000 toe/year) in the industrial, agricultural and tertiary sectors, annual national calls for projects. This procedure will be annually renewed over at least three years. The first call for projects was launched on 5 December 2008, and the results were announced on 19 October 2009. On the same day, the second call for projects was launched;
- for all other sectors, and for biomass facilities not falling under the calls for projects, the Heat Fund is managed by the ADEME at regional level. It complements aid currently granted in the context of State-Region Project Contracts (CPER) (*cf.* description below).

The Heat Fund may not be combined with any other of the aid systems presented here, nor with the energy saving certificate system, with the exception of other public subsidies for which the project will be eligible and which would then be taken into account during the economic

²⁰ For 2009 and 2010, see Law no. 2008-1425 of 27 December 2008 for 2009 finances, and Law no. 2009-1673 of 30 December 2009 for 2010 finances. The Heat Fund has been notified to the European Commission as State aid N 584/2008 – Aid regime for renewable energies from the ADEME authorised by decision of the Commission of 17 June 2009.

²¹ In addition to heat of renewable origin, the recuperated energy concerned by the Heat Fund is heat resulting from UIOMs and industrial processes and heat resulting from the production of electricity not benefiting from any electricity purchase price schedule. For the recovery of this recuperated heat, the Heat Fund aid is only involved on the heat network and equipment necessary to the recovery of this recuperated heat. The production of cold from RE and recuperated heat may be taken into account on a case-by-case basis, providing that the project presents satisfactory technical, economic and environmental reports.

calculation (local authority aid (CPER), aid from ERDF, the Energy performance plan for farms, the Waste policy support plan).

Technical specifications

The Heat Fund concerns projects for the production of more than 100 toe per year²² of renewable heat (with the exception of solar thermal for which the criteria are described below) and which are not eligible for the Sustainable Development tax credit. It therefore acts as a complement to the aid currently granted in the context of the State-Region Project Contracts (CPER) (*cf.* paragraph 4.4) which may relate to smaller projects not otherwise eligible for other aid schemes (Sustainable Development tax credit, zero rate eco-loan, etc.).

Biomass

Dendroenergy projects must adhere to constraints regarding the resources used. Projects using in total or in part biomass of forestry origin and intended for a production of renewable heat greater than 1 000 toe per year must include more than 50% wood chips. This rate is fixed by region (minimum 20%) for projects whose annual production is less than 1 000 toe. The quality of the dendroenergy supply plan is also taken into consideration (absence of use conflicts, supply radius, wood coming from sustainably managed woodland).

In other respects, biomass facilities aided by the Heat Fund do not have to correspond to particular quality standards regarding, for example, boiler yield. The projects providing the best thermal yield are, however, preferred. Finally, the facilities must use efficient systems for the removal of dust from the smoke, in order to avoid impacting air quality.

The limit values are:

- For 2010 call for projects (BCIAT):

Total power rating	Limit value for dust emission required by BCIAT 2010
< 20 MW	30 mg/Nm ³ at 11% of O ₂ (or 45 mg/Nm ³ at 6% of O ₂)
20 to 50 MW	20 mg/Nm ³ at 11% of O ₂ (or 30 mg/Nm ³ at 6% of O ₂)
> 50 MW	13.3 mg/Nm ³ at 11% of O ₂ (or 20 mg/Nm ³ at 6% of O ₂)

- For "branch level" aid, the files submitted in 2010 must include installations whose maximum dust emission value will be less than or equal to 50 mg/Nm³ at 11% of O₂; this value may be less from 2010 in some regionally defined "sensitive zones".

Due to a limited experience gained from biogas installations, there are no specific technical eligibility criteria: the project quality, including technical quality, is evaluated on a case-by-case basis. Facilities for the thermal recovery of biogas (and, where applicable, the associated biogas production facilities) may be subsidised. The use of energy crops as a resource for the production of biogas is limited to 25% maximum of the primary energy used.

Solar thermal

The Heat Fund supports facilities using solar thermal energy according to the following criteria:

- installations of more than 25m² of usable surface (according to the definition of standard NF EN ISO 9488) in tertiary and collective residential sectors (in the Overseas Departments): minimum 50m² in the tertiary sector or concerning more than 100 homes in

²² This threshold may develop to 200 toe per year (50m² of usable solar thermal panel surface) from 2011.

the collective residential sector),

- use of solar collectors corresponding to CSTBat, SolarKeymark or equivalent certification based on European standards,
- excluding innovative facilities (cold production or individual facilities of collective type), the project must meet a minimum useful solar productivity and a maximum investment cost per kWh of solar energy produced, which are variable depending on the geographical location and which must be estimated on the basis of a suitable calculation program.

Geothermal/hydrothermal

Geothermal operations using heat pumps must meet certain criteria for size and performance:

- heat pump on ground water, sea water or waste water: minimum thermal power rating of the heat pump of 50 kW, machine performance coefficient equal to or greater than 4 (measure for expected temperature conditions, according to the European standard EN 14511),
- heat pump on borehole field: minimum thermal power rating of the heat pump of 30 kW, machine performance coefficient equal to or greater than 3.7 (measure for expected temperature conditions, according to the European standard EN 14511).

Heating networks

Projects for the creation or extension of heating networks eligible for the Heat Fund are not required to meet specific technical standards, apart from current regulations (thermal regulations for the supplied buildings, standards NFE 39 001 to 004; NFEN 13941; NFEN 253; NFEN 448; NFEN 488; NFEN 489). However, the project itself must meet the criteria linked to the production of renewable heat used by the heat network:

- network creation: at least 50% of renewable origin or recuperated heat,
- extension of an existing network: at least 50% of renewable origin or recuperated heat corresponding to more than 25 toe per year, or an additional annual production of renewable origin and recuperated heat greater than 2 500 toe.

Optimisation and monitoring of the system

The ADEME and MEEDDM ensure the monitoring of the results of the Heat Fund, particularly in terms of project finances, commissioning, and renewable heat produced by the installations which have received aid.

For national calls for projects, the selection of projects is done according to the efficiency of the aid provided in terms of renewable heat produced: the projects are classified by decreasing economic efficiency (ratio aid requested/renewable heat produced), then selected according to the total finance budget, which allows for optimisation of the use of the Fund aid. The aid is then provided, in part for the launch of the work, and in part during the following five years, according to the real production of renewable heat, which also enables monitoring of the facilities.

For "branch level" aid, the level of aid is set with regard to the economic analysis of the project such that the price of the heat resulting from the RE facility is less by around 5% than that of heat produced by a facility using a conventional reference energy – while complying with the European rules for State aid for the protection of the environment. Optimisation of the level of aid provided by the Heat Fund is thus carried out on a project by project basis, and in consequence depends on the technologies – while ensuring equality of treatment for the different technologies. Indicators such as the cost per tonne of CO₂ avoided or the level of aid per MWh of renewable heat produced also allow an evaluation of the efficiency of the Heat

Fund. A part of the aid granted to the projects is only issued at the end of one year of production, according to the real production of renewable heat (measured with the help of a system for metering energy and collecting data, which are then communicated to the ADEME). In addition, the aid is conditional, in the case of solar thermal, on the installation of an instrument system for the facility with annual transmission of data to the ADEME during the ten years following the commissioning of the facility.

State-Region Project Contracts²³

Signed in 2007 as a replacement for the State-Region Plan Contracts, the State-Region Project Contracts (CPER) are the preferred tool for the implementation of the policy for territorial planning and competitiveness, particularly for programmes and projects preparing for the future and requiring a medium term visibility and a multi-annual financial commitment, in a general sustainable development perspective. With a duration of seven years (2007-2014), CPERs are based on three strategic objectives: competitiveness and attractiveness of the territory, promotion of sustainable development, and social and territorial cohesion. A CPER is a contract signed between the State and a region, which commits to multi-annual programming and financing of certain projects. Other authorities (general councils, urban communities, etc.) may be associated with a CPER on the condition that they contribute to the financing of the projects concerned.

In the context of the target of promotion of sustainable development, each CPER includes specific contractualisation on energy efficiency, the development of renewable energies and the prevention and treatment of waste; themes for which the ADEME represents the State for the funds contributed to these policies.

In the context of this contractualisation, the authorities are encouraged to develop regional or territorial "climate-energy" plans (arrangements that will soon be mandatory under Grenelle II law) and to put in place a system of regional observation of energy and greenhouse gases²⁴.

Regarding the development of renewable energies, support policies are annually reviewed by the regions in consultation with the ADEME, according to particular regional issues and the development of policies for national support. The support arrangements proposed in the context of CPERs are thus very varied and mainly concern:

- the development of the wood-fired heating sector (collective boiler systems) with monitoring of the supply problem
- the development of solar thermal collectors with integration into the building.

The selection criteria are varied and may or may not include certifications or quality criteria. One of the guiding lines of the contractualisation concerns the conditionality to be established between energy efficiency and the development of renewable energies, which imposes verification of the possibility to obtain a minimum energy performance level from buildings before any mobilisation of public aid for the implementation of equipment using renewable energies. This link is ensured by the contractualisation by the inclusion of eco-conditionality for aid.

The development of electric renewable energies is also supported by the CPERs, in particular in the context of calls for projects (*cf.* paragraph 4.3). Investment aid intended for individuals in the context of photovoltaic facilities are being reduced following the implementation of national support mechanisms (purchase prices).

Since 2006 and following the growth in national measures for the support of renewable energy development, a re-balancing of financial commitments can be observed in favour of controlling energy demand (financing of Energy Information Spaces, PREBAT calls for projects, etc.).

²³ Reference of the notification to the European Commission: State aid no. 669/2008- France.

²⁴ In 2009, 15 regional energy observation centres were active, in a total of 22 French Regions.

Beyond the CPERs, there are other support arrangements implemented at local level, particularly at the level of municipalities for their territory, and which are too numerous and varied to be described here.

Support plan for waste policies

Aid provided in the context of the Support plan for waste policies and concerning support for the production of biogas (other than any energy use) are described in paragraph 4.6.2.

Energy Performance Plan for farms (PPE) (cf. paragraph 4.3)

The PPE, in subsidising the acquisition by farms of solar drying equipment, biomass boilers, heat exchangers and heat pumps, and solar water heaters, also supports the use of heat produced from renewable resources.

Aid for the construction or redevelopment of commercial greenhouses and greenhouses in the ornamental and nursery horticulture sector²⁵

These subsidies are granted in order to modernise the greenhouse stock in the horticultural and market gardening sectors, by the former Interprofessional office for wine, fruit, vegetables and horticulture (VINIFLHOR), renamed France AgriMer in 2009. They fall under the structural adaptation plan initiated in 2006, intended to respond to the increase in energy prices. The methods of intervention of France AgriMer are intended to rationalise the location and design of new installations and to promote energy substitution in favour of the most competitive energy sources, particularly renewable energies. The new increases in the cost of energy recorded in 2008 have led to a reinforcement of the support for energy reconversion and for the improvement of energy efficiency.

Among the eligible and subsidised investments appear:

- the replacement of a heavy oil, bottled or natural gas heating system by a renewable energy heating system;
- the installation of heat pumps.

Accelerated or exceptional depreciations

This arrangement is described in paragraph 4.3.

Energy saving certificates

Law no. 2005-781 of 13 July 2005 of the programme setting the guidelines for energy policy (POPE law) has set several targets for national energy strategy, particularly the control of energy demand. The energy saving certificate system, created by Articles 14 to 17 of this Law, constitutes one of the instruments for the control of energy demand (A). It targets in particular the varied and diffuse source of energy savings to be made in the residential, tertiary and transport sectors. The involvement of energy vendors in the arrangement enable the mobilisation of their commercial organisation to better promote energy efficiency to their customers. In a more marginal way, the energy saving certificate system also contributes, and particularly as a complement to the Heat Fund and aid intended for individuals (Sustainable development tax credit and zero rate eco-loan), to the development of renewable energies (B).

²⁵ Reference of the notification to the European Commission: Aid N 484.2007: aid for investments in the protection of crops (agricultural operations, particularly in horticulture) until 31.12.2013

A – The energy saving certificates system and the control of energy demand

The system of energy saving certificates (ESC) is based on an obligation to make energy savings²⁶ which is imposed on vendors of electricity, gas, domestic fuel oil, LPG and heat or cold via networks (the "obliged parties"). A national target for energy savings of 54 TWh cumac has been set for them for a period of three years, from 1 July 2006 to 30 June 2009.

The energy saving operations, carried out by the obliged parties (for example, by promoting energy efficiency to their individual or professional customers), result in the issuing, by the services of the Energy Minister, of the ESC. To fulfil their obligations, the obliged parties may also purchase certificates from third parties.

At the end of the three-year period mentioned above, the obliged parties must justify the accomplishment of their obligations by the production of ESCs for a kWh cumac volume equivalent to these obligations. A non-compliance penalty of 2 euro cents will be levied for each kWh cumac missing.

Standard operation sheets have been developed to facilitate the construction of energy saving actions. These define, for the most common operations, the fixed rate amounts for energy savings in kWh cumac. Energy savings made in addition to standard operations are categorised as specific operations.

At the end of June 2009, the volume of energy saved was 65.2 TWh cumac (63.7 TWh via standard operations and 1.5 TWh in the context of specific operations). The energy savings certified are primarily divided across the sectors of residential building (86.7%), industrial (7.4%) and tertiary building (4.3%).

In the light of the positive results of the first period, in the context of Grenelle II law, the government has decided to prolong the ESC system and to extend the energy saving obligations to the suppliers of automobile fuels.

B – The energy saving certificates system and the development of renewable energies

The second sub-paragraph of Article 15 of the POPE law provides that "*the installation of equipment allowing the replacement of a non-renewable energy source by a renewable energy source for the production of heat in a building results in the issuing of energy saving certificates according to the specific calculation methods*".

In addition, Article 4 of decree no. 2006-603 of 23 May 2006, relating to energy saving certificates, provides that the actions in this sub-paragraph may not result in the issuing of the ESC unless they are carried out in premises for residential use or tertiary activity. The equipment included is new equipment enabling the supply of heat resulting from renewable energies for heating or domestic hot water in existing buildings. Finally, the number of ESCs attributed for each operation is equal to the production of net heat obtained after deduction of the energy consumed by the equipment.

The table in Annex 2 presents for the actions targeted by this Article 4 and which are the subject of standard operation sheets, the volume in kWh cumac of energy saved, between 1 July 2006 and the start of 2010. This volume amounts to 20.9 TWh or 22% of the total volume of the energy saving certificates issued.

Regarding the second period, in order to develop renewable energies in the agricultural sector in the context of the Grenelle II law, Parliament has modified the wording of the sub-paragraph mentioned above as follows:

²⁶ The energy savings considered as accounted in final energy savings accumulated over the life time of the operations, with a discount rate of 4% (kWh cumac).

"The installation of equipment allowing the replacement of a non-renewable energy source by a renewable energy source for the production of heat in a property for residential use or agricultural or tertiary activities results in the issuing of energy saving certificates according to the specific calculation methods".

The ESC system can be combined with other aid arrangements, except for aid awarded by the ADEME (CPER, Heat Fund, Support plan for waste policies, etc.).

4.4.2. District heating and cooling systems

4.4.2.1 Legislative and regulatory measures

Among the measures implemented for the development of district heating and cooling networks, there are already regulatory measures such as the classification of networks mainly supplied by renewable or recuperated energies, and cooling networks, which can make mandatory the connection of a building in the zone of a network, particularly if it is a new construction. The Grenelle II law simplifies the classification decision and modifies the definition of new buildings or facilities to fall in line with that of the 2005 Thermal Regulation.

In addition, most heating networks are legally organised in the form of a public service delegation. Article L. 1411-2 of the Local and regional collectivity code sets out the principle that the conventions for public service delegation must be limited in their duration, and states that, while the facilities are the responsibility of the assignee, the delegation convention takes into account, for the determination of its duration, the nature and amount of the investment to be made and may not exceed the normal depreciation duration for the implemented facilities. This same provision provides that the public service delegation may not be prolonged except in two cases:

- for reasons of general interest, in which case the duration of the prolongation may not exceed one year;
- when the assignee is constrained, for the correct execution of the public service or the extension of its geographical area and at the demand of the assigner, to carry out material investments not foreseen in the initial contract, and which are of such a nature as to modify the general economics of the delegation and which may not be depreciated over the remaining duration of the convention except for by a manifestly excessive price increase.

The development of renewable energies implies often large investments and requires a long depreciation period. The Grenelle II law provides, in its Article 85, for the explicit adding to the Local and regional collectivity code of investments for the development of renewable energies among the causes which may justify the prolonging of a public service concession, if the remaining duration of the concession is at least three years, in order to avoid windfall effects.

4.4.2.2. Financial measures

A recent fiscal incentive was adopted in order to apply a reduced VAT rate from 19.6% to 5.5%²⁷ on the supply of heat where the renewable or recuperated energy level used by the network is greater than 50% (General Tax Code, Article 279 b (i), Tax Instruction 3C-1-07 and 3C-1-09). No specific technical criteria are required of the renewable energy production technologies used.

The heating networks supplied by renewable energies may equally benefit from the exceptional or degressive depreciation previously mentioned.

²⁷ In the departments of continental France. For the departments of Corsica, Guadeloupe, Martinique and Réunion, the rate applied is 2.10%.

These measures are complemented by the granting of subsidies (investment aid) which are essential to enable the development of heating networks, for which investment costs are high. The proposed aid is issued by the ADEME in the context of the previously mentioned Heat Fund. They are aimed at the development of existing networks which already use renewable or recuperated energies and the extension of which enables a supplementary use of these energies in place of conventional energies that cause greenhouse gas emissions. Aid for the creation of new networks is conditional on the fact that the main source of the production of energy supplying these networks is a source of renewable or recuperated energy (*cf.* paragraph 4.2.2).

4.5. Support schemes to promote the use of energy from renewable resources in the transport sector

Targets and overall programme

In the context of the French biofuels plan, the European target for the inclusion of 5.75% LHV²⁸ in 2010 has been advanced to 2008 and raised to 7% LHV in 2010 in the Law no. 2005-781 of 13 July 2005²⁹ of the programme setting the guidelines for French energy policy.

By 2020, the State will ensure that suppliers reduce greenhouse gas emissions, produced over the whole fuel life cycle, by at least 6%, in compliance with Directive 2009/30/EC relating to fuel quality. This reduction is calculated compared to the average of European greenhouse gas emissions for 2010.

Moreover, the Grenelle I law provides for several measures intended, firstly to reduce the use of fossil fuels and, secondly, to promote the development of transport methods using renewable energy sources.

Article 11 provides thus for considerable development of non-road transport, with a large-scale renovation of river channels and the development of port facilities and rail freight. The target selected is to increase the non-road and non-aerial share of transport by 2022 from 14% to 25%. In order to finance transport infrastructure projects, an eco-tax will be levied from 2011 and will be intended to represent the cost of the use of the non-conceded national metropolitan road network.

Regarding passenger transport, Article 12 provides for the State to contribute, within the limit of 16 billion euros, to the financing of an investment programme enabling the start of construction of 2 000 kilometres of new high speed rail lines by 2020. In addition, urban transport will be strengthened in the Ile-de-France region, particularly by the construction of an automatic underground train ring route in the inner suburbs. Outside the Ile-de-France, Article 13 provides for the development of collective transport on new sites in order to take these in fifteen years from 329 kilometres to 1 800 kilometres, the State providing 2.5 billion euros by 2020.

Incentive measures

General incentive measures have been put in place to promote the replacement of fossil fuels by renewable energies.

In addition to the **Domestic consumption tax on petroleum products which falls within the context of Directive 2003/96/EC** of the Council of 27 October 2003 "restructuring the community framework for the taxation of energy products and electricity", France supports the implementation at European level of a climate contribution system, which will subject all fossil fuels to taxation.

²⁸ Energy percentage.

²⁹ Modified by the Law no. 2006-11 of 5 January 2006 on agricultural guidelines.

To permit the achievement of ambitious targets for the inclusion of biofuels, four types of measure have been implemented:

- the increase in inclusion percentages in fuels distributed, with in particular the launch on 1 April 2009 of SP95-E10 in the petrol sector;
- the authorisation of fuels with a high biofuel content, with in particular E85 in the petrol sector and B30 in the diesel sector;
- the introduction of double counting for biofuels resulting from waste in the 2010 Finance Law;
- the accounting of biodiesels included in non-road diesel, a fuel which will be launched in summer 2010, and which will permit the reduction of emissions by the engines using it.

In addition, fiscal incentives have been put in place:

- an additional levy of the general tax on polluting activities (TGAP) must be paid by operators (refiners, supermarkets and independents) who make available for consumption fuels containing a proportion of biofuels lower than the national targets for inclusion set since the 2005 Finance Law (Article 32). The amount of this levy is highly penalising and *de facto* incites operators to achieve the annual target.
- a tax exemption through the partial exemption of the Domestic consumption tax (TIC) for biodiesel and bioethanol and a total exemption for pure vegetable oils used as fuel in agricultural and fishing. This tax exemption enables the compensation for the extra manufacturing costs of biofuels compared to fossil fuels. It only applies to biofuels produced by units having been approved after a call for tenders published in the Official Journal of the European Union. This exemption amounted to 500 million euros for 2007, 720 for 2008 and 521 for 2009. The amounts are adjusted each year in the Finance Law to take into account the development of economic conditions. The 2009 Finance Law therefore set the unit amounts (€/hl) of the tax exemption until 2011, with a progressive decrease in the tax exemption, with a view to an eventual reform following the recasting to come from Directive 2003/96/EC on energy taxation.

Reduction in TIC (€/hl)	2007	2008	2009	2010	2011
Fatty acid methyl esters	25	22	15	11	8
Ethanol ETBE*	33	27	21	18	14
Vegetable oil ethyl esters	30	27	21	18	14
Synthetic biodiesel	25	22	15	11	8

*only the ethanol portion may benefit.

It should be noted that the double accounting of biofuels produced from used oils and animal fats has been introduced in the Finance Law for 2010.

Finally, a certain number of measures have been put in place in order to promote the renewal of the automobile stock and thus to replace heavily-consuming vehicles by new, more economical vehicles:

- The scrapping premium of 1 000 euros in 2009 is revised downward in 2010 with 700 euros in the first half year, then 500 euros thereafter. It will be removed in 2011.
- The ecological bonus promotes the purchase of a more economical vehicle. In 2010, the bonus ranges from 100 to 1 000 euros for vehicles emitting less than 155 gCO₂/km. It reaches 5 000 euros for the purchase of a vehicle emitting less than 60 gCO₂/km² (hybrid or entirely electric vehicle).

4.6. Specific measures for the promotion of the use of energy from biomass

In the context of the Grenelle Environment Forum, biomass has been identified as the main source of renewable energy which will permit France to achieve the target of 23% of renewable energies in the total consumption of final energy by 2020. The promotion of the use of energy produced from biomass is also the subject of specific measures described below.

4.6.1. Biomass supply: national sources and exchanges
Supply in 2006

Table 7. Biomass supply in 2006

Sector of origin		Quantity of national resources	Imported		Exported		Net quantity	Primary energy production (ktoe)
			EU	Non-EU	EU	Non-EU		
A) Biomass resulting from forestry	Of which:	59 778 254	1 656 455	174 342	2 182 059	321 542	59 105 450	11 029
	1. Direct supply of woody biomass resulting from forests or other wooded areas for the production of energy (felling, felling residues (crowns, branches, bark, stumps), residues from the management of the natural framework (woody biomass resulting from parks, gardens, rows Of trees, bushes), other)	29 030 250	43 094	1 404	551 099	8 561	28 515 088	6 256
	2. Indirect supply of woody biomass for energy generation (residues from sawmills, from woodworking, from the furniture sector (bark, sawdust), sub-products from the pulp and paper sector (black liquid, tall oil), processed wood fuel, wood recycled after consumption (wood recycled for energy production, household wood waste), other)	30 748 004	1 613 361	172 938	1 630 960	312 981	30 590 362	4 773

Sector of origin		Amount of national resources	Imported		Exported		Net quantity (ktoe)	Primary energy production
			EU	Non-EU	EU	Non-EU		
B) Biomass resulting from agriculture and fishing	Of which:	4 726 930 t			45 200 t		4 681 730 t	1 217
	1. Crops and fishing products directly supplied to the energy production sector (arable crops (cereals, oilseeds, sugar beet, silage maize), plantations, short-rotation forestry plantation, other energy crops (herbaceous), algae, other)	3 453 430 t	-	-	-	-	4 681 730 t	802 ktoe
	2. Agricultural sub-products/processed residues and sub-products of fishing intended for energy production (straw, manure, animal fats, meat and meat and bone meal, sub-products such as oil-cake and olive oil-cake for the production of energy, biomass resulting from fruits (including nut shells and fruit stones), sub-products of fishing, clippings from vines, olives, fruit trees, other)	1 273 500 t	0	0	45 200 t	0	1 228 300 t	391 ktoe biogas: 24 ktoe

Sector of origin		Amount of national resources	Imported		Exported		Net quantity	Primary energy production (ktoe)
			EU	Non-EU	EU	Non-EU		
C) Biomass resulting from waste	Of which:	Around 8 600 kt	-	-	-	-	Around 8 600 kt	1 345 ktoe
	1. Biodegradable fraction of solid municipal waste including biowaste (biodegradable waste resulting from gardens and parks, food and household kitchen waste, waste from restaurants, caterers or retailers; and comparable waste from agri-foodstuff factories) and landfill gas	Total waste incinerated ³⁰ : 12 950 000 t Total waste methanised: 147 000 t	-	-	-	-	Total waste incinerated ³¹ : 12 950 000 t Total waste methanised: 147 000 t	1 291 ktoe
	2. Biodegradable fraction of industrial waste (including paper, cardboard and pallets)	-	-	-	-	-	-	-
	3.Sewage sludge	1 000 000 t	-	-	-	-	1 000 000 t	54 ktoe

³⁰ Only 50% of the energy produced is considered as renewable and accounted in the last column, "Production of primary energy (ktoe)"

³¹ Only 50% of the energy produced is considered as renewable and accounted in the last column, "Production of primary energy (ktoe)"

The conversion factors and the calculation method used to convert into primary energy the quantities of resources available are indicated below:

A) Biomass resulting from forestry

- Unit: m³ round or roundwood equivalent
- Conversion coefficients

1 toe is equivalent to:

4.5578 m³ of RWE (Round Wood Equivalent)

5 m³ of wood waste

5.73 m³ of wood residue

3.86 m³ of black liquid

12.91 m³ of wood chips

14.85 m³ of bark

A) Biomass resulting from agriculture and fishing

1. Crops and fishing products directly supplied to the energy production sector

a) Arable crops (cereals, oilseeds, sugar beet, silage maize) - Specific case of biofuels

Regarding biofuels, the raw material data are in tonnes. The net quantity of raw materials has been converted into a quantity of biodiesel and ethanol using the following coefficients:

- **Biodiesel:**
 - Yield of rapeseed oil: quantity of vegetable oil/t of rape = 0.42 t/t
 - Yield of sunflower oil: quantity of vegetable oil/t of sunflower = 0.44 t/t
 - Quantity of vegetable oil/VOME (t/t) = 1.05 t/t
- **Ethanol:**
 - Ethanol yield of beetroot (L/t) = 100
 - Ethanol yield of wheat = 350
 - Ethanol yield of maize = 350

The quantity of primary energy has then been calculated with the following LHVs:

- Ethanol LHV: 26 805 MJ/t=0.641 toe/t
- Biodiesel LHV: 26 805 MJ/t=0.894 toe/t

b) Short rotation forestry plantation

- Unit: tonnes of dry matter
- Coefficient: SRC LHV:

2. Agricultural sub-products/processed residues and sub-products of fishing intended for energy production

- Unit: tonnes
- Coefficients:
 - Bagasse LHV: 0.185 toe/t
 - Animal fat LHV: 8 500 kcal/kg or 0.86 toe/t on average
 - Meat and bone meal LHV: 4 600 kcal/kg or 0.46 toe/t on average
 - Cereal straw LHV: 16.5 MJ/kg dry matter or 0.39 toe/tdm

Waste from agri-foodstuffs industries have been considered as "agricultural sub-products" and are thus integrated in line B) 2., particularly for biogas production.

Methanisation facilities in the agri-foodstuffs sector represent the largest share (78%) of the 86 industrial methanisation facilities in 2008, the other industrial sectors being the chemical sector (10%) and that of paper making (12%). While the corresponding available production of primary energy (24 ktoe in 2006 according to the Observation and Statistics Office (SOeS) of MEEDDM) are aggregated for all industrial sectors, it has, however, been decided to incorporate this production in line B) 2.

B) Biomass resulting from waste (units: tonnes)

The data for the production of primary energy presented in Table 7 result from the national statistics of the SOeS. The data relating to the volume of waste results from the SOeS and the ADEME.

1. Household and assimilated waste

a) Incineration of household waste

In 2006, France had 128 household waste incineration units (UIOM).

The stock of incinerators has reduced by more than half in ten years, falling from 300 facilities in 1993 to 165 in 2002 and 128 in 2006. This development results in particular from the application of the environmental legislation³², which led to the closure of many old, small-scale incinerators, of which the majority were not energy producing. In spite of the reduction in the number of facilities, the tonnage of waste incinerated increased between 2000 and 2004 (+8%), but has reduced by 5% since 2004.

Of the 12.95 million tonnes of incinerated waste, 96% are used for energy production with a varying energy efficiency, in 110 of the 128 UIOMs mentioned. The majority of incineration takes place in very large capacity incinerators. Since 2005, 50% of the energy produced by incineration of household waste has been considered as resulting from organic waste, and thus of renewable origin; the other half being considered as of non-renewable origin.

The production of energy takes place, as appropriate, solely as electricity, solely as heat, or by cogeneration:

Energy production methods of UIOMs	GWh	ktoe
only electricity	1 064	
only heat		60
electricity and heat in cogeneration	531	250

Source: SOeS, key energy figures for 2008

b) Landfill gas

Since 1997, the collection of landfill gas has been at the discretion of the petitioner and the State services, and the use for energy production of the biogas collected remains optional; a discussion on the development of the regulations concerning landfill gas is under way. The production of primary energy from landfill gas increased in 2006 to 161 ktoe.

c) Methanisation of household waste

There are six household waste methanisation units in France, producing 2 ktoe of renewable energy (in the form of heat or electricity). This technology is, however, developing strongly, with more than a dozen units planned or in the process of construction. The regulatory context

³² The order of 20 September 2002 relating to incineration and co-incineration facilities of non-dangerous waste.

of these sites has just been updated.

2.Industrial waste

The production of biogas, resulting mainly from agri-foodstuff waste, has been incorporated in line B) 2.

Industrial wood waste (particularly pallets) are assimilated into wood recycled after consumption and incorporated into line A) 2.

Paper or cardboard type waste is and will continue primarily to be the subject of material recovery by recycling, in compliance with the hierarchy defined by European Directive 2006/12/EC (prevention and reduction, material recovery, energy recovery).

3.Sewage sludge

74 urban wastewater treatment plants are equipped with methanisation facilities, resulting in a primary energy production of around 54 ktoe. The biogas produced within industrial wastewater treatment plants results primarily from agri-foodstuff waste and has thus been incorporated in line B) 2.

Biomass potential by 2010

Table 7a. Estimated national biomass supply in 2015 and 2020

Sector of origin			2012		2015		2020	
			Quantity of national resources expected	Primary energy production (ktoe)	Quantity of national resources expected	Primary energy production (ktoe)	Quantity of national resources expected	Primary energy production (ktoe)
A) Biomass resulting from forestry	1) Direct supply of woody biomass resulting from forests or other wooded areas for the production of energy	Forest	33-34 Mm ³	7 250-7 450 ktoe	34.7-38.1 Mm ³	7 660-8 410 ktoe	37.64-45 Mm ₃	From 8 356 to 10 006 ktoe
		Other wooded areas					From 0.8 Mm ³ to 1.6 Mm ³	From 200 to 400 ktoe
	2) Indirect supply of woody biomass for energy production		From 33 to 33.8 Mm ³	From 5 163 to 5 283 ktoe	From 33.8 to 35.6 Mm ³	From 5 280 to 5 560 ktoe	From 35.1 to 38.6 Mm ³	From 5 473 to 6 023 ktoe
B) Biomass resulting from agriculture and fishing	1) Crops and fishing products directly supplied to the energy production sector		10.21 Mt	2450 ktoe	10.44Mt	2 505 ktoe	13.41 Mt	3 210 ktoe
	2) Agricultural sub-products/ processed residues and sub-products of fishing intended for energy production				1.25 Mt dry cereal straw or 1.43 Mt gross	500 ktoe	2.5 Mt or 2.8 Mt gross ³³	1 000 ktoe

³³ Hypothesis: cereal straw at 15 % humidity

Sector of origin		2012		2015		2020	
		Quantity of national resources expected	Primary energy production (ktoe)	Quantity of national resources expected	Primary energy production (ktoe)	Quantity of national resources expected	Primary energy production (ktoe)
C) Biomass resulting from waste	Biodegradable fraction of solid municipal waste including biowaste (biodegradable waste resulting from gardens and parks, food and household kitchen waste, waste from restaurants, caterers or retailers; and comparable waste from agri-foodstuffs factories) and landfill gas	Incineration/ methanisation: 6-7 Mt	Incineration/ methanisation: 1 000 – 1 700 ktoe Landfill gas: 161 ktoe	Incineration/ methanisation: 5 – 6 Mt	Incineration/ methanisation: 850 – 1 500 ktoe Landfill gas: 161 ktoe	Incineration/ methanisation: 5 – 6 Mt	Incineration/ methanisation: 850 – 1 500 ktoe Landfill gas: 161 ktoe
	1) biodegradable fraction of industrial waste: treated wood waste	-	-	1.5 Mt	500 ktoe	2.7 Mt	900 ktoe
	2) Sewage sludge	1 000 000 t	54 ktoe	1 000 000 t	54 ktoe	1 000 000 t	54 ktoe

Explanatory note: The low range (200 ktoe) and high range (400 ktoe) relating to the direct supply in woody biomass originating outside forest sources were decided on the basis of expert opinion.

A) Forest biomass

On the basis in particular of the study led by the Agricultural and Environmental Engineering Research Institute (CEMAGREF) in 2007, the work of the Forestry Conference has enabled the identification for 2020 of a potential 21 Mm³ (9 Mm³ of timber of which 40% goes to the energy sector, and 12 Mm³ of energy wood/industrial wood (BIBE) which may be directly recovered by the pulping industry or the energy sector) which can be mobilised in sustainable management conditions and while respecting use hierarchies (the "timber" use takes precedence over the "industrial wood" use, which itself takes precedence over the "energy wood" use). On this basis a target has been set for forestry of an additional contribution by 2020 of 4 Mtoe in the Operational Committee (COMOP) no. 16 mentioned in paragraph 5.4, taking into account the implementation of a system for the mobilisation of forestry biomass.

This detailed study of the morphology of the woody resource resulting from forestry was updated in 2009. It shows an available volume of standing timber. Reasonable management scenarios within the context of sustainable management of the forestry resource have been applied to this biomass. The 2009 update highlights an additional potential estimated at 6 Mtoe per year, to which is added a "branchwood" source (MB – of diameter less than 7 cm) of 1.4 Mtoe per year.

The theoretically mobilisable volumes resulting from this model depend however on mobilisation costs and the prices of products delivered to the factory. It is these costs and this price that will determine the decision to put these products on the market by the owner of the resource, and particularly that of private owners.

	Timber (Mm ³)	Share of timber for energy (Mtoe)	Industrial and energy wood (Mm ³)	Industrial and energy wood (Mtoe)	Branch wood (Mm ³)	Branch wood (Mtoe)	Total (Mm ³)	Total (Mtoe)
Forestry Conference and Grenelle Environment Forum	9	0.9	12	3	-	-	21*	4
Updated in 2009 with the same hypotheses	9.8	1	20	5	5.7	1.4	35.5**	7.4

(*): An increase of 60% in the French harvest marketed in 2008;

(**): An increase of 100% in the French harvest marketed in 2008.

In this regard, the new IFN SOLAGRO study carried out on behalf of the ADEME and which is based for the forestry aspect on the scenarios developed by the CEMAGREF show that for the current market conditions, the mobilisable resource is one of around 4 Mtoe (BIBE/MB). By doubling this price, most of the available forestry resource may be mobilised (8 Mtoe). This data should, however, be considered with considerable prudence as the price of energy wood alone is not sufficient to initiate the harvest. The mobilisation of energy wood is intrinsically linked to that of timber, whose value alone, being considerably higher than that of energy wood, can repay investments and management by the forestry owner. Structuring the forestry biomass sector is also essential to absorb the harvest increases (60 to 100% more of the commercial harvest) and, in this respect, the system for the mobilisation of forestry biomass

is yet to be completed. Finally, the subdivision of private forest, which represents nearly two-thirds of the French forest, also constitutes a brake to the mobilisation of forestry biomass.

The plan therefore retains a reasonable increase in the mobilisation of the forestry resource of +2.8 to +5 Mtoe in 2020, divided between line A1) "forest" (75%) and line A2) (25%).

Moreover, this study is complemented by an evaluation of the biomass resource in the woody resources initially classified as ancillary (vineyards, orchards, urban trees, forest stumps), which suggests significant quantities of material. The gross pool of wood resulting from wooded areas – excluding forest – is estimated at around 4 million tonnes of dry matter which would permit the production of an additional 1.7 Mtoe by 2020.

However, these resources are dispersed across the national territory and the quantities which can be mobilised per site are sometimes low (harvests of vine clippings or urban pruning wood). Short cycle recovery is certainly preferable for reasons of economic profitability.

The quantitative evaluation of the volumes physically available is based on national hypotheses. It should be refined based on more local data and expertise. Moreover, **the results of the study concern gross availability**, which is equivalent to a theoretical maximum. No technical-economic reduction has been taken into account at this stage. **The technical, economic and environmental conditions for the effective mobilisation of these resources remain to be clarified.** For this reason, the current plan provides, on the basis of expert advice, a range relating to this potentially mobilisable resource excluding forest:

- Low hypothesis: 0.2 Mtoe by 2020,
- High hypothesis: 0.4 Mtoe by 2020.

In conclusion, the plan retains an increase in the mobilisation of the forestry resource (forest and other wooded areas) of +3 to +5.4 Mtoe in 2020.

B) Agricultural biomass

1. Harvest residues

The heating PPI report sent to the National Assembly and the Senate evaluates the potential available in agricultural and agri-foodstuff residues at 1 Mtoe.

"Harvest residues" (in the broad sense of SOeS including agri-foodstuff industry waste) constitute, according to professionals, a potentially mobilisable resource evaluated at 2 Mtoe. It is divided thus:

- Straw is the ligno-cellulosic agricultural resource which can most immediately be exploited and mobilised. According to professionals in the cereal sector, the available resource would be in the order of 1.4 Mtoe. This estimation takes account of current needs and uses (essentially for livestock) and agronomic precautions necessary to be taken.
- Harvest residues (declassified seed, silo residues, etc.) from the cereal sector constitute a resource evaluated at 0.6 Mtoe. As of today, the resource of first and second transformation residues is in the process of being estimated. The advantage of this biomass is its location, near where heat is consumed, and its ease of mobilisation.

2. Ligno-cellulosic production

Ligno-cellulosic production on agricultural land constitutes another resource which is likely to increase significantly.

The Ministry of Agriculture, Food and Fisheries estimates that a mobilisation of more than a million hectares to produce, by 2020, 4 to 5.5 Mtoe per year of short rotation coppice or of ligno-cellulosic crops is very ambitious. Short rotation coppice represents today less than a thousand hectares.

The development of such crops should therefore be estimated in respect of the agronomic potential of the land (agricultural or forest), agri-environmental requirements, the economic environment and judgements between food and non-food crops. Given work in progress in the context of the research programme on bioenergies (the REGIX and ECOBIUM programme), an assessment is required to simulate the expected surface areas and the production volumes possible, while taking into account the different priorities (food, environment, etc.) and evaluating their impacts.

C) Biomass resulting from waste

1. Solid municipal waste and landfill gas

The "waste" section of the Grenelle Environment Forum (Article 46 of the Grenelle I law) provides for:

- a reduction in the rate of production of household and similar waste of 7% over 5 years (2008-2012), compared to the trend scenario, then a stabilisation of the overall volume at the 2012 value,
- an increase of the share of material and organic recycling (composting, methanisation) of 25% in 2006 to 35% in 2012 and 45% from 2015, while retaining a constant relative ratio for these three sectors between 2006 and 2015.
- and a consequent reduction of the share of incineration and disposal in landfill of 75% to 65% in 2012 and 55% from 2015, while retaining a constant relative ratio for these two sectors between 2006 and 2015.

As previously discussed, incineration and landfill gas recuperation currently represent the main method for the energy recovery of the organic fraction of household waste. However, recovery by methanisation is developing, the separation of the biodegradable fraction of household and similar waste being carried out either by sorting at source or by sorting in a waste treatment centre (mechanical-biological sorting). The relative share of organic household waste should therefore decrease in other treatment methods (incineration, disposal in landfill) in favour of methanisation, without it currently being possible to exactly separate the methods of use from the point of view of their respective renewable energy production. The volumes and quantities of energy presented in Table 7a line C) 1 therefore represent an estimation of the whole biodegradable fraction for solid municipal waste and of the associated energy use, in the form of incineration or of biogas production, taking account of the reduction in the overall volume of waste expected and the reduction in the volume of waste incinerated. The range presented allows the current uncertainty on the development of methanisation facilities to be taken into account.

The departmental household waste management plans defined by the Regional Councils are intended to guide and coordinate all actions to be carried out, whether by public authorities or private bodies. Methanisation projects should thus appear in the departmental plans for the management of household waste and be based on the entire flow of relevant waste.

2. *Industrial waste*

As above, all agri-foodstuff waste has been integrated into line B) 2.

Regarding non-dangerous industrial waste, the resource of shredded non-treated wood waste represents 1.5 million tonnes (or 0.5 Mtoe) and is mainly used by industrial board manufacturers. The available resource for energy needs is marginal.

However, treated wood waste, not currently accounted by the SOeS, represents a consumption of less than 0.5 Mtoe. The overall resource which could be used for energy production would represent 0.9 Mtoe according to the CREED³⁴ (2005 data).

Paper or cardboard type waste is and will continue primarily to be the subject of material recovery by recycling, and is not therefore considered as a resource available for energy recovery.

3. *Sewage sludge*

The resources in terms of the energy use of sewage sludge are considered as constant.

Role of imports

With the exception of biofuels, imports of biomass should not have a particular role up to 2020. It is possible to predict up to 2020 the imported biomass quantities and their provenance; this data varies considerably from one year to another.

Current situation of agricultural land specifically dedicated to energy production

Table 8. Allocation of agricultural land to crops specifically dedicated to the production of energy in 2006

Agricultural land allocated to crops specifically dedicated to the production of energy in 2006	Surface area (ha)
1. Land allocated to short rotation forestry plantations (willow, poplar)	192.3 ha
2. Land allocated to other energy crops such as herbaceous plants (reed canary grass, switch grass, miscanthus), sorghum	Negligible

4.6.2. Measures to increase biomass availability, taking into account other biomass users (agriculture and forest-based sectors)

4.6.2.1. Mobilisation of new biomass sources

There are not currently any measures to encourage the allocation of unused arable land, degraded land, etc. to be used for energy purposes.

Degraded land

The definition of the notion of "degraded land" must be discussed in committee procedure, and there are no current statistics regarding the surface area of currently degraded land.

³⁴ The Environment, Energy and Waste Research Centre of the company Veolia Environnement

Unused arable land

There is no significant surface area of unused arable land in France which may be used for crops intended for biofuels.

Projects for the use of certain raw materials for energy purposes and promotion of biogas

Projects encouraging the use for energy purposes of raw materials fall under measures promoting the development of the production of biogas, in particular by methanisation of sub-products and waste (agricultural, industrial, municipal, etc.).

Indeed, biogas is part of the Grenelle Environment Forum policy, whether under the heading of the development of renewable energies, the treatment and use of waste or the reduction of greenhouse gas emissions.

Prospects for the development of the sector

The rate of development of methanisation and the share of the theoretical potential that can truly be exploited in 2020 depend on territorial projects and thus on the local conditions for the development of methanisation, the details of regulatory policies for the support of the environment, and the capacity of the methanisation sectors to organise themselves.

Due to the scale of sources of substrates suitable for methanisation, (particularly in the agricultural and agri-foodstuffs sectors), and taking into account the technological development which have already taken place, France could experience a rapid rate of development and achieve according to some estimates a biogas production level of **1 to 2 Mtoe of primary energy per year in 2020** (via methane digesters).

The fermentable resources which could be used to produce biomethane result mainly from three sectors:

1. agriculture: harvest residues, livestock manure, etc. Ten agricultural methane digesters are in service today, with the prospect of significant progress in the years to come;
2. local authorities: fermentable part of household waste, green waste, sewage sludge from wastewater treatment plants, etc. There are today 6 plants for the methanisation of household waste, and 74 methane digester units on urban wastewater treatment plants which recover biogas. For the record, the facilities for the storage of non-dangerous waste are intended to receive final waste and to limit the entry of biodegradable waste, so no additional production of energy from landfill gas has been taken into account in Table 7a;
3. industry: waste from processing procedures, washing water, etc. There are around one hundred units treating industrial sludge by methanisation (of which 20 recover the biogas).

Three types of biogas use are possible, aided by various support measures:

1. Electricity production (*cf.* paragraph 4.3)

The most common biogas use is the production of heat and electricity by cogeneration, due to the implementation of a mechanism for the obligation to purchase electricity according to a subsidised rate which was increased in 2006. In parallel with the purchase price, calls for tenders are launched by the MEEDDM for the execution of facilities for the production of electricity from biomass, including biogas.

2. Heat production (*cf.* paragraph 4.4)

The Heat Fund, described in paragraphs 4.2.2 and 4.4, enable the granting of investment aid for the thermal recovery of biogas. Cogeneration facilities are not eligible, except where the electricity does not benefit from a purchase price, for example where it is entirely self-consumed on the industrial site.

3. The injection of biogas into the network (*cf.* paragraph 4.2.7)

At present, projects for the injection of biogas into the network may be the subject of Heat Fund support as described in paragraph 4.4. Discussions are under way to put in place a more specific system to develop this emerging sector.

Finally, whatever the type of energy recovery, biogas production facilities may also be aided in the context of the Support plan for waste policies managed by the ADEME (*cf.* below) and the Energy performance plan for farms managed by the Ministry of Food, Agriculture and Fishing (*cf.* paragraphs 4.3 and 4.4).

Support plan for waste policies (ADEME)

One of the priorities of the waste policy decided as a result of the Grenelle Environment Forum is **prevention, development of material and organic recycling**, and finally **improvement in the efficiency of the recovery of the energy resulting from waste**, in compliance with the Directive relating to waste, 2008/98/EC. The intention is particularly to preserve the primary resources which are becoming depleted, whether industrial raw materials whose exploitation has a high environmental impact, or the organic material in soil. It is also intended to limit impacts linked to the treatment of waste.

As previously mentioned, the priorities of the Grenelle Environment Forum are to move from 24% of household and similar waste oriented towards material and organic recycling in 2004 to 35% in 2012, and then to 45% in 2015 (Grenelle I law).

In this context, the ADEME is responsible for a financial support system. The development of the general tax on polluting activities³⁵ (TGAP) for incinerators³⁶ and storage³⁷ (a development resulting from the Grenelle Environment Forum and contained in the 2009 Finance Law), is fed back into the budget that the ADEME employs for the prevention and improvement of waste management.

Moreover, the Grenelle I law intends to increase the energy control of agricultural operations in order to achieve a rate of 30% of farms with a low energy dependence by 2013. The "agriculture" operational committee (COMOP 15) had set a target of 1 000 farm-based methanisation units by 2013.

In this context, methanisation is the subject of a dual-pronged specific commitment by the ADEME within this support system: the organic recovery of digestates and the production of renewable energy in the form of biogas which can be converted to electrical or thermal energy or into fuel.

Support for methanisation within this system is provided in particular by:

1. the evaluation of existing units, in particular by their environmental, energy and sanitary

³⁵ Introduced by the 1999 Finance Law and coming into effect on 1 January 2000, the general tax on polluting activities (TGAP) was initially aimed at four categories of polluting activity, including the storage of household and similar waste and the elimination of special industrial waste. The TGAP is based on the "polluter pays" principle contained in the Environmental Charter attached to the Constitution since February 2005.

³⁶ This new component is, in particular, modulated according to the energy efficiency of the incineration facilities. It is directly allocated to the budget of the ADEME.

³⁷ This component concerns landfill, and its product, while paid into the general budget of the State, is in part intended for the finances of the ADEME.

performance,

2. technical and financial support for operations exemplifying the methanisation of biowaste or agricultural effluent, in connection with the possible support from the Heat Fund; the financing of projects is carried out on the basis of an economic analysis of projects, it being understood that only the "biogas production" aspect will be taken into account in the aid assessment resulting from the Support plan for waste policies, the recovery of biogas being excluded from this assessment (but able to be financed by the Heat Fund).
3. the technical-economic development and optimisation of techniques for the recovery and the return to the soil of digestates,
4. the promotion of the quality of digestates resulting from waste.

In this context, methanisation equipment may benefit from an aid of 30% maximum, calculated from an assessment basis of the amount of the operation with a ceiling of €10 M before tax. In 2009, 24 methanisation projects were financed in the agri-foodstuffs and agricultural sectors, for an aid amount of approximately €6 M.

Energy performance plan for farms

The "methanisation" call for projects of the Energy performance plan for farms presented in paragraph 4.3, in conjunction with the plan for the relaunch of the economy, also permit support for the production of biogas. These projects for the construction of agricultural methanisation units use livestock manures and other substrates. 82 applications were selected in 2009 to benefit from investment aid.

Development of forestry management

The convergent results of the different evaluations of the wood resource available in the French forest indicate a volume of standing timber of 2.4 billion cubic metres. The annual biological growth, estimated at 100 Mm³, is only exploited to 60%. This structural sub-exploitation of the French forest, particularly significant in private forest, leads to an increase of the volume of standing timber of 1.4% per year.

The decision to mobilise a part of this resource will make it possible to meet national commitments and to satisfy the requirement for wood energy development. The planned measures are the following:

- Implement public aid arrangements in the context of the French rural development programme (PDRH):
 - forestry aid: measure 122 makes possible support for the renewal of stands which are over-mature, dying or poorly adapted to local conditions.
 - aid for improving access to stands: measure 125 A intends to transform the "physical" resource into an economically mobilisable resource by the improvement of access conditions.
 - aid for the mechanisation of the operation: the modernisation of the exploitation material stock and the diversification of mobilisation techniques fall under measure 123 B. This measure contributes to the improvement of the economic performance of forestry exploitation companies by reducing production costs.
- Support the modernisation of primary processing companies in order to develop the mobilisation of timber. Timber processing generates 40 to 50% by volume in sawmill by-products (PCS) of which a part will supply wood-energy projects.
- Introduce legislative and/or regulatory modifications:
 - increase the sustainably managed surface areas (Simple Management Plan –

PSG – 25 ha) and implementation of Multi-annual regional forestry development plans (PPRDF) as local development strategies in the context of the draft law for the modernisation of agriculture and fishing (LMAP),

- develop producer organisations. A decree on this subject will appear in January 2010.
- Develop the tax system:
 - encourage management by the conditionality of aid (aid via subsidy or tax aid). A decree on this subject will appear in January 2010.
 - strengthen the work aspect of the DEFI (system for the stimulation of investment in forestry) by increasing by five the ceiling for expenditure. This measure was contained within the 2009 Finance Law and will be renewed until 2013.
 - implement, through the DEFI contract aspect, the authority for the management and enlargement of stakeholders supporting private owners also through the LMAP project.

4.6.2.2. Impact studies on other sectors

Forest biomass may be used by several competing sectors in terms of raw material supply.

The development of the energy use of biomass can only be considered in the light of an application of a hierarchy of its uses, firstly for food, then industry and finally for energy. A plan for the mobilisation of the forest biomass must guarantee this hierarchy and allow all needs to be met.

The structure of the production costs of paper, cardboard and board makes these industries particularly vulnerable to tension relating to raw materials. The mobilisation of additional volumes of wood is essential in order to avoid creating tension relating to the resource and putting these industrial sectors in a difficult situation.

Monitoring of the impacts of the use of biomass for energy is based on a specific administrative organisation: the "Regional biomass units". These biomass units group together the decentralised State services at regional level under the auspices of the prefect. They are comprised of representatives of the DRAAF, DREAL and regional ADEME delegations. They were created in 2007, during the second call for tenders for the production of electricity from biomass in order to evaluate the project supply plans.

They were confirmed in their duties in 2008 in order to take into account tasks and activities to be fulfilled at regional level regarding biomass. Their duties are of two types:

1. Expertise

In the context of calls for tenders for the production of electricity or call for projects for the production of heat from biomass, the opinion of the Regional prefect on the project supply plans is regularly required.

2. Monitoring use of biomass resources and prevention of conflicts of use.

The duties of the biomass units also relate to the evaluation and monitoring of the production, mobilisation, collection and processing of biomass. This requires an understanding of the structure of the "biomass energy" sectors (forestry, agriculture, waste) to anticipate the occurrence of any conflicts of use and to ensure that the balanced management of the resource is guaranteed. In order to carry out these duties, a biomass observatory at regional and national scale is being constructed.

4.7. Planned use of statistical transfers between Member States and planned participation in joint projects with other Member States and third countries

The action plan provides for reaching the target of 23% set by Directive 2009/28/EC using renewable production methods installed on national territory. **The action plan therefore contains a zero target regarding imports, exports and statistical transfers as defined in Directive 2009/28/EC.**

However, due to its commitment in the Mediterranean Solar Plan (MSP), **France may be caused by 2020 to use the "joint projects" mechanism with several countries around the Mediterranean rim. If necessary, the mechanism will then enable France to exceed its target.**

Given the current state of progress of the MSP and of many points of discussion remaining still to be dealt with, it does not seem possible to precisely quantify the quantities of imported renewable energies in question, nor the countries likely to host joint projects. However, the ambition of the MSP is the installation of electrical power of 20 GW by 2020, of which a major part will be of wind or solar origin, which means that the magnitude of the quantity of renewable electricity entering into the French electricity network as a result of these joint projects involving France may be in the region of 1 to 2 GW.

It is intended to implement rapidly regulatory provisions enabling these cooperation mechanisms. France is also co-leader with Germany of the joint action for the implementation of these mechanisms.

Regarding the different cooperation mechanisms, the action plan contains, however:

- no development of joint projects on French territory;
- no joint project on the territory of another Member State;
- participation in the Mediterranean Solar Plan which may lead to implementing joint projects on the territory of a third country from the Mediterranean rim;
- In the case of success of the MSP and of exceeding national targets, a statistical transfer with a deficit Member State.

Table 9: Estimated excess and/or deficit production of renewable energy compared to the indicative trajectory which could be transferred to/result from other Member States in France (ktoe)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Excess expected in the forecast	0	0	0	0	0	0	0	0	0	0	0
Excess expected in the national	0	0	0	0	0	0	0	0	0	0	0
Deficit expected in the forecast document	0	0	0	0	0	0	0	0	0	0	0
Deficit expected in the national action	0	0	0	0	0	0	0	0	0	0	0

5. EVALUATIONS

5.1. Total contribution expected of each technology for the production of energy from renewable resources to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the electricity, heating and cooling and transport sectors.

The Grenelle Environment Forum, and the operational committees which followed it, have identified for each sector potential sources which could be mobilised by 2020. Most of these potential sources were adopted as targets in the 2009 Multi-annual Investment Programming (PPI), sometimes with some modifications to take into account the new data available since 2008.

It should be noted that the scenarios resulting from the Grenelle Environment Forum are not based on the same calculation methods as those required by Directive 2009/28/EC defining the writing of this action plan. This is why several hypotheses have been constructed and are presented below.

In addition, in order to improve the forecasts of the scenarios, 2008 has been added to tables 10a, 10b and 10c. 2008 served as the reference during the writing of the PPIs.

Principal results

Regarding the production of renewable electricity, water power remains in 2020 the main contributor with an annual production of 66 GWh, of which a large part is for the management of the daily consumption peak. Wind-power is the second contributor with an annual production of 57 000 GWh. These two energies represent more than 80% of the production of renewable electricity in 2020, biomass and solar energy representing respectively only 10 and 5% of the production of renewable electricity.

Regarding the production of renewable origin heat, the main contributor in 2020 remains biomass³⁸ with a total production of 16 455 ktoe, or more than 83% of the renewable heat production. Individual heat pumps represent 8% of the production of renewable heat. Other renewable resources of heat contribute less than 5% each to the production of renewable heat, namely solar thermal at 927 ktoe (5%) and geothermal not including individual heat pumps at 750 ktoe (4%).

As indicated in paragraph 3, renewable origin cooling is not handled in a quantitative manner in this plan.

Regarding transport, the progressive introduction of biofuels into conventional fuels is the main source of renewable energy until 2012. This share then increases significantly with the progressive distribution of electric vehicles. Second generation biofuels resulting from waste and residue which appear in the middle of the 2010s, second generation ligno-cellulosic biofuels which appear towards 2017 and the increasing distribution of electric vehicles allow the renewable resource share to increase still more in the transport sector in 2020.

Hypotheses relating to the production of renewable electricity

- water power: the 2009 electricity PPI contains an increase in mobilisable power of 3000 MW mainly through the over-equipment of existing works and the installation of pumping stations (STEP) for peak management. The hypothesis has therefore been made that 2400 MW of the 3000 MW will consist of pumping stations.

The 2009 PPI and the statistical data only approximately distinguish between centres with a power rating of less than 1 MW and those whose power rating is between 1 MW and 10 MW. In addition, the scenarios resulting from the Grenelle Environment Forum and the PPI do not

³⁸ All sources combined: biogas, wood, renewable fraction of household and industrial waste, etc.

indicate the division in terms of power for facilities constructed from 2009. The reasonable hypothesis has been made that the division in power of water power facilities will not be modified until 2020.

- geothermal: in 2009 France only has two operational centres: a facility with a power rating of 16 MW at Bouillante in Guadeloupe, and an experimental facility at Soultz-Sous-Forêts in Alsace with an electrical power rating of 1.5 MW, and which will soon be able to progress to 3 MW. The PPI underlines that the prospects for development of the sector exist but are limited and do not give a figure for the potential exploitation by 2020. A project of 100 MW is however being studied in Dominica, as is the implementation of additional capacity of 20 to 40 MW on the Bouillante site. The action plan makes the reasonable hypothesis that in 2020, an additional 65 MW will have been put into service.

- solar energy: the PPI contains the target of 5 400 MW installed by 2020. In spite of the considerable rise in the number of photovoltaic projects in 2008 and 2009, which can lead one to think that this target could be achieved before that date, the action plan retains this target. It appears difficult, however, to assess the division between the different types of technologies. The following hypotheses have been made:

- solar thermodynamic will represent in 2020 10% of the total installed power. The annual operating duration is 1 800 hours at the peak power of the facility. The first facilities will be put into service in 2012.
- the photovoltaic systems with solar tracking represent 1/6 of the total installed power in 2020. The annual operating duration is 1 800 hours at the peak power of the facility.
- the remaining power installed is comprised of photovoltaic facilities without solar tracking. The annual operating duration is 1 100 hours at the peak power of the facility.

- maritime energies: in 2009, the tidal energy facility at la Rance is the only one operational and has produced 534 GWh for a power of 250 MW. The PPI identifies several potential sources without it being possible at present to accurately know the fraction of these potential sources which may be exploited by 2020. The sources identified are:

- thermal sea energy: the potential for development is above all situated in the Overseas Departments and may, for the production of electricity, reach 200 MW for 7 000 hours of annual operation. The action plan states that 1/5 of this potential could be put into service in 2020.
- marine current: the technology has major advantages in France due to the power of the tidal currents on the north-west coast; however, eligible sites are very few. The potential could reach 400 MW for 3 500 hours of annual operation. The action plan states that 1/8 of this potential could be put into service in 2020.
- tidal energy: its development will require the construction of artificial lagoons associated with facilities of 500 MW operating 2 500 hours per year. The action plan makes the hypothesis that the Rance facility will be the only one in service in 2020.
- wave power: the potential of 200 MW for 4 000 hours of annual operation is high and diffuse, but the technologies are not yet mature. The action plan states that 1/4 of this potential could be put into service in 2020.
- osmotic pressure: the technological and environmental constraints do not allow the construction of industrial scale prototypes.

- wind power: the PPI contains the target that 25 000 MW, of which 6 000 MW of sea-based wind-turbines, should be installed by 2020. These targets were renewed in the national action plan with the first sea-based facilities to be put into service in 2013. The annual duration of operation stated is 2 100 hours for land-based wind-turbines and 3 000 hours for sea-based wind-turbines.

- biomass: the target stated in the action plan is the same as that in the PPI, which is a production of 1 475 ktoe (17 171 GWh) in 2020. The progress between 2008 and 2020 is assumed to be linear. The division between facilities using solid biomass, biogas and bioliquids is hard to quantify at this stage. However, a slowdown in the number of new waste incineration facilities is expected, which in 2005 provided 56% of the electrical production of centres using solid biomass. Taking into account this slowdown and the rise in production facilities based on biogas, the hypothesis has been made that the biogas share of production in the total production of electricity from biomass will increase from 12% in 2008 to 22% in 2020.

Hypotheses regarding the production of heat and cooling

The objectives stated in the action plan were officially set within the ministerial order of 15 December 2009 relating to the Multi-annual Investment Programming for heat production. They result from the following hypotheses:

- geothermal: The production of heat from geothermal energy (excluding heat pumps) was 130 ktoe in 2005. The target set by the PPI is divided between the sectors of geothermal "deep" energy (low and medium energy, with direct use of geothermal energy) and "intermediate" geothermal (low energy and very low energy, with heat pumps). The case of intermediate geothermal energy will therefore be considered below with the forecast relating to heat pumps. For deep geothermal energy, the PPI provides for a production of 195 ktoe in 2012 and 500 ktoe in 2020 by geothermal facilities directly using medium or even low energy resources, mainly in the area of the Paris Basin.

- solar thermal: the production of renewable heat from solar thermal energy was 38 ktoe in 2005 and 70 ktoe in 2008, demonstrating a strong development of the sector. Two sectors contribute to the development of solar thermal energy: individual facilities in single family houses and "collective" facilities (multi-occupation housing, tertiary).

- Individual solar thermal: the target set by the PPI to produce 817 ktoe of renewable heat from individual solar thermal facilities in 2020 (150 ktoe in 2012) translates by the fitting of nearly 30% of homes with an individual system for the production of solar energy (individual solar water heater or combined solar thermal system (heating and domestic hot water)). This ambitious target equates to multiplying by nearly 48 the production of solar thermal energy in single family houses in 2005.
- Collective solar: the expected progress in the field of collective solar corresponds to a multiplication by 11 of the 2005 production level, to reach 110 ktoe in 2020 (35 in 2012).

- biomass: the total stated target of 16 455 ktoe in 2020 divides into sub-targets for the following sectors:

- individual wood energy: in 2005 the consumption of wood by private individuals represented 6 549 ktoe. The target is to raise this figure to 7 400 ktoe in 2020 while significantly increasing the number of homes heated by wood energy by 5.75 million to 9 million. This more rapid increase in biomass facilities than in consumption results from a replacement of existing appliances by those presenting a better yield and by the reduction in requirements for domestic heating (thermal renovation of existing buildings and new thermal regulation in new ones).³⁹
- biomass in the collective housing, tertiary and industrial sectors: the PPI states a target of

³⁹ The trajectory presented is different from that in the PPI, which provides for the achievement of the target of 7.4 Mtoe from 2012, then an increase in facilities, with constant consumption. During the writing of the PPIs, the estimation of the consumption for 2008, following the trends of 2005, was 7.4 Mtoe, and the target was to keep this consumption constant while considerably increasing the number of facilities. The real statistics for 2008 have, however, shown a reduction in the constraint of wood energy in individual housing to a level close to 6.3 Mtoe. The target of 7.4 Mtoe has been retained for 2020, but will be achieved via a progressive trajectory between 2010 and 2020.

5 200 ktoe of renewable heat produced from biomass and intended for these sectors in 2020. The industrial sector represents the major share of this development with a target of 3 200 ktoe.

- heat resulting from biomass cogeneration: the target set by the PPI is to achieve 540 ktoe in 2012 and 2 400 ktoe in 2020, from a practically zero production in 2005.
- RE portion of household and industrial waste: an improvement in the current policy of waste treatment aims to achieve a recovery of the renewable part of household and industrial waste of 470 ktoe in 2012 and 900 ktoe in 2020, from 400 ktoe in 2006. The development of the methanisation of household waste and a better recovery of the heat from UIOMs (in particular by the improvement of yields and the development of cogeneration) are envisaged.
- biogas: the target stated in the PPI for the production of heat from biogas is 60 ktoe in 2012⁴⁰ and 555 ktoe in 2020. This target includes in particular the volumes of biogas inserted into the natural gas network, whose final use (electricity, heat or fuel) is not completely determined, but which will mainly be used for the production of heat. As indicated in paragraph 4.2.8, the injection of biogas into the natural gas network is currently under study and regulation in France, resulting in a globally stable production of biogas until 2012 and then growing from 2012 to 2020.

- heat pumps:

- Individual heat pumps: the PPI states a target of 1 200 ktoe in 2012 and 1 600 ktoe in 2020; the 2020 target is based on the hypothesis that 1 925 million additional individual homes will be equipped with geothermal or aerothermal heat pumps, to achieve a total of 2 million equipped homes. In view of the sales levels of the different heat pumps, the current division between geothermal heat pumps and aerothermal heat pumps is expected to develop to reach a division of 80% of the energy produced by aerothermal heat pumps and 20% by geothermal heat pumps.
- Intermediate geothermal: this designation covers operations in the tertiary or industrial sector using heat pumps to exploit very low temperature geothermal resources (superficial aquifer, borehole field, geothermal piles, etc.) or low temperature (30°C). The target set by the PPI is to produce 100 ktoe in 2012 and 250 in 2020 from such operations.
- Hydrothermal: hydrothermal operations (heat pumps or free-cooling on surface water: lake, river, sea) are currently very few in France: their development is integrated into that of geothermal heat pumps.

The development trajectory of the different sectors, presented in Table 11, result from these targets. The production values, in ktoe, are given with a minimum margin of incertitude of 5 ktoe.

⁴⁰ The difference compared to the value given in Table 11 (86 ktoe in 2012) is linked to a difference in calculation methodology for the final energy considered between the PPI and the national action plan.

Table 10a: Estimation of the total contribution (installed capacity, gross electricity production) expected for each technology based on renewable energy resources in France in order to achieve the binding targets for 2020 and the indicative trajectory for the shares of energy produced from renewable resources in the electricity sector from 2010 to 2014

	2005		2008		2010		2011		2012		2013		2014	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro-electric:	25 349	70 240	25 416	68 324	25 800	69 024	26 050	69 291	26 300	69 559	26 550	69 827	26 800	70 095
<1MW	433	1 796	447	1 677	441	1 694	445	1 700	449	1 707	453	1 713	458	1 720
1MW–10 MW	1 618	6 111	1 620	5 708	1 647	5 766	1 663	5 789	1 679	5 811	1 695	5 834	1 711	5 856
>10MW	18 995	62 332	19 046	60 940	19 333	61 563	19 520	61 802	19 707	62 041	19 895	62 280	20 082	62 519
<i>Of which pumping</i>	4 303	4 705	4 303	4 599	4 800	5 130	5 000	5 344	5 200	5 558	5 400	5 771	5 600	5 985
Geothermal	15	95	15	89	26	153	31	185	37	218	42	250	47	282
Solar:	25	22	110	70	504	613	778	947	1 100	1 350	1 470	1 828	1 887	2 375
<i>Photovoltaic</i>	25	22	110	70	504	613	778	947	1 080	1 314	1 402	1 706	1 752	2 132
<i>Concentrated solar power</i>	0	0	0	0	0	0	0	0	20	36	68	122	135	243
Ocean current/wave/tidal	240	535	240	513	240	500	240	500	256	572	271	644	287	717
Wind:	752	1 128	3 458	5 707	5 542	11 638	6 830	14 344	8 265	17 956	9 845	21 875	11 572	26 101
<i>Onshore</i>	752	1 128	3 458	5 707	5 542	11 638	6 830	14 344	7 598	15 956	8 512	17 875	9 572	20 101
<i>Offshore</i>	0	0	0	0	0	0	0	0	667	2 000	1 333	4 000	2 000	6 000
Biomass:	707	3 819	877	4 391	1 052	5 441	1139.5	5966	1227	6491	1449.5	7826	1 672	9 161
<i>solid</i>	623	3 341	755	3 708	888	4 506	954	4905	1021	5304	1191	6324	1 361	7 345
<i>biogas</i>	84	478	122	683	164	935	185	1061	206	1187	258.375	1501.25	311	1 816
<i>bioliquids</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	27 088	75 839	30 116	79 094	33 164	87 369	35 069	91 233	37 185	96 146	39 628	102 250	42 265	108 731
<i>of which in CHP</i>	360	3 372	422	3 935	1 052	5 441	1 140	5 966	1 227	6 491	1 450	7 826	1 672	9 161

Table 10b. Estimation of the total contribution (installed capacity, gross electricity production) expected for each technology based on renewable energy resources in France in order to achieve the binding targets for 2020 and the indicative trajectory for the shares of energy produced from renewable resources in the electricity sector from 2015 to 2020

	2015		2016		2017		2018		2019		2020	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro-electric:	27 050	70 363	27 300	70 631	27 550	70 899	27 800	71 167	28 050	71 435	28 300	71 703
<1MW	462	1 727	466	1 733	471	1 740	475	1 746	479	1 753	483	1 759
1MW-10 MW	1 727	5 878	1 743	5 901	1 759	5 923	1 775	5 945	1 791	5 968	1 807	5 990
>10MW	20 269	62 758	20 457	62 997	20 644	63 236	20 831	63 475	21 019	63 714	21 206	63 953
<i>Of which pumping</i>	5 800	6 199	6 000	6 413	6 200	6 626	6 400	6 840	6 600	7 054	6 800	7 268
Geothermal	53	314	58	346	64	378	69	410	75	443	80	475
Solar:	2 353	2 981	2 867	3 645	3 428	4 368	4 037	5 148	4 695	5 987	5 400	6 885
<i>Photovoltaic</i>	2 151	2 617	2 597	3 159	3 091	3 760	3 632	4 419	4 222	5 137	4 860	5 913
<i>Concentrated solar power</i>	203	365	270	486	338	608	405	729	473	851	540	972
Ocean current/wave/tidal	302	789	318	861	333	933	349	1 006	364	1 078	380	1 150
Wind:	13 445	30 634	15 463	35 473	17 628	40 620	19 939	46 073	22 397	51 833	25 000	57 900
<i>Onshore</i>	10 778	22 634	12 130	25 473	13 628	28 620	15 273	32 073	17 063	35 833	19 000	39 900
<i>Offshore</i>	2 667	8 000	3 333	10 000	4 000	12 000	4 667	14 000	5 333	16 000	6 000	18 000
Biomass	1 895	10 496	2 117	11 831	2 340	13 166	2 562	14 501	2 785	15 836	3 007	17 171
<i>solid</i>	1 531	8 366	1 701	9 387	1 871	10 407	2 041	11 428	2 211	12 449	2 382	13 470
<i>biogas</i>	363	2 129	415	2 444	467	2 758	520	3072	572	3 386	625	3 701
<i>bioliquids</i> ⁴¹	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	45 098	115 577	48 123	122 787	51 345	130 364	54 756	138 305	58 366	146 612	62 167	155 284
<i>of which in CHP</i>	1 895	10 496	2 117	11 831	2 340	13 166	2 562	14 501	2 785	15 836	3 007	17 171

⁴¹ See note at the bottom of page 24.

Table 11: Estimation of the total contribution (final energy consumption) expected for each technology based on renewable energy resources in France in order to achieve the binding targets for 2020 and the indicative trajectory for the shares of energy produced from renewable resources in the electricity sector from 2010 to 2020 (ktoe)

	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Geothermal ⁴²	130	114	155	175	195	235	270	310	350	385	425	460	500
Solar	38	70	130	155	185	280	370	465	555	650	740	835	927
Biomass	9153	9 365	9 953	10 250	10 542	11 280	12 020	12 760	13 500	14 240	14 980	15 715	16 455
<i>solid</i>	9067	9 284	9 870	10 165	10 456	11 135	11 815	12 500	13 180	13 860	14 540	15 220	15 900
<i>biogas</i>	86	81	83	85	86	145	205	260	320	380	440	496	555
<i>bioliquids</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Renewable energy from heat pumps	76	472	886	1 090	1 300	1 370	1 440	1 505	1 575	1 645	1 715	1 780	1 850
<i>of which aerothermal</i>	27	368	664	810	960	1 000	1 040	1 080	1 120	1 160	1 200	1240	1280
<i>of which geothermal and hydrothermal</i>	49	104	222	280	340	370	400	425	455	485	515	540	570
TOTAL	9 397	10 024	11 121	11 670	12 222	13 165	14 100	15 040	15 980	16 920	17 860	18 790	19 732
<i>of which district heating⁴³</i>	368	381	540	650	775	925	1105	1320	1575	1880	2245	2680	3 200
	3.9%	3.8%	4.9%	5.6%	6.3%	7%	7.8%	8.8%	9.9%	11.1%	12.6%	14.3%	16.2%
<i>of which biomass in households⁴⁴</i>	6 549	6 379	6 835	6 890	6 945	7 000	7 060	7 115	7 175	7 230	7 285	7 345	7400
	70%	64%	61%	59%	57%	53%	50%	47%	45%	43%	41%	39%	38%

⁴² With the exception of geothermal heating in heat pump applications.

⁴³ Percentage of the renewable energy consumption by district heating and/or cooling compared to the total consumption of heating and cooling produced from renewable energy sources. (SER-CU)

⁴⁴ Wood-energy consumed in individual homes, excluding biomass in the collective and heating network sectors; percentage compared to the total consumption of heating and cooling produced from renewable energy sources.

Table 12: Estimation of the total contribution expected for each technology based on renewable energy resources in France in order to achieve the binding targets for 2020 and the indicative trajectory for the shares of energy produced from renewable resources in the electricity sector from 2010 to 2020 (ktoe)

	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bioethanol/bio-ETBE*	75	510	550	550	550	550	550	550	550	575	600	625	650
<i>of which biofuels Article 21(2)⁴⁵</i>	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>of which imported (EU and non-EU)⁴⁶</i>	0	71	50	50	50	50	50	50	50	50	50	50	50
Biodiesel:*	328	1887	2165	2250	2350	2350	2350	2375	2500	2600	2700	2800	2850
<i>of which biofuels⁴⁷ Article 21(2)⁴⁸</i>	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>of which imported (EU and non-EU)</i>	12.5	322	400	400	400	400	400	400	400	400	400	400	400
Hydrogen from renewable resources	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity from renewable resources	141	167	183	192	212	221	240	260	287	306	335	362	402
<i>Of which road transport</i>	0	0	0	0	10	10	21	31	41	51	71	90	110
<i>Of which non-road transport</i>	141	167	183	192	202	211	219	229	246	255	264	272	292
Others (vegetable oils, biogas, etc.)	0	0	0	0	0	0	10	30	50	80	110	140	160

⁴⁵ From 2017, the forecasts for the top line include a share of second generation biofuels, which must be adjusted according to their availability. Taking into account high uncertainty, it seems preferable at this stage to not indicate detailed figures on this point.

⁴⁶ From the total quantity of bioethanol/bio-ETBE.

⁴⁷ Biofuels included in Article 21(2) of Directive 2009/28/EC;

⁴⁸ From 2017, the forecasts for the top line include a share of second generation biofuels, which must be adjusted according to their availability. Taking into account high uncertainty, it seems preferable at this stage to not indicate detailed figures on this point.

* These values are likely to be adjusted during a future review; they depend directly on fuel sales, the division of these sales between petrol and diesel, developments in logistical and industrial tools, European guidelines in terms of fuel specifications, and the authorised incorporation rate, from now until 2020. Some values may be difficult to achieve.

	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<i>of which biofuels⁴⁹ Article 21(2)</i>	0	0	0	0	0	0	0	0	10	20	30	40	50
TOTAL	544	2 564	2 898	2 992	3 112	3 121	3 150	3 215	3 387	3 561	3 745	3 927	4 062

Methodological note

The renewable electricity share in road transport has been calculated in the following manner:

- The power consumed to work an electric car is 12.5 kW, including air conditioning and other internal uses.
- The annual average number of kilometres travelled is 12 000 km per year.
- The final energy consumed by an electric vehicle is therefore of 1 500 kWh per year to which must be added the different losses: loss to the transformer rectifier which supplies current to the battery (10%), loss to the power electronics and the electric motor (10%), loss linked to the yield of the battery charge (10%). These losses take the final electricity consumption per vehicle to 2 000 kWh per year.
- The final energy consumed per vehicle is multiplied by the number of vehicles it is planned to put into circulation.

Within this consumed electricity, it is also necessary to extract the share produced from renewable resources, that is to say to multiply by the percentage in the RES - E (%) line of Table 3.

In compliance with the European calculation methodology, the production data for wind power, water power and maritime energies have been averaged over the last 15 years. This leads to a reduction in production for water power and maritime energies, as 2006, 2007 and 2008 were less favourable than the average over the last 15 years.

⁴⁹ Biofuels included in Article 21(2) of Directive 2009/28/EC

5.2. Total contribution expected from energy efficiency and energy saving measures to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources the in electricity, heating and cooling and transport sectors

Energy efficiency and energy saving measures have been identified as the main factor in achieving the targets set by the Directive. The reference scenario, based on the pursuit of behaviours compared to 2007, provides thus for an increase in 2020 of the energy consumption of 18% compared to 2005. Such an increase would make it impossible to achieve the target of 23% of renewable energies in the total energy consumption in 2020.

The national action plan therefore retains the targets for the reduction of energy consumption formulated as a result of the Grenelle Environment Forum. This involves reducing by 7% the energy consumption in 2020 compared to 2005, which corresponds to a reduction of 20% compared to the reference scenario.

The building sector is the main source of savings identified, with an expected reduction of 38% in the energy consumption of housing by 2020. This very ambitious target requires the systematic improvement of the housing stock, together with a reduction in consumption by equipment. In the transport sector, this requires the pursuit of the reduction in unit consumption of new vehicles.

Total annual energy consumption	Reference scenario	Percentage development compared to 2005	Scenario retained in the action plan	Percentage development compared to 2005
2005	165 202	-	165 202	-
2020	194 900	18%	155 268	-7%

Annual energy consumption	Electricity		Transport		Heating and cooling	
	Reference scenario	Increased energy efficiency scenario	Reference scenario	Increased energy efficiency scenario	Reference scenario	Increased energy efficiency scenario
unit: ktoe						
2005	45 317	45 317	45 080	45 080	68 949	68 949
2015	49 439	46 381	48 263	43 027	75 716	62 983
2020	56 613	46 913	57 500	42 000	97 400	60 000

5.3. Impact assessment

This optional aspect will be completed on the occasion of the presentation to the Commission of one of the biennial reports provided for in Article 22 of Directive 2009/28/EC.

5.4. Development of the national action plan for renewable energies and monitoring its implementation

The development of the national action plan was the subject of a consultation between the different ministerial services. The consultation of all renewable energy stakeholders, including the local and regional authorities, took place during the Grenelle Environment Forum in 2007, and the action plan includes most of the targets and measures validated in this context.

As described in paragraphs 4.2.1 and 4.2.6, the finalisation of the regional and local strategies will be done through the regional plans for the climate, air and energy (SRCAE); these strategies will be expressed in an operational manner in the territorial climate-energy plans and in the town planning documents.

Description of the Grenelle Environment Forum

The Grenelle Environment Forum was held from July to November 2007. It involved all interested parties: State, local and regional authorities, unions, companies and associations. Its aim was to debate environmental problems and to define a route map in favour of the ecology and sustainable development and redevelopment. Organised around eight working groups, it resulted at the end of October 2007 in an action plan of 20 concrete and quantifiable measures receiving the broadest possible agreement from the participants.

Following this national consultation, 33 operational committees (COMOP) involving all interested parties were put in place to refine the route map and to define, for each theme identified as essential, a list of targets, together with specific actions and recommendations to be implemented. Where necessary, these operational committees indicated those measures not receiving the approval of all interested parties, and the possible alternatives. They then produced public summary reports to serve as a later basis for policy decisions.

Among the 33 operational committee themes appear renewable energies (COMOP 10), the improvement of transportation (COMOP 6, 7 and 8), the improvement of building performances (COMOP 1, 2 and 3), and forestry (COMOP 16).

Monitoring the national action plan

The authority charged with the definition and monitoring of the policy in favour of renewable energies is the General Climate Directorate of the Ministry of Ecology, Energy, Sustainable Development and Sea. Within this directorate, the Renewable Energies Office is specifically responsible for ensuring monitoring of the development of renewable electricity production sectors and has the job of monitoring the national action plan. It is assisted by the Heat and Equipment Office, the Department for the Combat of the Greenhouse Effect, and the Petroleum Industry and New Energy Products Office.

Monitoring instruments

The Energy Ministry has many indicators enabling it to monitor the development of consumption by energy type (petrol, electricity, gas, coal, etc.) for different economic sectors (tertiary, residential, industrial, agriculture). It also has available statistics and models enabling it to accurately estimate the development of collective transport and the road and aerial vehicle fleet. These indicators enable the monitoring of the development in energy consumption by use and by sector in order to see if the trajectory followed will permit the achievement of the targets for the reduction in energy consumption set following the Grenelle Environment Forum and the PPIs.

Regarding monitoring of the production of renewable energies by sector, this is a growing sector where the State is in the process of putting in place observatories and tools enabling the reliable and durable collection of data. A renewable energy observatory is thus in the process of being created within the unit responsible for establishing statistics inside the Energy Ministry. This observatory is intended to enable annual monitoring (for some sectors, monitoring is intended to be half-yearly or less) of the development of means of production for each sector. It must enable the accurate monitoring of electrical means of production: photovoltaic centres, wind farms, biomass boiler systems, maritime energies, micro-water power, etc. It must also be able to provide solid aggregate figures concerning the installation of equipment in residential and tertiary buildings: heat pumps, heating networks, boilers, solar water heaters, photovoltaic panels, etc. To achieve this, it will integrate the data received from the network managers and the bodies contracting for the purchasing obligation, and the data resulting from the examination of cases by the decentralised State services.

In parallel, market studies (insulation materials, windows, heating equipment, solar water heaters, etc.) led by the Economy Minister and the Environment Minister will permit an understanding of the development of sales flows and the installation of domestic equipment, together with the development in the number and quality of renovation works. Where necessary, periodic complementary studies entrusted to the ADEME will add to this data or enable a progress assessment.

Regarding the overall monitoring indicators, the General Commissariat for Sustainable Development (CGDD) has put in place a series of 10 sustainable development indicators. These indicators, whose scope goes far beyond renewable energies, evaluates the global trend for society to fulfil sustainable development criteria. Renewable energies constituting one of the indicators:

- Air pollution in urban environment
- Nitrates in watercourses
- Biodiversity: common birds
- Land use
- Consumption of materials
- Municipal waste
- Greenhouse gas emissions
- Renewable energies
- Expenditure for the protection of the environment
- Concerns of the French population

Finally, a biomass observatory is in the process of being developed by the Ministry of

Agriculture and the French trade body FranceAgriMer. This tool will synthesise the different information concerning the availability of the resource and will ultimately enable the biomass units mentioned in 4.6.2 to monitor the mobilisation of biomass on the regional scale and to prevent conflicts of use relating to biomass.

**ANNEX 1. DETAIL OF APPLICABLE ADMINISTRATIVE PROCEDURES
FOR EACH TYPE OF FACILITY**

Hydroelectric facilities

According to the Law of 16 October 1919 regarding the use of water energy, energy facilities of a power rating greater than 4.5 MW fall under the regime of concession, and a single application enables in a single act the obtention of the declaration of public use (for compulsory purchase), planning authorisations for the dam and auxiliary structures, the operating authorisation and the authorisation as required by the law on water (act of concession constituting authorisation as required by the law on water).

Land-based wind-turbines

As required by the Town Planning Code, wind-turbines having a mast height greater than 12 metres are subject to planning permission. The Construction and Housing Code submits wind-turbines having a mast height greater than or equal to 12 metres to technical inspection.

As required by the Environment Code, wind-turbines having a mast height greater than or equal to 50 metres are subject to an impact study and public inquiry. The operators must provide financial guarantees for the reinstatement of the site on decommissioning of the facility. The Grenelle II law provides for the methods for the creation of financial guarantees and for the general provisions for decommissioning to be set by decree before the end of 2010.

To benefit from the obligation to purchase electricity produced, any new wind farm created since 15 July 2007 must be situated in a Wind Power Development Area (ZDE) which requires a positive opinion from the municipalities hosting the project.

In order to avoid scatter development, the Grenelle II law provides for new wind power facilities to be comprised of at least five wind-turbines to benefit from the obligation to purchase in a ZDE. However, this rule does not apply to small facilities comprising one wind-turbine of less than 250 kW and of less than 30 metres.

The Grenelle II law also provides for wind-turbines to respect a minimum distance of 500 metres from housing. It also provides for wind farms to be classified under the IPCE regime (authorisation).

Sea-based wind-turbines

The Grenelle II law provides for the abolition of all formalities required by the Town Planning Code. It also provides for sea-based wind-turbines that the purchasing obligation is not subject to being sited in a ZDE.

As required by the Code of State-owned property, any project for the siting of a wind farm in the public maritime domain must be subject, for the wind-turbines themselves and for their connection to the land, to an authorisation to occupy state land, together with a fee set by the tax authorities. The decree relating to concessions for the use of the public maritime domain excluding ports constitutes the regulatory context of the state land occupation procedure.

As required by the Environment Code, wind farms are subject to authorisation as they constitute works in contact with the marine environment and have a direct impact on this environment. They are also subject to an impact study and public inquiry.

Moreover, the Grenelle II law provides for the methods for the creation of financial guarantees and for the general provisions for decommissioning to be set by decree before the end of 2010. It also provides for the classification under the IPCE regime for sea-based wind farms.

The strategy for ensuring their development is based on the launch of the call for tenders within zones defined as relevant by the public authorities. This targeted procedure of calls for tenders allows control of the execution calendar, optimisation of the conditions for connection and acceleration of the obtention of all authorisations required.

Photovoltaic electricity

Historically put in place for large power facilities, the regulations have been considerably revised in order to facilitate the establishing of thousands of small-scale photovoltaic centres. For small-scale facilities, this involves reducing the administrative procedures to two steps: one required by planning law and one required by electricity regulations/obligation to purchase. For large-scale facilities, this means framing the procedures from the point of view of planning and the environment.

Electricity regulations and purchasing obligation

Since November 2009, facilities with a power rating less than 250 kW are considered to be declared and no longer have to undertake action under the electricity regulations. For facilities with a power rating between 250 kW and 4.5 MW, an online declaration program allows the facility to be declared on the Internet. For facilities with a power rating greater than 4.5 MW, the authorisation procedure remains centralised and the application must be sent to the Energy Ministry. The law known as "Grenelle II" provides, firstly to raise to 12 MW the threshold of the application for operating authorisation, and secondly to eliminate prior declaration.

In order to benefit from the preferential price of the purchasing obligation for photovoltaic origin electricity, the owners of solar facilities must request from the State a certificate giving the right to the purchasing obligation. Since April 2009, in order to simplify the process for low power facilities, facilities of less than 250 kW power rating are exempt from such certificates.

Moreover, the application for connection to the electricity distribution network and the contractualisation of the purchasing obligation with the energy supplier (EDF purchasing obligation or the non-nationalised distributor for the sector) have been simplified. Since 1 January 2010, the two simultaneous processes have been grouped in a single process, speeding up the processing of applications, with the target of connecting the facility within four months of the acceptance by the project sponsor of the connection and purchase contract proposal.

Environment

Environmental studies are only required for land-based facilities of more than 250 kW power rating (except for special cases). Since December 2009, project sponsors must carry out an environmental impact study. The case is presented during a public inquiry. An impact study is also required for projects whose realisation is such that it would affect a Natura 2000 site.

Planning

Solar devices located on buildings are subject to prior declaration (a maximum of two months taken to scrutinise the case). This process is essential to ensure that the project respects the architectural and planning provisions, particularly in protected or classified sectors (proximity to historic

monuments, for example). Except in classified or protected sectors where the assent of the "Bâtiments de France" architect remains necessary, the provisions of the Grenelle II law facilitate the installation of solar panels: it is thus stated that solar panels can no longer be refused for planning reasons (colour of panels differing from the provisions of the local town plan, type of material prohibited on roofs, aesthetic criteria, etc.).

Land-based solar facilities whose power rating exceeds 250 kW have been subject to planning permission since 1 December 2009. The issuing of the planning permission is in particular conditional on the respect of local planning documents and on the result of the environmental impact study.

The installation of facilities on agricultural or natural land is therefore very strongly discouraged, (by the application of the Town Planning Code), as this land is not intended to be used for the production of electricity. The draft law for the modernisation of agriculture which should be reviewed during 2010 will further clarify these provisions.

Other procedures

Depending on their nature and the technology used, thermodynamic facilities may be subject to procedures falling under the regime of installations classified for the protection of the environment (ICPE).

Geothermal energy

Facilities for the production of renewable energy from geothermal energy may be subject to authorisation or declaration procedures in the context of several legislative texts:

- the Mining Code
- the Environmental Code, particularly the measures concerning the management of water resources
- the Local and Regional Authority Code
- The Mining Code separates the exploitation of geothermal resources into three categories, to which correspond different procedures:
- the exploitation of high temperature geothermal deposits (temperature above 150°C) (authorisation),
- the exploitation of low temperature geothermal deposits (temperature below 150°C) (authorisation),
- the exploitation of low temperature geothermal deposits of minor importance, characterised by a depth of drilling less than 100 m and a withdrawal capacity less than 232 kW (authorisation or declaration).

A revision currently in progress of the Mining Code is intended to clarify the notion of the low temperature geothermal deposit, which will be defined by a depth of more than 100 m or a temperature of more than 25°C, involving the elimination of the notion of the low temperature geothermal deposit of minor importance. With the exception of drilling works (*cf.* below), the exploitation of geothermal facilities with a depth of less than 100 m and with a temperature of less than 25°C will no longer be concerned by the procedures imposed by the Mining Code.

Procedures relating to high temperature geothermal deposits (Mining Code)

The commencement of research and exploitation work on high temperature geothermal sites is, as required by the Mining Code, subject to an administrative authorisation, granted in particular after a public inquiry:

- exclusive research permit for research work for geothermal resources,

- exploitation concession for the exploitation of geothermal resources.

The authority competent to issue authorisation is the Minister for Mines, currently in the form of the MEEDDM.

Specific procedures concerning the overseas departments, where geothermal deposits may also be exploited under an exploitation authorisation (also constituting authorisation for research work) or an exploitation permit. The competent authority is then the prefect of the department.

Procedures relating to low temperature geothermal deposits (Mining Code)

Research work is subject to the obtention of a research authorisation by order of the prefect of the department, after a public inquiry.

Similarly, low temperature geothermal deposits may only be exploited under an exploitation permit issued by the prefect of the department after a public inquiry. The exploitation permit defines the volume of exploitation, may impose provisions, in particular concerning the extraction, use and reinjection of heat-conveying fluids, and can set a perimeter of protection in the interior of which any underground works likely to prejudice the geothermal exploitation may be prohibited or regulated.

Low temperature geothermal deposits of minor importance are only subject to the declaration to the prefect of the department of the drillings when these are deeper than 10 m.

The obtention of authorisations previously mentioned as required by the Mining Code constitute authorisation or declaration as required by procedures falling under the Environmental Code described below. Only low temperature geothermal deposits of minor importance are therefore subject to specific procedures as required by the Environmental Code.

Procedures relating to drillings (Mining Code, General Code of the Local and Regional Authorities, Environmental Code)

Any drilling of a depth of more than 10 m must be the subject of a declaration to the decentralised State services in charge of mines, (Regional Directorate for the Environment, Land-use Planning and Housing – DREAL) as required by Article 131 of the Mining Code. All types of geothermal energy are concerned. In order to simplify the administrative process, applications for authorisation and declarations as required by the Environmental Code described below constitute a declaration of drilling as required by Article 131 of the Mining Code.

Moreover, drillings intended for research for underground water or for the temporary or permanent withdrawal of underground water are subject:

- in the case of a withdrawal of less than 1 000 m³ per year, to a declaration to the mayor of the municipality concerned as required by the General Code of the Local and Regional Authorities,
- in the case of a withdrawal of more than 1 000 m³ per year, to a declaration to the prefecture of the department as required by the Environmental Code.

These provisions concern geothermal aquifers for the residential, tertiary and industrial sectors, both for the production of heat and of cooling.

Withdrawals of water (Environmental Code)

As is the case for drillings, the following provisions concern geothermal aquifers for the residential, tertiary and industrial sectors, both for the production of heat and of cooling.

In order to facilitate the reconciliation of the interests of different users of underground and

surface waters in the areas presenting a shortage, other than exceptional, of resources compared to needs, the water distribution areas (ZRE) are set by order of the coordinating prefect for the basin⁵⁰.

The authorisation or declaration procedures linked to withdrawals of water are, as required by the Environmental Code, the following:

- outside a ZRE:
 - no procedure (other than declaration of drilling seen previously) in the case of a withdrawal of less than 10 000m³ per year,
 - declaration if the withdrawal is between 10 000 and 200 000m³ per year,
 - authorisation in the case of a withdrawal of more than 200 000m³ per year.
- within a ZRE:
 - declaration if the withdrawal capacity is less than 8 m³ per hour,
 - authorisation if the withdrawal capacity is more than or equal to 8 m³ per hour.

The competent authority is the prefect of the department. Similar procedures concern the withdrawals from surface waters, in the context of the exploitation of hydrothermal resources.

Reinjection of water (Environmental Code)

In the case of a reinjection in the same aquiferous nappe of water withdrawn for geothermal energy, the facility is subject, as required by the Environmental Code, to:

- declaration if the total reinjection capacity is more than 8 m³ per hour and less than 80 m³ per hour,
- authorisation if the total reinjection capacity is more than or equal to 80 m³ per hour. The competent authority is the prefect of the department.

Decentralised and small-scale facilities

General case

Low power domestic or tertiary methods of heating (heat pump on external air, boilers, inserts, convectors, etc.) are not subject to authorisation or to particular administrative procedures. For a new building, the project sponsor simply specifies the method of heating in the planning permission application. For a renovation, the application as required by planning law (most often prior declaration) also mentions the subject of the renovation.

Geothermal heat pumps

Geothermal heat pumps with horizontal collectors are not subject to any obligation by the Mining Code or the Environmental Code. However, as we have seen above, low power vertical geothermal heat pumps (depth less than 100m, thermal power rating less than 232 kW) are subject:

- to a drilling declaration to the prefect of the department if this exceeds 10m in depth

⁵⁰ The list of ZREs is available in Article R.211-71 of the Environmental Code. It contains, for example, some captive parts of the aquiferous nappes of the albian and neocomian stages in the Ile-de-France, which are exploited by low energy geothermal facilities supplying district heating networks.

- to the obligations relating to the Environmental Code in the case of withdrawal and/or reinjection of water, with the aim of protecting aquifers.

Details of ICPE regimes applicable according to the type of facility for energy production

ICPE - combustion installations: production of electricity and/or heat from biomass

The ICPE regulation provides for a procedure of declaration or authorisation according to the installed power rating⁵¹ and the type of fuel used.

When the facility consumes biomass in the natural state without being impregnated or coated with any substance whatsoever:

- authorisation is required if the maximum thermal power rating of the facility is more than or equal to 20 MW,
- a simple declaration is required when the maximum thermal power rating of the facility is more than 2 MW and less than 20 MW + periodic inspection.

When the facility consumes other fuels, in particular fuel which can be assimilated by biomass (lightly treated wood: wood for furniture, interior beams, waste from treated wood but where the treatments do not contain toxic metals or halogenated substances), authorisation is required from 0.1 MW.

Where it concerns waste incineration (household waste, treated wood waste, etc.), this activity is subject solely to the regime of authorisation under the specific headings of the nomenclature of classified installations with the respect of provisions intended to take into account the risks linked to the discharge of toxic pollutants.

ICPE - Installations for the production of cold and heat pumps

The ICPE regulations are also applicable to units for the production of cold or to heat pumps in the case of facilities for cooling by dispersion of water in an air flow or refrigeration or compression facilities operating at effective pressures of more than 10⁵ Pa:

- Cooling by dispersion of water in an air flow: authorisation is required when the facility is not of the "closed primary circuit" type from the point at which the maximum evacuated thermal power rating is greater than or equal to 2 000 kW. Declaration is applicable when the maximum evacuated thermal power rating is less than 2 000 kW or when the facility is of the "closed primary circuit" type.
- Refrigeration or compression operating at effective pressures of more than 10⁵ Pa: authorisation is required when the absorbed power is greater than 500 kW and in the case of facilities compressing or using inflammable or toxic fluids where the absorbed power is greater than 300 kW. Declaration is applicable when the absorbed power is greater than 50 kW, but less than or equal to 500 kW and in the case of facilities compressing or using inflammable or toxic fluids where the absorbed power is greater than 20 kW, but less than or equal to 300 kW.

ICPE - Installations for the production of biogas

With the exception of methanisation facilities in urban wastewater treatment plants, methanisation facilities are also subject to the ICPE regime:

- facility for the methanisation of unprocessed vegetable matter, livestock manures, stercoral matter, agri-foodstuff industry vegetable waste: authorisation if the quantity of material

⁵¹ The maximum thermal power is here defined as the maximum quantity of fuel, expressed in lower heating value, likely to be consumed per second.

treated is greater than or equal to 30 t per day; otherwise declaration.

- facility for the methanisation of other non dangerous waste, excluding facilities in urban wastewater treatment plants: subject to authorisation.

ICPE - wind-turbine installations

The Grenelle II law provides for the classification of wind farms under the ICPE regime in order to better frame the installation of wind farms and the safety of the facilities (e.g. interference with meteorological and aerial surveillance radars, disruption of TV signal reception, noise, ejection on broken blade, ejection of ice, etc.). No later than the publication date of the law, land-based wind-turbine facilities of more than 50 metres will be subject to the authorisation regime as required by the ICPE legislation. Projects having obtained planning permission before the classification of wind farms as required by the ICPEs will not be subject to the obligations of the ICPE regime.

ANNEX 2. FIRST RESULTS OF ESTABLISHED MEASURES

Sustainable development Income Tax credit

The establishment, since 1 January 2005, of an income tax credit to promote equipment using a renewable energy source has contributed to the development of these new sectors.

The solar thermal market has thus experienced strong progress, increasing from 8 000 solar water heaters sold in 2004 to more than 30 000 units sold in 2008. We can also observe the start of the market for combined solar systems, providing heating and domestic hot water, increasing from 600 units sold in 2004 to more than 5 000 in 2008.

The solar photovoltaic market is also growing, increasing from 4 000 facilities in 2007 to around 30 000 units in 2009.

The relaunch of the market for wood-fired heating appliances, which started in 2000 has been highlighted with the implementation of the tax arrangement. Overall sales have experienced a rebound of the same order as that achieved in the aftermath of the oil crisis at the start of the 1980s (more than 400 000 sales per year). The stove segment shows steady progress; the growth in the market for closed hearths/inserts and boilers is more unstable.

The market for heat pumps has also been stimulated by the tax arrangement, with nearly 150 000 units sold in 2009 compared to 20 000 sales in 2004. The geothermal heat pump segment remains stable until now while the market for air/water heat pumps shows very strong progress.

Taking into account the economic context, 2009 has experienced a decline in sales which varies depending on the sector. Nonetheless, nearly 800 000 households have invested in equipment using renewable energies in 2009.

Zero rate eco-loan: first results

The distribution of the zero rate eco-loan started in mid April 2009, the date at which the Minister for Sustainable Development, Jean-Louis BORLOO, witnessed the signatures of the first zero rate eco-loans. Only a few weeks after the vote on the measure by Parliament, the arrangement was in operation. By the end of 2010, 100 000 zero rate eco-loans have been offered to French people by banks.

All partners are confident in their capacity to reach 200 000 zero rate eco-loans by the end of 2010, the target set by the convention of 26 February 2009 between the State, the banks and building and estate agency professionals.

The average amount of thermal renovation financed by the zero rate eco-loan is 19 000 euros.

Loan offers issued and accepted until now enable us to discern the initial overall trends in the arrangement, which confirms the success of the concept of the "combination of works". In more than 27% of cases, individuals choose to carry out at least three activities, which enables a higher energy performance achievement.

The average amount of loans issued is around 16 500 euros, corresponding to an average amount of 14 300 euros for the combinations of two activities, 23 200 euros for combinations of three activities, 18 200 euros for the energy performance and 7 200 euros for works on individual sewage systems.

The technical specifications of the works vary according to the regions and climates, which emphasises the significant flexibility offered by the "combinations of works". The most popular combinations of works are those associating the replacement of windows with:

- the improvement of the heating or hot water production system (27% of combinations of two activities);
- roof insulation (23% of combinations of two activities);
- the incorporation of renewable energies for heating (13% of combinations of two activities);

The works carried out using the zero rate eco-loan are to a very large extent carried out by owner-occupiers of single family houses.

Heat Fund

During its first year of existence in 2009, the Heat Fund participated in the financing of nearly 360 projects, giving a production of renewable heat of 190 ktoe per year and the construction of 114 km of district heating networks. The investment aid reached 160 million euros, of which 60% for projects using dendroenergy and biomass (including the associated heating networks), 3% for geothermal, 29% for heating networks (excluding new biomass boiler systems), 8% for solar and 0.2% for methanisation:

- Overall, the ADEME has approved 290 applications in the context of "branch level" aid for the 2009 budget, with a total aid amount of around 157 million euros;
- The first BCIA call for projects has ended with a very positive result: 31 projects were approved of 37 submitted, resulting in a total energy production of around 147 ktoe (312 MW th), or more than 45 ktoe more than the target set. Aid supplied in the context of the BCIA call for projects (around 63 million euros) represents nearly 40% of the total subsidies of the Heat Fund, for a volume of 80% of the energy production (in toe) aided. The average aid ratio is €426/toe.

Support plan for waste policies (ADEME)

In 2009, 24 methanisation projects were financed in the agri-foodstuffs and agricultural sectors, for an aid amount of approximately €6 M.

Energy performance plan for farms

35 million euros were allotted in 2009, of which 30 million euros under the plan for the relaunch of the economy (PRE).

29 systems for energy production on isolated sites, 91 solar dryers, 53 biomass boilers, 186 thermal exchangers, 168 solar water heaters and 51 heat pumps were subsidised. In addition, 82 methanisation unit projects for a total installed power of 20 MW electric have been selected at the end of a national call for projects, for a total of nearly 19 million euros.

Aid for the construction or redevelopment of commercial greenhouses and greenhouses in the ornamental and nursery horticulture sector

The amount of aid granted for the installation of heat pumps was 200 784 euros in 2006 and 1 446 571 euros in 2008, and for the replacement of fossil energy heating systems, 187 033 euros in 2007 and 2 152 471 euros in 2008.

Energy saving certificates

The table below presents the volume of energy saving certificates issued at the start of 2010 from different standardised operations relating to renewable energies.

Table of standardised forms for energy saving certificates relating to renewable energies

Sector	Reference number of standardised operation form	Title of the form	Volume of energy savings certified at the start of 2010 [kWh cumac]	Proportion
<i>Residential</i>	BAR-TH-01	Individual solar water heater (metropolitan France)	439 423 342	2.10%
	BAR-TH-02	Collective solar water heater (metropolitan France)	22 393 912	0.11%
	BAR-TH-03	Water/water type heat pump	1 003 249 300	4.80%
	BAR-TH-04	Air/water type heat pump	4 638 262 120	22.18%
	BAR-TH-12	Independent wood-fired heating appliance	2 504 209 700	11.97%
	BAR-TH-13	Individual biomass boiler	1 052 768 000	5.03%
	BAR-TH-14	Biomass boiler system	67 740 488	0.32%
	BAR-TH-14-SE	Biomass boiler system with contract ensuring the maintenance of the boiler system's energy yield	0	0.00%
	BAR-TH-24	Individual solar water heater (Overseas Departments)	2 396 875 572	11.46%
	BAR-TH-29	Air/air type heat pump	6 417 778 140	30.68%
	BAR-TH-35	Collective solar water heater (Overseas Departments)	2 428 500	0.01%
	BAR-TH-37	Connection of a residential building to a heating network supplied by renewable energies	1 236 528 485	5.91%
	BAR-TH-38	Mini-cogeneration without purchasing obligation	0	0.00%
<i>Tertiary</i>	BAT-TH-07	Biomass boiler system	34 104 526	0.16%
	BAT-TH-1 1	Collective solar water heater	4 885 824	0.02%

	BAT-TH-13	Water/water type heat pump	8 990 580	0.04%
	BAT-TH-13-GT	Water/water type heat pump in large building	0	0.00%
	BAT-TH-14	Air/water type heat pump	55 095 750	0.26%
	BAT-TH-14-GT	Air/water type heat pump in large building	24 008 142	0.11%
	BAT-TH-21	Collective solar water heater (Overseas Departments)	0	0.00%
	BAT-TH-27	Connection of a tertiary building to a heating network supplied by renewable energies	562 592 528	2.69%
<i>Networks</i>	RES-CH-01	Production of renewable heat by network	443 766 516	2.12%
Total			20 915 101 425	100%
Volume of energy savings certified at the start of 2010:			96 307 121 577	
Proportion of energy savings made in the context of the development of renewable energies:			22%	

ANNEX 3. ACRONYMS USED

ADEME	Agence de l'Environnement et de la Maîtrise de l'Énergie (French Environment and Energy Management Agency)
CEI	Call for expressions of interest
ANAH	Agence Nationale de l'Habitat (French National Housing Agency)
ANR	Agence nationale de la recherche (French National Research Agency)
BBC	Bâtiment Basse consommation (Low energy consumption building)
BCIA(T)	Appel à projets du Fonds Chaleur « Biomasse Chaleur Industrie Agriculture » (Heat Fund call for projects, "Biomass Heating Industry Agriculture")
BIBE	Bois industrie – bois énergie (energy wood – industrial wood)
BRGM	Bureau de recherches géologiques et minières (French Office for Geological and Mining Research)
CEMAGREF	Institut de recherche en sciences et technologies pour l'environnement (French Agricultural and Environmental Engineering Research Institute)
CGDD	Commissariat général au développement durable (General Commissariat for Sustainable Development)
CIDD	Crédit d'impôt développement durable (Sustainable development tax credit)
CO	Carbon monoxide
COMOP	Comité Opérationnel (Operational Committee)
COP	Performance coefficient
CPER	Contrat de projets État-Région (French State-Region Project Contracts)
CRE	Commission de Régulation de l'Énergie (French Energy Regulation Commission)
CreeD	Centre de Recherches pour l'Environnement, l'Énergie et le Déchet de la société Veolia Environnement (The Environment, Energy and Waste Research Centre of the company Veolia Environnement)
CSPE	Contribution au service public de l'électricité (Contribution to the public electricity service)
DDT(M)	Direction départementale des Territoires (et de la mer) (French Departmental Directorate for Territories (and Sea))
DEFI	Dispositif d'encouragement à l'investissement en forêt (System for the Stimulation of Investment in Forestry)
DGEC	Direction générale de l'énergie et du climat (French General Directorate of Energy and the Climate)
DREAL	Direction régionale de l'environnement, de l'aménagement et du logement (French Regional Directorate for the Environment, Land-use Planning and Housing)
DROM	Département et Région d'Outre-Mer (French Overseas Department and Region)
DTADD	Directive territoriale d'aménagement et de développement durables (French Spatial Planning and Sustainable Development Directive)
EECS	European Energy Certificate System
EIE	Espace Info Énergie (Energy Information Space)
RE	Renewable Energy
R&RE	Renewable and Recuperated Energy
EPCI	établissement public de coopération intercommunale (French Public Intermunicipality Cooperation Institution)
FACE	Fonds d'Amortissement des Charges d'électrification, abondé par l'État (French Fund for the Amortisation of Electrification Costs, funded by the State)

GRT	Gestionnaire du réseau de transport (d'électricité) ((Electricity) Transport Network Manager
ICPE	Installation classée pour la protection de l'environnement (Installation Classified for the Protection of the Environment)
ktoe	Thousand tonnes of petrol equivalent
kWhpe	kWh primary energy
LMAP	Loi de modernisation de l'agriculture et de la pêche (Law for the Modernisation of Agriculture and Fishing)
MB	Menu bois (branchwood)
MEEDDM	Ministère de l'écologie, de l'énergie, du développement durable et de la mer (French Ministry of Ecology, Energy, Sustainable Development and Sea)
Mtoe	Million tonnes of petrol equivalent
MW	Megawatt
OPAH	Opérations programmées d'amélioration de l'habitat (Programmed Operations for the Improvement of Housing)
PDRH	Programme de Développement Rural Hexagonal (French Rural Development Programme)
PLU	Plan local d'urbanisme (Local Town Plan)
POS	Plan d'occupation des sols (Land use plan)
PPE	Plan de Performance Énergétique des exploitations agricoles (Energy Performance Plan for Farms)
PPI	Programmations pluriannuelle des investissements (électricité, gaz, chaleur) (Multi-annual Investment Programming (electricity, gas, heating))
PPRDF	Plans pluriannuels régionaux de développement forestiers (French Regional Multi-annual Forestry Development Plans)
PREBAT	Programme de recherche sur l'énergie dans le bâtiment (Programme for Research into Building Energy)
MSP	Mediterranean Solar Plan
PTF	Proposition technique et financière (Technical and Financial Proposal)
RECS	Renewable Energy Certificate System
RT	Réglementation thermique (Thermal Regulation)
SCOT	Schéma de cohérence territoriale (Urban Master Planning)
SOeS	Service de l'Observation et des Statistiques (French Observation and Statistics Office)
SRCAE	Schémas Régionaux Climat Air Énergie (French Regional Climate, Air and Energy Plans)
STEP	Station de Transfert d'Énergie par Pompage, <i>ou</i> Station d'épuration des eaux (Station for Energy Transfer by Pumping <i>or</i> Wastewater Treatment Plant)
STIIC	Service Technique Interdépartemental d'Inspection des Installations Classées (French Interdepartmental Classified Installation Technical Inspection Service)
toe	Tonne petrol equivalent
TGAP	Taxe générale sur les activités polluantes (General Tax on Polluting Activities)
TIC	Taxe intérieure de consommation (Domestic Consumption Tax)
ZDE	Zone de développement de l'éolien (Wind power Development Area)